Northern Ireland Assembly

Agriculture and Rural Development Committee

Review into Bovine Tuberculosis

Together with the Minutes of Proceedings of the Committee
Relating to the Summary, the Minutes of Evidence and Correspondence

Ordered by Agriculture and Rural Development Committee to be printed 13 November 2012
Report: NIA 83/11-15 Agriculture and Rural Development Committee

REPORT EMBARGOED UNTIL COMMENCEMENT OF THE DEBATE IN PLENARY

Membership and Powers

Powers

The Committee for Agriculture and Rural Development is a Statutory Departmental Committee established in accordance with paragraphs 8 and 9 of Strand One of the Belfast Agreement and under Assembly Standing Order No 46. The Committee has a scrutiny, policy development and consultation role with respect to the Department of Agriculture and Rural Development and has a role in the initiation of legislation. The Committee has 11 members including a Chairperson and Deputy Chairperson and a quorum of 5.

The Committee has power:

- to consider and advise on Departmental budgets and Annual Plans in the context of the overall budget allocation;
- to approve relevant secondary legislation and take the Committee Stage of relevant primary legislation;
- to call for persons and papers;
- to initiate enquiries and make reports; and
- to consider and advise on matters brought to the Committee by the Minister of Agriculture and Rural Development.

Membership

The Committee has 11 members, including a Chairperson and Deputy Chairperson, and a quorum of five members. The membership of the Committee is as follows:

- Mr Paul Frew (Chairperson)
- Mr Joe Byrne[1] (Deputy Chairperson)
- Mr Thomas Buchanan
- Mr Trevor Clarke
- Mrs Jo-Anne Dobson
- Mr Chris Hazzard[2]
- Mr William Irwin
- Mr Declan McAleer[3, 4]
- Mr Kieran McCarthy
- Mr Oliver McMullan
- Mr Robin Swann

1 With effect from 23 January 2012 Ms Michaela Boyle replaced Mr Conor Murphy

2 With effect from 08 May 2012 Mr Chris Hazzard replaced Mr Willie Clarke

3 With effect from 19 May 2012 Mr Joe Byrne replaced Mrs Dolores Kelly as Deputy Chairperson

4 With effect from 10 September 2012 Mr Declan McAleer replaced Ms Michaela Boyle

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List of Abbreviations in Relation to the Committee for Agriculture and Rural Development

AFBI	Agri-Food & Biosciences Institute
AHLVA	Animal Health and Veterinary Laboratories Agency
APHIS	Animal & Public Health Information System
AVSPNI	Association of Veterinary Surgeons Practising in Northern Ireland
BCG	Bacillus Calmette-Guérin
bTB	Bovine Tuberculosis
BVA	British Veterinary Association
BVD	Bovine Viral Diarrhoea
CAP	Common Agricultural Policy
CNCC	Council for Nature Conservation and the Countryside
CMS	Countryside Management Scheme
CSL	Central Science Laboratory
CVO	Chief Veterinary Officer
DARD	Department of Agriculture & Regional Development
DEFRA	Department for Environment, Food & Rural Affairs
DFP	Department of Finance & Personnel
DIVA	Differentiating Infected from Vaccinated Animals
ESA	Environmentally Sensitive Areas
FERA	Food & Environment Research Agency
IFNG	Interferon Gamma
ISG	Independent Scientific Group
LMC	Livestock and Meat Commission
NIAO	Northern Ireland Audit Office
NIAPA	Northern Ireland Agricultural Producers Association
NIDA	Northern Ireland Dairy Association
NIEA	Northern Ireland Environment Agency
NIVA	Northern Ireland Veterinary Association
OTF	Officially Tuberculosis Free
OTS	Officially Tuberculosis Suspended
OTW	Officially Tuberculosis Withdrawn
PAC	Public Accounts Committee
PFG	Programme for Government
PVP	Private Veterinary Practitioners
QUB	Queens University Belfast
RBCT	Randomised Badger Culling Trial
SCITT	Single Comparative Intradermal Tuberculosis Test
UFU	Ulster Farmers Union
USPCA	Ulster Society for the Prevention of Cruelty to Animals
VEU	Veterinary Epidemiology Unit
WANE Act	Wildlife & Natural Environment Act (Northern Ireland) 2011
WHO	World Health Organisation
YFCU	Young Farmers' Club of Ulster

Executive Summary

1. Bovine TB is a highly infectious disease that presents a problem for herd health in Northern Ireland. While in recent years there has been a very welcomed downward trend in infection rates, in the last 18 months there has been a sharp and as yet unexplained and unprecedented increase. There is serious concern amongst Committee Members, that unless this is tackled the disease could take a much firmer hold in Northern Ireland proving more difficult to eradicate in the longer term.

2. Statutory responsibility for control of the disease lies with the Department of Agriculture and Rural Development (DARD) who operates a programme based around compulsory testing and slaughter of infected animals, cattle surveillance, movement restrictions and disinfection. While DARD maintains that its programme is one of eradication, some witnesses questioned whether the DARD strategy is more about containment and control than eradication.

3. In this context, the Committee continues to express its disappointment that the Programme for Government has no explicit target for the eradication of bovine TB, finds the rationale for this omission to be weak and emphasises the need for this to be reconsidered by DARD.

4. The disease has cost Northern Ireland around £317m over the 15 years up to March 2011. This is a substantial amount of money, the bulk of which is spend on the testing regime and on compensation payments for the slaughter of infected animals. However, this has to be put in context in that the bovine TB programme enables an export trade in livestock and livestock products which is valued at around £1000m per year. But the cost of bovine TB cannot be measured solely in financial terms. Account has also to be taken of the personal stress and emotional distress that herd breakdowns brings for many farming families.

5. Under the Tuberculosis Control Order, compensation is paid out at 100% of the market value of the reactor or in contact animal. This arrangement has come under some criticism by external bodies. DARD has been considering revisions to this arrangement and while scrutiny of these revisions has not formed part of this inquiry the Committee remains to be convinced that they will be an effective tool in the plan to eradicate bovine TB. The focus on revised compensation arrangements must not however overshadow attempts to control costs elsewhere such as on lay testing arrangements and on more cost effective blood testing. Indeed, the fact that DARD has now addressed a failure to secure around €5million per annum from the EU Commission towards its eradication plan is particularly welcomed in this context.

6. The Committee does consider the current testing and surveillance regime to be one of the most robust in Europe but at its heart is a reliance on a skin test to identify the disease. This inquiry has shown that the skin test has limitations around its sensitivity. In a best case scenario, the skin test could be missing one in four infected animals. Other witnesses put its sensitivity[1] at around 50 - 60%. Furthermore, according to emerging research, the effect of liver fluke and Johnnes Disease could be masking bovine TB further. The blood test used in Northern Ireland to sometimes supplement the skin test is the Gamma Interferon test and while it cannot replace the skin test it may help to address some of its limitations. While it is expensive, the Committee does welcome research being conducted by the Department on its use while recommending that issues around its performance and cost are addressed. The testing regime is central, therefore ensuring it is conducted properly and to the highest standards is of vital importance, be that by a private veterinary or a DARD employed veterinary. The Committee did examine, in some detail, supposed differences in testing results between private and DARD veterinaries and is glad to see that efforts are being made by all to ensure that the testing is to the highest possible standards.

1 Sensitivity is the ability of a test to correctly identify an infected animal or to not identify an infected animal as uninfected (false negative). Specificity is the ability of a test to correctly identify an animal that is free from disease or infection or not to identify uninfected animals as infected (false positive).

7. What became clear during the course of the inquiry was that while much is still unknown about bovine TB, there is a wealth of information available within Northern Ireland that, in the opinion of the Committee, is not being interrogated and used to its fullest extent. For example, there is very detailed data available on the various strains of bovine TB but little information or knowledge on whether certain strains are more virulent or whether some can evade skin testing. Another example is that bovine TB displays a distinct pattern whereby around 80% of reactors are in 20% of herds. Yet until recently there appears to be no urgency to discover why this pattern is occurring or how it can be broken, nor indeed is there any clear definition of what constitutes a chronic herd or repeat breakdown herd. The Committee believes that better use of existing data can and will pay dividends for Northern Ireland in its fight against bovine TB.

8. Regarding the recently announced Wildlife Intervention Study (test, vaccinate or remove), while the Committee welcomes the movement by the Minister on addressing the role of wildlife in bovine TB, it does consider that this is late in coming. There has been concern in the farming industry that for too long the wildlife factor has been ignored by the Department. There are still concerns around the practicalities of the chosen approach and around the fact that it could take years to conduct the study, analyse the results and, assuming it was successful, roll it out across Northern Ireland. In the meantime, the Committee does applaud the work being done by many wildlife organisations on badger vaccination within their land and estates in England and would welcome schemes to encourage such activity within Northern Ireland.

9. Finally, there appears to be substantial and promising movement on the long awaited cattle vaccine (and associated DIVA test). But there is still extensive work to be done before the vaccine is acceptable under EU law. There is an active role for the Minister, the Committee and for the industry in lobbying for the necessary changes to allow for cattle to be vaccinated. But, as clearly pointed out to the Committee, the vaccine is not and is likely never to be the whole answer. It will not prevent infection and therefore, even if successfully introduced, other measures are always likely to be needed.

Recommendations

Levels and Incidence Rates

1. It is of vital importance that bovine TB does not establish a firmer foothold in Northern Ireland, and from this perspective the recent and rapid increase is particularly worrying to the Committee. The Committee recommends that DARD comes forward immediately with the findings from its investigations into the recent 40% rapid increase in TB herd incidence rates and that DARD confirms that sufficient resources are devoted to ensuring the disease does not take a firmer hold in Northern Ireland.

2. The Committee recommends that DARD considers how the advice and expertise of local veterinary practices could be used in partnership with the farmer/herd keeper so that assistance and information is tailored to the specific situation of the farmer.

3. The Committee noted and recommend to DARD that it undertakes further analysis taking account of herd size, 'repeated' herd tests, test reason and seasonality might be worth doing, assuming any analysis involving the pre-2011 data can also control for the impact of any policy or testing methodology changes over time.

Testing & Surveillance regime

4. The Committee is concerned that awareness of the potential impact of liver fluke and Johne's Disease to the sensitivity of the testing for bovine TB, and anergic animals is not clearly understood and recommends that research into such issues is sustained by AFBI.

5. The Committee also recommend that DARD, through partnership with the industry and with other important stakeholders such as private veterinary practices make every effort to improve communication with farmers affected by bovine TB around the current testing regime and its limitation as well as raising awareness on the potential impact of liver fluke and Johne's Disease.

6. The Committee recommend that DARD reports back to the Committee on methods available to improve the performance and reduce the cost of the gamma interferon test.

7. The Committee recommends therefore that DARD bring to it as soon as possible proposals that explore how the comprehensive and detailed information currently available on strains can be better interrogated and used in the programme to eradicate bovine TB.

Strategy and approach

8. The Committee note its continued disappointment that the Programme for Government has no specific target on the eradication of bovine TB and recommends that the Minister makes representation to the Executive to rectify this omission.

Wildlife

9. Members wish to commend Queens University Belfast on its research project on detecting infected badger setts through use of faeces. While acknowledging that it is at a very early stage and funded by DEFRA, the Committee recommend that DARD monitor its outworking, giving due consideration to practical use within Northern Ireland.

10. The Committee recommends that DARD put in place appropriate efforts to ensures a time bound delivery of the scoping work, the development of a model and the obtaining of all

necessary approvals for the Wildlife Intervention Research (test and vaccinate or remove) as soon as possible. The Committee also recommends that DARD focuses on and provides further information to it as soon as possible on addressing potential weaknesses in the model as currently proposed regarding the sett side test, the possibility of perturbation and the obtaining of licences.

Chronic and Repeat Breakdown Herds

11. The Committee recommends that DARD complete its analysis of the available data on bovine TB and, in conjunction with the industry defines what is meant by chronic herd and/or large/sustained outbreak.

12. The Committee recommends that DARD commissions a detailed study into the epidemiology of farms with chronic herd and/or large/sustained outbreaks. The study should have a focus on understanding the factors involved and how the cycle of repeat breakdowns may be broken quicker than is currently the case.

Biosecurity

13. The Committee recommends that DARD investigate how biosecurity training and advice could be reinvigorated and delivered at a pace and in a setting that best suits the farmer and herd keeper.

14. The Committee is aware that there have been delays in the publication of the TB Bio-security study, and is keen to scrutinise the results and recommend its publication as soon as possible.

Wildlife Biosecurity

15. The Committee recommends that DARD conducts a similar research project in Northern Ireland as has been carried out by FERA to establish the extent of badger visits to farms and their “routines” or actions while visiting and/or entering farm buildings. While recognising that there may be practical and statistical difficulties, the Committee recommends that DARD makes efforts to design the study to see if there is any linkage between badger exclusion measures and Bovine TB incidence rates. DARD should ensure that such research dovetails with existing research.

Wildlife vaccination

16. The Committee recommends that in addition to the DARD Wildlife Intervention Research Programme, DARD should consider introducing immediately a similar programme to support those farmers/Wildlife Trusts who wish to vaccinate badgers on their land in Northern Ireland.

Cattle Vaccine

17. Given the resources and priority being given by DEFRA to the cattle vaccine, and the legislative hurdles it faces in Europe, the Committee recommend that the Minister and the Northern Ireland MEPs, in consultation with the industry, seek to do all they can to support the UK as it pursues legislative change to allow for cattle vaccination.

Introduction

1. On the 13 March 2012 the Committee for Agriculture and Rural Development agreed to conduct a review into Bovine Tuberculosis.

2. The Committee agree to undertake this review because it was aware of the problem this disease presented to cattle herd health in Northern Ireland and because it was aware of a sharp increase in incidence rates.

3. The proposal by the Department for Agriculture and Rural Development around possible revisions to the compensation scheme also influenced the thinking of the Committee.

4. The Committee agreed its Terms of Reference at its meeting on 20 March 2012.

Terms of Reference

5. The Committee agreed that the Terms of Reference would be "To explore all measures, including broad consideration of likely cost/benefit that could be taken in Northern Ireland towards the reduction and eradication of Bovine TB based on international and local experiences."

Committee Approach

6. The Committee agreed to write to key stakeholders to request submissions on the matters included in the Terms or Reference.

7. The Committee agreed that evidence around issues such a bio security, vaccinations, dealing with Tb in wildlife, testing for BTB, cattle movements and research into BTB would be highly relevant to the review.

8. The Committee received 19 written submissions and these can be found at Appendix 3.

9. The Committee agreed that there were a large number of organisations that could brief the Committee to provide a broad spectrum of information. These included the Department, the wildlife sector, farming representatives, research bodies including Queens University Belfast and AFBI, and vets associations.

10. The Committee considered 13 oral evidence sessions based on the above and these can be found at Appendix 4.

11. The Committee also commissioned 5 research papers on topics such as Bovine TB – Biosecurity Measures, the link between Bovine TB and Badgers, 'Multiple' claims for Bovine TB compensation and Badger policy related to Bovine TB in Wales.

12. Copies can be found at Appendix 5.

13. The Committee undertook a UK visit on 19 and 20 June 2012. The visit was based around two sites in order to look at specific aspects of bovine TB control that are not practiced in Northern Ireland, namely the proposed English badger cull and badger vaccination.

14. During the visit, the Committee met with Gloucestershire Wildlife Trust to discuss its vaccination programme and The Food and Environment Research Agency, which is the organisation licensed to train people to catch and administer the privately funded badger vaccination.

15. The Committee also met with the National Farmers Unions at Stoneleigh in Birmingham, on the proposed industry led badger cull in England.

16. The Committee had a closed session briefing in Parliament buildings with officials from the Animal Health and Veterinary Laboratories Agency, DEFRA.

Acknowledgements

17. The Committee would like to express its appreciation and thanks to all the organisations and individuals who contributed to the review.

Key Findings and Issues

1. Bovine tuberculosis or bovine TB is an infectious disease affecting a wide range of mammals including cattle. It is caused by various strains of the bacterium Mycobacterium bovis (M. bovis). Badger, deer and other mammals can also be infected with M. bovis. In cattle it is a chronic, debilitating disease which is difficult to treat and to prevent. The disease is very complex and it is widely recognised that it remains one of the most difficult animal health problems to tackle throughout the world. Despite decades of research and investigations it appears that there is still much not known about the disease.

2. Tuberculosis is mainly considered to be a respiratory disease and evidence shows that Tuberculosis in cattle is most common in the throat and lungs of affected animals. It is accepted that cattle mainly become infected by inhaling the bacteria which causes the disease and that bacteria are passed from the infected animal in its breath or in discharges from the nose or mouth.

3. Bovine tuberculosis (bovine TB) is a problem for herd health in Northern Ireland and while in recent years there had been a decline in incidence rates, the last eighteen months has seen a sharp and, as yet unexplained increase. Northern Ireland, in common with other parts of the United Kingdom and the Republic of Ireland, has a programme to tackle bovine TB. This programme has been in place since the 1950's. Throughout those years and decades, up to the present day, the aim of that programme has been the eradication of bovine TB from herds in Northern Ireland. One of the mainstays of the eradication programme since 1959 has been compulsory testing and associated cattle surveillance and movement regime. Since the introduction of compulsory testing levels of bovine TB have been reduced and maintained at a lower level than the 1950's but have never come close to being 0.2% for three consecutive years, which is required before obtaining bovine TB free status. Details of the current DARD programme to eradicate bovine TB in Northern Ireland are contained in Appendix three of this report.

4. The current testing regime is based around the single intradermal comparative cervical tuberculin test (SICCT) or skin test which is used worldwide. It is accepted that it is not perfect and while there are differences of opinion in how reliable it is, it appears to be the best available test. Cattle that fail the tuberculin skin test are known as reactor animals and if a reactor is found in a herd it is known as a herd TB breakdown. Breakdown herd are placed under movement restrictions and the reactor should be isolated by the farmer before it is removed to be slaughtered. In Northern Ireland herds are tested every 12 months. DARD compensates for slaughtered animals at current market value i.e. 100%. Reactor animals are examined post-mortem in the abattoir for visible signs of TB and samples are sent to the Veterinary Science Division for analysis.

5. The movements of breakdown herds are restricted in order to minimise contact with cattle in other herds. This is because the disease may be incubating in cattle but not reached the point where it will react to the skin test. The aim of constraints on cattle / herd movement is to ensure that, as far as possible only disease free cattle move to other herds or to markets. Cattle in restricted herds may only be moved directly to the abattoir. Breakdown herds must have two clear whole tests in a row, involving every animal in the herd, before the restrictions are lifted. A further test occurs four to six months after movement restrictions are lifted to ensure that no infection remains.

6. DARD, on a voluntary basis, permits the use of another test known as the gamma interferon test. This is a blood test which can be used to compliment but not replace the skin test. It has a higher sensitivity and will detect cattle missed by the skin test but it does create a number of false positives i.e. shows up reactors that are not infected.

7. In its written guidance to herd keepers "TB in Your Herd", DARD provides advice on how to prevent breakdowns of herds to include information on cattle purchase, bought-in beef

store cattle, minimising contact with badgers, maintaining good boundaries, avoiding sharing equipment and not using slurry or manure from other herds on their land.

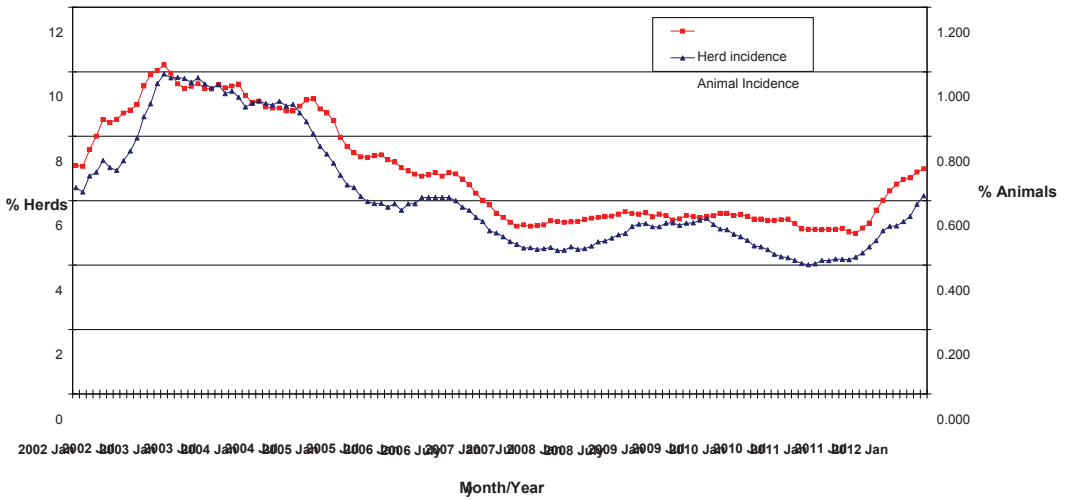
8. Within the Northern Ireland context, it is accepted by DARD, stakeholders and the Committee that there are several reasons why bovine TB remains a difficult issue to tackle. These include the complex nature of the disease, a reservoir of infection in wildlife and badgers in particular, intensive farming, cattle to cattle contact, the impact of extensive conacre[1] system and the associated levels of cattle movements.

9. Under the Tuberculosis Control Order (Northern Ireland) 1999, compensation for reactors and in-contact animals is currently paid at 100% of the market value of the animal. DARD is currently considering compensation arrangements and has held two consultation exercises.[2] In response to this, the Committee agreed that it was opposed to a proposal for a system of table valuations for compensation as it was unconvinced about the effectiveness of this as an eradication tool.

Levels and Incidence Rates

10. This disease is a long standing problem in Northern Ireland, with associated high costs and the Department appears to be no nearer eradicating than it was 15 years ago. There was a significant increase during the Foot and Mouth Disease (FMD) outbreak with levels in 2002 rising to the highest in Europe at 13%. This can be linked to the suspension of the testing regime during the FMD outbreak. Since then, and with the introduction of more cattle surveillance measures, the rate fell to an all-time historic low of 4.99% in August 2011. However, it has since risen to 6.99% on 30th June 2012. This represents a comparative increase of 40%.

Table One – TB Herd and Animal Incidence (12 month moving average: January 2002 to June 2012)[3]



11. The Department noted that this unexpected rise has no clear explanation and that it is distributed throughout Northern Ireland. The rise is especially unwelcome as it came when TB

1 The term "conacre" refers to land let by a landowner to a third party for either, the sowing and harvesting of crops, or the grazing of livestock for an 11 month period.

2 http://www.dardni.gov .uk/index/consuktations/archived-consultations.htm

3 http://www.dardni.gov.uk/index/dard-statistics/animal-disease-statistics/pubs-tb-stats-june-2012.htm

levels were the lowest they had been in Northern Ireland for decades. In oral evidence to the Committee on 11th September 2012, DARD Officials stated that

> *"We are seeing a Northern Ireland-specific increase. Nine of our 10 divisional veterinary office areas have shown a rise this year in annual TB herd incidence compared with the previous 13 to 24 months. The rise has been particularly striking in the Omagh area, although most other areas have seen substantial rises. We will continue to consider possible causative factors. It may be that no single issue is causing or driving the disease. TB, as many of the presentations to the Committee explained, is a notoriously complex and multifactorial disease."*

12. It is usual to see a seasonal increase in reactors over the winter months, and it is accepted that with a disease such as bovine TB, trends cannot be read in months but must be considered over years. Nevertheless, the Committee is very concerned with what it sees is such as substantial increase (40%) in rates in such a comparatively short space of time. The Committee would have concerns that if this rapid and unexplained increase is not addressed, it could allow the disease a firmer foothold that will prove more difficult to eradicate.

13. The Committee noted and welcomed the substantial and detailed work that has been carried out by the Northern Ireland Assembly Public Accounts Committee (PAC) and the Northern Ireland Audit Office (NIAO) on Bovine TB. The PAC report of 29th June 2009 "The Control of Bovine Tuberculosis in Northern Ireland"[4] was particularly useful to the Committee. It provided a benchmark from which to assess developments and progress by DARD on key issues since its publication.

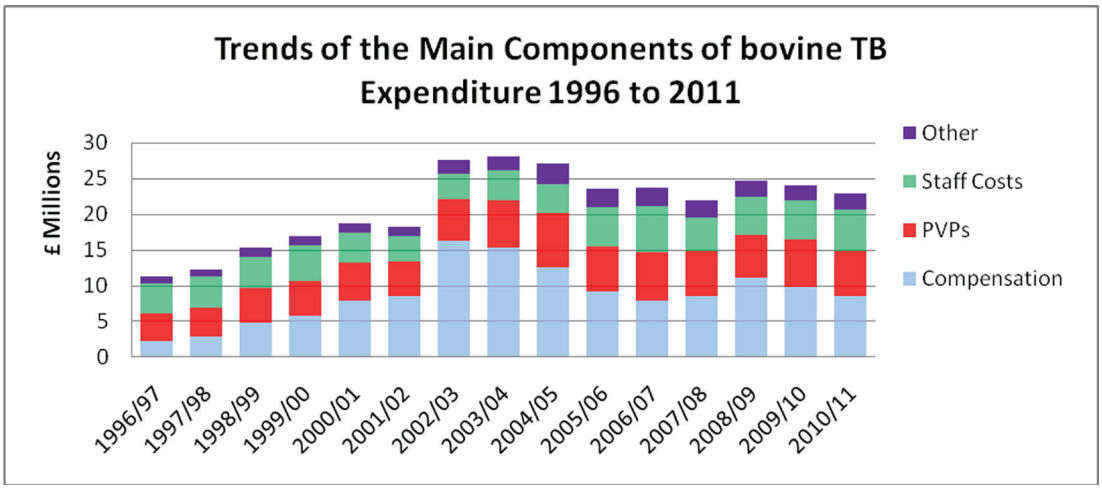
14. In connection with the PAC report, the Committee received written evidence from and took oral evidence from the NIAO on 24th April 2012 and was particularly interested in the work it had done around the cost of bovine TB to the public purse. NIAO noted:-

> *"The significant increase in prevalence of bovine TB has had a major impact on public expenditure. Over the 15 years to March 2011, DARD has spent £317 million on its bovine TB programme. This included £132 million on compensation to farmers for the compulsory slaughter of animals, £86 million to Private Veterinary Practitioners (PVPs) for herd testing, and staff costs of £71 million – see Figure 2. Total expenditure in 2010-11 was almost £23 million. Despite the huge cost, the evidence suggests that DARD is still many years from achieving eradication."*

15. Using information obtained from DARD, the NIAO were able to present the following table to the Committee on the main components of bovine TB expenditure from 1996 to 2011. The Committee found this breakdown of costs to be particularly useful.

4 The Control of Bovine Tuberculosis in Northern Ireland

Table Two:- Information on bovine TB expenditure presented by NIAO



Source: DARD

16. The Committee also noted with interest information from the NIAO that there is also the associated but not reported cost to the farmer regarding the time associated with testing. NIAO estimated this at just under £2m per year.

17. Separate to its work on bovine TB, the Committee took evidence from DARD officials on 25th September 2012 on its proposed October Monitoring Round bid[5]. In its written briefing on that bid, DARD stated that for the 2012/13 financial year TB compensation was estimated at £16.811m.

> *"In considering the TB Compensation financial requirements in 2012/13, the Veterinary Service forecasts an estimate of 12,201 cattle in 2012/13. This is up from the estimate of 11,039 cattle provided in June monitoring.*
>
> *On the basis of 12,201 TB cattle, TB Compensation payments in 2012/13 are forecast to be £16.811m."*

18. While the Committee is content that DARD have a statutory duty to provide compensation, as stated above, it is concerned that appropriate resources are devoted to investigating the causes for and addressing the rapid rising incidence rates which is leading to rising compensation costs.

19. **It is of vital importance that bovine TB does not establish a firmer foothold in Northern Ireland, and from this perspective the recent and rapid increase is particularly worrying to the Committee. The Committee recommends that DARD comes forward immediately with the findings from its investigations into the recent 40% rapid increase in TB herd incidence rates and that DARD confirms that sufficient resources are devoted to ensuring the disease does not take a firmer hold in Northern Ireland.**

20. In its consideration of the PAC Report of 2009, the Committee referred to the past failure of DARD to take full advantage of the funding available from the EU Veterinary Fund. The PAC Report of 2009 stated:-

> *"The Committee recommends that the Department address its failure to secure what would have been millions of pounds' worth of grants from the EU Veterinary Fund. The Committee wants the Department to be in no doubt that it expects full advantage to be taken, in future, of the funding available from the EU."*[6]

5 http://www.niassembly.gov.uk/Assembly-Business/Official-Report/Committee-Minutes-of-Evidence/Session-2012-2013/September-2012/October-Monitoring-Round-DARD-Briefing/

6 http://archive.niassembly.gov.uk/public/2007mandate/reports/2008/report_40-08-09.htm

21. In its evidence to the Committee the NIAO were able to provide the Committee with an update on this position. The Committee was pleased to note that in recent years DARD has been successful in securing the EU Commission's approval of Northern Ireland's 2010, 2011 and 2012 TB Eradication Plans. This means DARD have been able to secure €5 million per annum co-funding from the EU Veterinary Fund for TB

22. The Committee also took evidence on and gave some consideration to the issue of lay testing, as a means of reducing the cost of testing for bovine TB. The 2009 PAC Report considered that lay testers did have the potential to provide a useful new resource, while achieving savings. The Committee heard that DEFRA had been examining the use of lay testers, driven by a shortage of Vets to carry out the test, in England. DEFRA has now clarified with the EU that lay testers can be used to test for bovine TB. DARD commenced a lay testing pilot project in June 2011. The objective of the pilot was to train and deploy a small number of lay testers and use the information gained to inform a wider consultation in 2012. The pilot ended on 31 December 2011 and the results of the evaluation were provided to the Committee at its meeting on 9th October 2012. The main findings were that no obstacle emerged which would prevent the development of Approved Lay Tuberculosis Testers working as DARD employees. Specifically, the pilot showed that technically, Veterinary Service could train, register, and deploy lay testers. The Committee noted that Veterinary Service will consider the report's recommendations and will endeavour to take these forward in the development of any future Lay Tb Testing training. The Committee look forward to hearing from DARD on this issue, specifically around cost savings such an approach could provide, as soon as possible.

23. The Committee has taken note of the concerns of VetNI as expressed to it on 22nd May 2012 and will keep this in mind when examining any proposal brought forward by DARD.

> *"Certainly, to the inexperienced eye, lay staff ought to be less costly than qualified vets, but experience demonstrates to us that the presence of vets on farms and in the rural community in Northern Ireland certainly offers much more than an opportunity just to inject tuberculin and complete a TB test. We are convinced that any move by DARD to employ lay testers at the expense of veterinary practices will bring many significant disadvantages in farm health, animal welfare and surveillance for disease such as epizootic outbreaks, Schmallenberg or even the production diseases that Lindsey spoke about earlier."*

24. The Committee is aware that private veterinary practices do have a wide range of experiences which may be used to the benefit of the farmer in their fight against Bovine TB.

25. **The Committee recommends that DARD considers how the advice and expertise of local veterinary practices could be used in partnership with the farmer / herd keeper so that assistance and information is tailored to the specific situation of the farmer.**

26. The Committee noted evidence from VetNI that private veterinary practitioners carry out around 90% of the annual herd tests in Northern Ireland, as well as a percentage of the risk and reactor tests. The Committee also gave consideration to concerns around the differences in detection of bovine TB rates between DARD staff and private veterinary practices.

27. The Committee is aware of the work being undertaken by DARD to address this issue. It also commissioned its own research into the matter, when it asked the Northern Ireland Assembly Research and Information Service to consider a report by DARD on "TB Testing in Northern Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons". The conclusion of that work was that, while there does appear to be differences in the TB testing results obtained by private vets and DARD vets, the differences may not be as large when other factors (outside of those included in the DARD statistical analysis) are taken into account.

28. **The Committee noted and recommend to DARD that it undertakes further analysis taking account of herd size, 'repeated' herd tests, test reason and seasonality might be worth doing, assuming any analysis involving the pre-2011 data can also control for the impact of any policy or testing methodology changes over time.**

29. The Committee emphasises that it wishes to see that all testing, be that by a private vet or by a DARD vet, is done to the same standard and with the same rigour and consistency.

30. Regarding compensation payments and patterns thereof, the Committee commissioned a briefing from the Northern Ireland Assembly Research and information Service on Multiple' claims for Bovine TB compensation – further analysis of DARD data. Looking at the 2011-12 data in greater detail it is apparent that the number of payments relating to individual herds over the course of the year varies widely. Whilst many herds had only one compensation payment within the period there are instances of 'multiple' payments (2 or more). Table 3 below provides a breakdown of the compensation data in terms of the amount paid out within each DVO area and how much was for single payments and how much was for 2 or more payments.

Table Three: 2011-12 Bovine TB compensation paid out in single and multiple (2+) payments

DVO area	Total compensation paid 2011-12	Amount paid out single payments (% of total compensation)	Amount paid out in 2 or more payments (% of total compensation)
Armagh	£1,260,490	£278,610 (22%)	£981,880 (78%)
Ballymena	£278,916	£103,361 (37%)	£175,555 (63%)
Coleraine	£1,048,851	£396,545 (38%)	£652,306 (62%)
Dungannon	£822,070	£302,485 (37%)	£519,585 (63%)
Enniskillen	£1,552,592	£560,710 (36%)	£991,882 (64%)
Londonderry	£156,025	£90,910 (58%)	£65,115 (42%)
Mallusk	£402,870	£151,390 (38%)	£251,480 (62%)
Newry	£3,235,170	£762,840 (24%)	£2,472,330 (76%)
Newtownards	£2,291,725	£680,675 (30%)	£1,611,050 (70%)
Omagh	£1,808,370	£588,935 (33%)	£1,219,435 (67%)
Total	**£12,857,079**	**£3,907,671 (30%)**	**£8,949,408(70%)**

31. In overall terms the total amount of compensation paid in 2 or more payments accounted for 70% of the total compensation paid in 2011-12. However, the usefulness of the compensation payment data provided by DARD is limited without further contextual information. This issue is explored in some detail later in this report regarding chronic herd.

32. In October 2008 the EU Bovine Brucellosis Sub-group of the Taskforce for Monitoring Disease Eradication specifically commented that DARD's compensation scheme did not encourage farmers to implement biosecurity measures and could encourage fraud. In its 2009 Report on Bovine TB, the Public Accounts Committee recommended that as an added incentive to prevent Bovine TB breakdowns that

> *"…the Department considers introducing a system whereby the rate of compensation would be progressively reduced in cases of multiple claims by the same herd keeper."*

33. It is worth noting that DARD has consulted on and devised revised proposals for compensation levels. Separate to this inquiry, DARD discussed these proposals with the Committee on a number of occasions when the Committee expressed misgivings about the proposed schemes. The Committee do not feel that the schemes, as presented, will aid in the eradication of Bovine TB.

Testing & Surveillance regime

34. The current programme operated by DARD is based on annual testing to detect and remove infected animals to slaughter and reducing the risk of spread through movement control, encouraging good biosecurity on farms, investing in research and development and enhanced management and monitoring of the programme.

35. The single intradermal comparative cervical tuberculin test (SICCT) is the primary means of testing and it is recognised and accepted by the EU Commission as the means for screening for bovine TB. It is commonly known as the skin test. According to DARD, it has an estimated one in four failure rate, although some witnesses, such as Queens University Belfast and AFBI, indicated that the skin test could actually be at the lower end of reliability i.e. only 50 – 60% reliable. In an AFBI paper provided to the Committee on " Bovine Tuberculosis: A review of diagnostic tests for M.Bovis infection in cattle", it was noted that sensitivity of the skin test remains moderate with estimates of 50 – 60% but that, nevertheless, it is the best single test currently available. Bovine TB is a disease with a long incubation period. This means that an undetected infected animal in a herd can be spreading the disease. The regime of annual testing to identify infected animals alongside restrictions on cattle movement, isolation of reactor animals and disinfecting in reactor herds, is a system to protect uninfected animals and prevent the spread of the disease. From the point at which the disease is detected, a herd status will change from "Officially TB free" (OTF) to either "Officially TB Suspended" (OTS) or Officially TB Withdrawn" (OTW). There must be two clear whole-herd tests in a row, involving every animal in the herd, before restrictions are lifted. These herd tests must be carried out at least 60 days apart. DARD may apply a more severe interpretation to make sure the herd is cleared of the infection as quickly as possible. If bovine TB is not confirmed on post-mortem or laboratory examination, and there are only a limited number of reactors, it may be possible to remove restrictions after only one clear herd test. A further test will be arranged for the herd 4 to 6 months after movement restrictions are lifted to check that no infection remains. Should the test be delayed more than one month past the due by date DARD will remove the facility for any movement to and from the herd until the test due is completed. Full details of the programme and testing regime can be found on the DARD website[7].

36. In oral evidence to the Committee on 19th June 2012, The Ulster Wildlife Trust pointed out that options to improve the effectiveness of the testing regime are of vital importance and that there is growing recognition that the sensitivity of the test may be reduced by the presence of other diseases such as Johnes Disease or Liver Fluke. :-

> *"I will now move on to improved diagnostics and movement restrictions. You have heard from the Northern Ireland Audit Office (NIAO) that one in four infected animals is not identified through the current testing regime. You may also have seen the recent research by the University of Liverpool that indicated that about one third of bovine TB cases in England and Wales are masked by the skin test because of liver fluke. Clearly, options to improve the efficacy of the testing are a priority in any eradication strategy.*

37. Nevertheless, since the introduction of compulsory testing in 1959, bovine TB has reduced from its height of nearly 20% in 1956. Indeed the temporary suspension of the testing and surveillance scheme during the FMD outbreak and the subsequent increase in incidence rates enforces the success of the skin testing regime, even with its flaws. In oral evidence to the Committee on 1st May 2012, AFBI indicated that:-

> *"There is evidence to indicate that bovine TB sensitivity may be reduced by intercurrent disease, including Johne's disease. Johne's disease causes reactions at the avian site, and changes in the prevalence of Johne's disease over time may have affected the sensitivity of the skin test. Work by AFBI — for example, in collaboration with UCD — has demonstrated experimentally that co-infection with liver fluke also suppresses the immune response to bovine TB, as measured by the skin and gamma-interferon tests."*[8]

7 http://www.dardni.gov.uk/tb-in-your-herd-booklet.pdf

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38. The Committee also heard that there are TB incidences where the animal is defined as "anergic", which means that the animal has reached the stage where it is no longer reacting to the skin test, in part due to being tested so often. In such cases, the animal could be carrying and spreading bovine TB. This type of reaction to the skin test may be more prevalence in dairy cows which tend to have a longer life span, and therefore more testing than meat animals.

39. **The Committee is concerned that awareness of the potential impact of liver fluke and Johne's Disease to the sensitivity of the testing for bovine TB, and anergic animals is not clearly understood and recommends that research into such issues is sustained by AFBI.**

40. **The Committee also recommend that DARD, through partnership with the industry and with other important stakeholders such as private veterinary practices make every effort to improve communication with farmers affected by bovine TB around the current testing regime and its limitation as well as raising awareness on the potential impact of liver fluke and Johne's Disease.**

41. The gamma interferon test is a blood test which can back up or compliment the skin test. It has higher sensitivity and will detect infected cattle missed in skin tests but it does create a number of false positives i.e. shows up reactors that are not infected. It was introduced by DARD in 2007 on a voluntary basis and on a pro rata basis is used more in Northern Ireland than the Republic of Ireland and England. The gamma interferon test is a faster test and can give an earlier indication of the presence of the disease. It is expensive – around £20 compared to £2.50 for the skin test and it has some logistical difficulties in getting the sample to the lab on time. In Scotland the blood test is compulsory in new herd outbreaks.

42. DARD has commenced an evaluation of a trial of the gamma interferon blood test, costing £222,000 but results are not expected until 2014 at the earliest. In providing evidence to the Committee, Queens University Belfast did note that the gamma interferon test used by DARD is now out of patent and that there might be an opportunity for a cheaper "generic" blood test to be developed. While the development of any animal disease diagnostic tool is never easy or "cheap", Northern Ireland does have some expertise in this field. AFBI also noted that there are a number of ways in which the gamma interferon test could be improved.

> *"Efforts to develop alternative tests have been hampered by the complex nature of the disease. The most common alternative in use, including at AFBI, is the gamma-interferon test. It is a test that, as we heard earlier, has a higher sensitivity but, in its current format, is more costly and has lower specificity, which limits its application. However, a number of possibilities exist to improve the performance and reduce the cost of the test, and there are a number of alternatives, such as serological tests, which may have a place in the control."*

43. **The Committee recommend that DARD reports back to the Committee on methods available to improve the performance and reduce the cost of the gamma interferon test.**

44. Members also heard from Queens University Belfast about the work it is doing for DEFRA, some of which is about earlier detection of the disease. One project, still at an early stage and currently being tested, shows promise of picking up more cases of bovine TB in cattle after slaughter. The current means of detecting M.Bovis in the lymph nodes of cattle, taken at slaughter, is by culture. That is a slow method and can take up to eight weeks. In that time, bovine TB could be present in a herd and spreading. In oral evidence to the Committee on 1st May 2012, the Committee were informed by Queens University Belfast that:-

> *"Our test is picking up 25% more culture positives from the non visibly lesioned lymph nodes, which means that an extra 25% of animals, and whatever number of herds that represents, are positive and farmers are being told that there is no evidence of M. bovis on the basis of the current statutory culture"*

45. The Committee expressed interest in this potentially new type of testing which, if it can be rolled out successfully may provide earlier and more accurate testing of bovine TB in cattle after slaughter.

46. The Committee also heard about the various strains of TB in Northern Ireland and how they have a very distinct regional pattern of distribution. Although the mapping does not tell what the sequence of movement is or what direction it moves in or the time sequence, this information is sometimes helpful for on farm assessment of the source of the disease. Members also heard how some strains of the disease were more contagious than others. In oral evidence to the Committee on 1st May 2012, AFBI noted that:-

> *"Importantly, strain typing is important in two aspects: first, at local outbreak level; and secondly, for research. At research level, the integration of strain-typing information with Northern Ireland cattle movement and test data has started to show significant potential and to answer fundamental questions about bovine TB epidemiology. Such questions include: is there a variation in virulence between different bovine TB strains? Are there strains that evade current skin testing? How do cattle and wildlife strains compare? What is the role of cattle movement? How do Northern Ireland strains compare with those in GB, Ireland and beyond?*

47. The Committee heard that it is now routine in many cases for veterinary officers to ask for strain typing when investigating TB breakdowns and at times this reveals interesting information on the movement of regional strains. DARD officials noted that when an animal goes down with bovine TB and tests show that it has a strain which is not local, it can be reasonably assumed that that particular outbreak was caused by a bought in animal. Reference was made to some of the big beef finishing units that buy animals from many sources where it is found that they may have multiple strains on the unit.

48. The Committee expressed considerable interest in the information available on strains although it was concerned that insufficient work had been done to analyse and utilise the data. The Committee is particularly interested in finding out if the information on strains has any bearing on chronic herd and / or large / sustained outbreak and if there are strains which are more virulent.

49. **The Committee recommends therefore that DARD bring to it as soon as possible proposals that explore how the comprehensive and detailed information currently available on strains can be better interrogated and used in the programme to eradicate bovine TB.**

50. In its evidence on 1st May, AFBI made reference to promising work being done by it and the Roslin Institute in Edinburgh on genetic resistance within some breeds to the disease.

> *"Recent evidence, including collaborative work undertaken by AFBI and the Roslin Institute, which, as was said, is part of the University of Edinburgh, indicates that cattle vary in their genetic susceptibility to TB and raises at least the prospect of trying to breed animals with increased resistance."*

51. The Committee is aware that many herd keepers have spent generations building up the bloodlines of their herds. In fact, when herds come down with bovine TB, it is not just the stress of operating a closed herd and seeing productive animals slaughtered that causes distress to farmers, but it is also the impact of experiencing a lifetime of work building up bloodlines within a herd being destroyed. As pointed out by the Ulster Farmers Union and by Northern Ireland Agricultural Producers' Association on 8th May 2012:-

> *"There is a significant impact on farmers because of the cost of testing – both the performance of animals and the man time involved – and the loss of a lot of genetic improvements that has gone on in herds over many years."*

52. While recognising that the research is at a very early stage, the Committee is very interested in the out workings of the AFBI and the Roslin Institute on genetic susceptibility to TB.

Strategy and approach

53. While the DARD website contains considerable information on the DARD approach to bovine TB, and it did provide the Committee with 86 page document that it submits yearly to the EU[9] in order to qualify for EU funding, there have been questions raised by witnesses on whether DARD has a strategy or is simply maintaining the current situation / position. There were questions raised over whether the serious actions called for by the Public Accounts Committee in the Assembly were ever taken forward by DARD.

54. Evidence from organisations such as the UFU and NIAPA and the Northern Ireland Audit Office is that there is concern that DARD is in a "wait and see" mode. Specifically that it is watching what happens elsewhere with the now delayed English Cull Programme and with the Welsh Vaccination Programme. Obviously there has been considerable movement with the announcement by the Minister of the Wildlife Intervention (test, vaccinate or remove) research programme that may address perceptions that DARD has a containment rather than an eradication programme, and that its programme does not contain a full suite of measures including those that deal with wildlife.

55. DARD has maintained that it is in phase one of a programme that will lay foundations for the eventual eradication of bovine TB. Phase one is about evidence gathering, research and analysis. DARD did provide a list of the research projects it has commissioned, or hopes to commission in the near future.

56. In the Programme for Government for the last mandate, DARD did have a target for the eradication of Bovine TB. However, in the oral evidence on 1st May 2012, a DARD official stated that it did not set a target date for eradication of bovine TB until it could be sure that there was a set of actions it could take that would guarantee eradication in a definite timeline. DARD officials maintained that it does not have all the answers and that looking around the countries of the world that have eradicated bovine TB, "…more stringent cattle control would be necessary, in excess of existing EU Trading requirements as well as measures to prevent the spread of infection to cattle from TB-infected badgers"[10]

57. Oral evidence provided to the Committee by UFU and NIAPA stated that DARD had in 2008, outlined a three strand strategy that included industry and government working in partnership, addressing cattle to cattle spread and addressing wildlife diseases. The part of the strategy which was to address wildlife was never taken forward and therefore Northern Ireland was the only region in the UK "…that is not at least trying to look at dealing with all aspects of disease including wildlife."

58. Over a 10 year period to 2009, DARD spent £200m to merely contain the disease. The Public Accounts Committee concluded this was poor value for taxpayer money and that it was concerned that the DARD approach has been to contain bovine TB rather than work towards eradication. PAC stated on page 12 of its report:-

> *"If, in practice, this "pragmatic approach" involves continuing indefinitely with the current high levels of public expenditure, without actually eliminating bovine TB, the Department must think again. There is nothing pragmatic about spending £200 million over a 10-year period, merely to contain a disease and with no end to the problem in sight."*

9 Standard requirements for the submission of national programme for the eradication control and monitoring of the animal diseases or zoonoses referred to in Article 1(a).

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59. **The Committee note its continued disappointment that the Programme for Government has no specific target on the eradication of bovine TB and recommends that the Minister makes representation to the Executive to rectify this omission.**

Wildlife

60. The Committee took considerable evidence on and discussed with a wide range of witnesses the role of wildlife – specifically deer and badgers – in the spread and persistence of bovine TB within Northern Ireland. The Committee examined scientific evidence that shows that bovine TB can be transmitted from cattle to cattle, badger to cattle, cattle to badger and badger to badger. Badgers are susceptible to bovine TB and many have died from the disease. It is considered that deer represent a limited risk, although as their populations increase and their ranges spread so the associated risk may also be increasing.

61. However, in its oral evidence to the Committee on 15th May 2012, Farmers for Action outlined its growing concerns on the risk posed not only by badgers but also by deer. The group made reference to a recent cull of a deer herd in Northern Ireland due to the herd being infected with TB.

62. The Committee is aware that the exact role of the badger in the spread of bovine TB is disputed and is a highly emotive issue. The Committee also noted that no other country in the world has managed to tackle bovine TB without first tackling any reservoir of the disease in wildlife. Within Northern Ireland there is a study of badgers killed in road traffic accidents. While the absolute numbers of such road kill badgers are very low, and this creates doubt over its validity, the post mortem examination shows that 16 – 20% of such badgers are infected with bovine TB. In various reports DARD attributes around one in six outbreaks to wildlife, although there are some, such as the Northern Ireland Badger Group who dispute this figure. While the Committee accept that there may be some dispute on the extent to which outbreaks can be attributed to badgers, it is clear that badgers do contribute to the problems of bovine TB in cattle and that any attempt to eradicate the disease without dealing with the reservoir in the local wildlife population is unlikely to succeed. It does, however, also agree with a number of witnesses such as VetNI that there remain a number of research gaps regarding the role of the badger and other wildlife.

63. The Committee heard evidence from Queens University Belfast that:

- badgers in Northern Ireland tended to be smaller than the rest of the UK;
- with smaller sett densities and huge variation in density between sett;
- different sett habitats than those in England / Wales;
- that badgers do not align themselves to one farm but tend to visit many farms but that most farms have only one badger group spanning neighbouring farms;
- that population size and social groups have not changed between 1990's -2007/08;
- that landscape is very influential and there can be as much as a 30 fold difference in population density;
- that, according to population survey 2007/08, there are roughly 41,000 badgers in Northern Ireland;
- the population remained fairly stable between the 1990's and the last survey in 2007/08.

64. The Committee would query if there has been a population increase since the survey of 2007/2008 and believes that the population census of badgers may need to be updated especially in light of the Ministerial Announcement on the Wildlife Intervention Research (test and vaccinate or remove).

65. Members heard from a range of organisations including the Northern Ireland Badger Group, the USPCA, The National Trust and the Ulster Wildlife Trust on the ecology of badgers. This indicated that the average badger can live between three to five years, that each group tends to be very well settled, with little migration under normal circumstances, and that setts can be vast and can be passed down through generations. Over half the European population of badgers can be found within three countries – the UK, the Republic of Ireland and Sweden.

66. The Committee is aware that badgers are a heavily protected species in part due to the levels of persecution they had been subject to in the past. Badgers are listed on the "Convention on the Conservation of European Wildlife and Natural Habitats" or the Bern Convention which was put into place in 1982. Badgers are also protected under the Wildlife (Northern Ireland) Order 1985 (as amended). In written evidence to the Committee the Council for Nature Conservation and the Countryside noted:-

> *"It has become clear that badgers are susceptible to bTB, and many badgers have died from the disease often following painful and unpleasant symptoms such as open ruptures of salivary and sun-maxillary glands. It is also clear is that badgers may then infect cattle, and as such represent one of the main routes of transmission and spread of the disease. What remains unclear are the exact pathways for transmission and spread of the disease from cattle to badgers, from one badger to another, and from badger to cattle."*

67. The evidence provided by the Ulster Wildlife Trust on the classification of infected badgers was of particular use to the Committee on this issue.

> *"There are generally considered to be five different classifications of bovine TB in badgers: those that have been exposed to the disease; those that have been exposed to it but have not become infected; those that are infected but are not infectious; those that are infectious but do not show any symptoms; and those that are severely debilitated and highly infectious. The severely debilitated and highly infectious badgers make up a very small proportion of the badger population. I have read that it is between 2% and 5%, but that varies."*

68. The Committee heard from Queens University Belfast on a project funded by DEFRA which started in January 2012 about a device that may be used in the field to test badger faeces for M Bovis. The project is at the very early stages and will run for 18 months and will include development of the test, evaluation in the lab, and evaluation in the field. If successful it may allow a mapping of infected and non infected setts across Northern Ireland.

69. **Members wish to commend Queens University Belfast on its research project on detecting infected badger setts through use of faeces. While acknowledging that it is at a very early stage and funded by DEFRA, the Committee recommend that DARD monitor its outworking, giving due consideration to practical use within Northern Ireland.**

70. The Committee is aware that there is a level of concern amongst the farming community and industry that the wildlife factor has been ignored by the Department. In evidence to it on 8th May 2012, The Ulster Farmers Unions and Northern Ireland Agricultural Producers' Association stated:-

> *"The farmers have done a lot on the cattle side, but we feel that there has been no, or very little movement, on trying to address the problem in wildlife. We feel that the Department of Agriculture and Rural Development (DARD) should recognise that attacking the reservoir of TB disease in wildlife is an essential part of the disease eradication programme."*

71. Members also noted that in 2008, the Minister of Agriculture and Rural Development had committed to a three part strategy with (i) industry and government working in partnership (ii) to address cattle-to-cattle spread and (iii) to address wildlife diseases. The Committee is concerned that there is frustration amongst the industry that the element of addressing wildlife did not seem to be progressing. The Committee also noted that in its written document to the EU Commission, DARD state that

"DARD recognises that the involvement of wildlife, mainly badgers, must be addressed if eradication is to be achieved although the extent of the badger contribution to the incidence of disease has not been quantified.

A Badger Stakeholder Group was formed in 2004 in Northern Ireland, which was tasked with assessing the available information and considering the potential need for a badger management strategy within Northern Ireland".

72. The Committee therefore give a broad but conditional welcome to the approach announced by the Minister to the Committee on 3rd July 2012, that DARD would undertake a

"…specific wildlife intervention research. That approach involves testing live badgers, vaccinating and releasing the test negative ones and removing the test positive ones."

73. The Minister indicated that DARD Officials have been tasked with designing and costing this Wildlife Intervention Research (test and vaccinate or remove), the aim of which will be to test the effectiveness of the approach on the levels of TB in badgers and cattle and to generate information about a model that could be used throughout Northern Ireland. The first steps will be to design a model which will then be tested in a pilot area (not yet chosen) before, if successful, rolling out across the rest of Northern Ireland.

74. The Committee is aware of the wildlife intervention strategies that are used elsewhere including the delayed cull in the UK (which is aligned to increased biosecurity and cattle surveillance measures as well as badger vaccination), the reactive culling of badgers in the Republic of Ireland and the badger vaccination programme currently underway in Wales.

75. DARD officials have indicated that preparatory scoping work has begun to gather the relevant information to send to the Food and Environment Research Agency (FERA) to help begin to build the Northern Ireland model. Once the model has been designed, the next steps will be design of the study itself. The Committee took note of a decision by the Welsh Government initially stating that it would undertake such an approach and it later decided on vaccination only. This decision was partly driven by uncertainties around perturbation effects associated with a catch, test, vaccinate or remove model.

76. The Committee is aware that there a number of practical and operational issues that must be addressed to allow the intervention strategy of test, vaccinate or remove announced by the Minister its best chance of succeeding. One major issue is that of a reliable diagnostic field test for TB in badgers. The Committee is concerned that the best available test, at the moment, appears to be the Brock Stat-Pak test. That test would appear to have an estimated sensitivity of 49.2% and a specificity of 93.1%[11] , although sensitivity apparently does increase as the infection rate increases in the badger. The Committee has concerns that the testing could leave infected badgers in the population, allowing the disease to persist. In oral evidence on 11th September, DARD officials stated that :-

"Any captured badgers that are released because they test negative will be vaccinated first. Some of those being released will obviously be truly negative badgers and they will be vaccinated, so that element of protection will be built up within the badger population. Our understanding of experimental evidence is that vaccination in itself actually slows the progress of the disease in an infected badger, so there is an advantage to that as well. Over time, the vaccination aspect will actually build a level of protection within the badger population. That is the idea. The purpose of the research is to test the effectiveness of it. What we want to be able to do at the end of it is to measure the effect that it has had on the level of TB in badgers and cattle. That is the end purpose and the ultimate outcome of it".

11 Sensitivity – the ability of a test to correctly identify an infected animal or to not identify an infected animal as uninfected (false negative). Specificity is the ability of a test to correctly identify an animal that is free from disease / infection or not to identify uninfected animals as infected (false positive).

And

> *"The animals that are test-negative may be truly negative, in which case they will be vaccinated and protected. If they are in the early stages, there may be some protective element. However, those animals are likely to be caught again the following year and the year following that. Once they test positive, they will be removed. The average lifetime of a badger is three to four years, so the population in that study area will have turned over in that period. Animals that are diseased will be taken out. Animals that are test-negative will be vaccinated."*

77. In response to this, DARD commented that the Department for Environment, Food and Rural Affairs (DEFRA) had further research on going into potential alternative diagnostic tests for badgers.

78. The Committee is also aware of the level of legal protection for badgers and the need for licences for this research being granted by The Department of the Environment. DARD officials indicated that the request for a licence would be based on a scientific study / the scientific procedure element of the legislation. The Department of the Environment or the Northern Ireland Environment Agency would be unable to comment on whether such a licence would be granted until the scientific proposals with all the relevant information had been provided to it. The Committee did seek information from the Department of the Environment on the issuing of licencing. A letter of response can be found at appendix six of this report.

79. One of the big issues around a test, vaccinate or remove strategy is whether perturbation would be an outcome of such an approach. The Minister, in addressing the Committee on 3rd July 2012 stated:-

> *"Such a test, vaccinate and remove approach was modelled in 2009 as a possible intervention for the Welsh Government by the Food and Environment Research Agency (FERA). The results of that modelling indicated that if a perturbation effect occurred, it would make the TB situation in cattle worse; that is, it would lead to increased confirmed cattle herd breakdowns. Where perturbation was assumed not to occur, the model predicted that the effect of the intervention would be marginally better than cull-only and vaccinate-only approaches. However, no field trials have taken place to test the actual effectiveness of that approach anywhere in Britain or in the South. Based on discussions with the FERA experts who developed the model, we believe that we may not see the same perturbation effect in the North, as the badger social group size here is smaller and badger movement behaviour may be different."*

80. As the Committee discovered on its visit to England, there are practical and operational issues around the catching and testing of badgers. These are not insurmountable as is demonstrated by the fact that catch and vaccinate is being undertaken by the Welsh Assembly, by the National Farmer Union as part of the now delayed badger control programme in England and by various Wildlife Trusts in England including The National Trust at its farms in Devon and the Gloucestershire Wildlife Trust. These issues include identifying the location of badger setts in Northern Ireland, practicalities around placing cages, often in difficult and / or hard to reach locations, trapping badgers, anaesthetising, taking a blood sample, waiting for the sample to develop and then making a decision on whether to vaccinate or cull – all within a very short space of time – perhaps no more than 30 minutes. The badger vaccine is a medicine that must be prescribed by a Vet and held under strict temperature controls.

81. The Committee therefore, while giving a broad welcome to the fact that DARD is now beginning to recognise and address the wildlife issue, still have some concerns over the programme as proposed. There is substantial concern within the Committee around the accuracy of the sett side test for TB in badgers and the impact that this could have on the success or failure of the catch, test, vaccinate or remove study. The Committee also realise that the impact of any wildlife intervention programme, be that a cull in England or a vaccination programme as in Wales, will take years to show any effect. There are also

concerns around ensuring any study is carried out humanely and takes into account the impact of breeding cycles in badgers. The Committee is therefore concerned that any delay to any of the steps in the Wildlife Intervention Research (test and vaccinate or remove) could lead to delays in addressing the impact of the reservoir of M. bovis in wildlife within Northern Ireland.

82. **The Committee recommends that DARD put in place appropriate efforts to ensure a time bound delivery of the scoping work, the development of a model and the obtaining of all necessary approvals for the Wildlife Intervention Research (test and vaccinate or remove) as soon as possible. The Committee also recommends that DARD focuses on and provides further information to it as soon as possible on addressing potential weaknesses in the model as currently proposed regarding the sett side test, the possibility of perturbation and the obtaining of licences.**

Chronic and Repeat Breakdown Herds

83. The Committee expressed considerable interest regarding the information available on chronic and / or repeat breakdown herd from both the NIAO and in particular from the Agri-Food and Biosciences Institute (AFBI). Individual Members of the Committee were already aware that the severity of an outbreak in terms of the number of reactors and / or the length of time it took for a herd to recover from a breakdown and be declared clear varied considerably from region to region within Northern Ireland and from farm to neighbouring farm. Members are aware of the personal and emotional strain that comes from having a herd classified as a breakdown herd. Members are further aware that the emotional strain to a farmer and his family can be immense when a herd has a large breakdown or is in a cycle of continuous breakdown.

84. The Committee were therefore very interested to note oral evidence from AFBI on 1st May 2012 on this point which appeared to provide evidence that the disease exhibits clustering pattern.

> *"With regard to your point, about 40% of outbreaks have one or two reactors. However, the number of reactors by herd is highly skewed. An easy way to think of it is that 80% of reactors are in 20% of herds; it is clustered. So, you have examples, as you said, with big outbreaks. We looked at whether there is a strain effect that is responsible for that and, surprisingly, there is not. Our interpretation of that situation is that there are risk factors adding to substantial cattle-to-cattle spread in those herds, whether it is concurrent infection or something else — and I am guessing at the moment. However, it is not a strain effect, which is surprising."*

85. In answering questions about this aspect of the disease in Northern Ireland on 11th September 2012, DARD officials stated that around 70% of reactors are coming from 30% of herds. The Committee were surprised that the disease exhibited the Pareto principle or that roughly 80% of the effects come from 20% of the causes. The Committee considers that lessons could perhaps be learnt from this disease pattern. The Committee is concerned that DARD have been aware of this fact for some time but have not, until recently, appeared to have any impetus to dealing with it. Finding out why this clustering is happening and developing methods of addressing it could potentially make a serious difference to the disease incidence rate in Northern Ireland.

86. Members were also made aware that while bovine TB breakdowns occur all over Northern Ireland, there is a geographical pattern which indicates that the highest rates of infection are in the Divisional Veterinary Offices (DVO) of Armagh, Newry and Newtownards. In written evidence DARD noted that the Newtownards division has had the highest herd incidence for some time, although it has been falling steadily over the years. Mallusk has the lowest herd incidence.

87. While the reasons for this geographical pattern are unclear, in evidence to the Committee DARD noted that there is an association between incidence rates and stocking densities.

Herd and cattle densities are highest in the south and west of Northern Ireland with the highest concentrations in Co Armagh and Co Down. Herds in the north and east tend to be larger. Bovine TB is principally a respiratory infection and the majority of infections are thought to occur via direct aerosol transmission between animals in close proximity. In its EU Report DARD stated that higher stocking densities probably play an important role in the risk of breakdowns and prolonged or large breakdowns occurring.

88. The Committee did receive a briefing from the Northern Ireland Research and Information Service on "Multiple claims for Bovine TB compensation – further analysis of DARD data". That briefing indicated that in 2011 – 12, the total compensation paid in relation to TB reactors and negatives in contact with a disease test equated to £12,857,079. This was split across 1860 herds giving an average payment per herd of £6,912. Just over half the money or 53% (£6,787,385) is paid out in the areas covered by Armagh, Newry and Newtownards. The highest average payment per herd relates to the Newtownards DVO. The following table is taken from the briefing and is based on information provided by DARD.

Table Four: Bovine TB compensation paid out per DVO office 2011-12

Divisional Veterinary Office (DVO)	No of herds paid	Total Paid	Average payment per herd
Armagh	161	£1,260,490	£7,829
Ballymena	77	£278,916	£3,622
Coleraine	216	£1,048,851	£4,856
Dungannon	174	£822,070	£4,725
Enniskillen	226	£1,552,592	£6,870
Londonderry	59	£156,025	£2,644
Mallusk	76	£402,870	£5,301
Newry	369	£3,235,170	£8,767
Newtownards	224	£2,291,725	£10,231
Omagh	278	£1,808,370	£6,605
Total	**1860**	**£12,857,370**	**£6,912**

89. While recognising that it is not possible to investigate every herd and every breakdown, the Committee welcomes indications from DARD that it does intend to commission a chronic herd study. It is however, dismayed to note that DARD has not as yet developed a definition of "chronic herd". It does appreciate that there are some difficulties to be overcome in creating such a definition but believes that in doing so, DARD may be able to find a new focus on eradication. It welcomes the fact that DARD is now beginning to integrate the data that it holds on APHIS to help with refining and defining chronic herds.

90. **The Committee recommends that DARD complete its analysis of the available data on bovine TB and, in conjunction with the industry defines what is meant by chronic herd and/or large/sustained outbreak.**

91. **The Committee recommends that DARD commissions a detailed study into the epidemiology of farms with chronic herd and/or large/sustained outbreaks. The study should have a focus on understanding the factors involved and how the cycle of repeat breakdowns may be broken quicker than is currently the case.**

Biosecurity

92. Bovine TB is a highly infectious disease, and as with any highly infectious disease, even in humans, biosecurity measures to limit transmission is an essential part of the control mechanism. Biosecurity has an important role to play alongside other measures but alone, it won't lead to any substantial reduction of the disease in cattle. The Committee did commission a briefing paper from the Northern Ireland Assembly Research and Information Service on biosecurity measures used in various countries across the world to tackle bovine TB. From this paper it was clear that the definition of biosecurity varies considerable but that the following broad measures are used around the world:-

- Cattle testing;
- cattle purchases;
- movement testing;
- prevention of close contact between neighbouring herds;
- disinfecting;
- control of slurry spreading;
- prevention of wildlife to cattle transmission

93. Biosecurity is an important area and the Committee recognise that it will require partnership working with the farming community and industry. The greatest risk of transmission of bovine TB comes from cattle to cattle contact and there are over 600,000 cattle movements recorded on the APHIS system. And that figure does not include in farm movements. In October 2004, DARD introduced a statutory requirement for farmers to maintain their fences to prevent contact with animals on adjoining land. In addition, the importance of fencing that prevents contact between animals was highlighted in the voluntary Bio-security Code that was developed jointly by DARD and industry and published in 2004. DARD commissioned the Agri-Food and Biosciences Institute (AFBI) to carry out the TB Bio-security Study in a TB high prevalence area in Co Down. The Study was launched in October 2010 and the fieldwork elements of the Study including a survey of boundary fences were completed in July 2011. Some 200 farmers participated in the Study and provided valuable information. DARD stated that "It is hoped that this information will add to our knowledge of TB risk factors and inform the new biosecurity advice for farmers. It is expected that the findings will become available in early 2012."

94. The Committee note that it is vitally important that any biosecurity element must recognise and work with the situation as it pertains in Northern Ireland. For example, in its written submission to the Committee the National Trust noted that:-

> *"In Northern Ireland the conacre tenancy system results in a majority of farmers having several neighbours. This may increase the risk of contact between infected cattle and non-infected cattle across boundary fences, compared with in England or Wales, where farmers have fewer neighbours. So, a key to minimising contact between infected and non infected cattle in Northern Ireland may be to increase bio-security around parcels of land leased through the conacre system."*

95. In oral evidence on 1st May 2012, Queens University Belfast stated that:-

> *"We also have some preliminary data on biosecurity. For example, we have been able to show that 60% of farms graze cattle next to their neighbours, and there is no barrier to contact between cattle."*

96. Other witnesses, such as the Northern Ireland Badger Group noted that addressing the lateral spread of bovine TB in cattle through nosing is vital and that current hedging and fencing did not seem to be doing the job. In oral evidence to the Committee on 29th May 2012, the Northern Ireland Badger Group stated:-

"If farmers can be incentivised to make stock-proof and contact-proof fences that would be useful in the wider countryside in general and in preventing not just TB but other disease."

97. The Ulster Farmers Union and the Northern Ireland Agricultural Producers Association noted the importance of biosecurity as one of series of measures in controlling the spread of TB and that more could be done to incentivise at farm level as adopting biosecurity measures to prevent cattle to cattle spread, and that the incursion of wildlife can be very difficult and extremely costly. It was suggested that as well as biosecurity measures, more needed to be done to identify the source of the disease.

98. Members considered the practical difficulties with the prevention of close contact between neighbouring herds. There are also issues regarding who owns the land in between the fencing and the cost of its maintenance. One estimate is 120 million metres of double fencing would be required and the Committee have concerns around the practicalities and cost of providing so much fencing. There are also issues around the impact of the conacre system. There could also be difficulties regarding who owns the three metre system of land between the double fencing. Members of the Committee also expressed concerns around the possible impact of double fencing on Single Farm Payments.

99. Members considered that between 2004 and 2012 only 1,394 herd keepers out of 26,000 had taken bio security training provided by DARD. In oral evidence VetNI noted that "…most cattle farmers here take few health precautions when introducing purchased animals to their herds or at farm boundaries." VetNI suggested that a different approach is taken, one which involves vets giving advice and guidance to the farmer. In its written evidence to the Committee it suggested that "A cattle health programme encompassing enhanced biosecurity measures would improve cattle health as a whole and therefore also have a positive impact on bTB".

100. The Ulster Wildlife Trust also noted the disappointing low uptake in training and suggested that perhaps such training could be incorporated into the Focus Farms Programme. The Committee did note that biosecurity training is offered to young farmers as they make their way through CAFRE courses and that this is then carried back into everyday practice on farms.

101. The Committee has concerns about the uptake on training and advice offered on biosecurity. The low levels of uptake suggest that its content and delivery is not suited to the needs of the farming community.

102. **The Committee recommends that DARD investigate how biosecurity training and advice could be reinvigorated and delivered at a pace and in a setting that best suits the farmer and herd keeper.**

103. The Committee is concerned that the TB Bio-security Study, aimed at determining if there are any differences in the characteristics of herds that have recently had a TB breakdown against those that have had no recent history of a breakdown, has had no output as yet. The study has been completed for some time, with the information gathering on boundaries finished since July 2010. The Committee is concerned that there had been no information forthcoming and no preliminary findings announced. DARD explained that this was in large part due to critical staff shortages, that this had now been addressed and the results would be forthcoming shortly.

104. **The Committee is aware that there have been delays in the publication of the TB Bio-security Study, and is keen to scrutinise the results and recommend its publication as soon as possible.**

Wildlife Biosecurity

105. Members heard from Food and Environment Research Agency (FERA) on 12th June. In that session it was outlined that research by two PhD students on four farms near Woodchester Park in England showed that badgers were going into farm buildings on a regular basis. A subsequent questionnaire indicated that levels of biosecurity to reduce wildlife entrance to farm buildings was quite low.

106. Members heard from other witnesses that badgers are likely to visit cattle housing because it was an easy source of food. While there is some debate over whether the majority of contact between badgers and cattle happens at pasture or in sheds, evidence provided by the Ulster Wildlife Trust (based on a research paper from Cheeseman and Mallinson published in the Journal of Zoology 1981), was that badgers found in farm sheds are three times more likely to be infected than road kill. It was suggested that badgers weakened with TB, who find it difficult to dig for food, will use cattle feed as an easier and ready available source of food.

> *"We have also found that badgers found in farm sheds are three times more likely to be infected with bovine TB than roadkill. That comes back to the fact that badgers that are severely debilitated by the disease will roam a lot further to find easy sources of food so that they can survive."*

107. The Committee took oral evidence from the Food and Environment Research Agency (FERA) on a research project on badger visits to farms in Gloucestershire. The aim of the research, held over three years in Gloucestershire was to determine the frequency of badger visits to farm buildings and to examine what simple measures could be employed to reduce the contact between badger and cattle in the buildings and whether exclusion methods caused displacement of badger activities into other buildings.

108. The research was carried out using 32 farms over 365 nights and highlight finding were that :-

> *"On 32 farms in Gloucestershire, we put remote-sensor cameras on the entrance points to feed storage areas, silage clamps, cattle housing, yards and so on. We had those cameras on every night for at least 365 nights in a year. We had something like nearly 300 cameras out for the first year. Those were motion-sensor infrared cameras, so, as soon as something went past the cameras, they took a photo. Of the 32 farms, 19 had visits from badgers. Some of those had only one or two visits recorded over the whole year, but at the other end of the scale, about 10% of the farms had visits on 70% to 80% of nights. Badgers came on five or six nights a week. It was not just one badger, it was not just one incursion a night, and they were not just travelling through the farmyards; they were going into the farm buildings.*

109. FERA further outlined and provided details on how the second stage of the research was to move to badger exclusion methods. The main results of this part of the research was:-

> *"Throughout the second year, a badger got into a building only 58 times, and that was because a gate or door had not been closed, the electric fencing had not been on, or something like that. When the measures were used properly, they were 100% effective. We also found that having the measures on the buildings reduced the level of visits to the farmyard as a whole. Therefore, we had less observation of badgers walking through the farmyards. We also found that, if the measures were just on the feed store, it reduced the level of visits to cattle houses and vice versa, which was a bit surprising. Therefore, it seemed to have some sort of protective effect on the buildings that you did not directly put the measures on."*

110. The Committee noted the relatively low costs of applying these measures ranging from £604 for two new solid gates to £12,000 to secure over 32 buildings on one farm. The average cost was just over £4,000.00. The Committee also noted that the research did not focus on whether the exclusion of badgers from farm buildings had any impact on bovine TB incidence rates. The evidence session with FERA was particularly useful in allowing the Committee to consider whether measure to exclude badgers from farm buildings could be applied in

the Northern Ireland context. The Committee do acknowledge that such wildlife biosecurity methods will only be useful if a farm is experiencing badger visits and that this fact must be established first and foremost. The Committee also noted that FERA had indicated that there was no method of linking badger exclusion methods to TB incidence rates. In evidence to the Committee FERA stated:-

> *"None of the farms in the study had never had TB; they had all had TB at some stage or another. Some of them went down with TB during the course of the project, but we were not specifically looking at the effect of the measures on the likelihood of a TB breakdown, mainly because, in order for it to be statistically significant, we would have had to observe thousands of farms or carry on for a number of years. Even if the measures stopped all the TB breakdowns in those 32 farms, it would not have been powerful enough to pick it up in a statistical analysis."*

111. **The Committee recommends that DARD conducts a similar research project in Northern Ireland as has been carried out by FERA to establish the extent of badger visits to farms and their "routines" or actions while visiting and/or entering farm buildings. While recognising that there may be practical and statistical difficulties, the Committee recommends that DARD makes efforts to design the study to see if there is any linkage between badger exclusion measures and Bovine TB incidence rates. Dard should ensure that such research dovetails with existing research.**

Wildlife vaccination

112. The injectable badger vaccination is currently being used in both England and Wales. It will also be an essential part of the now delayed cull programme in England. It will be offered to landowners who do not wish to take part in the cull and to those in the surrounding areas who are likely to experience the perturbation effect. The National Farmers Union will offer the vaccination to those who wish to avail of it.

113. The Members who took part in the visit to Gloucestershire Wildlife Trust and met with both the Wildlife Trust and FERA heard that the injectable vaccination used is the BCG which is the same as given to humans. Ulster Wildlife Trust noted that :-

> *"The vaccine confers a level of immunity to offspring, significantly reduces the progression, severity and excretion of bovine TB and avoids all the issues that go with perturbation."*

114. In its evidence The National Trust outlined that it is vaccinating badgers on 18 farms on its Killerton estate in Devon which is a bovine TB hotspot. Its aims are to minimise the risk of badger to cattle transmission and to demonstrate an alternative to culling. The National Trust also expressed willingness to be involved in any badger vaccination pilots here in Northern Ireland. The Committee expressed interest in this National Trust project and will watch for its outcomes in due course.

115. In June 2012, some Members of the Committee travelled to Gloucestershire Wildlife Trust to discuss its project on badger vaccination. Members also had the opportunity during the visit to discuss the badger vaccination, its limitations and developments on the oral vaccine in further detail with FERA staff. Members found this visit extremely instructive as it was focused on the practical and operational issues. They obtained the following information regarding costs associated with the injectable vaccine[12]:-

- Annualised 5 year costs - £8, 656
- Per hectare (Group A&B) - £51.00
- Per Field Hour - £68

12 Published in "Natures Reserves Badger Vaccine Deployment Programme 2011"

- Per hectare (Stroud Valleys, Group A) - £56
- Per hectare (Greystones Farm, Group B) - £41
- Per Farm Holding (Greystones Farm) - £2,856

116. In closed session, Members heard from a DEFRA official that a four-year licensing field study demonstrated that vaccination with BCG resulted in a 74% reduction in the proportion of wild badgers testing positive to the antibody blood test for TB in badgers (Chambers et al. 2010). However, as the blood test is not an absolute indicator of protection from disease, the field results do not tell the degree of vaccine efficacy. Further analysis of the data from the field study has been carried out. A DEFRA report states that:-

> *"While we would expect vaccination of badger populations to result in reduced transmission of TB to cattle, we currently have no direct experimental evidence on this, other than from computer modelling".*

117. FERA and DEFRA officials also outlined work being done on an oral vaccine which could potentially be easier to apply. It is at the research stage and England is working in an international partnership with Republic of Ireland, France, Denmark and New Zealand on this. However, results are not likely until before 2015.

118. In England, funding has been made available to support a badger vaccination programme and 26 grant applications were approved for 2012/13.

119. **The Committee recommends that in addition to the DARD Wildlife Intervention Research Programme, DARD should consider introducing immediately a similar programme to support those farmers/Wildlife Trusts who wish to vaccinate badgers on their land in Northern Ireland.**

Cattle Vaccine

120. A cattle vaccine has been developed by DEFRA but is not yet available for use due to a number of outstanding issues. It would appear from the evidence provided to the Committee that there is very little dissent and some considerable hope amongst all stakeholders that a cattle vaccine will provide a medium to long term solution.

121. However, it would appear that most EU member states have little interest in TB vaccination because they are practicality TB free. The Committee heard that there may be reluctance amongst EU member states to change a disease control system that is working for the majority of state members. However an opportunity to lift the prohibition may be offered by the drafting of a new European Animal Health Law.

122. In its evidence to the Committee, the Northern Ireland Badger Group noted that from an economic and long term sustainability point of view, vaccination of cattle is easier and more effective and provides more value for money. In its written evidence, Council for Nature Conservation and the Countryside noted that the cattle vaccine could shift control of the disease and possibly provide a cheaper and more effective solution to test and slaughter.

123. The Committee received written briefing from DARD and a closed session oral briefing from DEFRA. The Committee noted that EU Directive 78/52/EEC and associated Directives[13] prohibits anti-tuberculosis vaccination and that this EU legislation will need to be amended to allow cattle vaccination to proceed. As a vaccinated animal could react positively to the bovine TB skin test, a DIVA test has been developed to differentiate between infected and vaccinated cattle. This will need to obtain international validation and acceptance before the EU Directives can be amended.

13 Directive 64/432/EEC and Reg (EC) 853/2004

124. It has been outlined to Members that developing a TB vaccine for both badgers and cattle is a high priority for DEFRA and over £39m has been invested since 1998 with a commitment of a further £20m 2011/12 to 2014/15. An application for licensing has been made to the Veterinary Medicine Directorate in January 2012. However, it is also worth noting that in evidence to the Committee, DEFRA noted that the vaccination of cattle will not always prevent infection – it is a useful tool but still not perfect. Other measures will always be needed including continuing with cattle controls and tackling wildlife.

125. **Given the resources and priority being given by DEFRA to the cattle vaccine, and the legislative hurdles it faces in Europe, the Committee recommend that the Minister and the Northern Ireland MEPs, in consultation with the industry, seek to do all they can to support the UK as it pursues legislative change to allow for cattle vaccination.**

Northern Ireland Assembly

Appendix 1

Minutes of Proceedings

Appendix 1 – Minutes of Proceedings

24th April 2012

1st May 2012

8th May 2012

15th May 2012

22nd May 2012

29th May 2012

12th June 2012

19th June 2012

3rd July 2012

11th September 2012

24th September 2012

25th September 2012

16th October 2012

23rd October 2012

13th November 2012

Tuesday 24 April 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mrs Dolores Kelly MLA (Deputy Chairperson)

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.31pm The meeting commenced in Open Session

5. Bovine TB Review – Oral Briefing NI Audit Office

The following Northern Ireland Audit Office representatives joined the meeting:

Robert Hutcheson, Director
Joe Campbell, General Audit Manager

The NIAO representatives briefed the Committee and this was followed by a question and answer session.

2.00pm Ms Boyle left the meeting.

2.05pm Mr Swann left the meeting.

Mrs Dobson declared an interest as a farmer.
Mr Irwin declared an interest as a farmer.

Agreed: The Committee agreed to raise a number of issues identified in the Update Report for the Public Accounts Committee on Bovine TB, with the Department at the next meeting.

2.37pm Ms Boyle re-joined the meeting.

2.45pm Mr Irwin re-joined the meeting.

2.55pm Mrs Dobson left the meeting.

2.57pm Mr Buchanan left the meeting.

The Committee discussed a proposed visit to England in order to inform the Bovine TB Review.

Agreed: The Committee agreed a visit to England on 19 and 20 June 2012 as part of the Bovine TB Review.

4.53pm The meeting was adjourned.

Paul Frew

Chairperson, Committee for Agriculture and Rural Development

Tuesday 1 May 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Ms Michaela Boyle MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mr Thomas Buchanan MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)
Mr Mark Allen (Assembly Researcher) for agenda item 5

1.34pm The meeting commenced in Open Session

5. Bovine TB Review

The Assembly Research and Information Officer briefed the Committee on his paper "The Link between Bovine TB and Badgers" and "Bovine TB – Biosecurity measures". This was followed by a question and answer session.

1.57pm Mr McCarthy left the meeting.

2.10pm Mr Clarke joined the meeting.

Agreed: The Committee agreed to request further research on the four badger cull areas in the Republic of Ireland.

DARD Briefing

The following Departmental officials joined the meeting:

Colette McMaster, Assistant Secretary
Colin Hart, Deputy Chief Veterinary Officer
Roly Harwood, Senior Principal Veterinary Officer
Ian McKee, Principal Officer

The officials briefed the Committee and this was followed by a question and answer session.

Mrs Dobson declared an interest as a farmer.

Agreed: The Committee agreed to write to the Department to request sight of DARD maps showing the strain of TB from farm to farm.

Agreed: The Committee agreed to write to the Department to request information on call outs to DARD vets/private vets when there has been a suspected breakout of TB.

Agreed: The Committee agreed to write to the Department to seek clarification on the figures quoted in the DARD Briefing paper in relation to multiple compensation claims.

3.30pm Mrs Dobson left the meeting.

3.40pm Mr Irwin left the meeting.

3.47pm Mr McCarthy rejoined the meeting.

3.47pm Mr Clarke left the meeting.

3.50pm Mr Irwin rejoined the meeting.

4.00pm Mrs Dobson rejoined the meeting.

AFBI Briefing

The following AFBI officials joined the meeting:

Professor Seamus Kennedy, Chief Executive
Dr Stanley McDowell, Senior Veterinary Officer
Dr Sam Strain, Veterinary Research Officer
Dr Robin Skuce, Veterinary Research Officer

The officials briefed the Committee and this was followed by a question and answer session.

4.07pm Mr Swann left the meeting.

4.36pm Mr Swann rejoined the meeting.

4.39pm Ms Boyle left the meeting.

QUB Briefing

The following QUB representatives joined the meeting:

Professor Chris Elliott, Director of Institute of Agri-Food and Land Use
Professor Ian Montgomery, Quercus Director
Dr Irene Grant, Lecturer in Microbiology and Food Safety
Dr Neil Reid, Quercus & Natural Research Partnership Manager

The QUB representatives briefed the Committee and this was followed by a question and answer session.

Agreed: The Committee considered requests from Ulster Wildlife Trust, the National Trust and Farmers for Action and agreed to receive oral evidence from them.

5.36pm The meeting was adjourned.

Paul Frew

Chairperson, Committee for Agriculture and Rural Development

Tuesday 8 May 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mrs Dolores Kelly MLA (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.32pm The meeting commenced in Open Session

6. Bovine TB Review – Oral Briefing UFU/NIAPA

The following UFU/NIAPA representatives joined the meeting:

Harry Sinclair, President UFU
Wesley Aston, Policy Director UFU
Colin Smith, Policy Officer UFU
Michael Clarke, NIAPA
Sean Fitzpatrick, NIAPA
Donal McAtamney, NIAPA

The representatives briefed the Committee and this was followed by a question and answer session.

1.55pm Mr Swann left the meeting.

1.57pm Mr McCarthy left the meeting.

2.05pm Mr Swann rejoined the meeting.

2.11pm Mr Hazzard left the meeting.

Mr Irwin declared an interest as a farmer and a member of the Ulster Farmers' Union.

2.27pm Mr Irwin left the meeting.

2.33pm Mr Hazzard rejoined the meeting.

2.36pm Mr Clarke joined the meeting.

2.41pm Mr Buchanan left the meeting.

2.55pm Ms Boyle left the meeting.

2.59pm Mr Swann left the meeting.

3.00pm Mr Hazzard left the meeting.

4.15pm The meeting was adjourned.

Paul Frew

Chairperson, Committee for Agriculture and Rural Development

Tuesday 15 May 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mrs Dolores Kelly MLA (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Mr Paul Carlisle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.30pm The meeting commenced in Open Session.

7. Bovine TB Review - Oral Briefing Farmers for Action

The following representatives from Farmers for Action joined the meeting;

Mr William Taylor
Mr Sean McAuley

The representatives briefed the Committee and this was followed by a Question and Answer session.

1.56pm Mr McCarthy left the meeting.

1.57pm Mr Swann joined the meeting.

Mrs Dobson declared an interest as a farmer.
Mr Irwin declared an interest as a farmer.

The representatives agreed to provide the Committee with further information on specific areas in England where deer are infected with TB and the statistics relating to the length of time infected animals are left before they are lifted for disposal.

2.07pm Ms Boyle left the meeting.

2.16pm Ms Boyle rejoined the meeting.

2.20pm Mr Clarke joined the meeting.

2.30pm Mr Hazzard left the meeting.

2.32pm Mr Irwin left the meeting.

Noted:The Committee noted the correspondence from the Department of the Environment detailing the legislation governing badgers in Northern Ireland.

2.45pm Mr Buchanan left the meeting.

Agreed: The Committee agreed to write to the Department to seek a detailed breakdown for compensation payments for the 2011/2012 period

3.49pm The meeting was adjourned.

Joe Byrne
Deputy Chairperson, Committee for Agriculture and Rural Development

Tuesday 22 May 2012
Room 30, Parliament Buildings

Present: Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mr Paul Frew MLA (Chairperson)
Mrs Jo-Anne Dobson MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)
Mr Mark Allen (Research Officer) for agenda item 5
Ms Bronagh Gillen (Research Assistant) for agenda item 5

1.34pm The meeting commenced in Open Session with Mr Joe Byrne in the Chair.

6. Bovine TB Review - Oral Briefing Vet NI

The following representatives from Vet NI joined the meeting;

Bert Allison, North of Ireland Veterinary Association
Kevin Corry, The Association of Veterinary Surgeons Practising in NI
John Johnson, The Association of Veterinary Surgeons Practising in NI
Lindsay Read, North of Ireland Veterinary Association

The representatives briefed the Committee and this was followed by a Question and Answer session.

2.35pm Mr Buchanan re-joined the meeting.

Mr Irwin declared an interest as a farmer who employs the services of private vets.

2.40pm Mr Hazzard left the meeting.

Agreed: The Committee agreed to obtain a copy of the Rogers report which will include information on the percentage of possums in New Zealand who are infected with TB.

Agreed: The Committee agreed to write to the Department to ask for the rationale for refusing a proposal made by NIVA and AVSPNI to carry out work on Brucellosis sampling at the same time as Bovine TB sampling.

3.34pm The meeting was adjourned.

Paul Frew

Chairperson, Committee for Agriculture and Rural Development

Tuesday 29 May 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA

Apologies: Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.34pm The meeting commenced in Open Session

9. Bovine TB Review – Oral Briefing NI Badger Association & the Ulster Society for the Prevention of Cruelty to Animals

The following representatives joined the meeting;

Mike Rendell, Coordinator NI Badger Group
Dr Pól Mac Cana, NI Badger Group
David Wilson, Information Officer, USPCA

The representatives briefed the Committee and this was followed by a Question and Answer session.

Mr Irwin declared an interest as a farmer.

2.31pm Ms Boyle left the meeting.

2.32pm Mr Irwin left the meeting.

2.34pm Mr Irwin rejoined the meeting.

2.34pm Ms Boyle rejoined the meeting.

2.58pm Mr Buchanan left the meeting.

2.58pm Ms Boyle left the meeting.

3.03pm Mr McCarthy rejoined the meeting.

3.48pm The meeting was adjourned.

Paul Frew
Chairperson, Committee for Agriculture and Rural Development

Tuesday 12 June 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Trevor Clarke MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mr Thomas Buchanan MLA
Mrs Jo-Anne Dobson MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.35pm The meeting commenced in Open Session.

5. Bovine TB Review – Oral Briefing Food and Environment Research Agency (FERA)

Dr Johanna Judge, Wildlife Biologist, FERA, joined the meeting. Ms Judge briefed the Committee and this was followed by a question and answer session.

1.57pm Mr McCarthy left the meeting.

2.20pm Mr Swann joined the meeting.

2.21pm Mr Clarke joined the meeting.

3.31pm The meeting was adjourned.

Paul Frew
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 19 June 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)
Mr Mark Allen (Research Officer) for agenda item 4

1.34pm The meeting commenced in Open Session.

4. Bovine TB Review – Oral Briefings

The following representatives from the Ulster Wildlife Trust joined the meeting;

Jennifer Fulton, Chief Executive Officer
Joe Furphy, Chairperson
Conor McKinney, Living Landscapes Manager

The representatives briefed the Committee and this was followed by a question and answer session.

1.40pm Mr Buchanan joined the meeting.

1.45pm Mr Clarke joined the meeting.

1.55pm Mr McMullan left the meeting.

1.56pm Mr McCarthy left the meeting.

1.58pm Mr Buchanan left the meeting.

2.02pm Mr Byrne joined the meeting.

2.03pm Mr Clarke left the meeting.

2.03pm Mr Irwin left the meeting.

2.07pm Mr McMullan rejoined the meeting.

Agreed: The Committee agreed to request a copy of research paper referred to by the Ulster Wildlife Trust on the behaviour of badgers infected with TB.

The following representatives from the National Trust joined the meeting;

Heather Thompson, Director for Northern Ireland
Philomena Davidson, Wildlife and Countryside Advisor
Patrick Begg, Rural Enterprise Director

The representatives briefed the Committee and this was followed by a question and answer session.

2.10pm Mr Clarke rejoined the meeting.

2.10pm Mr Irwin rejoined the meeting.

2.15pm Mr Swann left the meeting.

2.23pm Ms Boyle joined the meeting.

Mrs Dobson declared an interest as a farmer.
Mr Irwin declared an interest as a farmer.

Agreed: The Committee agreed to seek the date of stakeholder event in Greenmount College which the National Trust participated.

Agreed: The Committee agreed to seek a copy of the National Trust information video on its four year project in Devon.

The Assembly Research Officer briefed the Committee on The 4 areas Badger Cull conducted in Ireland. This was followed by a question and answer session.

2.45pm Mr Swann rejoined the meeting.

2.50pm Mr Buchanan rejoined the meeting.

2.59pm Mrs Dobson left the meeting

2.59pm Mr Hazzard left the meeting

Agreed: The Committee agreed to seek further research on the comparative costs for the 4 areas trials conducted in Ireland.

3.56pm The meeting was adjourned.

Paul Frew
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 3 July 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Ms Michaela Boyle MLA
Mr Thomas Buchanan MLA
Mr William Irwin MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mr Joe Byrne (Deputy Chairperson) MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Mr Mark O'Hare (Assistant Assembly Clerk)
Ms Tara McKee (Clerical Supervisor)
Ms Claire Ward (Clerical Officer)

1.54 p.m. The meeting commenced in Open Session

Agreed: The Committee agreed to take agenda item 5 in closed session at the start of the meeting.

1.55 p.m. The meeting moved into Closed Session

1. Bovine TB Review – DEFRA Oral Briefing

Officials from the Animal Health and Veterinary Laboratories, DEFRA, joined the meeting;

The officials briefed the Committee and this was followed by a question and answer.

1.57p.m. Mr Buchanan joined the meeting

2.08p.m. Mr Swann joined the meeting

2.31p.m. Mr McMullan left the meeting

2.35p.m. Mr McMullan re-joined the meeting

2.45p.m. Mr Irwin left the meeting

2.48p.m. Mr Irwin re-joined the meeting

2.52 p.m. The meeting moved into Open Session

Agreed: The Committee agreed to take agenda item 6 next.

2. Ministerial Briefing

The Minister and the following Departmental officials joined the meeting:

Michelle O'Neill MLA, Minister for Agriculture and Rural Development

Gerry Lavery, Permanent Secretary

Bert Houston, Chief Veterinary Officer; and

Colette McMaster, Grade 5, Director of Animal Health and Welfare.

The Minister briefed the Committee and this was followed by a question and answer session.

Agreed: The Committee agreed to request that they receive some further detail in regards to the Departments proposals to implement a 'Wildlife Intervention Strategy'.

Agreed: The Committee further agreed that DARD give due consideration to how the Committee can be kept informed in the event of crisis, such as the recent flooding of Dundonald House.

3.50p.m. Mr Buchanan left the meeting

3. Apologies

As recorded above.

5.14 p.m. The meeting was adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 11 September 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Joanne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)

1.35 p.m. The meeting commenced in Open Session

15. Oral Briefing RalSe – Bovine TB

The Senior Assembly Research Officer and Research Officer briefed the Committee on Multiple Claims for Bivine TB, Bovine TB In Wales – Key Milestones 2008/12 and statistical differences between private vets and DARD vets.

This was followed by a question and answer session.

3.30 p.m. Mr Byrne rejoined the meeting.

3.31 p.m. Mr McCarthy rejoined the meeting.

3.35 p.m. Mrs Dobson left the meeting.

3.45 p.m. Mrs Dobson rejoined the meeting.

3.50 p.m. Mr McCarthy left the meeting.

16. Bovine TB Review – Oral Briefing DARD

The following Departmental officials joined the meeting;

Colette McMaster, Assistant Secretary

Colin Hart, Deputy Chief Veterinary Officer

Ian McKee, Principal Officer

The officials briefed the Committee and this was followed by a question and answer session.

4.00 p.m. Mr McAleer left the meeting.

4.07 p.m. Mr McAleer rejoined the meeting.

4.15 p.m. Mrs Dobson left the meeting.

4.25 p.m. Mr Clarke left the meeting.

4.25 p.m. Mrs Dobson rejoined the meeting.

4.30 p.m. Mr McAleer left the meeting.

4.32 p.m. Mrs Dobson left the meeting.

4.39 p.m. Mr Hazzard left the meeting.

4.40 p.m. Mr McMullan left the meeting.

4.45 p.m. Mrs Dobson and Mr Hazzard rejoined the meeting.

4.46 p.m. Mr McMullan rejoined the meeting.

4.52 p.m. Mr McMullan left the meeting.

4.55 p.m. Mr McMullan rejoined the meeting.

Agreed: The Committee agreed to write to the Department to request information on proposals for Finishing/Fattening Units.

4.58 p.m. Mr Swann left the meeting.

5.05 p.m. Mr Swann rejoined the meeting.

5.08 p.m. Mr McAleer rejoined the meeting.

5.10 p.m. Mr Clarke rejoined the meeting.

Agreed: The Committee agreed to move to Agenda item 18 and 19 next.

19. Bovine TB Review – Committee Consideration

5.10 p.m. The Committee moved into Closed Session.

The following Committee Members were present;

Mr Frew, Mr Byrne, Mr Buchanan, Mr Clarke, Mrs Dobson, Mr Hazzard, Mr Irwin, Mr McAleer, Mr McMullan, Mr Swann.

Agreed: The Committee agreed to schedule a meeting on Monday 24 September 2012 at 12.00 p.m. to consider the Bovine TB Review.

5.24 p.m. The meeting was adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Monday 24 September 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan MLA
Mrs Joanne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)

3.11 p.m. The meeting commenced in Closed Session

3. Bovine TB Review – Committee consideration

The Committee discussed the Badger Control Programme/Wildlife Intervention Study, DARD Strategy and Approach, Levels and Incidence Rates and Testing and Surveillance.

4.26 p.m. The meeting was adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 25 September 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Joanne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)

1.34 p.m. The meeting commenced in Closed Session

The following Members were present Mr Frew, Mr Byrne, Mr Buchanan, Mr Clarke, Mrs Dobson, Mr Hazzard, Mr Irwin, Mr McAleer, Mr McCarthy, Mr Swann.

1. Bovine TB Review – Committee Consideration

The Committee considered issues on the testing and surveillance regime and biosecurity.

2.29 p.m. The meeting moved into Open Session

5.12 p.m. The meeting was adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 16 October 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Trevor Clarke MLA
Mrs Joanne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

Apologies: Mr Thomas Buchanan MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Mr Kerry Richards (Clerical Officer)

1.33 p.m. The meeting commenced in Closed Session

1. Review of Bovine Tuberculosis – Draft Committee Report

1.55 p.m. Mr McMullan and Mr Swann left the meeting.

1.56 p.m. Mr Hazzard and Mr McCarthy left the meeting.

2.24 p.m. Mr Clarke joined the meeting.

2.25 p.m. Mr McMullan rejoined the meeting.

2.26 p.m. Mr McAleer left the meeting.

Agreed: The Committee considered the draft report into the Review of Bovine Tuberculosis and agreed amendments to paragraphs 8, 24, 29, 33, 37, 43, 46, 56, 61 and 73. It further agreed paragraphs 1-7, 9-23, 24-28, 30-32, 34-36, 38-42, 44-45, 55-60, 62-72 and 74.

Agreed: The Committee agreed to reconsider paragraph 18 at the next meeting and recommence consideration of the draft report at paragraph 75.

2.34 p.m. The meeting moved into Open Session

13. Date and time of the next meeting

Agreed: The next meeting of the Committee for Agriculture and Rural Development will take place on Tuesday 23 October 2012 at 1.30 p.m. in Room 30, Parliament Buildings.

4.41 p.m. The meeting adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 23 October 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Oliver McMullan MLA
Mr Robin Swann MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Mr Kerry Richards (Clerical Officer)

1.32 p.m. The meeting commenced in Open Session

3.27 p.m. The Committee move into Closed Session

The following Members were present; Mr Frew, Mr Byrne, Mrs Dobson, Mr Irwin, Mr McAleer, Mr McCarthy, Mr McMullan and Mr Swann.

10. Review of Bovine Tuberculosis – Draft Committee Report

Agreed: The Committee considered the draft report into the Review of Bovine Tuberculosis and agreed amendments to paragraphs 85, 87, 90, 94, 101, 102, 105 and 116. It further agreed paragraphs 75-84, 86, 88-89, 91-93, 95-100, 103, 104, 106-115.

3.34 p.m. Mr Byrne left the meeting.

3.40 p.m. Mr Byrne rejoined the meeting.

3.57 p.m. Mr McMullan left the meeting.

4.01 p.m. Mr McMullan rejoined the meeting.

4.05 p.m. Mrs Dobson left the meeting.

4.10 p.m. Mr Dobson left the meeting.

4.11 p.m. The meeting was suspended.

4.29 p.m. The meeting resumed.

The following Members were present; Mr Frew, Mr Byrne, Mr McAleer, Mr McCarthy, Mr McMullan and Mr Swann.

Agreed: The Committee agreed the Membership and Powers.

Agreed: The Committee agreed the Table of Contents.

Agreed: The Committee agreed the Introduction.

Agreed: The Committee agreed Appendix 1-6.

12. Date and time of the next meeting

Agreed: The next meeting of the Committee for Agriculture and Rural Development will take place on Tuesday 6 November 2012 at

1.30 p.m. in Room 30, Parliament Buildings.

4.39 p.m. The meeting adjourned

Paul Frew,
Chairperson, Committee for Agriculture and Rural Development

Date

Tuesday 13 November 2012
Room 30, Parliament Buildings

Present: Mr Paul Frew MLA (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan MLA
Mr Trevor Clarke MLA
Mrs Jo-Anne Dobson MLA
Mr Chris Hazzard MLA
Mr William Irwin MLA
Mr Declan McAleer MLA
Mr Kieran McCarthy MLA
Mr Robin Swann MLA

Apologies: Mr Oliver McMullan MLA

In attendance: Ms Stella McArdle (Clerk to the Committee)
Ms Elaine Farrell (Assistant Assembly Clerk)
Mr Mark O'Hare (Clerical Supervisor)
Mr Kerry Richards (Clerical Officer)
Ms Dagmar Walgraeve (Clerical Officer)

1.31 p.m. The meeting commenced in Closed Session

The following Members were present; Mr Paul Frew, Mr Joe Byrne, Mrs Jo-Anne Dobson, Mr Chris Hazzard, Mr William Irwin, Mr Declan McAleer and Mr Kieran McCarthy.

1. Review of Bovine Tuberculosis – Draft Committee Report

Agreed: The Committee agreed the Executive Summary for the Committee Report on the Review of Bovine Tuberculosis.

Agreed: The Committee considered previous amendments to paragraphs in the draft report and agreed 3, 4, 9, 19, 24, 25, 32, 33, 35, 43, 52, 54, 61, 62, 64, 69, 74, 78, 80, 81, 82, 95, 98, 104, 106, 110, 111, 112, 114, 115 and 125.

Agreed: The Committee agreed the Recommendations contained in the Committee Report.

Agreed: The Committee agreed the Committee Motion and agreed that one and a half hours should be allocated for the debate.

Agreed: The Committee agreed that an advance copy of the report should issue to the Department.

Agreed: The Committee agreed that the Chairperson could sign off the relevant extract from the minutes of today's meeting so that it could be included in the Committee report.

Agreed: The Committee agreed that the report on the Review of Bovine Tuberculosis should be ordered to print.

1.53 p.m. The meeting moved into open session.

4.02 p.m The meeting adjourned.

Paul Frew, Chairperson, Committee for Agriculture and Rural Development

Date

Appendix 2

Minutes of Evidence

Appendix 2 – Minutes of Evidence

24th April 2012	Northern Ireland Audit Office
1st May 2012	Department of Agriculture and Rural Development
1st May 2012	Agri-Food and Biosciences Institute
1st May 2012	Institute of Agri-Food and Land Use Queens University Belfast
8th May 2012	Northern Ireland Agricultural Producers' Association Ulster Farmers' Union
15th May 2012	Farmers for Action
22nd May 2012	Vet NI
29th May 2012	Northern Ireland Badger Group Ulster Society for the Prevention of Cruelty to Animals
12th June 2012	Food and Environment Research Agency
19th June 2012	National Trust
19th June 2012	Ulster Wildlife Trust
3rd July 2012	Minister for Agriculture and Rural Development Department of Agriculture and Rural Development
11th September 2012	Department of Agriculture and Rural Development

24 April 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mr Trevor Clarke
Mrs Jo-Anne Dobson
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Joe Campbell	*Northern Ireland*
Mr Robert Hutcheson	*Audit Office*

1. **The Chairperson**: I welcome Robert Hutcheson, a director in the Northern Ireland Audit Office (NIAO) and Joe Campbell, a general audit manager. You are very welcome to the Committee. I know that you have a briefing for us. After we have heard that, we will open the meeting for questions. Please proceed.

2. **Mr Robert Hutcheson (Northern Ireland Audit Office)**: Thank you, Chair, and good afternoon. We very much appreciate the opportunity to talk to the Committee about bovine TB. The Audit Office and the Public Accounts Committee (PAC) have invested a considerable amount of time and effort in examining the topic, and we are very pleased that you are taking a close interest in it.

3. First, I propose to briefly highlight the main themes from the NIAO and PAC reports. Secondly, I will provide, where possible, an update on progress made by the Department of Agriculture and Rural Development (DARD) over the past three years and highlight some of the sticking points. Finally, I will give the Committee an indication of what we see are the key issues going forward.

4. I should make it clear that we have not done any more fieldwork on bovine TB since 2009, when the NIAO and PAC reports were published. Therefore, not all of our information may be up to date. However, we have been able to pick up some more recent data from the Department, which has been very helpful in that regard, and one or two other sources. I should also make it clear that we do not claim to be experts on bovine TB and are not scientists or vets. We had professional input into the work that we did, but we are very much independent and objective observers, and that position proved quite useful in giving a different perspective to certain issues. The final thing that I want to make clear, in case the Committee is not aware of it, is that the Audit Office remit is such that we do not input to policy. Policy issues lie outside our remit and are the preserve of Ministers. Our role is to look at the implementation of that policy, which is the role of the Civil Service.

5. Fundamentally, there were two big messages in the Audit Office and PAC reports: the high incidence of the disease; and the enormous cost. Despite the long-standing nature of the problem and the huge cost, the Department seemed to be no closer to eradication than it was 15 years earlier. The incidence of bovine TB began to rise significantly from the mid-1990s, to a point in 2001-02 when it seemed to be pretty much out of control. You can see that trend in figure 1 on page 2 of the NIAO written submission. You will see that it rose from about a 4% incidence in herds that were tested in 1996 to a peak in 2002, at which point we had the highest levels of bovine TB in Europe. Thereafter, it began to drop and, by 2007, herd incidences had reduced to about 5·5%, although that was still significantly higher than the pre-1997 levels. Interestingly, over the past four years, the levels have remained largely static. However, there was an increase over the past year, with herd incidences

of just over 6% recorded in December 2011.

6. The significant increase in the incidence of bovine TB has had a major impact on public expenditure. Over the 15 years to March 2011, DARD spent £317 million on its bovine TB programme. The main elements of that expenditure were £132 million on compensation paid to farmers for the compulsory slaughter of animals; £86 million paid to private veterinary practitioners for herd testing; and DARD staff costs of £71 million. You can see that trend in figure 2 on page 2 of the written submission. The component that has changed most over the 15 years is the compensation figure. It is lower than it was 10 years ago, but it is still very substantial; in fact, it was about £8·6 million last year. The total annual expenditure remains high. In 2010-11, we were talking about £23 million.

7. In addition to that, there is the cost to farmers of the time associated with testing. When we did our audit, that was calculated at just under £2 million a year, and it may have risen since then. Despite the huge cost, the evidence clearly shows that we are still many years away from achieving eradication. That is something that the PAC felt very strongly about. It commented that spending hundreds of millions of pounds each year on a programme that was not explicitly aimed at eradicating the disease seemed a very poor use of taxpayers' money.

8. There were several important themes in the report relating to the more detailed operational level. There were various issues around testing for bovine TB. As you know, the skin test is the primary means of detecting bovine TB in cattle. Unfortunately, however, it is not a wholly reliable test, and it fails to detect as many as one in four infected animals. Therefore, infected animals can remain in a herd even after skin testing.

9. There is also the gamma interferon blood test, which is an ancillary test that can be used to complement the skin test. It has a higher sensitivity, so it will detect infected cattle that are missed by the skin test. However, there is a problem with the specificity of the blood test. Its weakness is that it will create a number of false positives: it will appear to show reactors that, following post-mortem laboratory testing, are found not to be infected. However, it is still a useful ancillary test, and, after 10 years of consideration, DARD introduced the blood test in 2007 as a supplementary to the skin test, but still only on a voluntary basis, so the farmer has to agree to have that used in their herd.

10. The overwhelming amount of tests are carried out by private veterinary practitioners, and there is no doubt that private vets have made a major contribution to DARD's bovine TB programme. Similarly, there is no doubt that, in the majority of cases, they have very diligently carried out their duties. However, there was evidence that, on occasion, not all private vets managed to meet the high standards required. The PAC commented on a number of problems, such as the late reporting of test results, testing of exempt animals, failure to check dates of birth and use of out-of-date tuberculin, all of which undermine the fight against the disease. That said, it is worth noting that PAC commented that those shortcomings also reflected on DARD. It pointed to a lack of supervision and control by the Department over private vets.

11. The other particularly notable issue with private vets was that, in two comparison exercises, DARD found that, on average, its in-house vets were between 1·5 and 1·8 times more likely than private vets to classify a herd as a breakdown during testing, but, unfortunately, they could not determine why.

12. As well as testing, biosecurity was an important area and a difficult one, particularly in view of the nature of farming here. The often small fragmented farm structure and strong dependence on conacre and the high levels of movement between and within herds and to markets all facilitate the spread of bovine TB. When we did our review, analysis by DARD showed that the largest individual source of bovine

TB infection was from neighbouring herds. That was about one in three cases. More recent analysis has reaffirmed that that remains a major issue. You may be aware that DARD launched a biosecurity code in 2004, and one of the recommended measures is three metre-wide double-fencing to prevent nose-to-nose contact between neighbouring herds. However, a DARD survey 10 years ago found that only 21% of fencing was nose proof. Therefore, that seems to remain a significant problem.

13. There is also the wildlife issue, particularly in relation to the badger. DARD attributed around one in six outbreaks to wildlife, and the Ulster Farmers' Union and the two veterinary associations made very strong representations to us and to the PAC about the need to deal with the wildlife problem. However, PAC found that DARD had not intervened in any way to tackle the wildlife factor. Therefore, that remains a big issue.

14. PAC also looked at compliance with the EU directive on bovine TB and noted several areas of underimplementation or non-compliance. For example, for years, DARD had not been complying with the EU directive on inconclusive test results. It allowed two retests rather than the one permitted by the EU, and the reason given was that compliance at that stage would have cost £1·1 million annually. Ironically, however, through its non-compliance, DARD cut itself off from additional funding, which it could have claimed from the EU veterinary fund to help eradicate disease. Therefore, there was a loss of millions of pounds of potential income.

15. Isolation of reactors was and remains a problem in a number of herds, particularly in dairy herds where animals are in housing. PAC's view was that there was an onus on the industry to meet the requirements of the EU directive and that farms should be properly equipped to apply the standard control procedures.

16. The final area looked at was compensation, enforcement and fraud. I said earlier that compensation has been the largest individual cost area over the past 15 years. Therefore, I will mention two issues that PAC specifically referred to in the report. The first issue was an endorsement of DARD's intention at that time to link non-compliance with the biosecurity code to the level of compensation awarded. However, as it later transpired, that did not materialise in bovine TB cases. I believe that line is being applied in brucellosis cases but not in bovine TB cases.

17. The other issue was that there were a number of cases where multiple compensation claims had been paid to the same herd owners. To set the context, the PAC report referred to an analysis of farmers who had multiple claims paid over a three-year period. At that stage, the top six had between them 67 separate claims paid over a three-year period. The top compensation was £482,000, which was paid to one farmer in respect of 12 claims. The next highest was £393,000 to another farmer in respect of 19 claims. PAC readily acknowledged and recognised that it can be very difficult to eradicate bovine TB from herds, but it was concerned about the question of whether a 100% compensation rate provided sufficient incentive for herd owners to prevent infection. PAC's view was that it did not think it was right that the cost of repeated disease breakdowns rested almost entirely with the taxpayers; it felt that, in such cases, a share of the costs could or should be borne by the industry.

18. Overall, PAC's conclusion was that the Department's progress in tackling bovine TB had been much too slow. For example, it was slow to tackle the rise in disease incidence, slow to respond to the problems around testing, slow to take action on the wildlife factor, and so on. PAC readily accepted that eradication presented a major challenge but felt that if DARD were to make real progress, it would need a fundamental change in its mindset and would need to take a much more strategic approach, with a clear focus on eradication rather

than merely containing the disease. That is a very quick summary of the report, but I hope that it gives a reasonably good feel for the main issues involved.

19. I will now update the Committee on how things have moved on since the PAC report in 2009. I will not go through all the PAC recommendations, but I will cover most of them. I will break it down into three groupings: first, the areas where I think there has been significant progress; secondly, the matters that appear to have progressed less well; and finally, a small number of issues that the Department has not taken on board following the PAC report.

20. I will deal first with the areas where we think there has been significant progress. I think that you all have a copy of the summary of the PAC recommendations. DARD has made a number of improvements. Recommendation 3 is about the policy review process. That has been improved so that now, once a review has been completed, the results will be considered and implemented in a much more timely fashion, with progress monitored by top management. That is certainly an area where there were big delays in the past, and it has taken many years to implement the 2002 policy review.

21. Recommendation 4 is about private vets. DARD has certainly improved its partnership arrangements with private vets. It now meets them on a regular basis and exchanges performance data. It has also revised its private vet supervisory protocol, which will include sanctions for dealing with poor performers. That has not been introduced as yet but hopefully will be in the not-too-distant future.

22. Recommendation 10 is about lay-testing. DARD carried out a lay-testing pilot study between June and December last year, following a similar successful review by the Department for Environment, Food and Rural Affairs (DEFRA). That pilot is currently being evaluated. It has the potential to reduce testing costs in due course by about £350,000 a year.

23. In relation to recommendations 22 and 23, DARD is at last compliant with EU rules on inconclusive tests. So, it now allows only one retest of an inconclusive result rather than two, as was the case in the past. Now that DARD is compliant, it is eligible to claim from the EU veterinary fund. As a result, it has been awarded around €5 million a year for 2010-11 and 2011-12. That is good news, and it means that there is additional funding to help fight bovine TB.

24. Recommendation 25 is about fraud investigation. DARD is improving its evidence-collection process. It is just about to introduce a new DNA tag procedure that will help to detect cases where reactor animals have been fraudulently switched between test and slaughter, which happens from time to time. More widely, DARD has commissioned a number of research projects and literature reviews from the Agri-food and Biosciences Institute (AFBI), including a major TB biosecurity study in a high prevalence area in County Down. That involves some 200 farms. The fieldwork was completed in July last year. The results are currently being evaluated and we expect them to be available in late summer this year. Again, good progress is in prospect in that area.

25. Those are all areas in which progress has been made. However, there are also a number of other areas in which progress has, at least to date, not been so encouraging, and I will run through those. Recommendation 1 of the PAC report called for:

"a marked and sustained reduction in the prevalence of bovine TB" .

26. As I mentioned earlier, the position has remained fairly static over the past four or five years, but there was a recent increase. The level of incidence has now risen to 6·3%, which, in relative terms, is quite high. DARD assured the PAC that it was serious about eradication, but said that it was taking a phrased approach. Phase 1 of that approach would be the

five years to 2014 — we are still in the midst of that — during which DARD said that it would carry out research and analysis to assess how best to proceed. Thus far, there has been no marked and sustained reduction in the incidence of the disease.

27. Recommendation 2 dealt with performance targets, and DARD has not yet set a target date for eradication. It has said that there is insufficient analysis or evidence to do so and that it will review the position at the end of phase 1 in 2014.

28. Recommendation 5 dealt with the comparison of bovine TB detection rates between DARD in-house staff and private vets. Earlier, I referred to the DARD analysis, which showed that in-house staff were between 1·5 and 1·8 times more likely to classify a herd as a breakdown than a private vet, but DARD could not explain why that was the case. More recent analysis has reaffirmed that differential. In 2011, the figures showed that DARD staff were 2·16 times more likely than a private vet to classify a herd as a breakdown, but DARD still cannot explain why. We understand that the Department's response going forward will be to rely on increased supervision of private vets and departmental staff to try to resolve that differential.

29. Recommendations 6 and 12 related to private vet testing standards and enforcement and a review of the contractual arrangements with private vets. Those have been long-running issues. The review of contractual arrangements was recommended by DARD in it policy review in 2002, but it took until 2005 to engage consultants. They reported in 2006 and recommended a range of improvements. Discussions with vets associations and colleagues in England and Wales on similar issues followed, but, as yet, the revised arrangements have not been implemented. We understand, however, that DARD is setting up a formal project to take the issue forward. In fairness, I think that it is a difficult area, but it has taken rather a long time to progress.

30. In making recommendation 13, the PAC thought that there was a strong case for introducing compulsory blood tests in problem and high-risk herds, and it recommended that a blood test trial should be undertaken in a high incidence area as a basis for a cost-benefit assessment. That blood test trial started last year. We are told that it is three-year trial and that it will be at least 2014 before the results are clear.

31. Recommendation 15 of the PAC report dealt with biosecurity training for farmers. The PAC wanted to see a much higher level of attendance by farmers at biosecurity training sessions and compulsory attendance for those farmers whose herds had suffered repeated infection. Surprisingly, DARD rejected the idea of compulsory training in such cases, and, overall, the statistics are disappointing. From 2004 until March of this year, only 1,394 herd keepers out of 26,000 had undertaken that training.

32. Recommendation 17 relates to the wildlife factor. In 2009, DARD responded to what the PAC said about carrying out a badger prevalence study. That is a study to determine the level of bovine TB in the badger population. That study has not yet begun, which may indicate a rethink, because our understanding is that such a study would involve the culling of badgers. As you may be aware, plans to cull in England and Wales ran into problems following opposition from animal welfare groups. A judicial review into that area has been announced in England, so it is a difficult one to progress. The Department has also commissioned various literature reviews on the role of badgers in the transmission of bovine TB, but the bottom line is that, to date, there has been no intervention by DARD on the wildlife issue.

33. Those are areas in which we think there remains quite a bit more work to be done. There are also a few areas where DARD has not taken PAC's recommendations on board. Recommendation 14 was on updating the survey of boundary fencing. I

mentioned earlier that the 2002 review had found that only 21% of external boundaries on farms were nose-proof. DARD's view was that the cost of updating that figure would be enormous and that it was not, therefore, feasible. As you can imagine, there is a huge amount of boundary fencing around Northern Ireland.

34. Recommendation 16 related to the pre-movement testing of animals moving within Northern Ireland. There is pre-movement testing for animals that are being exported, but not for those that are being moved within Northern Ireland. DARD's policy review concluded that pre-movement testing was worth doing, and the PAC suggested using it on a trial basis in a high incidence area. However, DARD felt that its annual herd-testing arrangements were sufficient, so it did not take that suggestion on board.

35. I have already mentioned recommendation 24. It related to reducing compensation for multiple claims by the same herd keeper. DARD said that it was outside its powers to do that.

36. Finally, recommendation 26 was on paying reduced levels of compensation to convicted fraudsters in respect of future bovine TB claims. DARD said that it was not considered legally defensible to use a previous offence to withhold future compensation, and it felt it would be difficult to establish that withholding future compensation was proportionate as a deterrent to committing an offence.

37. All in all, it is a mixed bag. There are some encouraging improvements, but there are other areas in which progress has taken a little bit longer than expected. I am conscious of the fact that I have been talking for some time, but let me finish with a few brief words on what we think are the key issues going forward, based on the evidence that we have seen. First and foremost, the Department has to take decisive action to bring about a marked and sustained reduction in the prevalence of bovine TB, and thereby drive down the cost. Its action plans have to include a target date for eradication. Secondly, we think that the Department has to clarify its thinking on the wildlife factor and translate that into action. Third, biosecurity on many farms needs to be improved. Fourthly, it is very important to keep abreast of developments and research, and we think that that is particularly so around badger vaccination and developments in the quality of the skin tests and blood tests. Finally, on a more general note, we feel that DARD must seek to deal on a much more timely basis with the various issues that arise in dealing with the bovine TB problem. We recognise that there are various constraints, such as resources and other priorities. However, undue delay was very much a recurrent theme that was noted during our examination and by PAC. It certainly has not helped DARD get to where it needs to be. That is all that I want to say, Chair.

38. **The Chairperson**: OK. Thank you very much, Robert. Before we open the floor for questions, I remind members that the Audit Office can only talk about the reports that it and PAC produce and the response and activity of the Department, rather than about policy or the policy-makers. Therefore, please be guarded when you ask questions, members. I must say that I will probably fall into the same trap, Robert.

39. **Mr Hutcheson**: As long as I do not.

40. **The Chairperson**: My first question is high-level. Both your report and the PAC report are very damning in their overall conclusion that the Department's progress in tackling bovine TB has been much too slow. There is acknowledgement that although eradication of bovine TB in Northern Ireland represents a major challenge to the Department and the industry, there needs to be a fundamental change in mindset if DARD is to make real progress. The PAC report states that:

"it must adopt a much more strategic approach, with a clear focus on eradication of the disease rather than mere containment."

41. That is pretty damning of the Department's, if you like, knuckle-

trailing, heel-dragging and everything else that goes with that.

42. The date of the updated report is 10 January 2012. In the memorandum of reply, DARD states in response to recommendation 1 of the PAC report that its aim in the first five-year phase of the strategy — and you referred to this — is to lay the foundations for the eventual eradication of the disease. It goes into detail. It states that in that phase, its goals are to maintain trade and produce more effective and efficient ways to reduce transmissions of bovine TB between cattle and between wildlife and cattle. Those are the building blocks of that foundation in the first years. However, I do not see any evidence of the Department actually doing anything in the first five years. If you want to maintain trade, surely a reduction in the disease itself will not only maintain trade, but increase it? The Department talks about effective and efficient ways to reduce transmissions of bovine TB between cattle. That is a biodiversity issue, which also relates to the movement of cattle. It also talks about reducing transmissions between wildlife and cattle. Again, surveys and work are to be done. Again, there seems to be a reluctance from the Department to do anything on that. The approach seems very much to be to wait and see what happens in Wales and England.

43. The opportunity has been missed to set a target for eradication in the Programme for Government. It seems to me that the Department will wait until the end of the first five-year period before it comes to a conclusion on an eradication date. Surely, because the Programme for Government takes in that period, the place and time to come up with a plan and an eradication date would have been when it was being drafted? What are your thoughts on the Department's activity during the past five years? I know that you have not done a lot of work on that since your report and the PAC report were produced. Despite such a damning conclusion, not much seems to have been done during the first five-year phase of the strategy to lay that foundation.

44. **Mr Hutcheson**: Certainly, we were surprised when we saw that in the DFP memorandum. The five-year phase 1 seems to be very much about evidence-gathering, research and analysis. There is certainly no hint of any step up in action to actually push forward the idea or programme of eradication. Again, illustrated by the trend in the graphics that I referred to earlier in the written submission, you can see that over the past four or five years, incidence has remained largely static. There has certainly been a slight increase recently. There is nothing there that suggests to us that the serious action that PAC called for in starting to eradicate the disease has begun as yet. As you said, Chair, the Department's line is very clear: it regards this as phase 1, where it gathers information. One hopes that phase 2 will show a marked step up in activity to start driving down incidence of the disease.

45. **The Chairperson**: It seems to be the case that the Department is centring on containing TB and, if you like, cost-saving strategies and that it is not so much missing a trick with reduction and eradication.

46. **Mr Hutcheson**: I am not so sure about the cost saving, because it is spending £23 million a year, which is a huge sum. Again, figure 2 in the NIAO written submission shows that, in overall terms, it is not that much different from the annual cost in 2002, when the disease was at its peak. What has been reduced is the amount of compensation. However, there are various other costs, such as testing costs, staff costs and that sort of thing, which continue to be very high. The only way to make any big inroad into this over time is to drive down incidence of the disease.

47. **The Chairperson**: How do you feel — and I know that you brought it out in your report, and it was in the PAC report — about the levels of compensation? What is your belief? Of course, it says in the report that thought should be

given to reducing compensation. What measures do you think could be put in place so that where people have a high incidence of claims, or there is a high incidence level where it is proven that the farming industry has not put in place sufficient measures to tackle the disease themselves, the levels of compensation could be changed so they did not get the full amount? If it is proven that it was something that was done on the farm, that would affect the level of compensation that you would get. That would mean that the farmer who gets a reactor, through no fault of his own or his practices, would be given the full amount of compensation. That could help with eradication. Such a measure could lead to a reduction in and eradication of the disease.

48. Again, another method that could be used is pre-movement testing within Northern Ireland. What are your thoughts on that? Is it something that the Department should be looking at, so that, instead of a complete ban or cap on compensation, there would actually be varying degrees of compensation depending on how much biodiversity there is on a farm and what practices are conducted on it?

49. **Mr Hutcheson**: The Audit Office certainly supports the PAC's line on this. Compensation is very expensive. I do not think that anyone in the Audit Office or the PAC has any problem with the principle of fairness in respect of compensation. However, in our view, where there is a breakdown on a farm and it is quite clear that the herd keeper has made little or no effort to adhere to biosecurity standards, there is certainly a strong case for looking at the level of compensation paid. That situation is distinct from one where a herd keeper has quite clearly done everything he or she can to keep out the disease. On that basis, we think that it is worth revisiting the issue and perhaps tying compensation to biosecurity implementation.

50. **The Chairperson**: I have one final question before I open it up to members. DARD seems to do a lot of testing, as do the vets. There seems to be inspection after test after inspection after test after test, which leads me to the conclusion that, at the minute, it is more about containment than eradication. We know that the skin test is unreliable and that the blood test is used throughout the British Isles in various forms. We really need to get to the point where blood tests are used more. In your opinion, is it the case that it is down to cost alone?

51. **Mr Hutcheson**: When we did our work, the blood test was much more expensive relative to the skin test. I think that it was £20 as against £2·50. There were also some logistical difficulties around taking the blood test and getting it to the lab within a certain time; things like that. It is interesting that, in Scotland, for example, use of the blood test is compulsory in new herd outbreaks. Earlier, I mentioned that the use of the blood test in Northern Ireland is voluntary. Different options can be looked at. We do not want to be prescriptive about it. PAC suggested that there should be some form of trial of the compulsory use of the blood test within a high incidence area. That would, hopefully, provide some evidence to look at the impact of that on the high incidence area and perhaps other measures, which might go some way towards informing a change in policy.

52. **The Chairperson**: You mentioned that the top six claimants, if you like, had 67 claims between them . Would blood testing go some way towards reducing that reaction and the chances of high incidence occurring again? Would it help to break the cycle?

53. **Mr Hutcheson**: In a case like that, where you have repeated breakdown after breakdown, you really have to do something to break the cycle. You cannot just keep paying compensation. It probably involves a combination of factors. You have to look at biosecurity. You have to consider the use of the blood test. You may have to look at things like pre-movement testing in or out of such herds or areas and biosecurity in respect of the badger. There is a lot of different

science and differing views about the role of the badger and the extent to which it impacts on the spread of the disease in such cases. I understand that there have been trials in England in which they have fenced off badger setts and made buildings such as food supply stores very secure using sheet metal — top grade security to combat the potential wildlife threat. They have had some success. So, I think it is probably a combination of issues. It may not always be possible to determine which particular measures have the greatest effect. However, where you have a chronic situation, it is more important, initially, to try to reduce the level of infection. Afterwards, you can try to figure out the impact of specific measures.

54. **Mrs Dobson**: Thank you, Robert, for your very detailed presentation. I think that the answer to the eradication of TB is in the farmyards across Northern Ireland, not on the desks of DARD. As the Chair said, farmers are constantly dealing with herd inspections and disruptions to their business. They are working with DARD's legacy of failure every day. What input has your committee had directly with farmers? For example, have you visited a farm? Have you actively sought farmers' views? Have you visited during a TB test to understand the full impact?

55. **Mr Hutcheson**: Yes. During our work, we spoke to the Ulster Farmers' Union. We got a formal submission from it, as indeed did PAC. We went out —

56. **Mrs Dobson**: Were you actually on farms?

57. **Mr Hutcheson**: Yes. We went out. We visited a farm for a full day during herd tests to understand the process and, as you quite rightly say, its impact.

58. **Mrs Dobson**: So you are fully aware.

59. **Mr Hutcheson**: We are aware of that. We have been doing herd testing annually for many years. I can well understand that there is a lot of frustration in the farming industry. On the point that the Chairman made, this is happening year on year on year, but seemingly on the basis of containment rather than making ground in eradication.

60. **Mrs Dobson**: I have to declare an interest as a farmer, but there is total exasperation.

61. The County Down biosecurity study will be of great interest when it is published. You said in your presentation that practical steps could be introduced now to help reduce TB and bring down compensation. Do you agree that DARD needs to do more to enable farmers to improve their fencing? You said that the cost of the double-fencing and the fact that it is not compulsory means that not many farmers are doing it.

62. **Mr Hutcheson**: The biosecurity code is quite clear on double-fencing — three-metre, nose-proof — and the EU has said the same. The cost that I referred to relates to updating the figure of 21% through a DARD survey to see what the current level of compliance with double-fencing is.

63. **Mrs Dobson**: Have costings been done for this double-fencing?

64. **Mr Hutcheson**: No, but the —

65. **Mrs Dobson**: I know that it would be a big outlay, but so is the millions paid in compensation.

66. **Mr Hutcheson**: The memorandum of reply following the PAC report talks about 55 million metres of fencing, 120 million metres of hedgerow, 8 million metres of stone walls and so on. It states that the cost of surveying the boundaries would just not be worth it and that it would not be feasible.

67. **Mrs Dobson**: It would not all have to be surveyed if you know that double-fencing works in preventing nose-to-nose contact. DARD officials spend little enough time on the ground, so I cannot imagine them going round and surveying every fence.

68. **Mr Hutcheson**: No, they will not. A survey of farmers has also been ruled out. The County Down survey has a component looking at boundary fencing and the effect of proper boundary fencing, so hopefully we will get more information on that.

69. You made another point about the cost. Our sense is that the 21% figure that I mentioned is probably not that far from where we sit today. If DARD feels that double-fencing is a necessity and there are real problems in the industry with the cost of providing double-fencing, that is an area that needs to be looked at. I do not want to stray too far into what DARD might do about that, but you mentioned —

70. **Mrs Dobson**: It seems logical to me, given that it has been identified that double-fencing is needed.

71. **Mr Hutcheson**: That is the key. If the biosecurity studies show that there are real benefits to be achieved from having nose-proof fencing, it is incumbent on the Department to look at ways in which it can make it happen on the ground.

72. **Mrs Dobson**: Is your recommendation to have additional biosecurity measures such as double-fencing?

73. **Mr Hutcheson**: Our view is that the biosecurity code is very comprehensive and seems to make sense. Clearly there is a cost to both DARD and the industry in implementing it —

74. **Mrs Dobson**: Some £317 million in compensation is also a heck of a cost.

75. **Mr Hutcheson**: But look at that against the bigger picture. You can do the sums. As I said earlier, the real cost-saving measure, ultimately, is driving down the incidence. Anything that can contribute meaningfully to that is very worthy of active consideration. I do not want to go further than that because you have to look at the evidence base. However, based on DARD's advice —

76. **Mrs Dobson**: Every farmer in the country knows that double-fencing would be ideal in preventing nose-to-nose contact.

77. **Mr Hutcheson**: As I said earlier, I am not a scientist. However, studies have shown that the spread of the disease is most likely to happen through nose-to-nose contact, whether that is from neighbouring herds, at markets or whatever. If that is the case, something has to be done about it.

78. **Mrs Dobson**: Farmers want a solution. They know what needs to be done, but I think that DARD is standing in the way of their getting it.

79. **Mr Irwin**: I had better declare an interest since I am a farmer. Although I can, at times, be as critical of the Department as anyone else in relation to TB, I feel that some of the recommendations in the PAC report could be investigated from the armchair but are not practical on the ground. Double fencing across Northern Ireland is totally impractical. Thousands on top of thousands of miles of fencing would need to be done. The nature of Northern Ireland farming is small farms and a lot of rented land that is owned by pensioners. I do not think it is practical to have double fencing. We certainly want to see the eradication of TB. I am not sure that it is going to happen in the near future, and I am not sure that it is possible. Look at mainland Britain and Southern Ireland. The incidence of TB in mainland Britain has been on the rise in recent years. It is a major problem.

80. I am sure that you will agree that the Department should be looking at the blood testing, especially in severe cases. I am not so sure if the PAC is aware of the fact that there are different strains of TB, some of which are more virulent than others. I am seen herds in which several hundreds of animals have gone down with a very contagious strain of TB, and another herd in which only one animal has gone down. I am sure the Department will agree with that. It is very easy to make recommendations, but the practicalities of some of this on the ground are more difficult, and I am sure you will accept that.

81. **Mr Hutcheson**: It is an enormously difficult problem for the Department. I will pick up on one or two of your points, Mr Irwin. The double fencing recommendation is not the PAC's idea or the Audit Office's idea; it is the Department's standard, rightly or wrongly. I do not disagree with you in any

sense about the real practical difficulties of double fencing or whether, ultimately, there is a realistic prospect of having a fully comprehensive implementation. That is a matter for the Department. However, if the Department is setting the standard, either the standard has to be applied or, perhaps, the Department needs to look at it again.

82. You are right in what you say about the nature of farming. The use of conacre complicates matters and makes it much more difficult. That is something the Department has to factor into its thinking. It has to ask what standard it wants to set and how best it can be applied.

83. You also mentioned bovine TB across the water. It is interesting to note that Scotland has a much lower incidence level than certain parts of England. There are high incidence areas in the south-west of England in such areas as Hereford, Worcester and Gloucestershire and down into Devon and Cornwall. However, not all areas are at that level. I do not pretend to understand why that is the case, but there are differences. Here in Northern Ireland, however, that is not the case. I know we have our hotspots, but it is a problem across Northern Ireland as a whole. It is not as if there are certain pockets that are free of the disease. So I agree that it is not an easy one to tackle in any sense.

84. **Mr Clarke**: I am bewildered, like my colleague Willie Irwin, at even Jo-Anne advocating double fencing. There is another aspect to double fencing. There are many small farms in Northern Ireland. Who owns the piece of land between the two three-metre fences? Who is going to write that land off as not being eligible for the purpose of single farm payment? Will the savings that are made in the reduction of bovine TB by taking three-metre strips off every field in Northern Ireland outweigh the amount of money that will be lost to Northern Ireland in single farm payments? You mentioned Scotland and said that the incidence of bovine TB was low there. However, the last time that I visited Scotland, I saw that most fields had stone walls around them that were not three metres apart. I am surprised that someone in this Committee thought that was a good idea.

85. Robert, the other point that I wanted to raise is about your graph. I thank you for your presentation, which has been very useful. However, I am struggling with something in figure 2. That graph is useful in one respect, but it probably does not answer the question that I am going to ask you — so that is why I am going to ask it. Is there any reason why the staffing costs in 2006-07 almost doubled from the cost 2002-03, yet the incidence of TB did not reduce? With the doubling of staffing costs, why was there not a halving of the incidence? Is there a correlation between higher staffing costs and a reduction in the level of bovine TB? Figure 2 does not seem to suggest that there is.

86. **Mr Hutcheson**: I do not think that there is a direct correlation; in any case, there would be a time lag in the impact. From recollection, I think the Department engaged a number of additional staff in 2004. Bovine TB was looked at by the Westminster PAC in 1993 or 1994. One of its recommendations was to increase the number of in-house staff, because, at that stage, in-house staff were markedly cheaper than using private vets. However, for various reasons, that did not happen for a number of years, until more staff were taken on in the early 2000s. The sense of it is that, if the Department were to take on more temporary veterinary officers or more veterinary officers were engaged in testing, any additional work they did would be offset against a reduction in work by private vets.

87. **Mr Clarke**: That does not seem to be the case. It would be useful if you could forward to the Committee figures showing the difference in costs for in-house staff and for private veterinary practitioners. Although the graph shows the overall expenditure, it does not give us a direct comparison. I am curious why the number of private veterinary practitioners has not reduced if the staffing costs have increased.

88. **The Chairperson**: Departmental officials will be with the Committee next week; that is a good question for them.

89. **Mr Hutcheson**: I am not trying to pass the buck, but we took the updated figures from DARD. We will have a look at that.

90. **Mr Clarke**: The other issue is that the compensation almost halved in 2006-07.

91. **Mr Hutcheson**: The amount of compensation purely reflects the level of incidence in any given year. You may see a reduction in the incidence, but, for example, annual herd testing is still being done. If the incidence drops, through time you would expect the levels of at-risk or restricted herd testing to drop slightly. However, the bulk of the testing is the routine herd testing and, while you are on an annual herd testing regime, those levels will remain pretty constant.

92. **Mr McMullan**: You mentioned the top six claims: it would be interesting to know the total number of animals involved in those, and whether the same farmers or their family members were making repeat claims. That sort of information needs to come back to the Committee. It was interesting to listen to you, and I thank you for your presentation. We have talked about fences and contact, but we have not really mentioned the badgers. Was that deliberate, as we are no better off in our knowledge of where it all starts?

93. Wide fences are supposed to stop the spread of bovine TB. However, the farming community argue that they do not and that, in fact, they create more problems. As Mr Clarke said, in Scotland, where the incidence is low, there are mostly stone walls. It is fine having this report, which, as you yourself would say, is scathing. However, in a scathing report, there needs to be some indication of how to bring the incidence down or how to find a solution. Yet, nowhere in this are there any solutions. It talks about skin tests and blood tests not being conclusive. However, what conclusive steps could the farming community take to help to eradicate the disease? In any presentation I have heard from those in the farming community and their representatives, they say that the problem is badgers. The Government in England made the decision to cull badgers, but we are still waiting for that to happen there, because a judicial review has now been granted. It comes back to this question: is culling badgers the answer to the problem?

94. **Mr Hutcheson**: That is a great question to which there is no definitive answer. If you talked to 10 scientists, you would probably get 10 different answers. Let me mention a few things around that. The double-fencing that I mentioned earlier is to prevent cattle-to-cattle contact. Badgers are a separate issue. Particular fencing can be put around a badger sett if badgers are perceived to be a problem, and that has been done.

95. Various studies have been done on the impact of badgers on the transmission of bovine TB and the prevalence of the disease. There have been major culling projects: a 10-year culling project in Great Britain and the four-areas trial in the Republic of Ireland. In both cases, the view was that major long-term badger culling is not the answer to the problem. The view is that it could be of use in certain circumstances where it is used reactively in particular areas of difficulty but that widespread culling of badgers is not the answer. The Republic of Ireland has a culling policy, which is, I think, on a reactive basis. Some figures we have seen suggest that in the region of 4,000 badgers a year are culled; that varies up and down. I believe that that is done on a reactive basis, but if enough reactive culling is done, it ends up almost being proactive.

96. I think the Committee's timetable says that you are to hear from representatives from the Republic of Ireland as part of the inquiry. Are they not coming?

97. **The Committee Clerk**: No.

98. **Mr Hutcheson**: I thought that they were. They might have been able to throw more light on it.

99. What information do we have here on the prevalence of bovine TB in the badger population? The Department had been talking about carrying out a badger prevalence study, but that has not been done. So, the information available here is based on tests carried out on badgers killed on the roads. It was found that something like 16% or 17% of those badgers had tuberculosis. Other studies have suggested that addressing the badger problem would reduce the prevalence or incidence of the disease by something like 16% or 17%. So, 80%-plus of the infection still comes from other sources. As regards what is being done here, I know that the Department has commissioned a number of studies and literature reviews by AFBI on the badger. However, in the absence of something like a prevalence study, the extent to which you can actually determine the impact of the badger will be limited. Culling has run into trouble in England and Wales. There is no reason to believe that it would not run into trouble here if the Department actually set about trying to do something like that. The legislative base in the South is different to that which exists here and in England and Wales. That probably impacts on why they can do certain things that, perhaps, we cannot do here.

100. Therefore, I agree with you: the Ulster Farmers' Union has been very strong in its representations to us about the impact of the badger and that something needs to be done. However, the Department has not as yet determined what that should be.

101. **Mr McMullan**: The point that I am making is that representations from farmers are fixed solely on one cause of the disease, but do we have proof of that? A false message could be going out to farmers. You talk about nose-to-nose contact in herds. We got figures indicating that there is no big difference between dairy and beef cattle with regard to the number of infected animals that are slaughtered. That includes reactors. It has been suggested that cattle movement is an issue, but the dairy herd is static, for want of a better word. It does not move around as much as beef cattle, which move around farms and between different farms. Therefore, the argument about cattle movement and nose-to-nose contact does not weigh up. There is no evidence of that. Indeed, as I have said, if you look at the number of slaughtered cattle, you will see that that does not stack up as evidence of contact having spread the disease.

102. You have come up with the idea of wide fencing. I would like to see figures from Scotland, to see whether the numbers there have gone down. There are, certainly, issues in the report that need to be looked at. However, a lot of what it contains is hypothetical. It has no proven base. It looks good on paper. I agree with you on the figures. However, as you have said, testing of badgers has been done using roadkill. Of the badgers that are killed on the roads, 16% are infected, but 16% of what number? Sixteen per cent sounds high.

103. **Mr Hutcheson**: Sixteen per cent of the badgers that are killed on the roads are found to have —

104. **Mr McMullan**: How many badgers that were killed on roads have been tested?

105. **The Chairperson**: We could ask the Department that.

106. **Mr McMullan**: What I am trying to drive at is that it is still inconclusive.

107. **Mr Hutcheson**: Sorry. Let me make a couple of points. Unsurprisingly, I disagree with you about the report. It is evidence-based. However, as I said at the outset, we do not pretend to be experts on bovine TB, nor do we pretend to have looked at every single aspect of it. The science is a huge subject in itself. That is not what we are doing. We are very much looking at the public expenditure side of things. An awful lot lies behind that. As regards the science and that kind of thing, I suggest that those are definitely questions to put to the Department because that it where

the expertise lies. It is looking at it in great detail.

108. **Mr McMullan**: You are quite right. What you have brought is a report on cost. Now, it is up to someone else to quantify how we arrived at that cost. You have actually opened up a can of worms —

109. **Mr Hutcheson**: We hope that we have informed the debate and put the issue on the agenda whereby, hopefully, it will help to generate or renew momentum in the Department, so that it will, ultimately, achieve eradication.

110. **Mr McMullan**: It would be very interesting to hear the Ulster Farmers' Union's take on all of that.

111. **The Chairperson**: We will go through that. There is a long way to go with the inquiry, but we have a PAC report and an Audit Office report sitting there. The Department has engaged with that and agreed to recommendations.

112. **Mr Hutcheson**: The fact that we are discussing this on the back of the PAC report and Audit Office report shows that there has been real value in putting the topic on the table, whatever you may feel about the findings.

113. **Mr McMullan**: We will agree to disagree. We will not fall out.

114. **Mr Buchanan**: Robert, thank you for your report. It is a scathing report and an indictment of the Department that, over the years, previous Ministers have failed to grasp the nettle on this issue and failed to do something to reduce the incidence of the disease. It may not be possible to eradicate it, but it could at least be reduced by a lot more than it has been. I have concerns about the whole nonsense of double-fencing, because I do not believe that it is the answer. It will put a huge cost on to the farming community, which will stand to lose a lot of income because of it. Your report says that DARD cut itself off from quite a bit of money from the EU because of its failure to comply. You have not specified what that figure might be. Can you give us any information on the amount that the Department has lost simply because it failed to comply with the EU directive?

115. **Mr Hutcheson**: In our report, there is a table that shows the extent to which DARD had successfully claimed from the EU fund, up to the point at which we published. For example, in 2003, 2005, 2006, 2007 and 2008, there were no claims. In 2004, it got €2 million. So, that may give some idea of the potential income lost at that time. Fast-forward to more recently, and I mentioned that, because it is now compliant, it has applied for and been awarded grants from the EU veterinary fund, and we are told that that is around €5 million each year for 2010, 2011 and 2012. The Department could not necessarily say how much was lost, but it would be fair to say, based on the figures that I have presented, that we are talking about quite a few million euro.

116. **Mr Buchanan**: Surely it is negligence on the part of the Department that it failed to do that, which resulted in a huge loss of income.

117. **Mr Hutcheson**: Yes. The PAC was quite clear that it did not make good sense, and, thankfully, the Department has now started to take advantage of the funding from the EU.

118. **Mr Clarke**: You represent the Audit Office, Robert: given that some of the recommendations from the PAC were not taken on board, can you use any sanction powers on the Department? As you mentioned, the PAC said that it was poor use of taxpayers' money. You broke it into three categories, but you suggested that the Department did not do anything about a few of the recommendations in the last category.

119. **Mr Hutcheson**: Yes, on things such as pre-movement testing. Those were the PAC recommendations, and it is a separate body from us. However, I put on record that we are 100% in support of all the PAC recommendations, and we stand to shoulder to shoulder with them.

120. **Mr Clarke**: One recommendation was to pay reduced compensation to convicted fraudsters. I have a difficulty paying a

reduced amount of compensation to farmers, because the problem happens through no fault of their own. However, you are saying that the Department did not accept the recommendation regarding someone who commits fraud. So, if someone has committed fraud, is the Department saying that it will pay them 100%?

121. **Mr Buchanan**: The Department is good at doing that, Trevor.

122. **Mr Hutcheson**: To clarify, that refers to future claims. If, in year 1, a herd keeper were investigated and convicted of committing fraud, they would not get any compensation for that fraudulent claim. That recommendation suggested that, as an added deterrent, not only would they not get compensation for that fraudulent claim but future compensation would be reduced to whatever extent. The Department said that it was advised that it would not be legally defensible to use a previous offence to reduce future compensation claims. It felt that it would be difficult to establish, presumably in court, that withholding future compensation was proportionate as a deterrent to committing a fraudulent offence.

123. **Mr McCarthy**: If they do not get compensation, do they get jail?

124. **Mr Clarke**: That would cost more.

125. **Mr Hutcheson**: The whole issue of fraud is quite an interesting one, because, when we did our work, we found that there was very little activity. I do not think that there were any fraud cases, and there were certainly no convictions for fraud. In fairness to the Department, it is a very difficult area to nail down sufficiently to sustain a case in court. There is a very high evidence threshold for cases of fraud. Since our report, there have been more investigations, and there have been some prosecutions. You find that cases are prosecuted not under the fraud legislation but under other regulations such as switching of ear tags.

126. In fact, this month, a case went to court in Downpatrick where a farmer was found guilty of switching ear tags. They think that a reactor was picked up at test and that ear tags were switched between that and another animal, which ended up at the abattoir. They found that ear tags had been switched. That is as close to fraudulent activity as you could hope to find. Clearly, there was an attempt to deceive, but I believe that the case was prosecuted under ear tag rules and regulations rather than fraud. The farmer was found guilty and, I believe, was fined and given a three-month suspended sentence. That is a fair indication that, perhaps, the court did not see this simply as an ear-tag offence and that there was more to it. I do not think there has been very much prosecution under fraud legislation.

127. The PAC's view and, indeed, our view, is that, where there is a case of fraud, the full rigour of the law should be taken to deal with those people, because even a small number can cause quite a bit of a problem. Two or three farmers may be hiding infection or introducing infected animals for whatever reason, and that can cause absolute chaos and undermine the programme very significantly.

128. **Mr McMullan**: Only two of the eight cases that were investigated were prosecuted, and the two herd owners later got compensation for other TB-related cases. Was that in the same herds or a different farm business?

129. **Mr Hutcheson**: I think it was the same herds.

130. **Mr McMullan**: Is there not a mechanism, not for an appeal, but to say, "Hold on for a minute until we look at this?"

131. **The Chairperson**: A strategy, you mean.

132. **Mr McMullan**: Currently, if an inspection is going on, the farmer has to wait to get paid the single farm payment. It seems to be that this compensation is paid out very quickly. I would like to know where all this is centered around. I am like yourself and am being very coy. However, teasing that out may give the rest of us a better insight into where we are

talking about. The figures may be right, but it would be interesting to know the geographical spread.

133. **Mr Hutcheson**: It is definitely an area to pursue with the departmental officials, who will be here next week and again towards the end of the inquiry.

134. **The Chairperson**: That is a fair question to put to them.

135. **Mr Hutcheson**: I would not pretend to be up to speed with the precise procedures now. It is fair to say that there is a greater awareness of this problem area in the Department and a greater desire to take a tougher line against herd keepers who are clearly ignoring or improperly breaching regulation. It is certainly an issue to pursue with the Department.

136. **Mr McMullan**: Would it be proper to ask for a geographical spread of the claims?

137. **The Chairperson**: That would have to come from the Department. It is certainly a fair question to ask the Department. The intelligence gathering is all about trying to eradicate the spread of the diseases, and the geographical element undoubtedly comes into it.

138. **Mr Clarke**: Next week, could we also get information on the geographical spread in the Republic and on what measures they have taken to stop it happening around the border?

139. **The Chairperson**: We could certainly ask for that.

140. **Mr Clarke**: That would be interesting.

141. **The Chairperson**: It remains for me to thank Robert and Joe for coming here today to give us a presentation. It was very useful at the start of the inquiry to see whether the Committee can assist in any shape or form in the eradication of the disease. Thank you very much for your time, gentlemen.

142. **Mr Hutcheson**: Thank you.

1 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Ms Michaela Boyle
Mr Trevor Clarke
Mrs Jo-Anne Dobson
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Colin Hart	*Department of*
Mr Roly Harwood	*Agriculture and Rural*
Mr Ian McKee	*Development*
Mrs Colette McMaster	

143. **The Chairperson**: You are very welcome to the Committee to give evidence to the review of what we think is a very serious subject. I am sure that you have a presentation to give, so proceed without further ado, and Committee members will ask questions afterwards.

144. **Mrs Colette McMaster (Department of Agriculture and Rural Development)**: Thank you, Mr Chairman, for giving the Department of Agriculture and Rural Development (DARD) the opportunity to provide a written submission and to make a presentation today. We welcome the Committee's decision to undertake a thematic review of bovine tuberculosis (bTB) in Northern Ireland. It is an important matter, and we wish to assist the Committee's consideration in any way that we can.

145. You will have received copies of our written submission and associated annexes. They provide a summary of the tuberculosis (TB) eradication programme in Northern Ireland and the progress made on implementing the recommendations of the Public Accounts Committee (PAC) from 2009. With me today are Colin Hart, deputy chief veterinary officer; Roly Harwood, senior principal veterinary officer; and Ian McKee, policy lead for TB. Our presentation will come in two halves. First, I will cover TB policy, and then Colin Hart will cover TB programme delivery.

146. DARD is committed to the eradication of TB in cattle, and we are continuing to work towards that end. So, why have we not set a target date for its eradication? The straightforward answer is that we would set a target date if we were certain that there was a set of actions that we could take that would guarantee the eradication of TB in a definite timeline. However, it is not that simple. All the steps needed to get us to eradication and the tools that we would need to use are not yet known. We have a robust TB programme in place, and we have made good progress in dealing with the disease over the past decade. However, the fact remains that we still do not have all the answers. In our programme, we continue to make the best use of all the tools that we do have, to drive for more answers by investing in TB and wildlife research and studies, and to draw on new evidence as it emerges.

147. What sort of approach might it take to eradicate TB? From looking around the world to countries that have battled with the disease in cattle, we envisage that, to achieve eradication, more stringent cattle controls will be necessary, in excess of existing EU trading requirements, as well as measures to prevent the spread of infection to cattle from TB-infected badgers. Any approach will also need to be practicable and acceptable in the Northern Ireland context and represent long-term value for money.

148. What do we know about this disease? Bovine TB is a respiratory-transmitted infection that is mainly spread by close contact. It is widely distributed in cattle herds across Northern Ireland, and it also occurs in badgers and wild deer here. The farm structure and

management practices in Northern Ireland increase the risks of disease spread, because of fragmented land parcels and extensive use of conacre grazing, which lead to a high level of within-herd movements of cattle. There is also a high level of between-herd movements. Farms in Northern Ireland tend to share boundaries with many more neighbouring farms than farms in GB do, and epidemiological investigations have found farms here that have over 30 neighbours.

149. We know that in Northern Ireland circumstances the disease risk factors include local contact with infected herds; history of TB breakdown in a herd; high cattle density; herd size; cattle movement; buying in cattle; and the presence of badger setts. Our veterinary officers attribute most TB breakdowns in Northern Ireland to local spread in the area, but we cannot tell for certain whether one particular disease factor has caused a breakdown or whether it is down to a combination of multiple factors. Moreover, it may not be the same factor or combination of factors in play in every breakdown. We know that, to eradicate TB, we need to deal effectively with all the factors.

150. What are we doing about it? Our rigorous, European Commission-approved TB eradication programme is based on testing to detect infected cattle, removing infected animals and reducing the risks of disease spread through movement controls and other biosecurity measures. Farmers have a vital role to play by taking all reasonable steps to maintain good biosecurity to reduce the risk of infection to their stock. We continue to invest in TB and wildlife research and studies to build the evidence to improve how we deal with all the disease risk factors and reduce TB further. I will say more about that later.

151. Significant work has been done to enhance the management and monitoring of the programme. That includes internal governance arrangements and arrangements for engagement with industry and environmental stakeholders. The TB programme is approved annually by the European Commission. It is subject to external scrutiny from the Commission, the Northern Ireland Audit Office (NIAO) and the Public Accounts Committee. You will have received a summary of the work done to address their recommendations on TB control. Following criticism from those external sources, we have recently consulted on proposals for changes to the existing TB compensation arrangements.

152. How effective has all of that been? We know that we have an effective TB eradication programme that has reduced the disease to the current lower levels. We can say that because it is clear that disease levels increased significantly after the programme was suspended for a period during the foot-and-mouth disease outbreak in 2001. Disease levels fell again considerably after the programme was re-established following the ending of the foot-and-mouth disease crisis. Having European Commission approval for the programme safeguards our export-dependent trade in livestock and livestock products, which is valued at over £1,000 million each year. Therefore, in economic terms, the benefits of the programme far outweigh its cost. The £23 million annual cost to government of the programme ensures that that valuable international trade can continue. At any time, around 90% of our herds are free to participate fully in that trade. Having the Commission's approval also allows DARD to claim co-funding from the EU veterinary fund to offset a proportion of our costs. That will enable us to draw down some €5 million each year for 2010, 2011 and 2012.

153. What do we still not know about the disease? Extensive research has been carried out internationally into the causes of TB, how it spreads, how it can be diagnosed more accurately and what can be done to prevent its spread between cattle and between wildlife and cattle. However, there are still many unknowns. For example, although the skin test continues to be the internationally recognised test for

TB in live cattle, we know that it misses a number of individual infected animals, but it does operate well at a herd level. The gamma-interferon blood test, which is recognised by the EU for use as a supplementary test, has practical limitations and is expensive to use. It also provides false positives. There is clearly a need for more accurate and cheaper diagnostic tests to be developed.

154. I will now deal with the unknowns about badgers. There is no known means of preventing all contact between infected badgers and non-infected cattle. Biosecurity on farms plays an important role. If we knew where the contacts between badgers and cattle take place on farms in Northern Ireland — whether they occur around cattle-housing stores and feed stores, or at pasture, or both — biosecurity measures could be targeted to help separate badgers from cattle.

155. As the researcher outlined in his presentation, the research findings so far suggest that badger culling is not a clear-cut solution. It presents a mixed picture of its cost-benefit effectiveness in reducing disease levels in cattle, with evidence in England that it caused a perturbation effect and an increase in TB in cattle in the surrounding area. The follow-up to the randomised badger culling trial (RBCT) in England suggests that badger culling has resulted in a 16% reduction in confirmed herd breakdowns after nine years. Culling is also highly contentious with wildlife groups. The current plans to license culling of badgers in England are subject to judicial review from the Badger Trust. We will be interested to see if the proposals withstand that legal challenge.

156. As regards vaccination of badgers, injectable vaccine has been demonstrated to reduce the severity of infection in badgers. However, it is difficult to administer as the badgers have to be captured and vaccinated individually. Work to develop an affordable and usable oral bait vaccine that would not require individual capture is ongoing in Britain and the South. There is no evidence so far that vaccinating badgers reduces the level of TB in cattle.

157. At a local level, having made considerable progress in reducing TB herd incidence by around 50%, from almost 10% in 2002 to 4·99% in August 2011, we so far cannot explain the recent increase in TB herd incidence in Northern Ireland over the winter months. We do not know at this stage if it is a temporary rise or represents a change in the relatively level trend that there has been in incidence over the last five years and, if so, what has caused it. Colin will say more about the veterinary investigations into that which are under way.

158. What are we doing to push for more answers? A key component of our TB eradication programme is research and studies to build further evidence to help deal effectively with all the disease factors. Around £4 million has been allocated from the DARD budget to fund further TB and wildlife research and studies. We have taken a comprehensive look at the evidence needs for TB and commissioned further literature reviews, which were completed in 2011-12, on TB tests in cattle, TB tests in badgers, cattle-to-cattle transmission, badger-to-cattle transmission and badger vaccination. We discussed the evidence needs and their priority with key industry and environmental stakeholders.

159. A number of studies have been commissioned to help establish local evidence. The results of the TB biosecurity study are expected later this year, and we intend to use them to produce further biosecurity advice for herdkeepers. We have also commissioned an assessment of farmers' understanding of, and attitudes to, applying biosecurity measures when dealing with diseases. Also under way is an evaluation of the use that we currently make in the TB programme of the gamma-interferon blood test. The results will inform the way that we use that test. We will also consider the use of other new diagnostic tests as they emerge. A badger-cattle proximity study

which aims to assess the interactions between cattle and badgers in Northern Ireland, both in farm buildings and at pasture, has recently started in a high-incidence area. The results will help to inform where biosecurity measures could best be targeted on farms.

160. We are hosting an international vaccination experts scientific symposium in Belfast from 14 to 16 May. The symposium will consider all relevant issues associated with vaccinating the badger to achieve a reduction in TB in cattle. That will help DARD assess whether badger vaccination offers the prospect of reducing TB in cattle, and in what context. We are also looking at further potential studies. During the Budget period, we will continue to commission further TB and wildlife research and studies to guide the TB eradication strategy. We maintain close contact with the research and studies being conducted in Britain and the South of Ireland, including on the development of an oral bait badger vaccine that can be delivered in a cost-effective way. We are also closely tracking all badger intervention proposals in GB and the South on culling, vaccination, tests and so on.

161. What is the way ahead? We already have a rigorous EU Commission-approved eradication programme. We intend to build a sound evidence base to underpin future interventions in cattle and/or wildlife that could help to reduce TB as part of our eradication programme. In order to push further towards eradication, a future TB programme may need to involve a combination of more testing, tighter movement controls, new or improved measures to reduce the risks of disease spread from badgers, as well as cattle, and changes to current farming practices. However, additional actions must carry reasonable prospects of success. Jumping too quickly to a possible solution ahead of the evidence could prove to be an expensive mistake.

162. Whatever approach is developed will have to be practical, cost-effective and acceptable in our own particular circumstances. As the badger is a protected species, any intervention in the badger population would require the agreement of the Environment Minister. Any intervention would also have to be compliant with DARD's statutory powers and take into account any relevant legal rulings in Britain. It would also require substantial additional funding.

163. In conclusion, if doing X, Y and Z would eradicate TB in cattle in a definite time frame, we would do it. We can understand the frustrations that there are with the lack of certainty and guarantees, but the evidence does not yet exist to show that this would be feasible.

164. Colin Hart will now give a brief outline of the programme delivery, and then we will be happy to take questions.

165. **Mr Colin Hart (Department of Agriculture and Rural Development)**: As deputy chief veterinary officer (CVO), my main responsibilities include oversight of the delivery of the Department's brucellosis and TB eradication programmes and its efforts on farmed animal welfare. Each of those programmes is headed up by a senior principal veterinary officer, who is responsible to me for their overall delivery. I am accompanied today by Roly Harwood, who manages our TB delivery programme.

166. Veterinary Service is responsible for the implementation of policy and the provision of veterinary advice to policy colleagues. To enable us to discharge our TB programme responsibilities, a wide range of expertise is required, and I am accountable to the staff who deliver most elements of the programme. Those include DARD testing vets, DARD veterinary officers, livestock valuation officers and specialist epidemiologists employed in our veterinary epidemiology unit. I also have responsibility for the partnership that we continue to build with private veterinary colleagues who deliver TB testing on DARD's behalf. In addition, I am the senior responsible officer for the annual application to the EU for co-funding for the Northern Ireland TB eradication programme.

167. That list illustrates the diverse elements of the programme. It does not include other parts of Veterinary Service for which I am not directly responsible, but with which I liaise closely. They include our veterinary public health unit, which carries out meat inspection and oversees the hygiene of meat-producing premises on behalf of the Food Standards Agency. We also liaise closely with the veterinary service enforcement branch, the Department's central investigation service and Agri-Food and Biosciences Institute (AFBI) colleagues.

168. Despite the variety of inputs, critical processes are interlinked, creating a holistic programme structure. That integration is a great strength when it comes to the efficient application of disease controls and the extraction of information, for example in the regular audits carried out on the TB programme by the European Union. The tool that enables that holistic approach is the animal and public health information system (APHIS) computer system. It contains a vast amount of current and historical data on all animals that have been registered in Northern Ireland, including their testing and movement histories. Farmers, private veterinary practitioners (PVPs), market operators and others can access APHIS directly for relevant information. Combined with the capability to update the records in these locations, APHIS creates a real-time, comprehensive tool for the management of disease and analysis of disease patterns and trends.

169. I turn now to the delivery of the TB programme. As you know, the fundamental principles of bovine TB intervention centre on the detection of diseased or high-risk animals, the compulsory removal of those animals from their herd to slaughter and the restriction of movements of cattle from infected herds. The current DARD TB programme involves regulation of cattle movements; compulsory annual testing of all cattle herds using the single comparative intradermal tuberculosis test; removal of animals that give a positive reaction to the skin test; and tracing and testing of contacts. The programme also involves routine abattoir surveillance of all slaughtered bovines. Discovery of TB lesions in a carcass leads to TB controls in the herd of origin. Use of gamma-interferon testing as a complementary test is deployed under some circumstances. We conduct 17,000 blood tests per year, which is proportionately more than in GB and the ROI. TB skin testing is carried out by both private vets and DARD staff. The tests are interpreted, and disease control actions are applied by DARD veterinary officers, who also visit the breakdown farms and give public health and biosecurity advice to farmers.

170. Each breakdown farm is allocated to an individual veterinary officer on the basis of a patch management system, and that veterinary officer retains responsibility for the breakdown until herd restrictions are finally lifted. The patch veterinary officer's responsibilities also include carrying out an investigation into each TB breakdown. Unfortunately, since several farm outbreaks may occur simultaneously on farms in a locality, it is often impossible to determine the exact source of infection in a herd, whether from a neighbouring farm or from an infected badger. That highlights the points that Colette made on the need for further research to develop better tools to assist our understanding.

171. As Colette said, in Northern Ireland we have a farming system that is highly dependent on the leasing of pasture for conacre. That sets a particular set of challenges for us in that many movements of animals are not required to be registered: the so-called within-herd movements. While such moves are perfectly legal, their estimated scale often makes it difficult to fully evaluate the extent of herd-to-herd contact and the appropriate application of control measures.

172. Added to that, we still have a relatively high number of official movements of cattle, either directly from farm to farm or through markets. In 2010, the number of such animal movements recorded on APHIS was in the order

of 600,000. That compares to a cattle population of some 1·6 million and is proportionately very high. That figure does not include movements to abattoirs.

173. There are some 800,000 fields in Northern Ireland, with 55 million metres of fencing, 120 million metres of hedgerow and eight million metres of stone walls. Much of that is made up of external boundary fields because of the small fields in Northern Ireland. On average, they are about 1·5 hectares in size. The point that I am trying to illustrate is that, notwithstanding the risk which we believe the badger poses, there is a set of industry characteristics in Northern Ireland that make our situation quite unique in world terms and make TB eradication a particular challenge for DARD and the industry.

174. I referred to APHIS earlier. Much of our management information comes from that system. We monitor closely the application of disease controls by staff and carefully compare performance indicators across our 10 district areas. These arrangements have been enhanced considerably over the past few years, and we will continue to develop that work. That not only assists in management, but allows us to demonstrate compliance with our co-funding applications or eradication plans.

175. Statistics show that TB levels have been on a downward trend since 2002, when the herd incidence was 9·93% due to herd testing being suspended because of foot-and-mouth disease. Therefore, it has been extremely disappointing to note a recent rise in TB incidence it was 6·51% as of February 2012 not least because the TB incidence was 4·99% at 31 August 2011, which was the lowest that we had for around 15 years. We are continuing to monitor the situation closely to see if that increase represents a fundamental change in the relatively level trend that the incidence has followed since 2007, and, if so, to seek to understand what is driving the change and to counter it.

176. As you will know, we publish TB annual herd incidence data on the DARD website each month. The rise, which was unpredicted, has occurred across Northern Ireland, with the exception of the Mallusk and Coleraine divisions, and it remains unexplained.

177. I have recently held discussions to capture the views of the divisional veterinary managers, private vets and stakeholders across Northern Ireland and of internal experts across the Department and AFBI. No definitive reason for the rise has yet been established, but a number of possible factors have been prioritised and are being explored.

178. Many of the PAC recommendations were relevant to our TB testing arrangements with PVPs. As a result, we have established a TB testing liaison group with the veterinary associations, which underpins our partnership arrangements with private vets. The management of delivery standards for the contractual testing that is delivered by some 300 private vets across Northern Ireland in approximately 80 veterinary practices is an ongoing challenge. However, with the full support of the veterinary associations, we are working hard to maintain standards.

179. Our programme of audits is aimed at ensuring that testing is carried out to the required standard, whether by PVPs or DARD staff. As a result, our TB test audit arrangements and overall communications with PVPs have improved. For example, over 120 vets recently attended a TB testing seminar that was arranged by the local veterinary associations in partnership with DARD. I know that that work will continue, and I look forward to seeing it develop over the coming years.

180. I recognise that there are some areas where progress has been slower. One of those is the review of the testing contract that the Department has with PVPs. We have completed the review, but we have not been in a position to move forward with its recommendations. The main reason for that is that we

were waiting to see how the tendering exercise in GB developed. As there has still not been a conclusion to that exercise, I have instructed that work should begin on a new contract with private vets, and, to that end, I have set up a formal project, which has been accepted into the Department's overall governance arrangements for change management. It will be a lengthy piece of work, but the benefits in clarity, flexibility and practice accountability should be significant. As you may be aware, we have also recently completed a lay TB testing pilot. The evaluation report has been completed, and knowledge gained from that pilot will be used to inform our decision on how it should be taken forward to meet the departmental target of making £350,000 savings in the 2014-15 financial year.

181. I hope that I have given you a feel for what we believe is a comprehensive and holistic TB programme. Considerable efforts are being made to improve the standard of our in-house TB programme delivery, and we have been energetic in developing partnership arrangements with private vets to meet many of the PAC report recommendations. Thank you for your attention. We are happy to take questions.

182. **The Chairperson**: Thank you very much. Before I push it out to the members, I want to quiz you on the research side of things, because that is what the Department has been doing during this period. Do you recognise the period that you are in as regards the Department's eradication plan? I think you are in a five-year period which is due to end in 2014 with regard to building up a research base on the eradication of the disease. There is no problem with research or finding out new things every day. However, do you think that the £4 million that was allocated in the Programme for Government for research as a building block to tackling — not eradicating, tackling — TB is enough for that very important issue?

183. **Mrs McMaster**: Research has always been an important part of the DARD-funded research programme, and it is research for TB. It is not the only piece of research, and we are not just starting that research now. Over the years, substantial work has been done on TB by AFBI, for example, on the development of the gamma-interferon test and the development of strain typing methods to better understand the spread of the disease. There is an ongoing badger road traffic accident survey. That names a few.

184. We now have an additional £4 million in the budget, over and above what is normally available in the DARD-directed research budget. That is being allocated specifically for further TB and wildlife research and studies. It also comes at a time when DARD has fundamentally changed the way that it identifies and prioritises its evidence needs to help shape government policy-making. We are doing that with TB, as we are with the Department's range of other evidence needs. For the purpose of investment in this particular research, we have comprehensively looked at the evidence needs across the whole area of TB. We commissioned five literature reviews that were completed in 2011-12 and which I mentioned in my opening words. Those cover the whole range of TB in cattle and badgers, the tests for TB and so on. We have identified and are prioritising those as part of the process that we are in. We have spoken to industry and environmental stakeholders on this. We have taken away their comments and views and are developing options for further research and studies.

185. So, research is already under way. Beyond the AFBI research that had already been place, we have commissioned the TB biosecurity study, an analysis of the way that we use the gamma-interferon test in the programme and, recently, a study that will look at the interaction between cattle and badgers on Northern Ireland farms. We have other studies in the pipeline that we expect to commission soon. We will host an international symposium of vaccination experts in Belfast this month, which will help inform further

decisions about further research and studies. We do not see this as a one-off investment in research and studies; it may need more than that beyond this period.

186. **The Chairperson**: That brings me to my point. Everything you and by Colin, in his presentation, have said is about research, which is fine; of course we need research. What I am hearing and have always heard is that it will lead to more research. I have never heard a DARD official, permanent secretary or Minister say that this research will lead to action. That distresses me. You mentioned the eradication plan and the EU eradication plan. However, its content was more testing, better movement controls and better biosecurity. Again, we would love to see the detail of that better biosecurity. You mentioned the changes to farming practices, which again puts the onus on the farmer. That is all well and good, because the farmer, too, wants to eradicate this disease.

187. Do you understand my point? It seems to be that we are going for research in order that we can do more research. We are coming to the end of this research period in 2014, when we expect to see action. We still do not know DARD's strategy for action on, and the eradication of, this disease. That is what is distressing the Committee and me. In 2009, PAC said that DARD needed to have a more strategic approach to eradicating this disease. Yet, all we hear about are the options of more research. There does not seem to be a strategy, a glimpse or an inkling that, out of all this research, such a strategy will be published in 2014, or, in fact, that you are confident that something will be added into the strategic plan that will lead us to 2020. I asked the permanent secretary last week if he was confident that we can eradicate bovine TB by 2020. He could not give me that confidence. So, you will understand how critical and stressed members are around this issue.

188. My question around that is probably directed more at Colin and concerns the difference in standards between departmental vets and private vets. Are you still concerned about that differential, or do you feel that it has been eradicated?

189. **Mr Hart**: As I said, we have a good partnership relationship with the veterinary associations. We meet regularly, and we seek to ensure that testing is done to the highest possible standards. We manage a contractual relationship with 80 practices and some 300 veterinary surgeons. We have to work at that relationship. We have tried to improve communications. Since 2009, we have sent out statistics twice yearly to the head of each practice in relation to each of their vets who carry out TB testing so that they can help us to manage the situation on the ground. They get a comparative figure of how their testing statistics for identifying non-negative animals compare with the national average.

190. We are starting to reap real rewards from the partnership working. Recently, with the help of the veterinary associations, we held a seminar. Veterinary surgeons are very busy people, but we managed to turn out 120 veterinarians in the middle of the working day to attend a TB testing seminar. That shows the keenness of the veterinary profession to ensure that it is doing what is appropriate, to hear the latest information and to take it forward. If the Department had organised the seminar on its own, we would not have seen anywhere near the same number of people. That is an example of partnerships in action.

191. Clearly, we have an indicator; I think that the Committee discussed it with the PAC representative. The statistical measure from the data that we had was that, in 2009, the measure indicated an odds ratio of 1·60, which implies that a Department vet would have been more likely to have turned up a non-negative animal than a private veterinary surgeon. As a result of the efforts that we have made to improve communications, we revisited the audit protocol with private veterinary surgeons and stepped up the level

of audit with the veterinary surgeons and in discussion with the veterinary associations. That, combined with the increased information that we pass back on the individual performances of private practitioners to their practice principals, resulted in the figure going down to 1·19 in 2010. We through that we were making real progress there. Clearly, it is an issue that we have to manage very closely. The contractual relationship is something that the Department is very interested in.

192. Last week, we received the 2011 figures, which appear to indicate that the odds ratio has gone back to 1·93. That is disappointing. It is a statistical measure which, obviously, the statisticians have put a lot of effort into. We have had the process quality assured. However, it is a statistical measure; the population of animals that are tested by the Department's vets tends to be the high-risk population. There are good reasons for maintaining that; clearly, the Department has to focus on the high-risk areas. An adjustment is made in the figures for the various types of tests that are carried out. It is the best comparison that we have on the performance of the private veterinary contractors at the moment. Therefore, the fact that the odds ratio has gone up to 1·93 is a matter of concern, particularly as we had been so energetic in our efforts to manage the contractual relationship.

193. Only this week, we received a letter from the veterinary associations offering to become even more involved in the TB programme. We have been meeting them, and we met to discuss the issue quite recently with the same intention. We want to build further on the partnerships that we have developed. As I said, the efforts are being put in.

194. We intend to look at other types of measures that we can use for comparative purposes. Although the odds ratio is one measure, we may be able to use other measures to give us a little bit more insight into what is going on.

195. I think that that answers your question, Chairman. It is an ongoing issue. Mr Harwood leads the liaison group with the veterinary associations. A lot of energy has been put into the issue over several years.

196. **The Chairperson**: The biosecurity study in County Down was finished in June 2011, almost 10 months ago. Why have we had no results from that study yet? Are we in a position to publish them?

197. **Mrs McMaster**: The fieldwork has been completed, and we are now analysing the data that has been collected. The study overall is not yet complete. AFBI is currently analysing the data, and we expect the results to be reported later this year. When they are, we plan to look at them with stakeholders, and that will give us the opportunity to look at the existing biosecurity advice, which has been available since 2004 — the biosecurity code that was jointly produced by DARD and stakeholders at that time. We look forward to seeing the results of the biosecurity study when they are available.

198. **The Chairperson**: Could the evidence from that research be used to wrap it around, say, a farm modernisation scheme, in order to effect practical measures on the ground?

199. **Mrs McMaster**: We are engaged with the work looking towards the future rural development programme. My staff are engaged on the teams that are working on that. We will look at all the information that is coming in. We talked about the evidence earlier, and about when we come to the end of it. We will be looking at evidence as it becomes available during that period, rather than waiting until the end of a period and analysing it all. As that comes to us, we will be looking at it.

200. To return to what we will do with that evidence, hopefully these are not just studies that will simply identify new research areas. We hope that they will give us evidence to identify new interventions and new ways of assisting with the disease. That is something that

we will do when we get the results of the biosecurity study. We will have a look at that and see whether we can, first, provide better or new advice for herd keepers and, secondly, find other ways in which to target measures to help to separate, for example, badgers and cattle, and other areas of biosecurity.

201. I will come back to the point that you raised earlier —

202. **The Chairperson**: On the strategy?

203. **Mrs McMaster**: Yes. Just to clarify, the strategy is that we have our EU-approved TB eradication plan in place and we are going to continue to implement that. That is important, and we know that that has had an effect. It has reduced TB to the levels that it is at now. We know what will happen if we suspend the plan, because TB levels will rise again. The plan is there, and we will continue with it. Alongside that, we have been open and said that we do not have all the answers. We need to investigate that evidence. We hope to use the evidence to help identify new interventions that can be introduced to improve the eradication programme that is in place.

204. **The Chairperson**: Is it really an eradication programme or is it more of a containment programme, whereby DARD is living with the disease? Are we at that point? You can say that the eradication programme, in name, is doing well, and we know what happens when we suspend it, but, in DARD's view, is there an acceptable level of the disease?

205. **Mrs McMaster**: We are committed to eradicating the disease. Our efforts through our research are aimed at trying to find new ways to push levels of the disease down. We do not want to jump ahead of the evidence, but we will use it as it becomes available and see what it might mean. You mentioned the range of farming practices and what we know or do not know about badgers and cattle. A future eradication programme may involve dealing with all those issues, and it will look at other countries. We expect that we will need to tackle all the disease risks, and that may involve more stringent cattle controls and tightening up the existing programme, as well as introducing new measures to deal with the risks that we cannot fully successfully deal with currently, including risks from wildlife.

206. **The Chairperson**: I have one more question, and then I will open up the discussion to members. In your eyes, how reliable is the testing on roadkill badgers? How much does that form the basis of your research on the badger population?

207. **Mrs McMaster**: It is information that is there. As a result of the analysis of roadkill badgers, we are aware that there is TB in badgers in Northern Ireland. Relatively small numbers of badgers were analysed in that survey, and we have the figures here. However, it depends on the number of badgers that are reported as being run over on the roads. Therefore, it is not a robust scientific survey of badgers. We have information from as far back as 1998, and that is included in the information that we sent to the Committee on 27 April. The survey is indicative of the levels of TB in badgers over time, but it is limited to the badgers that are reported to us, and because of that, for example, farmers who have experienced a recent TB breakdown and are very conscious of badger activity will be more aware of badgers.

208. **The Chairperson**: Has the Department culled badgers or deer to test for TB at any time in the past 10 or 15 years?

209. **Mr Ian McKee (Department of Agriculture and Rural Development)**: We did work on deer that were being culled from deer herds around 10 years ago, and there was a rate of about 5% to 6% infected in that deer population. We had a smaller survey around three years ago, and the result was smaller, at around 2%, and because it was a smaller number, there are reservations about the prevalence and, as such, about extrapolating that percentage across the Province.

210. The figures on badgers have all been taken from roadkill, and although they are small, the numbers give an indication over time. As the Assembly researcher said about GB, the rate fluctuates, and, along with the prevalence in cattle, it has fluctuated over that period. However, the numbers are small, and we would have to do an enhanced road traffic accident (RTA) study to get meaningful figures that could be extrapolated. That is being considered.

211. **Mr Irwin**: Thank you for your presentation. As a farmer, I know only too well about the trauma caused to farmers and the problems that they have with testing. Sometimes, the last thing that they want to hear is that a neighbour's herd is down with bTB and that tests have to be done every four months.

212. TB has been with us for many years — probably the past 50 years — and we have been going down the same route. The levels fell in the late 1990s, rose in the early 2000s and then went back down again, but not to the same levels seen in the 1990s. We are all aware of the badger issue and that, to some extent, badgers do create a problem.

213. I see that there is the possibility of an oral vaccine becoming available in the next couple of years. That would be very welcome. There needs to be a different approach taken, because I do not think that you can eradicate TB simply through testing. I am not a vet or a scientist, but I do not think that that is possible. We have to vaccinate children against TB, and, to this day, TB is a killer in many parts of the world. What is the situation with a vaccine for cattle? I am told that one is being developed but that its use has not yet been cleared by the EU.

214. **Mrs McMaster**: You are right: cattle vaccines are prohibited under EU legislation through Council directive 64/432/EEC. That is because the only possible vaccine candidate for use in cattle interferes with the current tuberculin skin test. The vaccinated cattle would, therefore, react positively to the test, which would obviously be an issue for trade, and so on.

215. **Mr Irwin**: I imagine that if cattle were successfully vaccinated quite early in life, there would not be any need for the skin test.

216. **Mrs McMaster**: There is quite well-advanced research in the area. The Department for Environment, Food and Rural Affairs (DEFRA) has done a lot of research on developing a viable cattle vaccine. I mentioned the fact that vaccinated cattle would react positively to the current test. Therefore, DEFRA has done quite a bit of research to develop a test that differentiates between infected and vaccinated animals. A lot of progress has been made. However, at this stage, much still depends on trialling in field conditions, getting approval for the vaccine from the European Commission and then, beyond Europe, securing agreement from anyone who is involved in taking animals from our export markets. As I said, a lot of progress has made in that area. However, the issue now is around bringing that to completion by getting agreements with others.

217. **Mr Irwin**: Does the Department work with those involved to try to get this to work? Is the Department in discussions with the company that makes the vaccination? Is it in discussions with Europe to see whether it is possible to get approval for something like that here?

218. **Mrs McMaster**: The research is DEFRA-funded, so it is taking the lead on that and on the discussions with Europe. That certainly is happening. Through regular liaison meetings, we maintain close contact with the DEFRA teams involved.

219. **Mr McKee**: The DEFRA-funded research is done by the Animal Health and Veterinary Laboratories Agency (AHVLA). It has been taking that forward and doing a lot of work on it. The research seems quite promising, based on all the information that we are receiving. As Colette said, there will be difficulties getting approvals. For a start, rigorous analysis has to be done in field

conditions. The findings then have to be presented to the Commission, and the Commission has to be absolutely satisfied before it takes those findings to other member states. There is then the difficulty of negotiations with other chief veterinary officers. Therefore, it will be a long process; it will not happen in a year or two. It would, therefore, be unwise to give any indication that it will be a panacea immediately.

220. There are also trade issues, in that even if Europe were content with the vaccine, would international trading partners outside Europe be content to receive animal or livestock products coming from vaccinated stock? All those issues have to be gone through. Building and documenting the evidence is quite a tortuous process. Furthermore, if there is no prospect of progress and success, do you keep putting money into it? At this stage, it looks promising, but decisions will have to be taken within the next year or two as to whether it will run.

221. **Mr Irwin**: Let us hope that there are moves in a positive direction.

222. **Mrs Dobson**: Thank you for your presentation. Colette, I wrote down a few quotations from your comments. In your briefing, you referred to "more stringent cattle controls", "further research" and how you intend to build a "sound evidence base". If we asked for it, could you provide the Committee with maps and statistical information showing the spread of different strains of TB from farm to farm across Northern Ireland on a historical basis? Am I right in saying that that information already exists in DARD?

223. **Mrs McMaster**: We have information, but whether we have maps and statistical information for all the farms, I am not sure. It is something that we would need to take away, think about and take advice on. AFBI has conducted strain typing.

224. **Mrs Dobson**: Are you aware whether DARD has those details?

225. **Mrs McMaster**: Yes. We are provided with the information by AFBI, but I am not sure to what level. Perhaps my veterinary colleagues can comment on that.

226. **The Chairperson**: By way of information, there is a map showing the breakdown for 2011, titled "Tuberculosis breakdowns 2011", which highlights new and chronic outbreaks. That is for only one year, however.

227. **Mrs Dobson**: I am talking about the strain as it spreads — as a common cold spreads — from farm to farm and maps that show that.

228. **Mr Roly Harwood (Department of Agriculture and Rural Development)**: AFBI has done the work, and its representatives are sitting behind me. They can give more detail later. Yes, maps can be produced that show the different strains and how they cluster in Northern Ireland. At the moment, our veterinary officers have access to that information, so they can speak to experts in AFBI and find out what is the predominant strain in a particular area, whether the strain that they are dealing with is new and what is happening with the disease. At present, information cannot tell you the sequence of breakdowns, but it can give an indication of what is happening in an area and across Northern Ireland as a whole.

229. **Mrs Dobson**: Can we find out how far back that information stretches? You have historical detail, including information on strains of the disease and its spread from farm to farm. I declare an interest, as I am a farmer who has had some experience of TB. Why have you failed to use that valuable resource to come up with an effective eradication programme based on the documented facts? You can pinpoint the exact strain and its movement.

230. **Mrs McMaster**: We have that information, and it is used by our veterinary officers in the field, so we are using it. One of the points that Roly has just made is that the information does not tell us what the sequence of movement is, in what direction the infection is transmitted or the time

sequence. That is possibly what he is saying.

231. **Mr Harwood**: That is what I am saying. It is a very useful tool, and it certainly allows our vets to understand more about what is happening in an area and us to understand how strains cluster and move. However, we still have to investigate each breakdown and see where the infection could have gone and from where it came.

232. **Mrs Dobson**: That is very useful. As a Committee member, I find it strange that I was not aware of that. I was made aware through a reliable source that the information does exist. In order for the Committee to make decisions on TB, it would have been very useful for us to have known of its existence. From what I have heard, it is useful for following the pattern of the strain.

233. Is the Minister aware that you hold that historical data? Has she seen it? It might help her to make decisions on the eradication process.

234. **Mrs McMaster**: We are very happy to provide whatever data the Committee wants.

235. **Mrs Dobson**: It is just that we have so much information on TB, and to me that is very important. It is important for the Committee to see those maps, which I have been told exist.

236. **Mrs McMaster**: We can provide that information. It is questionable as to how much they will tell you, and explaining that is the problem.

237. **Mr Hart**: To reiterate, AFBI will be able to give you much more information on that. I have sat through some of the presentations from AFBI, and what immediately strikes you when you see the maps is that the strains of TB across Northern Ireland are clustered geographically. You can see all the points on the map in a particular area, and the strains of TB are found in the RTA badgers in the same area. Where the tool is particularly striking is in cases in which an animal has moved from one part of the country to another and has carried with it a strain of TB that is not regularly seen in one part of the country. When the veterinary officer does an investigation into an outbreak, it is very convincing to say that the outbreak was caused by a brought-in animal rather than an animal that became infected when it arrived at its destination. Say it had been there for a long enough period to pick up TB; the fact that it carried the TB from its home area is very impressive.

238. Where the disease strain is the same, we are left with the question of local spread. A lot of our veterinary officers, when they carry out the epidemiological investigation, come up with the conclusion that the outbreak was down to local spread. “Local” could mean badger spread or local farm-to-farm spread. Colette has alluded to the fact that we do not have all the tools in our box to eradicate disease.

239. **Mrs Dobson**: It was a reputable source in DARD that highlighted the tool to me.

240. **Mr Hart**: Yes, it is a very powerful tool.

241. **Mrs Dobson**: It is a very powerful tool that can show the movement from farm to farm.

242. **Mr Clarke**: We have seen it before — in this Committee during the previous mandate.

243. **Mr Swann**: A previous Committee, yes, but not this Committee and not during this inquiry.

244. **Mr Clarke**: We saw that in the Committee during the previous mandate. Then, maps were brought, and one of the interesting things highlighted was that the infection never crossed the border, which amazed me because it meant that badgers know where the border is. The badgers in question are Northern Irish, because the incidents never happened in the parts of the South close to the southern part of Northern Ireland, which is amazing. How statistics were collected in the Republic amazed me.

245. I do not know whether you were here on that occasion, Colette, or whether you

were in the position that you are in now. If you remember, Chairman, I asked last week for the map showing the incidents, because I had been previously amazed that badgers can travel from farm to farm and to different regions, as Jo-Anne mentioned, but never manage to cross the border into the Republic.

246. **Mrs Dobson**: Do you not agree, Trevor, that it would be useful to have included that research in this inquiry?

247. **Mr Clarke**: Yes.

248. **Mrs Dobson**: I was not on the Committee in the previous mandate, and I only know about this because a reputable source in DARD highlighted to me that the information exists. I was not made aware of it in Committee, but it would have been useful had I been. Is the Minister aware of the data?

249. **Mrs McMaster**: I cannot comment. I am not sure whether, from a veterinary point of view, she has seen the maps.

250. To outline what we are doing as a result, we have the information, which is provided to our Veterinary Service and to our veterinary officers who are in the field working. That will continue, but one of the studies that we are also considering is commissioning an analysis of all the data that has been collected to date.

251. **Mrs Dobson**: It would have been useful for the current Committee to have all those details on such an important piece of information. May I ask Colin a question?

252. **The Chairperson**: Yes.

253. **Mrs Dobson**: Colin, you claimed that DARD vets have a greater level of success in classifying herd breakdowns than private vets. However, is it correct that DARD vets mainly only come out to farms where there have been reported breakdowns? Do you agree with me that, because they do the majority of their testing following an outbreak, DARD vets are more likely to have a higher detection rate that private vets?

254. **Mr Hart**: Yes, it is true to say that the vast majority of annual testing in Northern Ireland is carried out by private vets. Indeed, quite a lot of the risk testing and check testing of contiguous premises is carried out by private vets. In the main, the departmental vets focus on TB breakdown situations in which you would expect, by and large, there to be a higher likelihood of infected animals.

255. **Mrs Dobson**: It is pretty obvious that you would, when they are called out to —

256. **Mr Hart**: That is right. The odds ratio that we referred to earlier has been adjusted by the statisticians to take account of the various herd types. I am not a statistician, but the measure that we use for comparative purposes has been worked by statisticians to equalise the influence that herds with a higher incidence of the disease would have against the others. I think that that is the —

257. **Mrs Dobson**: Would it be fair to say that it was not a fair comparison?

258. **Mr Hart**: We are told by the statisticians that it is a fair comparison. We have made efforts to have the process independently verified. We have not just used our own statisticians. We have had it verified out-of-house. As I said, I am not a statistician. It is a good question, because on the face of it, it would appear that we are testing two different populations of cattle.

259. **Mrs Dobson**: It is not like for like. I know that from my own experience of seeing DARD vets on the farm following a breakdown. I know that that is the case for many other farmers, so it is bound to have an impact on the reported success of the DARD vets.

260. **Mr Hart**: The statisticians tell us that it is like for like, and that is what I have to go on. Although there is enough commonality between the populations of animals that the two groups of testers test, the figure is calculated not over one year but over many years, so as to average out. You are right that there would not be enough data in one year to give the answer, but the statisticians tell

us that the concern that you have evens out over a number of years, and that that is a real measure. Having said that, I am not a statistician, so I have to go with what —

261. **Mrs Dobson**: Do you know the ratio between DARD vets attending call-outs in response to an outbreak or the annual herd figures? Is it 50:50, 60:40, 70:30 or worse?

262. **Mr Hart**: I will clarify, Chairman, about call-outs in response to an outbreak. We call out to investigate an outbreak, but I think that the member is talking about the testing of the herd rather than the call-out. The odds ratio of finding an animal testing non-negative in 2009 was 1·60 more likely for a DARD vet; it went down to 1·19 in 2010; and it has gone back up to 1·93 in 2011. On the face of it, that means that a DARD vet is more likely to come up with a non-negative animal in a situation that is adjusted for the lack of commonality between the two populations of testers.

263. **Mrs Dobson**: I know from my experience that seeing a private vet and a DARD vet are not comparable.

264. **Mr Hart**: I am a bit like you, in that I would go by what is in front of me, but the statisticians tell me that the figure has been equalised statistically.

265. **The Chairperson**: Trevor Clarke.

266. **Mr Clarke**: Thanks for calling me to follow on on that point, because I like the questions that Jo-Anne is asking. Could we get a wee bit of research done and more information on that subject? It is wonderful the number of people that are employed in this industry and it is wonderful how we can make ourselves look particularly good on the basis of stats, but I would like to analyse stats myself. It depends on how you present statistics and what sort of picture we are portraying. Look at the amount of money that the Department is investing in, or wasting on — whatever way you want to look at it — the eradication programme. I suggest that an awful lot of money has been wasted as opposed to being invested. If the rest of the members are content, Chairman, it would be useful if we could get that research.

267. Did I read somewhere today that there was no incidence in the Mallusk area?

268. **Mr Hart**: There has been no increase in the Mallusk area.

269. **Mr Clarke**: I looked at a map and saw that there was no incidence in Mallusk. Perhaps it is because the map is in black and white.

270. **Mr Hart**: It is a very low incidence area compared with the rest of Northern Ireland, but it has —

271. **Mr Clarke**: When I look at the other table of compensation claims that you have provided today, I see that, where there have been cases of multiple compensation claims, Mallusk has had four, as opposed to Ballymena having two and Londonderry having one. If there is no increase, or the number is very low, is there any reason that that particular area has got a high compensation claim rate?

272. **Mr Harwood**: It just depends on the nature of outbreaks that occur. Although Mallusk is our lowest-incidence division, that does not mean that it does not have TB.

273. **Mr Clarke**: I suppose if you want to play with stats it would be useful, but that is not giving us a very informative picture of what is happening in terms of multiple compensation claims. Armagh has 11. What percentage of the overall claims are multiple claims, as opposed to all of the rest of those in that table? That is giving us a very small snapshot of multiple claims, but what does 11 represent? Eleven of how many, and, in the same vein, four of how many? If we are saying that it is four of a very small amount, in Mallusk there seems to be a problem where we are having multiple claims.

274. **The Chairperson**: That was misleading — well, the way it was put was unfortunate rather than misleading. That table actually shows 104 herdkeepers

receiving more than £50,000, so it does not necessarily represent multiple claims. Is that right?

275. **Mr Harwood**: That is absolutely right. It is very difficult, certainly in the space of a week, or less than a week, to get that information, because we would need to look at every breakdown to see whether there were multiple claims. We have the claims based on each time there is a payment made, so if someone is down with TB, they could have two or three tests, and within that they would have three claims, or else they might just have one claim and one breakdown, and then a year later have another. That is just a rough indicator. You are quite right that it does not take into account the number of herds in a particular district or the level of disease.

276. **Mr Clarke**: For that reason, it is not giving us a very good indication of what is taking place on the ground. I appreciate that they have only had a week, so we could give them another week. If we could get the information for next week, that would give them two weeks then. I suppose the same could be said for the statistics in table B. The Clerk saw me with my calculator, but she had already beaten me to it. I would never want to put a Clerk or civil servant in the position in which they are thinking the same as us, but they probably thought, like me, that again we do not have all of the information provided that we need. Some of us were calculating here today. Colin, when did you see the decrease in incidence?

277. **Mr Hart**: Are you referring to the time after the 2001 foot-and-mouth disease outbreak?

278. **Mr Clarke**: You saw an increase, or a decrease?

279. **Mr Hart**: We saw an increase after the 2001 foot-and-mouth disease epidemic. The annual herd incidence was nearly 10% at that point. Following that, in response to a fairly intensive TB testing catch-up programme — because a lot of the annual herd tests had been missed in 2001 — the disease incidence came down fairly sharply, until around 2006. What we have seen since 2006 is a relatively level line of disease. In 2010, again we saw a fairly steady reduction in disease. It reached its lowest point in August 2011, when it was under 5% for the first time in many years.

280. **Mr Clarke**: Go back to the stats again and look at roadkill. How much weight do you put on roadkill and animals that are picked up and tested on the road?

281. **Mr Hart**: Colette was trying to touch on that too. There is a population of badgers that, for one reason or another, ended up being killed on a road. Does that tell you anything about their health at the point when the road accident occurred? What we know is that a percentage of those badgers have TB. What is more difficult to know is whether that percentage represents the level of disease in the entire badger population. Do the healthy badgers have the same incidence of disease, or do they have a slightly lower incidence, perhaps, by nature, because of the fact that they are healthier?

282. **Mr Clarke**: But the test should give you an idea of whether they have or not. It has given you an indication.

283. **Mr Hart**: We do not get testing healthy badgers.

284. **Mr Clarke**: I am talking about the ones that have been killed that are part of your survey. In terms of the ones you have surveyed, you will have an indication of whether they are carriers of the disease or not.

285. **Mr Hart**: Yes; it is very accurate because of the post-mortems.

286. **Mr Clarke**: Do you believe that it correlates with the outbreaks in particular areas or not?

287. **Mr Hart**: As we talked about, the strains correlate. The actual —

288. **Mr Clarke**: And the percentages of those that were examined against those that were confirmed to have had the disease?

289. **Mr Hart**: I do not believe that that correlation exists. Roly, do you want to pick up on that?

290. **Mr Harwood**: Can you repeat the question, please?

291. **Mr Clarke**: The correlation between those that have been killed on the road, whether they were infected or not. What is the purpose of this diagram that we have been shown today? It shows that in 1998, three were killed and one was a confirmed case, which represents 33% of the population of those that were killed having TB. The figures for 2001 do not, in my opinion, correlate with what Colin said about the normal incidence because we had four confirmed out of 20, which is 20%. According to this, it did not peak until 2002, and it has got worse since 2006 because 100 were killed on the road in 2006, and 10 of those were infected, which creates the 10% of the population of those that were killed on the road that were infected. It dropped to 6·8% in 2009, and it has risen as high as 13·54% since then.

292. **Mr McKee**: Because the sample is small, it is only indicative over time. You cannot extrapolate and say that this is a definitive position. There may have been a reduction in more recent years broadly equating to the reduction in cattle but, because the numbers are so small, you cannot put a scientific basis on it. It fluctuates from year to year, and it depends on where the animals were killed, who picked them up and how quickly they were brought to the veterinary services division for testing.

293. **Mr Clarke**: I find it a bit misleading to have that as part of the inquiry, if you look at the stats. The year with the highest percentage of road deaths was 2011. I am sure that that is why Stella did the same in trying to work out percentages. If you look at it quickly, it shows that there were 136 and, oh dear, 17 of those were killed. However, that really only represents 12% of the population of the badgers that were tested. In my eyes, that causes confusion. I do not know about the rest of the members but, to me, it confuses what we are trying to do with the inquiry.

294. **The Chairperson**: I suppose that it demonstrates how DARD is doing it and how it samples its badger population.

295. **Mr Clarke**: It sounds like it does not actually demonstrate anything. If, as Ian suggested, it is a very small sample and he is not putting any weight on it in terms of the outbreaks, then it is nearly a waste of time including it as part of the inquiry's evidence. Why is it even going through this practice? There is a cost applied to doing it. I assume that the tests are paid for by the Department.

296. **Mr McKee**: Yes.

297. **Mr Clarke**: What is the purpose of wasting more money carrying out those tests on those animals if it does not play a part in eradicating the disease? They are dead: bury them.

298. **Mrs McMaster**: It is background monitoring information, really.

299. **Mr Clarke**: It seems like a waste of money to me.

300. **Mrs McMaster**: At this present level, it very much depends on how many badgers are notified. There are no specified numbers to be surveyed. It is not from that point of view.

301. **Mr Clarke**: You would not be suggesting, Colette, that people are not notifying the Department that there is an animal on the road because of the fear that it is diseased? That is not what you are saying, no?

302. **Mrs McMaster**: I am not sure. Different people might notify the Department for different reasons. We believe that there is the possibility that farmers who have a TB breakdown on their farm are attuned to TB and may well report seeing a dead badger because that is very much in their mind. It really very much depends. By adding the last sentence, we tried to explain that it was only roadkill badgers that were tested, and that it was not a robust survey.

303. **Mr Clarke**: It is certainly not.

304. **Mrs McMaster**: We provided the information and it is there as background information.

305. **The Chairperson**: I remind members that we are running very late. Can we keep our answers succinct and our questions directed please?

306. **Mr McMullan**: That always happens when I start to talk.

307. **The Chairperson**: It is not just you, Oliver; it happens to everybody.

308. **Mr McMullan**: I want a survey done on that, because it happens every time that I want to talk. Is there any correlation between the foot-and-mouth disease outbreak and the drop and the rise again? Do you think that there is something there that should be looked at again, or do you think it is a fact of numbers?

309. **Mrs McMaster**: It is very much as Colin explained. The normal TB programme was suspended during the foot-and-mouth disease outbreak, because of the disease risks of foot-and-mouth disease, and so on. The routine testing stopped, so we were not detecting where there was TB infection on farms, and we were not removing that TB infection from farms during that period. That meant that when we resumed testing after the foot-and-mouth disease crisis, we found more TB on farms. It is getting back to the eradication programme, which is based on testing to detect disease and to then remove it, if infected animals are detected. Some of those infected animals may have been there and remained there until they were detected after testing was re-established. We believe that that was part of it. Perhaps, from the veterinary point of view —

310. **Mr McMullan**: Am I right in thinking that that testing for TB was done on farms that were not affected by foot-and-mouth?

311. **Mr Harwood**: Yes.

312. **Mr McMullan**: So, the farms that were affected by foot-and-mouth were not tested afterwards for the new stock that came in?

313. **Mr Harwood**: They would not have been tested until the new stock was in, obviously, but the bulk of the testing after the foot-and-mouth disease outbreak was done on the herds that were not depopulated as a result of foot-and-mouth.

314. **Mr McMullan**: That would have been on a kilometre base right round the affected area of the kill zone and the area affected by foot-and-mouth. So they have actually expanded the area out.

315. **Mr McKee**: I think we are confusing two things. The whole of the TB programme across Northern Ireland halted because of foot-and-mouth disease. There was no testing for TB on any farms, because everybody was dealing with the foot-and-mouth disease outbreak. The disease rose across the Six Counties.

316. **Mr McMullan**: Did the incidence of the disease rise in areas outside the foot-and-mouth area more than it did in areas inside it? I am looking at the list that we have here.

317. **Mr Harwood**: Newry is one of the areas in which there was foot-and-mouth disease, and, traditionally, it has had a relatively high level of TB. On the other hand, Newtownards, which has the highest incidence and, historically, has had the highest incidence for quite a few years — probably going back to the foot-and-mouth disease outbreak, or to that time — did not have a foot-and-mouth disease outbreak. So, although testing there would have stopped and animals would not have been moving, once testing resumed there were no animals removed in the Newtownards area.

318. **Mr McMullan**: That is what I am saying. The point I am making is that most of the areas that suffered badly with foot-and-mouth are not on that list. However, we will not dwell on that; that is the only point I am making, but it is food for thought. There are areas of high incidence on that list which did not have foot-and-mouth disease. That is why I am asking you if the foot-and-mouth

thing is a debate or argument within the area of trying to pinpoint this whole thing about TB. I do not think so.

319. **Mr Harwood**: I do not think so either.

320. **Mr McMullan**: From my point of view, the foot-and-mouth disease information is misleading, but not so much on the other arguments.

321. You say that there is a winter rise in TB. Is that a new thing?

322. **Mr Harwood**: No. It is a seasonal rise, when the animals are tested. You always get a rise starting around October, and it lasts until after Christmas. It goes up and down.

323. **Mr McMullan**: Is there an incubation period with TB? I am trying to find out whether there is a connection between summer and winter and between outdoor and indoor cattle.

324. **Mr Harwood**: Not to that extent. There is an incubation period. After an animal is infected, there is a period of about 60 days before it will react to a test, but you cannot link it like that. There is so much variation that you cannot generalise to that extent.

325. **Mr McMullan**: But would that not be a place to start working from? If there is the 60-day period from contact, through incubation to testing positively, are we testing at the right time to see whether the rise in winter numbers is to do with cattle being kept indoors or outside? I am talking about nose-to-nose contact, where people share buildings to winter cattle and all of that. I am trying to get round that. That is not coming up in the reports here, but it is a reasonable point to have a look at. Am I right?

326. **Mr Harwood**: It is difficult to answer. The disease can spread at pasture and in the house. The majority of our testing is done in the house. I am struggling to come to the point of what you said. I am sure that there will be something in it, but I do not think that it will make a difference overall to the incidence of disease. At one time, quite a few years ago, we made a point of trying to test every herd in certain areas before they went out to pasture. The idea was that, if they had been sprayed in the house, we could take those animals out and that would leave them free at pasture. It actually made very little difference — no difference really — to the spread of disease.

327. **Mr McMullan**: So there is no difference in that there, either, then? That is something that could be thrown out of the report, too. We are whittling this down well.

328. **Mrs McMaster**: On that last bit, we have a proximity study under way that is looking at the interactions between cattle and badgers on farms. I hope that that will give more information about the sorts of areas that —

329. **Mr McMullan**: What I was getting at about house cattle was whether there is something to do with the feed. Cats, for example, are notorious for getting into feed bins and can have a terrible effect on sheep during lambing. I wondered whether it was the same with cattle. If you think that there is no correlation, fine. It is either in or it is out. The last thing that we want is any more of these kinds of graphs that really have no bearing at all on the report. We could talk about this all day and get nowhere.

330. On biosecurity, your report from the veterinary people on the written submissions to the review of bovine tuberculosis made interesting reading. They are cautious about something that we dismissed in the report — the deer population. Do they throw caution in there? Is that something that has to be done? We do not seem to have really looked at that.

331. **Mrs McMaster**: We did some work looking at TB in wild deer. A fairly small sample was taken on that a few years ago that looked again at groups that had been surveyed at an earlier time. The survey was not big, but it gave an indication of the sort of levels of TB in deer, and I believe that they had not increased since the earlier survey.

332. **Mr McKee**: TB in deer seems to be less of a respiratory disease and more of an enteric and internal disease rather than a spread. It may be a factor in certain areas, and it should not be dismissed; you are absolutely right. I have seen deer moving through what I would have considered to be stock-proof hedges, and they ghosted through them. They can get into areas that you would never expect them to. Roly can give you instances and certain breakdowns near to forestry where deer have been considered, so it is not something that we dismiss and say that it cannot be deer. In the big scheme of things, it is a factor, but is it a big factor? Should we throw a lot of resource at that or other things? Part of the difficulty with TB is that there are so many unknowns, as we have been pointing out. There is so much that you could do. We talked about £4 million; you could spend £24 million researching TB and never get to the end of what we do not know. There are issues that we have to come to decisions about, and we have to focus and concentrate our resource on them. Deer is one. I agree that it should not be dismissed, but it may not be the big one. It should be borne in mind.

333. **Mr McMullan**: I am nearly finished. Although we recognise Scotland as being the lowest base for TB, we have no real mention of Scotland and how it has managed to keep the levels down. The farming practices there are nearly the same as ours. Are we taking any soundings of that?

334. **Mr Harwood**: Yes. We met the Scottish CVO a couple of years ago when they had just been given their freedom of disease. I have to emphasise that what they have done is they have got the disease down to a particular level. It still exists, but they would say that that is mostly due to imported animals from either England or Ireland. When we asked what they did to get rid of the disease, they said that they never really had the disease to start with; they did not have the burden of infection in their cattle or wildlife population that exists elsewhere. Their farming is a lot more extensive. Where we might have 10 or 15 neighbours to each breakdown farm, they have maybe one or two. It is a different environment. Their surveillance would not have been as frequent as ours. We test every year; they were probably testing their herds every four years. It just did not spread like it did here, and that is a historical thing.

335. **Mr McMullan**: Do more mandatory conditions need to be put into farming today? It is interesting that the vets are saying that the farming family today take TB more as a fact of life than a disease. How do you awaken the farming family to the fact that it is a serious problem? Are enough mandatory conditions, such as biosecurity, put on farming? At the end of the day, it is going to come down to quite a lot of that. Too much is left for people to do voluntarily, and we hope that it is done. Should more mandatory conditions be put in?

336. **Mrs McMaster**: Biosecurity is one of the important areas, although a whole range of things are important. DARD needs to work with the industry to do it. As others have said, it is as much a problem for the industry as it is for DARD. We want to work with the industry and the stakeholders to help to tackle it. It is really about looking at what the issues are. We know some of them. We are looking at biosecurity — we have had a biosecurity study — and we are looking at the contacts that happen on farms between badgers and cattle. When we get the results, we will discuss them with our stakeholder colleagues to see what we do next, what options are practical, voluntary or mandatory, and what the options are for improving how we tackle TB in Northern Ireland. Some of the things that we have to think about may be quite difficult. Other countries have had to tighten up on movement restrictions, controls on farms and so on. Whatever it is, it has to be workable in Northern Ireland, so it will require very careful consideration and discussion with our farming industry representatives and other stakeholders to see what way we go forward with this.

337. **Mr McMullan**: Do you not think that that should be there now, because that is going to be another forum for debate, debate and debate? It will be two to three years down the road before testing can be done and vaccines come through, but we have a chance to put biosecurity in now. Biosecurity is mentioned in your report quite a lot. Vets and everyone have come up with that. Can we not come up with a simple plan of biosecurity that would help, and get it out there to see what can be done? The argument is that we are doing nothing, only talking. Something like that would dispel that and go some way to do what the veterinary people have said in their summary. Biosecurity comes through quite a lot in their report. Can that not be done, or is someone scared of saying yes in case we ruffle the feathers of the farming community and drive the badgers over the border?

338. **The Chairperson**: That is a very valid point, and I ask you to be succinct, because we have to move on to Robin.

339. **Mr McMullan**: That is just one point that I want to make. That should be done now. A programme on what could help should be introduced now or brought to the table.

340. **Mrs McMaster**: We are considering the topic of biosecurity. We have a commissioned a study, which is under way and is coming to a close. Later this year, there will be a report, and that will be a good opportunity for us to look at where we take this next.

341. **Mr Swann**: Folks, where are we on the removal of reactors from farms? What is the time frame on those?

342. **Mr Hart**: We have some figures for you on that. We have a departmental target of 15 working days, and the EU target is 30 working days for removal.

343. **Mr Harwood**: Last year, our median time for removal was 9·6 days, and 86% were removed within 15 working days and 97% within 30 working days.

344. **Mr Swann**: And the 3% over that — how long where they on for? You said that you had 97% within the 30 working days. There were 3% over that. How long did they stand?

345. **Mr Harwood**: I am not sure of the detail of that, but, with each case that does not meet the target, we investigate why.

346. **Mr Swann**: You gave a median figure of 9·6 days. We can talk about statistics all day. What were the mean and modal averages?

347. **Mr Harwood**: I do not know. We only look at the median, because of the way that they are grouped. If one farm has 50 reactors and removal of all of them is delayed, it messes up the average figures.

348. **Mr Swann**: It makes it look worse, is that what you were going to say?

349. **Mr Harwood**: It is a matter for statisticians. We use the median. That is our standard method of reporting, and we use it as an indicator in our overall statistics. On the management of the removal, we look at the herds and the animals on a monthly basis.

350. **Mr Swann**: What are the main obstacles that you come up against in getting reactors off farms? What are the time frames?

351. **Mr Harwood**: First, we have an arrangement with a contractor who provides the hauliers to remove them. If the disease level is normal in respect of the numbers affected, we can get the animals away efficiently. However, if there are a couple of outbreaks that push the numbers up, that can slow it down. Moreover, it is in legislation that if people do not agree with the valuation, they can appeal it. If people choose to exercise that right, that can delay things. Equally, if you have animals that are not fit to travel for welfare reasons — perhaps they are coming up to calving or have been hurt in some way — removal can be delayed until the issue is sorted out.

352. **The Chairperson**: That is all the questions. I thank the officials for coming today. Thank you for your presentation and evidence . We are very appreciative.

1 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Ms Michaela Boyle
Mrs Jo-Anne Dobson
Mr William Irwin
r Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Professor Seamus Kennedy	*Agri-Food and*
Dr Stanley McDowell	*Biosciences*
Dr Robin Skuce	*Institute*
Dr Sam Strain	

353. **The Chairperson**: We are struggling for time, so we will move on to the briefing from the Agri-Food and Biosciences Institute (AFBI). I welcome Professor Seamus Kennedy, chief executive; Dr Stanley McDowell, senior veterinary officer; Dr Sam Strain, veterinary research officer; and Dr Robin Skuce, veterinary research officer. As we are struggling for time, I ask Committee members to keep it to two direct questions. If you have further questions, get them to the Committee Clerk, and she will pass them on.

354. **Mr Swann**: Are you going to stick to two as well?

355. **The Chairperson**: I will stick to two.

356. Gentlemen, you are very welcome to the Committee. I apologise for keeping you so long. You will appreciate that this is a very important issue for the Committee. I am sure that you have a presentation. I ask you to keep it brief, and then we will go straight to questions. Thank you very much.

357. **Professor Seamus Kennedy (Agri-Food and Biosciences Institute)**: Thank you, Chairman and Committee members, for the invitation to AFBI to provide evidence on the scientific base around tuberculosis (TB). I will very quickly introduce my colleagues: Stanley McDowell is the head of the bacteriology branch in AFBI's veterinary sciences division, where our statutory TB work and R&D work is mainly carried out; Sam Strain is in charge of that statutory programme of work but also has a particular specialism in the immunology of TB and the gamma-interferon testing; and Robin Skuce is our molecular fingerprint expert, which is a topic that came up earlier.

358. AFBI's work on bovine tuberculosis (bTB) includes a range of statutory work, basic testing of the lesions that are sent in to the lab from reactor animals and a range of R&D that is funded by the Department of Agriculture and Rural Development (DARD) and various other external funders.

359. The statutory and analytical work that AFBI carries out is in direct support of the Northern Ireland control programme. It includes microscopic examination of lesions from reactor animals to show whether they are TB lesions; the culture of the organism itself under high biocontainment conditions, because of the health and safety issues that go with TB; and molecular confirmation of the organism and the strain typing. We also carry out work on the performance of blood testing — the gamma-interferon assay— high-resolution strain typing of TB isolates, and laboratory examination of roadkill badgers.

360. We carry out DNA forensic typing of cattle, which is used by the Department to investigate potential cases of cattle identity fraud. All our statutory testing is accredited to ISO 17025 standard, which is the international quality assurance standard, and all our R&D is accredited to ISO 9001 standard.

361. We are very active in a range of international collaborations on TB research. That is important to us, because it is essential that we are at

the leading edge of research and are working with the leading groups in the world on TB so that AFBI has the most appropriate and up-to-date staff skills and technology.

362. I will give you an idea of the range of people with whom we collaborate. We collaborate with the European Union Reference Laboratory for TB in Madrid; the Institut Pasteur in France; the Animal Health and Veterinary Laboratories Agency (AHVLA) in the UK; the National Institute for Public Health and the Environment (RIVM) in the Netherlands; the Roslin Institute at the University of Edinburgh; Trinity College Dublin (TCD) and University College Dublin (UCD); the Statens Serum Institut (SSI) in Denmark; the Norwegian Veterinary Institute (NVI); the United States Department of Agriculture's Agricultural Research Service (ARS); and AgResearch in New Zealand. Those contacts allow us to access the most up-to-date technology and to share and exchange ideas on TB research.

363. AFBI has secured substantial competitive R&D for TB research over the years, and, over the past 15 years, we have won contracts amounting to approximately £3·5 million. That is an important addition to the work that is already funded by the Department. If we take in research on related diseases such as Johne's disease, the total goes up to over £4 million.

364. The core research that we carry out in AFBI is in the key areas of molecular biology and immunology. It is necessary for us to maintain the capacity and expertise to do the gamma-interferon testing and the other statutory TB work through research. The research is important in order to answer questions that are asked, but it is also important to maintain those skills among our staff. That is the lifeblood of our science organisation.

365. With that, I will end my introduction and hand over to Dr McDowell. He will concentrate more on the detail of the TB work that AFBI carries out.

366. **Dr Stanley McDowell (Agri-Food and Biosciences Institute)**: The paper that we submitted contains two main themes. First, it tries to summarise briefly, as far as we can in a short paper, current scientific thinking on bovine TB and bovine TB control, and hopefully it covers in outline the points that were raised in your letter of invitation. Secondly, it provides an overview of the research and development work that AFBI is funded to undertake, as well as a number of pointers towards the key role that science has to play in tackling this most complex and significant disease.

367. By way of introduction, bovine TB is caused by mycobacterium bovis (M.bovis), and is widely recognised as the most difficult endemic animal disease problem that we currently face. M.bovis is very similar though distinct from the cause of human TB, mycobacterium tuberculosis (M.tuberculosis), and the two share a number of similarities, including some of the difficulties encountered in areas such as disease diagnosis, vaccination and control. As we heard earlier, bTB is primarily a chronic respiratory disease of cattle, which, in an advanced stage that is fortunately now rare, is associated with a loss of productivity and milk yield. The causal organism presents a potential risk to human health, and prior to the introduction of control programmes, between 2,000 and 2,500 deaths were recorded each year in the UK. Such infections are now rare, principally due to the introduction of milk pasteurisation.

368. The epidemiology of bovine TB is probably uniquely complex. However, current evidence indicates that cattle and wildlife are sources of infection. A valid and often-asked question is what the relative importance of cattle and wildlife sources are. However, it is not exactly known, and the importance of both sources will vary across regions, depending on factors such as the adequacy of cattle control measures, the infection pressure in wildlife and the degree of interaction between the species.

369. Primarily, bTB is a respiratory lung disease, and prior to the introduction of tests and slaughter programmes, cattle-to-cattle transmission overwhelmingly predominated in the disease transmission. The predominant mechanism of cattle-to-cattle transmission is via aerosol contact, which means small droplets moving over a space of 2 metres to 3 metres, and it necessarily involves close contact between cattle. Indirect transmission between cattle via contaminated slurry or other contaminated objects is thought to be much less important. Milk-borne infection occasionally happens in young calves but is quite rare. Importantly, there appears to be marked variation in the level of cattle-to-cattle transmission in different settings. It would appear that not all individual cattle are equally infectious. There are parallels with the human TB situation. In many situations in NI, for example, there appear to be relatively low levels of transmission in within-herd spread. Equally, however, there are incidents of large outbreaks of what appear to be significant cattle-to-cattle spread.

370. It is not uncommon to have natural variation in the genetic susceptibility of individual animals to disease. That also appears to be the case with bTB. Recent evidence, including collaborative work undertaken by AFBI and the Roslin Institute, which, as was said, is part of the University of Edinburgh, indicates that cattle vary in their genetic susceptibility to TB and raises at least the prospect of trying to breed animals with increased resistance. Variability in the susceptibility of individual animals and their infectiousness owing to non-genetic effects, such as intercurrent disease and physiological status, is also likely. The parallel for that is human infection, where interaction between HIV/AIDS and M.tuberculosis infection is well recognised.

371. I will now move on to wildlife-to-cattle transmission. Wildlife reservoirs of bTB infection are not unique to the UK and Ireland. Indeed, they are recognised in a number of countries. Such reservoirs include possums in New Zealand, white-tailed deer in Michigan and wild boar in Spain and Portugal. A wildlife source was first suspected in GB owing to persistent foci of bTB infection in south-west England and infected badgers were detected subsequently in Gloucestershire in 1971. Reports of infected badgers followed from the Republic of Ireland and from road traffic accident (RTA) surveys in Northern Ireland.

372. Although bTB has a very wide species range of infection and has been recorded in a range of domestic and wildlife species, only badgers, and possibly deer in some localised areas, are thought to be significant in the epidemiology of the disease in the UK and Ireland. The evidence implicating badgers in the epidemiology of bovine TB includes the recorded occurrence in the species, spatial similarities in the strain type — although that does not indicate the direction of transmission — and the results of things such as badger removal trials, which have either increased or decreased the occurrence of bTB. M.bovis infection in badgers is again primarily respiratory, and badger-to-cattle transmission is thought to occur either directly via aerosol transmission or indirectly via contaminated urine or faeces. Going back 10 or 15 years, much of the focus would have been on the indirect routes of transmission, through things such as urine and faeces, but current evidence and thinking tend to favour direct aerosol transmission. I will come back to that when dealing with some of the issues around biosecurity. As you perhaps heard earlier, there is published evidence from GB indicating cattle-to-badger transmission in certain circumstances. That evidence comes from the randomised badger culling trial (RBCT). When there was a suspension of cattle testing, it was associated with an increased occurrence of M.bovis in badgers.

373. I will move on to bTB control in cattle testing. The control of bovine tuberculosis was first initiated owing to

the human health risk, with voluntary test and slaughter schemes introduced in the UK in the 1930s and later followed by compulsory schemes. It may be worth noting that, prior to the introduction of such control schemes, infection in cattle was widespread, with some 20% to 40% of cattle estimated to be infected. Therefore, yes, control schemes have made significant progress, despite all their problems.

374. Following the introduction of test and slaughter control schemes, there was generally rapid progress in reducing the number of reactors. In England and Wales, infection during the 1970s and early 1980s was largely confined to pockets in the west and south-west. However, the past 25 years — from around 1987 — have seen generally sustained increases of occurrence across the west and south-west of England and Wales. The NI situation also showed rapid initial progress, with generally low levels occurring during much of the 1970s and 1980s. There was also a period of sustained increase in NI from the late 1980s to 2002, although that has more recently been reversed. One of the obvious questions is this: why have those increases occurred? The aim of test and slaughter programmes is to detect and remove infected animals and to control cattle-to-cattle spread. However, importantly, their effectiveness relates to the accuracy of the test used. Skin testing is and remains the standard test used in control schemes worldwide, albeit in slightly different formats.

375. Estimates of sensitivity, which is a measure of how good the skin test is at detecting infected animals, are variable. They range from somewhere in the region of 55% to 90%. Recent estimates of skin test sensitivity tend to be towards the lower end of that range, and the test sensitivity overall could be best described as moderate. The recent estimates may be due to differences in methodology, or they may reflect genuine changes in test sensitivity of the skin test over time. Overall, sensitivity of the skin test at a herd level is higher, and that is as a result of repeated and regular testing.

376. Efforts to develop alternative tests have been hampered by the complex nature of the disease. The most common alternative in use, including at AFBI, is the gamma-interferon test. It is a test that, as we heard earlier, has a higher sensitivity but, in its current format, is more costly and has lower specificity, which limits its application. However, a number of possibilities exist to improve the performance and reduce the cost of the test, and there are a number of alternatives, such as serological tests, which may have a place in the control.

377. There is evidence to indicate that bTB sensitivity may be reduced by intercurrent disease, including Johne's disease. Johne's disease causes reactions at the avian site, and changes in the prevalence of Johne's disease over time may have affected the sensitivity of the skin test. Work by AFBI — for example, in collaboration with UCD — has demonstrated experimentally that co-infection with liver fluke also suppresses the immune response to bTB, as measured by the skin and gamma-interferon tests.

378. I move now to biosecurity and some of the steps that can be taken to limit infection. We heard quite a bit about biosecurity earlier. Fundamentally, bovine TB is an infectious disease, albeit that that appears variable, and biosecurity measures to limit transmission are a necessary part of control. A broad range of measures have been proposed to prevent infection through cattle-to-cattle transmission. They include issues around cattle purchase; pre- and post-movement testing; the prevention of close contact between neighbouring herds; and such measures as boundary fencing and control of cattle slurry.

379. Measures to prevent wildlife-to-cattle transmission are more uncertain owing to the limited evidence base, but they can be conveniently divided into measures at housing and measures at pasture. Measures at housing include preventing direct badger-to-cattle

transmission by preventing badger incursions into farm buildings, and preventing indirect transmission by stopping badgers accessing feed and silage stores. That leads to part of the critical evidence base into knowing whether the primary routes of transfer to cattle occur at housing or at pasture. Measures at pasture are much more difficult, but they are aimed mainly at stopping indirect contact between badgers. They include such measures as raising feed and water troughs, fencing off setts and possibly altering grazing patterns. Practically, that is probably a lot more difficult.

380. Dealing with TB in wildlife, particularly in badgers, presents fundamental difficulties and, as we heard earlier, can have unintended consequences. Direct intervention options are badger culling or vaccination. I will not repeat a lot of what the Assembly researcher covered earlier, but it is worth pointing out that the randomised badger culling trial, which is probably the most comprehensive evidence base for badger culling, occurred over a period of six or seven years and cost close to £50 million. The results of the RBCT indicated that proactive culling was associated with a modest beneficial effect, by way of a decrease in bovine TB within the cull area, but an initial detrimental effect in the surrounding 2-kilometre area. Preliminary results from reactive culling showed a detrimental effect of an increase in bovine TB in local cattle herds, and that area of the trial was stopped early.

381. Results from the four-areas trial and other trials in the Republic of Ireland have shown beneficial effects from area-based culling approaches. The potential benefits of culling need to be balanced against ecological impacts and significant economic costs. The Department for Environment, Food and Rural Affairs (DEFRA) has estimated that proactive culling costs around £2,500 per square kilometre. It is also worth noting that culling in small, targeted areas will have very limited impact on the overall regional or national statistics. Some extrapolations from DEFRA figures in their consultation suggest a benefit of 16%. If that is applied to only 10% of the cattle population or TB problem, we would reduce the overall regional prevalence by 1·6% to 2%. We are left to deal with 98% of the problem.

382. Badger BCG is the only TB vaccine currently licensed for badgers, and it is injectable. It is an old vaccine, which was first developed for human use in the 1920s. Being an injectable vaccine, it requires badgers to be caught, with all the associated costs. Experimental and field data have shown the vaccine to give a reasonable degree of protection. There have not been large trials to demonstrate the impact on cattle bTB levels, but the experimental evidence gives cause for reasonable hope that the levels of TB protection would translate to cattle. Further work on oral delivery vaccines is ongoing in GB and Ireland, and there is ongoing work in the human field on developing more modern and complex TB vaccines.

383. I will now give an overview of AFBI TB research. Owing to the complex nature of bovine TB, including the organism itself, the response of cattle to infection, the limitations of diagnostic tests and vaccines, and some of the major gaps in our knowledge of interactions between wildlife and cattle, disease eradication can be based only on increased emphasis on research. The TB research undertaken by AFBI falls predominantly into two areas, the first of which is our work on molecular and strain-typing research. AFBI scientists, and in particular by my colleague Robin Skuce, who is sitting to my right, have been to the forefront of developing strain-typing methods for M.bovis, including the identification of genetic markers, which are now used not only for M.bovis but for human M.tuberculosis. Those rapid and high-resolution techniques are applied routinely in NI as an aid to identifying sources of infection and for surveillance purposes.

384. Importantly, strain typing is important in two aspects: first, at local outbreak level; and secondly, for research.

At research level, the integration of strain-typing information with NI cattle movement and test data has started to show significant potential and to answer fundamental questions about bovine TB epidemiology. Such questions include: is there a variation in virulence between different bovine TB strains? Are there strains that evade current skin testing? How do cattle and wildlife strains compare? What is the role of cattle movement? How do NI strains compare with those in GB, Ireland and beyond?

385. The work on strain typing has also led to further significant areas of investigation, an example of which is the work on genetic susceptibility that I referred to earlier. Other significant work includes recent pilot studies with the University of Glasgow, which is using whole genome sequencing methods — sequencing the entire genome of M.bovis to compare cattle and badger isolates at the highest possible level of detail. Such high-resolution methods establish how similar strains are, not just that they are similar. It also opens up the possibility of indicating directions of transmission and of modelling transmission events.

386. Understanding the cattle immune response to infection is crucial to understanding bovine tuberculosis and to developing improved diagnostics and vaccines. Bovine TB immunological research at AFBI has included understanding the early immune response; understanding disease transmission between cattle; looking at new diagnostic reagents; trialling novel vaccine candidates; and looking at the effects of co-infection on disease development and diagnosis. Some examples of early work include the characterisation of the early immune response in cattle; work on ESAT-6, which is a highly specific antigen now used in gamma-interferon tests. Central to much of the work has been the development of highly refined bovine models of infection that closely mimic natural infection. The cattle infection model is widely used in international research projects.

387. Bovine and human TB, as I referred to earlier, have many similarities. The expertise that has been established at AFBI has attracted collaborative research from experts in human TB. One of our important collaborations is with the SSI in Denmark, which is probably the world-leading institute on bovine TB. Recently, AFBI secured EU funding to develop ferret infection models to mimic badger infections. The use of that model has included the evaluation of novel vaccine candidates. Those vaccine candidates offer the potential to go beyond the BCG in conferring protection in animals that are already infected.

388. I will now talk about epidemiology and ecology. Routine data collation and the majority of epidemiological research on bTB in Northern Ireland has, to date, been undertaken in-house by DARD's Veterinary Service. AFBI has been funded by DARD to undertake three projects, which are a TB biosecurity study, an analysis of gamma-interferon testing, and an ecological project on cattle and wildlife interactions. Those projects are ongoing.

389. Significant bovine TB R&D has been undertaken in NI and elsewhere, but the challenges of bovine TB control are, quite simply, immense. A multiplicity of factors drive short- and long-term disease trends. Research is therefore needed in a number of areas to address the challenges. Some examples of work that are needed for cattle include a better understanding of cattle-to-cattle transmission and the circumstances in which it most occurs; the impact of genetic and non-genetic effects on susceptibility; the effect of intercurrent disease, such as fluke and paratuberculosis, including their impact on skin and other tests; improved bTB diagnostic tests, including further development of gamma-interferon and other assays; and improved understanding of the general and molecular epidemiology of the disease.

390. There is a need to better understand badger-to-cattle interactions and how best to minimise contact between the species. Work on vaccine efficacy,

improved vaccines and vaccine delivery mechanisms are also long-term requirements. Work is also needed to better understand how best to deliver biosecurity measures to farmers and how best to work with farmers to achieve changes in biosecurity standards.

391. I appreciate that that was a fairly rushed and rapid run-through of what is a complex scientific area. We are more than happy to take questions and provide further written evidence on some of the issues if you feel that that would be useful.

392. **The Chairperson**: OK. Thank you very much for your presentation. I have a couple of questions before I invite questions from members. I remind members to stick to two questions because we are tight for time. If you can get your other questions to the Committee Clerk, she will pass them on.

393. Northern Ireland has been working on the eradication of the disease for over 60 years. It is not a Northern Ireland-specific disease, but it seems that officials, scientists and others still have so much more to learn about the disease. Why is that, in layman's terms? Explain to me why it is so complicated a disease to get a real handle on.

394. **Professor S Kennedy**: It is down to the nature of the TB bacteria. We all know about brucellosis. Although that has not been eradicated, we are on the way to doing that. However, for an organism such as brucellosis, we have the advantage of a very good blood test. It is the same with Aujeszky's disease in pigs. The TB organism hides itself in the body and changes its spots, and so on, so there is a fundamental gap in our knowledge of how it does that — its pathogenesis. As Stanley said, there are also unknown questions, such as whether there are some cattle that are almost like super-shedders that cause a lot of the spread of TB and perhaps other animals that do not spread it at all. There is a huge amount of information that we do not know because of the complex nature of the organism.

395. **The Chairperson**: To elaborate on that, are you saying that the disease is evolving quicker than we are researching it? Is that a way to put it?

396. **Professor S Kennedy**: The TB experts can comment on —

397. **Dr McDowell**: One of the difficulties with M.bovis is a parallel with M.tuberculosis. The latter causes in the region of two million deaths each year in something between a quarter and a third of the world's population. A massive research effort has gone into human TB. That maybe gives you part of the answer as to why we are struggling with bovine TB.

398. Yes, there may well have been changes in epidemiology over the past 20 or 30 years. It was assumed with the control programmes in the 1960s that we would eradicate TB very quickly. That has proved not to be the case. There may well be changes in the nature of the disease, the organism and the tests over time, and that is why ongoing research is required and will be required for the foreseeable future if we are really to get on top of the disease.

399. **The Chairperson**: You are the specialist experts. Do you have it in your heads what research needs to be done, and can you put a price on that? That is not to hold you to account in any shape or form with regard to funding packages, just to give us an idea how much this could actually cost to resource properly.

400. **Dr McDowell**: In paragraphs 35, 36 and 37 we have given an idea of some of the research ideas that we have. We have not formally costed those, but, to give some parallels in research funding, the randomised badger control trial cost £50 million as one study. DEFRA has spent close to £90 million on R&D. Its current annual spend on evidence and innovation is £12 million, a lot of which is research. That gives an indication of the global figure in terms of the research spend that is required to deal with the disease.

401. **Professor S Kennedy**: It is important that collaboration on research between international groups continues, because

the cost would be horrendous if every group replicated what was done elsewhere.

402. **Dr McDowell**: We gain huge benefits from the collaborations that we have in trying to gain knowledge from world-leading groups in the UK, Ireland and further afield.

403. **Mr Irwin**: Thank you for your presentation. The different strains of TB were mentioned a couple of times, including in the previous presentation. Almost 600 animals on a farm near to me were recently taken inside a 12-month period. I know of another herd where 700 animals went down for TB, two were taken and that was it clear. Presumably, those different strains can be identified by the Department. Should extra restrictions not be put on herds that have a very contagious strain? We talk about biosecurity but neither of those farms did anything different from the other, and one lost 600 animals and the other two.

404. **Dr Robin Skuce (Agri-Food and Biosciences Institute)**: You make a very interesting point, and the answer may surprise you. We have undertaken very structured surveillance of the strains that occur in animals at herd level and at the animal level. In recent years, we identified in the order of 200 TB strains in Northern Ireland. It continues to generate new strains all the time, and some of those get transmitted and others get removed by testing.

405. With regard to your point, about 40% of outbreaks have one or two reactors. However, the number of reactors by herd is highly skewed. An easy way to think of it is that 80% of reactors are in 20% of herds; it is clustered. So, you have examples, as you said, with big outbreaks. We looked at whether there is a strain effect that is responsible for that and, surprisingly, there is not. Our interpretation of that situation is that there are risk factors adding to substantial cattle-to-cattle spread in those herds, whether it is concurrent infection or something else — and I am guessing at the moment. However, it is not a strain effect, which is surprising.

406. **Mr Irwin**: All I will say is that a local veterinary officer, when questioned on this issue, said that they knew where it came from.

407. **Dr Skuce**: Yes, the strains are so geographically clustered that there is an Enniskillen strain, a Dromara strain and a Coleraine strain, and we can spot them very readily when they move around the country. When they move out of their hot-spot and into another herd, the outcome can be very variable. They can sit in that herd and do nothing; they can spread in that herd and not beyond; or they can spread to other herds. I would be over-reaching the evidence to say that, over time, there is evidence of transmission into wildlife. Those are examples and anecdotes, really, and we hope to get the funding to summarise those.

408. **Mr Irwin**: If one was looking from the outside, one would say that there is something wrong here.

409. **Dr Skuce**: It is a very important observation.

410. **Dr McDowell**: In summary, it appears that the variance does not occur within the strain. It occurs in the factors in the cattle. In those circumstances, issues that affect cattle transmissability are probably reasons why you are dealing with large outbreaks of that nature.

411. **Dr Skuce**: We have looked at a couple of other things. We have looked at whether the skin rises in the skin test are a strain effect, and that does not seem to be significant either. We would have thought that the recent application of the TB programme would have imposed a substantial selection on the population, so that maybe we have selected strains that are less detectable. However, that is not supported by our current evidence. That is reassuring because there do not tend to be big differences between the behaviour of human and bovine TB, except at the very big family level. However, that is a different story.

412. **Dr McDowell**: The worrying fact has been that skin testing by its very nature has been selecting and removing those strains that are most reactive and leaving those that are least reactive. However, the evidence indicates that that is not the case. It is important to know.

413. **Mr Irwin**: Do you have any idea what percentage of reactor animals that are taken from the farm actually show lesions for TB?

414. **Dr McDowell**: That is predominantly from DARD data. Our estimate is that it is approximately 40%. That does not mean that the other 60% are not infected.

415. **Mr Irwin**: I am a farmer myself. Do you understand that some farmers feel that animals are being taken unduly?

416. **Dr McDowell**: Absolutely.

417. **Mrs Dobson**: Thank you for your presentation. Has the Minister ever asked you for statistical research into a possible date when Northern Ireland could be TB-free?

418. **Dr McDowell**: No. That has never been raised with us.

419. **Mrs Dobson**: It has never been requested. Did she ask for AFBI's input into the determination of the PFG target for a brucellosis end date?

420. **Dr McDowell**: I am not aware of any approach.

421. **Professor S Kennedy**: Not aware; any request from the Minister normally comes through her officials.

422. **Mrs Dobson**: So, as far as you are aware, those were never asked for. You said that you have obtained substantial external funding for your TB research. How much funding have you secured, and how does that compare to DARD's contribution to your TB research?

423. **Professor S Kennedy**: Over the past 15 years or so, we have secured about £3·5 million external funding. Over the same period, the figure for the DARD work is about £7 million.

424. **Mrs Dobson**: That is substantial. How do you ensure that your research does not overlap with that of other institutions across the UK and Europe? You outlined the places that you combine research with. How do you ensure that that does not happen?

425. **Professor S Kennedy**: It is mainly through collaboration. The research team has constant communication with all those teams, and, when we go forward for external funding, for example, that is put through a peer review process. Therefore, if the funders — the EU or DEFRA, or whoever it happens to be — thought that there was duplication of work elsewhere, that would come out. However, it is done mainly through collaboration.

426. **Dr McDowell**: Research falls into two categories. There is the fundamental basic science research; collaborations are very important in that, and it is important not to duplicate. In terms of understanding the local epidemiology, it is important to have local research that understands the local problem.

427. **The Chairperson**: OK. I am going to move on. If there are any other questions, give them to Stella, and we will get a written response to them so that they can form part of the inquiry. It is very important that we ask all the questions that we can. The only unfortunate problem we have today is that we are stuck for time.

428. **Mrs Dobson**: That is OK. No problem.

429. **Mr McMullan**: The more I listen to scientific presentations, the more the badger argument goes out the window. Is that a fair comment in the future of eradicating this disease?

430. **Dr McDowell**: It is recognised that the badger plays a significant role in the disease, but we have tried to indicate in the paper and some of the discussions just how complex the issue is. It is not simply a wildlife source. There are a lot of complexities in respect of the cattle programme and cattle testing.

431. **Mr McMullan**: Yes; there is a myth that this or that Minister has not done enough, but this is a more complex disease than I think any of us realised until quite recently when we listened to gentlemen like you. We need to change our thoughts on the disease. It is not a back-door disease. It is a very complex disease, and the fact that bovine TB is so close to the human strain really surprised me. If nothing else, we need to go out of this whole thing about tuberculosis on a different way of thinking.

432. **Professor S Kennedy**: It is complex, and there is no one answer to it.

433. **Mr McMullan**: Thank you for your presentation. It was very interesting.

434. **Mr Swann**: Gentlemen, I am sorry that I missed part of your presentation. I have a quick question. Do you have any solutions? What would be your steps? As you were sitting working through all the statistics, you are bound to have thought about that.

435. **Professor S Kennedy**: That is a difficult question. We have skimmed over a lot of the unknowns. We definitely need more research; that is a given. However, I am mindful of the Chair's earlier comments that there is no point doing research if there is no benefit. It is a long-term process.

436. **Dr McDowell**: There is a range of possibilities. Things like cattle vaccines would be an ideal solution, but they are not an easy answer. They have cost implications, they react with the skin test and the BCG, for example, is not universally effective. I would be cautious in saying that the vaccination of cattle is a long-term and viable solution. If we could orally vaccinate badgers with an easy uptake, that would be a major step forward. I mentioned that we also have to look at the improved cattle tests that are more sensitive and specific and that can remove the disease more easily. We also have to look at and understand the large outbreaks, why they happen and whether other factors such as paraTB are having an impact. We know that bovine viral diarrhoea causes immunosuppression and we need to understand whether that is also an issue in some of the large outbreaks. As we go down the road towards eradication, there are a combination of factors.

437. **Professor S Kennedy**: One of the other points that we have not touched on is Robin Skuce's work with colleagues in Scotland, which indicates that there is a surprisingly high heritability of cattle resistance to TB. That raises the whole issue of whether, over a period of years, we could breed cattle that are progressively more resistant to the disease.

438. **Dr McDowell**: That research falls into two parts. The first is the quantitative part, which analyses retrospective data, and our collaborators in the Roslin Institute are engaging with the dairy industry to see whether that data could be used to promote the selection of sires with increased resistance. The longer-term aim is to look at whether we can genomically determine which animals are more resistant and say that those animals are the ones that should be bred from. However, that is a much longer-term objective.

439. **Mr Swann**: Has that research started yet? That is being done in Scotland?

440. **Dr McDowell**: We have undertaken the genomic selection part as a case control study, and the Roslin Institute is analysing that. Those are the first steps down what may be a long road.

441. **The Chairperson**: OK. Members, all of the questions have been asked. If you have any further questions for AFBI, please get them to Stella and we will ensure that they form part of the inquiry. Gentlemen, thank you very much for your attendance, your presentation and your answers.

1 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mrs Jo-Anne Dobson
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Professor Christopher Elliott	*Institute of Agri-Food and Land Use*
Dr Irene Grant Dr Neil Reid	*Queen's University Belfast*
Professor Ian Montgomery	*University of Ulster*

442. **The Chairperson**: I welcome Professor Chris Elliott, the director of the Institute of Agri-food and Land Use; Professor Ian Montgomery, the director of Quercus; Dr Irene Grant, a lecturer in microbiology and food safety; and Dr Neil Reid, the manager of the Natural Heritage Research Partnership. I hope that I got that all right. I will give you time to get settled.

443. Thank you for your attendance here today. This is a very important inquiry to the Committee, as has been demonstrated by the time that it has taken to get to you. I apologise for the fact that you have had to wait for so long, but I hope that you have found it as interesting as the members have. I am sure you have a presentation. Please keep it as brief as possible so that we can go directly to questions. I would appreciate that.

444. **Professor Christopher Elliott (Institute of Agri-Food and Land Use)**: You got our names, ranks and serial numbers correct, so I will not go through those again. We are very pleased that as a result of the research that has been conducted at Queen's over quite a long period, we can have an input into your important inquiry. As we have sat and listened with a great deal of interest, two key themes have emerged. One relates to the testing and the actual diagnostics of the disease, and the other is the role of the badger in the spread of the disease. Those are the two key areas that we have been conducting research on.

445. Mr McMullan was absolutely correct: bovine TB is an unbelievably complex disease. The organism is very intelligent. It can hide away in the system of an animal for months before the immune system recognises that it is there and can take action. During that period of a couple of months, the disease has the ability to spread within farms, because the disease can be spread as animals move around.

446. What happens during the two months when the bacteria is hiding in the animal? The present testing regime, which is based on the skin test, cannot detect the disease until it has been there for about two months. There is a second test called the gamma-interferon test; you have heard information on that test. It is a faster test, so it gives an indication of disease presence earlier than the skin test does. However, I have heard a lot of accurate information to say that it is not a very reliable test, because it is not measuring TB; it measures an acute phase protein, which can be elevated by many other different types of disease. So, it is not TB-specific.

447. My research group set out to look at that early period of infection — the first couple of months, when animals are subjected to the infection. We set out to look at what changes occur in the molecular fingerprint of the animals: what genes are switched on, what genes are switched off; what proteins the animals produce, and what proteins the animals have a

decreased production in. To cut a very long story short, we were able to find a number of those very specific gene and protein markers between two and four weeks after infection. We were able to produce a fingerprint of the disease. That fingerprint tells us some of the underlying mechanisms of what that bacterium is doing for the two-month period when it appears to be dormant, but is far from it. We searched many scientific databases to try to find out if there was any evidence that the markers we detected were linked with other diseases. In most cases, the answer was yes. However, the particular fingerprint that we have produced is very specific to bovine tuberculosis. In our laboratories at Queen's, we have come up with a number of very interesting targets that could be used to advance the diagnostics of bovine TB. That research was completed recently, and I presented it to the Department of Agriculture and Rural Development (DARD) before the end of last year.

448. **Dr Irene Grant (Queen's University Belfast)**: I want to make the Committee aware of a couple of mycobacterium bovis (M.bovis) projects funded by the Department for Environment, Food and Rural Affairs (DEFRA) for which I have been principal investigator. The projects are concerned with improving the diagnostic or detection methods for M.bovis. The current means of detecting M.bovis in lymph nodes of cattle taken at slaughter is culture, which takes eight weeks, so it is not rapid. It is very slow and may or may not indicate M.bovis presence when, in fact, the organism is there in low numbers.

449. I have almost 20 years' experience working with mycobacterium paratuberculosis, which is the relative of M.bovis. We used some of the things that we have learned about paratuberculosis and mycobacteria generally to approach M.bovis from a different angle. We have been looking to develop a method that will pull the organism out of the tissue sample to make it more detectable by a subsequent test method. This is called immuno-magnetic separation (IMS). In simple terms, you use microscopic beads with an iron core, coat the beads with an antibody or peptide to your organism of interest, and mix the beads with the sample. If M.bovis is there, it sticks to the beads. You can then apply a magnet, pull the beads out of the sample with any M.bovis attached to them, get rid of the rest of the sample, wash the beads and then do what you like with the bovis that you pulled out of the sample. So, you can use a polymerase chain reaction (PCR) DNA test or try to culture it. There are various other things you can do.

450. The first project that DEFRA funded, starting just over two years ago, was for two years and is just completed. We submitted our final report to DEFRA at the end of March. It was a collaboration between Queen's and the Agri-Food and Biosciences Institute (AFBI). It sought to develop or generate antibodies or peptides that could be used on those beads; prove that the bead system worked in pulling the M.bovis out of the tissue samples; and carry out a fairly substantial survey of bovine lymph nodes taken at slaughter, and compare the statutory results with our new test results.

451. We managed to generate several M.bovis-specific monoclonal antibodies and peptides. We successfully applied those to the beads. We then employed the beads in conjunction with PCR DNA tests and the culture test. We carried out a large-scale survey. The results showed that the IMS bead-based methods detected around 27% more M.bovis-infected lymph nodes than the current statutory culture method. The vast majority of those extras were from non-visibly-lesioned lymph nodes.

452. The positive IMS PCR results show an initial impression of M.bovis positivity was obtained by the PCR route within 48 hours. It was still eight weeks — the current statutory culture period — before the culture results became available. Generally speaking, however, the culture results mirrored the initial PCR results. So, you got an early

indication of M.bovis positivity, which was backed up by culture results later on. The IMS method provides a potential means of taking a different angle to testing for M.bovis. On the basis of a survey of 280 lymph nodes, we are getting better results, ie more M.bovis positives from lymph nodes from reactor cattle.

453. The second project started in January, also funded by DEFRA. It is using the antibodies and peptides generated in the first project but putting them into a different test format, a lateral flow device test, that may be used in the field to test badger faeces for M.bovis. My collaborators on that project are Professor Montgomery and Dr Neil Reid at Queen's, a diagnostic company in York and folks at the Food and Environment Research Agency, Woodchester Park, Gloucestershire.

454. The project will run for 18 months. We are in the test development stage. Once we have developed the test, we will evaluate it in the lab. We plan then to go out to badger setts in the Province in TB-affected areas and non-TB-affected areas. We will not interfere with the badgers at all, but we will collect faeces, do an in-field test on the spot and then take the sample back to the lab and test it there also. Then we will compare the results of the field test with the laboratory test and see how well the field test performs. However, the idea is that you can detect M.bovis-infected badgers, use GPS to say exactly where they are and link them in with TB breakdowns around the Province to provide that kind of information.

455. **The Chairperson**: Those are three very distinct projects, but they all tie in together.

456. **Professor C Elliott**: Exactly.

457. **The Chairperson**: Sorry, Dr Grant, were you finished?

458. **Dr Grant**: Yes.

459. **The Chairperson**: Is there someone else due to speak?

460. **Professor Ian Montgomery (University of Ulster)**: Yes, I will give a brief review of work on two areas of badger ecology and epidemiology. Since the early 1990s, we have been funded largely by DARD studentships, which have been extremely valuable and appreciated. Without that, we would have very little knowledge of what is happening with respect to the badger population. Very briefly, the results indicate similarities with GB but also some differences, which might be significant when it comes to implementing the control measures. Those differences might be related to landscape or to farming practice. It is not entirely clear, but there are some significant differences there.

461. In short, our badger groups tend to be smaller. They also tend to make use of habitats that are not used heavily by badgers elsewhere, such as field boundaries, for their setts, in the absence of significant woodland. We also see a huge difference in the density of badgers from one area to another. Landscape is very influential, and there can be as much as a 30-fold difference in population density. The GB experience always refers to particular studies which are in high-density areas. Very often, we deal with relatively low densities of badgers by comparison to GB. There are aspects that are very similar. They live in territorial groups, and males in particular can wander across the countryside. Significantly, one of the reasons why it is a difficult disease to control is that badger groups do not really line themselves up with farms. A single badger group could cover up to nine or 10 different farms, and it is likely that most farms have only one badger group, but it spans all the neighbours.

462. Some preliminary data on particular areas for the level of badgers that are exposed to the pathogen comes out at around 40%, but it is a limited study. We have something like 14% excretion of the pathogen in some of our data, and, in a later study, 6% came out, with 2% being super-excreters, that is, they excrete on more than one occasion of being captured. Therefore, we have

some idea what the disease is like in a living group of badgers in at least one area of the Province. We also have some preliminary data on biosecurity. For example, we have been able to show that 60% of farms graze cattle next to their neighbours, and there is no barrier to contact between cattle. That is clearly a major problem. There are a variety of other areas of data which are important, but I will not go into that because it is in the written submission.

463. The second area is to do with population change in badgers and persecution. That work was funded primarily by a competitively won tender with DARD. That work shows in a nutshell that population size and the number of social groups have not changed between the 1990s and 2007-08 when the last survey was done. There is probably every reason to believe that we underestimate badgers by that method. We have some genetic evidence which suggests that we can catch four out of five badgers. Therefore, when we make the correction, it comes out at roughly 41,000 badgers in Northern Ireland. There are wide margins of error, but that is the nature of the beast. It shows a huge range of densities, and, consequently, when we sample the population, we get quite wide confidence limits for the population size. Therefore, the population has not changed. It was fairly stable, as far as we can tell, between the 1990s and roughly five years ago.

464. The persecution aspect is also interesting. Of course, it is very topical. There was a lot of publicity recently, and there is anecdotal evidence that there has been an upsurge in persecution. When we did the work in 2007-08, however, we showed that there was a decrease in persecution from the 1990s. There was a major decrease in disturbance at setts in general but also a big decline in digging activity at setts indicative of people going into the setts with dogs.

465. Disturbance of that nature is important because it has a direct effect on the disease. Research done through the Central Science Laboratory (CSL) in England shows clearly that small groups have a higher level of disease, that badgers that are disturbed become mobile across the landscape and that more of the disease is put into the environment when you get disturbance at setts. In fact, when that sort of thing happens, it has a detrimental effect on the whole farming activity in certain areas.

466. Broadly speaking, those are some of our results. There are details there, so I will now shut up and take any questions that you may have.

467. **The Chairperson**: OK. Thank you very much. Again, I ask members to keep to the two-question rule, and I, too, will try to abide by that.

468. The three distinct yet linked projects that you talked about should be part of the research. However, how close are we to getting data into a practical solution that DEFRA or DARD can implement, and is there acceptance of the findings of those bodies?

469. **Professor C Elliott**: The answer to the first part of your question is this: for however long it takes. What we did at the university is really the fundamental research to say that we have the markers. Those results now have to be taken into a field study to validate them. It is one thing to do something in a nice academic environment but different when you get into the blood and guts of what is going on in real life.

470. My estimate is that it will take probably a minimum of a year to 18 months to do that study. It will not be a trivial undertaking. I costed it for DARD, and the ballpark figures that we came up with were between £500,000 and £1 million.

471. Will the data be accepted outside Northern Ireland? The answer is yes if you publish your research findings, which we do in international journals, so that would not be a fear.

472. **The Chairperson**: On the work and research that you have on the badger, its nature and its movements, have you compiled that evidence and impressed

it on the recent plans in England and, before this month, Wales for the proposed culls? Did you look at the details of the proposed culls and form an opinion on whether that would work? Having the intelligence that you have on the badger, is it there, is it right, is it nearly there or is it completely wrong? Can you give us some indication or steer as to what your view is?

473. **Professor Montgomery**: We have to look to a very substantial area of scientific literature, which is freely available to all concerned and has come out of the randomised badger culling trial (RBCT). That is the single biggest mammal epidemiology wildlife disease study undertaken ever, anywhere in the world. It is a huge study that has gone on from 1975, culminating in the Krebs trial — the actual experimental investigation — which confirmed the involvement of badgers in the disease. However, it also pointed out absolutely clearly that there is nothing to be gained, as far as we can ascertain, from conducting culling as a means of control. That comes out in paper after paper, and the arguments are very well thought out.

474. The contrary view has been taken in the Republic of Ireland, where they did a very different study, which was not designed to elucidate the perturbation that came out of the Krebs trial. It was done under very different circumstances, not in randomised fashion but in selected areas, which were selective because of their physical characteristics. As a result, that information does not travel, because it is very specific.

475. The motivation for us to do the research on badgers at Queen's was simply that there was a complete lack of information on what was going on with badgers in Ireland. Nobody else was doing any work on it at that time. I asked to get involved and have been involved in a marginal fashion over the years. It is not my prime area of interest. During that time, however, we built up a certain amount of expertise on how to interpret the scientific data coming out of the CSL, which has developed in that very large-scale study. We have been able to apply that information to what we know about badgers in our own backyard, so to speak.

476. That is one of the motivations on distribution abundance. Dr Reid has been able to model the distribution of badgers across the landscape, so we can predict — I hope fairly accurately — the population density. That will help us, whether we use a vaccine in future or simply try to ensure that badgers and cattle do not come into conflict in particular areas.

477. That sounds like a long-winded response, but the answer is that we can apply the information that we have now to any discussions. Most of our information is specific to Northern Ireland, but a lot of the information that was gathered in the past at the Central Science Laboratory, as it is now — it used to be the Ministry of Agriculture, Fisheries and Food (MAFF) — is directly applicable to what we experience as well.

478. **Mr McMullan**: You strongly advise against the culling of badgers.

479. **Professor Montgomery**: Yes.

480. **Mr McMullan**: That is your main thing. You are totally against, or strongly advise against, culling.

481. **Professor Montgomery**: There is no scientific argument in support of it.

482. **Mr McMullan**: Your — these big words get me — experiments on this new thing that means that you can get the diagnosis within 48 hours. What are the benefits of that?

483. **Dr Grant**: It means that you would have an indication much earlier of positivity that bovine tuberculosis (bTB) is potentially present. It is not a confirmation, but you could tag a herd as a stronger suspect earlier.

484. **Mr McMullan**: Do we not already know in theory that there is bTB in those hot spots and different areas?

485. **Dr Grant**: Oh, yes, TB is there but the way in which it works currently is that if skin tests are carried out and you get

reactors, the animals are slaughtered. The lymph nodes are taken, and they are either visibly lesioned or non-visibly lesioned, but they are all tested. Currently, the vast majority of the visibly lesioned ones will turn up M.bovis positive in culture and a very limited number of the non-visibly lesioned lymph nodes test M.bovis positive, so they are reported back as M.bovis negative.

486. Our test is picking up 25% more culture positives from the non-visibly lesioned lymph nodes, which means that an extra 25% of animals, and whatever number of herds that that represents, are positive, and farmers are being told that there is no evidence of M.bovis on the basis of current statutory culture.

487. **Mr McMullan**: Is there a possibility of the breeding of a super-badger? When we talk about strain types in badgers parallel to the strain types in cattle, what happens if badgers from different areas with different strains breed? Can that lead to immunisation or — I am being very flippant with my words — to what I call a super-badger? Is there a possibility of different strains in the breed confounding your analysis or anybody's reports on the strains of TB in badgers?

488. **Professor Montgomery**: The nature of the disease is that it can be present in an individual for a long period, so there is nothing to stop that animal from breeding. Consequently, there is not so much selective pressure on it. It is not likely that you will have a development of a super-badger spontaneously without very strong selective pressure. Consequently, I see that as being something that will not happen.

489. The disease is a conundrum. It can be with a badger throughout its life and never have an obvious detrimental effect. We very rarely see badgers that show external signs of any disease, even though they test positive.

490. **Mr McMullan**: What is the outcome of different strains of TB in badgers when they breed?

491. **Dr Grant**: It has nothing to do with it. They can breed and produce offspring, but the TB infection will not cross over at the same time.

492. **Mr McMullan**: The TB remains the same?

493. **Dr Grant**: Yes.

494. **Mr McMullan**: Are we sure about that?

495. **Dr Grant**: I think so, because it would have to be exchanged between the two bugs, not between the animals.

496. **Mr McMullan**: That has never been tested, then? We talked about different areas. We heard earlier that we have the County Tyrone strain, something else and something else again. If a badger from, say, County Down went into County Tyrone —

497. **Professor Montgomery**: You see a very similar pattern of distribution of those strains in the badger population to what you see in cattle. That has been demonstrated not just here but elsewhere. There is information to that effect in evidence from AFBI, based, I think, on the roadkill survey. Therefore, that is there already and has been done elsewhere.

498. We have evidence from a recent study that would suggest that very rare strains can show up in a badger, and there is some link between that and the local cattle population where it has shown up as a very rare strain. That is strong evidence that something is going on between the two populations of hosts of the disease.

499. **The Chairperson**: OK, I am going to move on. If you have any further questions, Oliver, get them to the Committee Clerk, and we will pass them on.

500. **Mrs Dobson**: Thank you for your presentation. Under project 1 in your submission, you say that a reservoir of undetected infected cattle exists because both TB tests do not identify all infected animals at the early stage. How big is that reservoir in percentage terms?

501. **Professor C Elliott**: Stats have already been quoted about the current tests.

I think that the skin test has around a 50% to 60% accuracy rate. The gamma-interferon test is quoted at around 70% to 80%. That means that, in roughly 20% of cases, animals are diagnosed as being positive that are not but in 20% of cases animals are positive and are not being diagnosed. That is the kind of error that we are working with.

502. **Mrs Dobson**: You touched on this, but what practical changes would you recommend or have you recommended to the way in which we test cattle for TB as a result of your research?

503. **Professor C Elliott**: The skin test is the standard method, and that will not change for a long time. That is being supplemented by the gamma-interferon test. That is a very expensive test, because the person who invented it was very clever and patented on it. However, that patent has now expired. Therefore, my recommendation to DARD was to stop buying commercial test kits and do the test itself, because it would come to a fraction of the cost. That would reduce the cost of the current testing but not improve its performance. We believe that if DARD introduces some of our fingerprinting techniques, that would greatly improve the chances of detecting accurately more than 90% of infected animals.

504. **Mrs Dobson**: Could a more accurate and cheaper alternative skin test be introduced? Is that a possibility?

505. **Professor Montgomery**: It is very unlikely. A lot of work has gone into that for a long time, and it has not improved substantially. Data was produced, and different people say that it is 50%, 80% or 90% reliable. Our feeling in Northern Ireland is that it is closer to the lower end, at 50% to 60% reliability.

506. **Mr Irwin**: I am sorry that I had to leave for a few minutes during your presentation. It probably proves how complex this disease is when even the possibility of a dual test still gets only 90% detection. That does prove how complex it is and how difficult it will be to detect 100%. Is that right?

507. **Professor C Elliott**: It is absolutely right. I would not claim now to be anywhere close to 100% accuracy for diagnostics.

508. **Mr Irwin**: That is what I thought.

509. **The Chairperson**: Thank you very much for your presentation and answers, and for attending this very important inquiry.

510. **Professor Montgomery**: Thank you.

8 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mrs Dolores Kelly (Deputy Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mr Trevor Clarke
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Michael Clarke Mr Sean Fitzpatrick Mr Donal McAtamney	*Northern Ireland Agricultural Producers' Association*
Mr Wesley Aston Mr Harry Sinclair Mr Colin Smith	*Ulster Farmers' Union*

511. **The Chairperson**: I welcome Harry Sinclair, president of the Ulster Farmers' Union (UFU); Wesley Aston, UFU policy director; Colin Smith, its policy officer; and Michael Clarke, Sean Fitzpatrick and Donal McAtamney from the Northern Ireland Agricultural Producers' Association (NIAPA).

512. Gentlemen, you are very welcome to the Committee to give evidence to this very important inquiry into bovine tuberculosis (bTB). Before I ask you to give your presentation, I congratulate Harry on becoming president of the Ulster Farmers' Union. He is somebody whom I have known for a number of years, and it is good to see him in that position. Congratulations to you and all your staff. I am sure that you will have a very productive time working with the Committee on various subjects.

513. You will both have a short presentation to make, after which we will go straight into questions on your submissions. I assume that all Committee members have read the written response that you provided to the inquiry.

514. **Mr Harry Sinclair (Ulster Farmers' Union)**: Thank you, Chairman and members of the Committee. I assume that you have all read our written submission, which should have been received in the middle of April. I will give you a brief outline of what was in that.

515. Tuberculosis (TB) has been in Northern Ireland now for 60-odd years — before any of our time, I think. A number of measures have come through over the years, at a great burden to the agriculture community. For a number of years, we have been TB-testing all herds in Northern Ireland annually, with the valuation, removal and slaughter of reactor and in-contact animals. We increased the frequency of TB testing for individual animals a number of years ago and have a severe interpretation of the test. That has had a fatal impact on the farming community in Northern Ireland. The administrative cost of TB is £8·25 million a year. There is a significant impact on farmers because of the cost of testing — both the performance of animals and the man time involved — and the loss of a lot of genetic improvement that has gone on in herds over many years.

516. There is frustration among farmers on the ground. We seem to have got to a level and are now sitting there. The farmers have done a lot on the cattle side, but we feel that there has been no, or very little movement, on trying to address the problem in wildlife. We feel that the Department of Agriculture and Rural Development (DARD) should recognise that attacking the reservoir of TB disease in wildlife is an essential part of the disease eradication programme.

517. The Minister and DARD should commit to developing a wildlife intervention programme that includes time-based milestones for detecting the disease in wildlife. DARD should establish a

group to operate with the sole aim of working up the elements, practical and conceptual, that would form the basis under which a robust, effective and defendable wildlife intervention programme would be delivered. DARD's Veterinary Service should commit to identifying a series of hotspots, or recent outbreak locations, where focused actions and research could be carried out with a view to further improving the already existing science and supporting the planned wildlife intervention. A lot of science has been done on the whole TB issue, but that seems only to lead to more science needing to be done rather than any actual action being taken on the ground.

518. The UFU recognises that it remains an aspiration of DARD to reduce TB compensation levels, but no such reduction will be implemented by the Department until an agreed intervention programme is operational in rural areas. Undoubtedly, biosecurity measures play an important role in controlling the spread of TB. Those should be incentivised at farm level, as adopting biosecurity measures to prevent cattle-to-cattle spread, and the incursion of wildlife can be very difficult and extremely costly.

519. Vaccination is an option that has been raised many times. Although we believe that vaccination has an important role to play in the eradication of TB, there are a lot of associated problems. The production of a cattle vaccination has consistently been delayed. Even if it is developed, deployment will be delayed because of EU regulations. The main problem would be that, if cattle were vaccinated with a TB vaccine, the current testing regime would deem all cattle to be TB reactors. That would lead to great trade difficulties with other countries.

520. Although the TB test is not perfect, according to DARD it is the best test currently available and can be expected to detect approximately 75% of infected cattle in any one test. One problem that we hear raised many times concerns reactors appearing shortly after tests. Until a more accurate test is developed, that is just one of those things that we have to live with.

521. The UFU believes that Northern Ireland's eradication programme is one of the most robust in Europe for cattle movement. Herd restrictions can cause significant overstocking difficulties for many farms. We are many years ahead of a lot of regions, in that we have had an electronic database for all our cattle for a long time. We always had traceability. The existing TB policy will not eradicate the disease from Northern Ireland. Cattle control measures are only one aspect of dealing with the disease. Until meaningful action is taken at source, particularly with wildlife, farmers will continue to carry the burden of an ineffective policy. As I said, for over 60 years, TB has blighted the industry, and unless policy changes are made, it will continue to do so. A series of measures must be implemented by the Minister immediately to allow progress on eradication to be made. As I always say, you will never complete a jigsaw without having all the pieces on the table. That is very important as far as TB is concerned.

522. **Mr Michael Clarke (Northern Ireland Agricultural Producers' Association)**: Thank you, Mr Chairman and members, for having us here. We more or less concur with everything in the submission from the UFU. TB has been around for longer than any of us care to remember. We are addressing the problem, and we seem to be making inroads, but then it seems to crop up again. I think that we do not really understand the disease. We can have all the biosecurity measures that we want between farms, but there has to be some other method by which TB is being transported. That is my experience and what I have learnt from talking to local vets. It is borne out by cattle that have been housed becoming infected with TB. That cannot come from a neighbouring farm, so there has to be some other method of transportation. Whether it is wildlife, wildfowl or whatever, there has to be some other method by which TB is transported from one animal to another,

and from one farm to another. Harry talked about a scientific approach. We need to take a long-term scientific approach to understand this disease — should it take five or ten years. It has been going for 60 years, and we thought we had dealt with it but now, all of a sudden, it has reared its head again. As I look through some statistics, I see that in our own area, Omagh, it has almost doubled in the past 12 months. A lot of this seems to be in the period when the cattle are housed.

523. I am not for the wholesale slaughter of badgers, but it is one particular aspect of this that we talk about every year but we never seem to do anything about it. In hotspots, we should concentrate on, perhaps, the eradication of badgers in that area. It is not a sexy thing to talk about. Although it is difficult, we might concentrate on the treatment of diseased badgers, just to see whether that is a way forward. However, there are other elements such as birds, for example, or feed. I spoke to a vet in the Omagh area this morning about this, and he told me of a farm that was almost totally free until they came to the last house and inside there were five calves, which had been born this winter, which had TB. Neither the mothers nor any other cattle had it. When the five were taken to be killed, they were rife with it. That did not come from a neighbouring farm. We need to understand the disease before we can really tackle it.

524. On the compensation side of things, we certainly do not agree with cutting compensation to the farmer. We all have to work together, and that will not endear us to the farmer if he is doing everything asked of him. It is not fair that farmers should be penalised. The majority of farmers, 99% of them, are law-abiding and are trying to eradicate the disease. It does them no good to have to test stock, especially in the summer, and I am talking from experience. If you have to gather cattle in from conacre, from three or four outlying farms during the summer, it stresses you and your cattle. We have alluded to that in our submission. That stress is unquantifiable.

525. This is something that we need to take a long-term look at, over five, six or even 10 years. If we can sort it out in 10 years, it has to be a positive. I do not think I have anything more to add at the minute. If I have, I will interject.

526. **The Chairperson**: That is not a problem. Certainly, when we go in to questions, we find that in the toing and froing we can bring out more information. There is no problem with that, Michael, whatsoever.

527. I am sure that you are aware that the Department is going through a phase in its approach, which it calls the area eradication plan. For the last three years, and for another two years until 2014, it is going through this plan of research. However, the Department will not really tell you what will be put in place after that initial five-year plan. There does not seem to be a strategic outlook in the Department with regard to the eradication of the disease. That goes right up to the permanent secretary. He is not confident that the disease will be eradicated by 2020. What I am saying about not being strategic enough comes from a Public Accounts Committee (PAC) report published in 2009.

528. This is a double-barrelled question to both of you: that is the way it is going to go here. How concerned are you about the lack of a strategy in the Department? That is my first general question.

529. **Mr Sinclair**: I suppose that it has been one of those things. For 60 years, we have been tackling this disease. The feeling on the ground is that we have got nowhere. We have these little waves and crests within it. The feeling of farmers on the ground is that there does not seem to be a strategy to eradicate TB; the strategy is just to maintain what we have. It is hard to get ordinary farmers to see that we are actually moving anywhere with TB.

530. Michael talked about the number of new outbreaks over the past six

months, and no one seems to have come up with any explanation as to why that has happened. Farmers are not doing anything differently. I myself am down with TB; we are testing today. No one can explain why we have these outbreaks, and, looking to the future, there does not seem to be any move to be TB-free by a certain date. A number of years ago, I was in New Zealand, and they had a strategy that aimed to eradicate TB within five years. They should be halfway through that period now, but at least they had a strategy and a timescale.

531. **The Chairperson**: Michael, do you want to add to that?

532. **Mr M Clarke**: Not really. Maybe it is the change of personnel in the Department. This is an ongoing thing, and Ministers come and go every four or five years and heads of Departments change. Maybe it is somewhere along that line. I am not accusing anyone of falling down, but, with those changes, sometimes you do not have that continuity of approach.

533. It is difficult to understand TB. We had an outbreak of TB about 10 years ago and I thought that I had solved it through my own research in the locality. I blamed the badgers. There was an infected herd and the farmer told me that he had seen a badger licking out of a bucket in his byre. It was a diseased badger and they killed it, although perhaps it should have been taken for examination. From that farm, the TB moved along a watercourse and up another smaller watercourse — a burn — and it came round to us. You would have put your house on it that it was wildlife and badgers. However, I have a badger sett and I am not for killing badgers. I know that the wildlife people do not want badgers to be killed, and neither do farmers. We have had a badger sett since I can remember and we still have it. That outbreak of TB lasted for perhaps two or three years. My herd has been clear since, but we still have the badgers. Therefore, we cannot blame it all on the badgers. There is a myth — I am sure you have heard it — that badgers will put sick badgers out of setts and that it is sort of like a nomad, almost. I am not sure if that is true but it would add some credence to the theory. I will leave it at that.

534. **Mr Wesley Aston (Ulster Farmers' Union)**: In December 2008, the previous Minister, Michelle Gildernew, issued a press release that outlined its strategy. At that time, the strategy had three strands: industry and government working in partnership; addressing cattle-to-cattle spread; and addressing wildlife diseases. We entered into the spirit of that strategy on the basis of *[Inaudible.]* but, yet and all, here we are several years later. We entered into the first and second strands of that strategy, but we have seen nothing on the level of disease in wildlife and the interaction that that plays. That is what frustrates us. As you know, we officially withdrew from the strategy on the basis of that lack of action. We got to the stage of being so frustrated. As Michael and our president have outlined, there is a lot of frustration among farmers. They do not want the disease and they do not want to kill badgers. Certainly, there is an issue about diseased badgers. However, we like badgers; that should be taken as a given. I will ask Colin to outline a bit more detail about that strategy.

535. **Mr Colin Smith (Ulster Farmers' Union)**: The strategy was announced in December 2008. As Wesley said, two of the strands were implemented, but the third strand remains unimplemented. That is why, in our submission, we have put forward actions that need to happen to get a strategy in place — not just any strategy but an effective strategy that looks at all areas and aspects of the disease. We are asking the Minister and the Department to commit to developing a wildlife intervention programme with time-based milestones. So, you have a strategy there but you also have objectives that need to be achieved within a timescale so that we do not go on for another 60 years and, although most of us will probably not be here, come back and look at this again. It is really about setting the record straight. Unfortunately, the

strategy from the previous Minister was not fully implemented and it is important to get the strategy right this time, and implement it.

536. **The Chairperson**: You have certainly answered my second question, which was with regard to the three-pronged strategy. The third question is around the testing and its accuracy. What do you know of the Queen's University studies and ideas that they have for testing? They claim to have a more accurate and cheaper test. Do you have any contact with them on that issue? Have you seen anything of that?

537. **Mr Sinclair**: At this stage we have not had contact but we will be enquiring now to see exactly where it is at because we have always called for a more accurate test. A long-term objective is to have the disease eradicated from our herds first of all, and maybe we can do that through testing. Most farmers see the third prong as the thorn in the side.

538. **Mr M Clarke**: I am not familiar with that experiment and their testing. Is that a blood test?

539. **Mr Sean Fitzpatrick (Northern Ireland Agricultural Producers' Association)**: I think it is a skin test but I think it was not very accurate either. There was maybe only 75% accuracy in it, so it was not a real goer. The last Minister did go forward, and we are all very willing to work with farmers and everybody else. However, the third prong never happened, and that was disappointing because farmers think that we are working to the best of our abilities towards them, and we are, but whenever something like that turns up and the third strand never gets off the ground, it looks very bad on all our behalfs.

540. This disease is costing our industry and the Government an awful lot of money and is something we could all do well without. We do not want to see disease in our herds at all, if possible, or wildlife wiped out either, because wildlife is part of our countryside. We need healthy wildlife and healthy livestock as well, so we need something that will really bring those three together.

541. **The Chairperson**: Yes. Sean, you mentioned in your submission that the length of time taken to collect reactors was an additional problem for farmers.

542. **Mr Fitzpatrick**: It has been a problem because, as you know yourself, those animals have to be isolated, especially in dairy herds, where cows have to be going in and out all the time and mixed about. It is not very easy but maybe in the past year or year-and-a-half reactors are going off the farm a wee bit quicker. However, it is most important that reactors are seen to go off the farm within weeks rather than months because we reckon the longer they stay in the herd, the bigger risk it is to other animals.

543. **Mr Sinclair**: As Sean said, it was at an unacceptable level a number of years ago but it has got a lot better recently. They are down now to 10 or 11 days.

544. **Mr Smith**: I think the average is now 11·2 days. I think the target from the Department is 15 days, but I think we have it below that. Obviously, the risk of spread is reduced the quicker you can get it off the farm. Maybe there could be an improvement from that end.

545. **The Chairperson**: We are still awaiting the results of the County Down DARD study, which has not been published yet. However, what hope is there for both organisations that something good may come out of that study?

546. **Mr Sinclair**: There is a lot of speculation about how the disease is transmitted. Farmers would like concrete evidence about whether they can do anything to address it. There has been a lot of stuff about biosecurity. Two of the most biosecure herds in Northern Ireland, at Hillsborough and Greenmount, have both had outbreaks in the past year. There are a lot of questions that farmers would like answers to. If something comes out of that study that gives some sort of an answer, that will be welcomed.

547. **Mr M Clarke**: I concur with what Harry said. It is one part of the jigsaw, and if it solves that part of it, I welcome it and look forward to the results. It is amnesty-related: there will not be any repercussions for people if things do not turn out to be right or whatever. However, something like that should be done on all aspects of it. We should be doing the same with wildlife. It will be a long-drawn-out process.

548. **Mrs D Kelly**: I welcome you all. Congratulations to Harry; I hope he has a very successful couple of years.

549. Obviously, as the Chairman has indicated, the Committee is very concerned about the lack of a target and a strategic direction by the Department. The papers that have been presented to us state that, in 35% of outbreaks, the cause has not been established. What are your thoughts or your diagnosis of that? It is quite a high figure and nobody knows what is causing it. It goes back to some of your earlier comments about the lack of research, even though this is some 60 years in the making.

550. **Mr Sinclair**: One of the questions we always ask is this: what happens after an outbreak is confirmed? Other than someone going out to look at biosecurity and putting disinfectant on the farms, that is nearly as far as it goes. The feeling that we get from farmers is that there is no interest in following it up any further. What protocol is there to look at other aspects of the problems and to find out where the infection came from?

551. **Mrs D Kelly**: Chair, if I am picking up on that correctly, you have the test done, you discover that there is bovine TB and the animal or animals are eventually taken away, but yet there is no assessment of that individual farm or farm practice, which could eliminate or reduce the risk of future occurrences. Is that correct?

552. **Mr Sinclair**: At the moment, the farmer receives a visit from veterinary staff and they look at the biosecurity and disinfection of where the animals are. However, with regard to looking into other aspects of where the disease comes from, many of our members say that no information goes back to them to let them know where the problem came from.

553. **Mr Donal McAtamney (Northern Ireland Agricultural Producers' Association)**: One of the areas that we encouraged a lot of our membership in County Down was regarding what the issues were, as Dolores said. That is the bottom line. If you had a car and it broke down, you would want to know why it happened. You just do not go and change this and do that; you want the source. It goes back to what we were discussing before we came in. A number of years ago, the Government had a thing about the flu, and they had a big place over in England where they worked from post-war until about three or four years ago, and they stopped it. That is almost like the — if I can use the word — intransigence in Dundonald House now: if we cannot beat it, we will try to keep it to acceptable levels. However, there is no level acceptable with farmers for the loss through stress, the monetary value and the genetic value. There seems to be no —

554. **Mrs D Kelly**: It is a policy of containment.

555. **Mr McAtamney**: Containment and get on with it. At the end of the day, I am not saying that the Department does not have direction, but it is probably doing the best that it can do with the science that is available, but you had the other types of tests, such as blood tests. I know that, in a number of herds that went down, a very high number went down with the blood test compared with the skin test. A farmer near me did some of the tests at his farm, and it just did not make sense. The animals passed the skin test and the other ones went down with the blood test. That case study has been going on too long. Sean had pushed a lot in south Down, where he comes from. It is one of these things where the report gathers dust. If you spend the money and get the people — we felt it was getting the people to help out and to say if it was the badger

setts and all the infrastructure around the farm, to go round and see all the watercourses and count down what there was that you could put it down to. I think that is what you were saying, Dolores

556. **Mrs D Kelly**: With anything, we are supposed to learn from incidents and accidents and then have risk management. There does not appear to be that follow-up strategy on a farm-by-farm basis.

557. **Mr McAtamney**: We wanted to highlight that there was that file, if you could access that. We have asked, and the union has asked a number of times, why that has not come about.

558. **Mrs D Kelly**: One would have hoped that the pilot would have informed the Programme for Government and the Budget. Surely, that would have been the rationale for doing it.

559. I was quite startled by the fact that five newborn calves, which had not been out at all, ended up getting TB.

560. **Mr M Clarke**: There is something about the disease that is really disturbing, because you can have a breakdown and then be clear. However, some cattle have an immunity, or build up an immunity, to the disease. So, your herd could still be infected because the cattle have been exposed. I am not saying that as a scientist, but maybe that is an explanation, because newly born calves may not have the immunity. It is the same if you have a herd and buy in livestock: the one that you buy in could take it, or you could have a clear herd and sell something and when it goes to some other herd, if it is exposed to TB it does not have the same immunity and it reacts quicker. I have had outbreaks: the cattle are all together, and you wonder why two out of 60 have contracted it. It is hard to understand. That is what we need to focus on first: understanding the disease.

561. **Mr Irwin**: I declare an interest as a farmer and a member of the Ulster Farmers' Union. Most people accept that wildlife plays a part. To what level, none of us are certain. One thing I saw recently was that there is hope that there will be an oral vaccine for badgers by 2014 or 2015, which is still some time away.

562. I have some concerns. I was talking to a departmental vet this morning about the TB issue. As had already been said, some large herds go down, one or two reactors are taken off the farm and there is no more issue. Yet, on a neighbouring farm three miles up the road there could be 200 or 300 animals taken. So, it is very difficult to understand why it spreads so rapidly in some herds and not in others. That leads some of us to believe that there are different strains of TB, not that we are experts.

563. We are looking at Scotland, which has a much lower level of TB. It is classified as TB-free, because the infection level is below 0·2%. Have members of the farmers' unions in Scotland done anything different? Is it just that the area is not as condensed with cattle? Have they done anything different?

564. **Mr Sinclair**: It is a different environment they are working in with different levels and density of livestock. Northern Ireland traditionally has been a very intensive livestock area. We have very high numbers of livestock per hectare compared to any other region in the UK. We have a lot less arable land. Scotland has large areas of expanse ground as well. Unless the science is looked into, as Mike says, there is a lot of information still to be learned about disease. We could easily say that we have much higher numbers of badgers in Northern Ireland than Scotland has, but again that is not scientific.

565. **Mr Fitzpatrick**: Right enough, we have a lot more fragmented herds than Scotland has. As well as that, our movement of cattle is a lot more frequent. They move maybe 10 times more because they are big herds. That may have an impact too; I do not really know. We are just different. We cannot really change our farming practices

because of disease. That would be impossible really.

566. **Mr Smith**: We are the only region in the UK that is not at least trying to look at dealing with all aspects of disease, including wildlife. ROI has a policy to deal with badgers. We are the only region that is not even looking into it. We really need to start somewhere. It is very complex, and I know that DARD staff have looked into it. One of the quotes from them was that the reality is likely to be a complex interaction of the two sources, both of which need to be addressed. We even have the Department's vets stating that in papers. It is about getting a strategy and implementing it.

567. **Mr Irwin**: I know of one herd that was closed, and they did not buy any animals. It was practically wiped out, so it looked like it was something like wildlife in that case. There were no other herds. The farmer's land is all on the lough, so he was wiped out completely.

568. **Mr Sinclair**: You would like a study done on that case to find out where it came from.

569. **The Chairperson**: You are quite right about other plans in the Republic of Ireland and GB. We will be taking a trip over to England to hear about the plans for the cull there and other aspects of biosecurity and everything else. I know that there has been a change of tack in the Welsh strategy of late. Of all the plans that are currently in action, is there one that would nearly fit Northern Ireland? If we were going down the road of talking about a cull of any description, would it need to be the whole of the Province? Would it be realistic to expect that you could do a part, a county or a peninsula, or, realistically, would we need to be talking about doing it Province-wide?

570. **Mr Sinclair**: To put it in perspective, Northern Ireland is smaller than one county in England. The lesson was learned. They did a trial cull in part of England at one stage. They found that the badgers dispersed, and there were certain areas that they did not go to. You talk about plans that are operating, but the South of Ireland is the only place that actually has one in operation. The rest are all at the planning stage. The evidence is that the areas in the South of Ireland that have addressed the wildlife have seen a big reduction in TB. In Northern Ireland, it is about getting some sort of a land-bound area to do a trial. It has to be land-bound, otherwise you need to treat the whole of Northern Ireland as one region.

571. **Mr Aston**: Ultimately, the issue is that, as the president said, Northern Ireland is a very small region. It is about getting a land-bound area. Going back to my earlier point, it is important to stress that we would love to find a way in which we could identify diseased badgers and indeed healthy badgers. It is a slightly different thing that they are talking about across the water and in the South. It is not about eradicating badgers. It is about eradicating disease that affects both cattle and badgers. If some sort of system could be developed, even on a pilot basis initially, it would at least give us, as farmers, an indication that something serious was being done. Once we saw how that went, we could then look at rolling it out across Northern Ireland as a whole. That would be a more pragmatic approach to the whole thing.

572. **Mr M Clarke**: I concur with Wesley. As I said before, we should do it on a pilot basis. If we put it out there that we were thinking of culling all badgers, you would have people outside here with placards. I just do not think that it is going to happen. What happens if we do that and we still have TB? Where are we then? We will be sitting with egg on our face. I certainly do not want badgers to be eradicated. If possible, we should eradicate the diseased ones. We could even deal with the badgers at a particular hotspot and have a cull in that area. If we can prove a point, at least we will have something to go on.

573. **Mr Sinclair**: It is about wildlife, and badgers are only one part of the equation.

574. **The Chairperson**: Yes.

575. **Mr Sinclair**: We have to keep in mind that it is not a one-species problem. TB has to be addressed as a whole package, no matter where it occurs.

576. **The Chairperson**: I understand that.

577. **Mr McAtamney**: William Irwin said that we are more intensive. The World Health Organization (WHO) has shown that TB is on the rise, especially in mainland UK. It has intensified in some cities, and there could be a link there, when you see TB in humans. We are groping in the dark, in a way, and we do not know the answers. The answers could be there, and they could be very simple.

578. **Mr Smith**: To date, there has been a TB working group. We walked away from that group because we felt that it failed to address the wildlife issue. We have recommended that a group should operate with the sole aim of looking at all the other programmes that we could make use of, as you mentioned. Of course, there will be aspects that we can use, and you will get that information when you go to England. However, it will be important to take all those aspects into consideration and have a group that will work everything out and see how it fits for Northern Ireland. Then, as Wesley said, it can be rolled out nationally.

579. **Mr Swann**: Thank you for your presentation, gentlemen. Again, I congratulate Harry on his appointment as UFU president and Colin on his reappointment as vice-president of the Young Farmers' Clubs of Ulster (YFCU).

580. We had a presentation from Queen's University last week. One of its projects involved testing badger droppings. That was one of the avenues that they were going down in order to identify, as Wesley mentioned earlier, infected badger setts so that targeted culls could take place.

581. I want to talk about the different models that are used in other jurisdictions. In the four-areas trial in the South, badger culls succeeded in reducing incidences of TB by up to 60%. There is evidence there that culling can be used if it is used right.

582. A total of £4 million has been assigned for research studies into TB, and I see that the union is very much saying no and that the study should not be about reinventing the wheel. Where is that £4 million best spent, in your opinion?

583. **Mr Sinclair**: When you look at what we have done, the strategy has to be formed before we can decide where the research is done. We need to look objectively at how we get to that endgame and at what the missing pieces are. Without working up a strategy, it is difficult to pinpoint individual items that need to be researched. The number one priority is to get the strategy sorted out, after which we can pick out the relevant bits.

584. We have to work out how cleans farms get TB and what needs to be done. The work has already been done on the different strains of TB in Northern Ireland. Even when cattle move, the strain seems to stay in the same area. A lot of work has already been done, so it is about taking that forward, sorting out the strategy and making the research suit the strategy.

585. **Mr M Clarke**: I thank the member for his question. I agree more or less with what Harry said. I would like to see us concentrate on the research into the disease. We need to trace where it has come from, if a herd goes down, rather than just look for compensation.

586. At one time, there was an ad hoc programme through which you could send a dead badger in. I did that myself, but I never heard anything back. That should be re-established. We are not killing the badgers; they are being killed accidentally on the roads. If there were a lab facility that could log the locations of those badgers and carry out post-mortems on them, that might give us some information. Plenty of them are killed on the roads. That might give you some wee idea.

587. **Mr Swann**: That scheme is ongoing, because we got stats on it last week. You can put in roadkill badgers. One thing to consider is whether it is healthy badgers or sick badgers that are being killed on the roads. You might get a skewed incidence.

588. **Ms Boyle**: Thank you both for your presentations. My question is similar to Robin's. On the wildlife intervention programme, what recent engagement have you had with DARD, and what do you envisage the programme entailing?

589. **Mr Sinclair**: As was mentioned a number of times, the previous Minister followed the three-tier approach. We feel that agriculture on the ground did a lot of work on the first two, with the third tier being wildlife. We have made the recommendation that a stakeholder group should be formed to look specifically at that point. That has been our communication with DARD since we withdrew from the stakeholder group. We feel strongly that wildlife is the issue on which there has been the biggest lack of research. A lot of work has been done on the farm side. There are some figures that show that 20% of badgers are TB carriers. That has come out in DARD figures in the past as well. With that level of disease in any species, the species could eradicate itself. The last thing that we want is to let things get to that level. We would rather have a healthy wildlife population.

590. **Mr Buchanan**: I agree that the sooner that the Department has a strategy in place to try to tackle bTB, the better. Do you feel that it is possible to eradicate TB from Northern Ireland totally ? Furthermore, what is your view on vaccination of cattle?

591. **Mr Sinclair**: I mentioned the vaccination of cattle earlier. At present, there is EU legislation that means that vaccinating cattle would deem more cattle ineligible for export. Northern Ireland exports such a high percentage of its food products, so the last thing that we want is to put an onus on our cattle population.

592. **Mr Buchanan**: If that ban were lifted, what would be your view then on the vaccination of cattle?

593. **Mr Sinclair**: Provided that there is an end strategy — there is no point going into a vaccination programme without there being some plan at the end of it. The long-term objective is to eradicate the disease in both cattle and wildlife. If we were to start vaccinating cattle, we would not be doing anything to address the better good of the wildlife population as well.

594. **Mr Fitzpatrick**: What Harry says is right. There is really no point in getting into a more costly way of doing things. Vaccination would be very costly, and it could hurt our exports to other countries. As Harry has already said, New Zealand wiped out bovine TB in five years by tackling its wildlife problem. There, it was not badgers but possums. New Zealand did it very quietly and discreetly by poisoning the possums, and there was not a big public issue made about it.

595. **Mr Sinclair**: New Zealand convinced tourists that it was a great thing to buy possum bags and possum gloves, and so a market was created for them. *[Laughter.]*

596. **Mrs D Kelly**: Badger wraps.

597. **Mr Fitzpatrick**: That really worked for New Zealand, so I think that that is something that we should work on. Something can be eradicated without having to go to costly vaccination and without hurting our exports, because we export so much from Northern Ireland. The disease will be a hard one to eradicate, but we should all push together and try. It will be very interesting to see the outcome of the research that has already been done. When did you say it would be out, Chairman?

598. **The Chairperson**: The County Down study? A date has not been given yet.

599. **Mr Fitzpatrick**: Hopefully, there will be some information there that we can bank on. I would like to think that there

will be, because a brave bit of money spent on the study, and it would be nice to have some positive advances coming out of it. We would be a step further forward on the learning curve.

600. **Mr M Clarke**: The information that I have is that the BCG vaccination can interfere with the skin test, so if you are vaccinating, you really cannot test.

601. **Mr Fitzpatrick**: The cattle would all be deemed reactors.

602. **Mr M Clarke**: We agree that there is nothing wrong with vaccination. If everyone is vaccinating, really and truly you should have the percentage down to an absolute minimum, or perhaps even 0%, but, similarly, if you are vaccinating, you cannot really test for bTB. Perhaps you should not have to test, but that is another arm of the octopus that we need to attack.

603. **Mr McMullan**: Thank you for your presentation. You say that, on the whole, no research is being done, but I do not think that you are being told what has been done. Research is being done by the Agri-Food and Biosciences Institute (AFBI). We had a presentation from its representatives last week. Research is being done at Queen's University as well.

604. To go back to the third strand of the approach as promised under the previous Minister, that has been answered in a way through a lot of that research. For example, Queen's is totally against the culling of badgers. AFBI said that a cull would have little or no effect on the eradication of TB. A very interesting point came out that goes back to what you were saying, Michael, about the strains and the need for more research. You are right. It was stated last week that there are strains of TB that are common to different parts of the country.

605. One issue that is being examined concerns the breeds of cattle, and whether the breed is part of the problem. That research is ongoing. That is the kind of thing that you say needs to be started, but it is in there. It might not be up to the level that you want, but there are cost implications. The point was made last week that it would cost a lot of money. There is a lot of talk about biosecurity, and that plays its part, but there are also issues around feed bins, nose-to-nose contact, animals being kept in-house in the wintertime, and so on. The point was made last week that the problem will not be solved overnight.

606. **Mrs D Kelly**: Can I clarify a point, Chairperson? Does it cost £20 million a year not to tackle bovine TB?

607. **Mr Fitzpatrick**: I beg your pardon?

608. **Mrs D Kelly**: You mention the cost of research, but the cost of not tackling the problem is £20 million a year.

609. **Mr McMullan**: In fairness, I was coming to that, if you had waited until I was finished. There is the cost of tackling and not tackling bovine TB, as you quite rightly put it, but we cannot blame the Department all the time. We have to work together, but the information that came out last week was totally new from what any of us had been told about TB before, and I think that the Committee was in agreement over that. The different organisations should be given sight of the reports that we had last week.

610. **The Chairperson**: Once we finish our inquiry —

611. **Mrs D Kelly**: Perhaps his colleague might do that.

612. **Mr McMullan**: That might answer some of the questions, although not all of them. I thought that the talk about research into different breeds of cattle and different strains of TB was very interesting. We have up to five or six different strains of TB here. I had always thought that there was only one. The closeness of TB in animals and TB in humans is another thing that came out of the research. We are down the line of getting it, but I do not know what the answer would be as to what kind of programme you put together. However, we are further on than you said.

613. **Mr McAtamney**: I said earlier that TB in humans is on the rise in inner cities. That goes back to the point that when western Europeans settled in the Americas, their diseases nearly wiped out the indigenous population.

614. **Mr McMullan**: Another quick point, Chairperson, if I can —

615. **The Chairperson**: Make it a question if you can, Oliver, rather than a point.

616. **Mr McMullan**: When culls were carried out in England, the percentage of cases of TB went down in cull areas by around 20%, but the incidence of TB went up 27% in areas adjacent to the cull.

617. That in itself tells you a story. I do not know what you take out of that, but —

618. **Mr T Clarke**: It means that they did not cull them all.

619. **Mr McMullan**: That leads on to another point: the protected status of the badger. The badger should not be a protected species, because, at present, it is reckoned that there are between 30,000 and 40,000 of them. There is an argument —

620. **Mrs D Kelly**: Is that Sinn Féin policy?

621. **Mr McMullan**: — over the protected status of the badger. You have it all there.

622. **Mr T Clarke**: You should table a motion on that.

623. **Mr Aston**: If there is research out there that indicates that we are further on than we think that we are, bring it on, because we would love to see it. The other issue is that other member states, other parts of the UK and the Republic of Ireland have exactly the same science and have been looking at these things for years and years. Everything is always five years away. I have been with the Ulster Farmers' Union for 20 years, and, when I started, a solution was five years away. Other member states are doing things. They have to do things differently as well. We cannot sit back and wait for this to happen, because, as Dolores rightly pointed out, the cost of not doing something is in excess of £20 million a year, and that is direct cost, never mind all the associated hassle. With the economic downturn and the difficulties at the minute, every penny is important.

624. **The Chairperson**: No other members wish to ask a question. I have two questions about issues that have not been addressed yet, one of which concerns biosecurity on farms. You touched on it a bit, Harry. Could DARD do more to incentivise biosecurity, such as wrapping it up in a farm modernisation scheme, or something of that nature, so that there are benefits or grants to incentivise farmers to bring in more security measures, such as bars or gates, to prevent wildlife from getting into barns and the like?

625. **Mr Sinclair**: There is always a bit of movement that can be done, but think about the structure of Northern Ireland farms: basically, our farms are small. We are fragmented, and we have a lot of conacre in our system. There are 120 million metres of hedge in Northern Ireland, so imagine the biosecurity required. There is so much that you can do, but there is a limit with livestock biosecurity. As you said, education is perhaps needed on simple biosecurity measures to keep wildlife out of buildings. Until the root of the problem — the source of the disease — is got to, no matter what you do with biosecurity, you will never address the problem.

626. **Mr M Clarke**: You make a good point. In the country at the minute, there is the environmentally sensitive areas (ESA) scheme and the countryside management scheme. The incentive is to plant hedges that are wider than six feet apart. Hopefully, there will be money in the new common agricultural policy (CAP) to roll that out. It is a step. Most people concentrate on boundaries. You put in the hedge and fence it six feet apart from your neighbour so that you do not get nose-to-nose contact. As Chairman Mao said, a journey of a thousand miles begins with a single step. That would be an incentive on the land side of it.

627. A lot of buildings are in a state of disrepair. There could be something in the farm modernisation scheme to deal with that. It is not something that farmers do. Perhaps they could close doors on big cattle houses, and things like that. We would welcome that. If DARD wants to give us some money to make farms more secure, we will not say no.

628. **The Chairperson**: My final question is about government policy and DARD setting targets. The permanent secretary told us that the Department cannot produce a target for eradication. I take the points about how complicated the disease is and that we do not know everything about it, but do you think that DARD could and should set a target for reduction? Why has it not even tried to set a reduction target?

629. **Mr Sinclair**: The target should be to set milestones along the path rather than actual reduction figures, because, as has been clearly stated, there are a lot of unknowns. In our opinion, the target should be to get to a certain stage along the strategy's path. It is about how you deal with things, especially on the wildlife side. There is no guarantee that that will deliver, but it has to lead to a reduction.

630. **Mr McMullan**: Do you think that there should be compulsory biosecurity systems on farms? We have talked about other countries such as New Zealand, Australia and America. In America, some measures have been made compulsory. Should we be going down the same road?

631. **Mr Sinclair**: I go back to the point that the two farms in Northern Ireland with the most biosecurity had outbreaks of TB this year. Therefore, biosecurity is not the whole answer. It is part of the answer, but it is definitely not the whole answer. I would hate to see our farmers become bogged down in regulation and cost, and have that not even deliver benefits.

632. **Mr Aston**: Mickey talked about taking certain biosecurity measures to protect feed piles for cattle. However, what biosecurity measures would you take to protect fields from badgers?

633. **Mr McMullan**: We are talking about the whole issue of biosecurity. That issue has to be broken down as well. What you are after saying is relevant. However, the other example that we keep using is the Scottish model, which slowed down incidence of TB. How did Scotland do that?

634. **Mr Aston**: Its cattle did not have it in the first place.

635. **Mr Swann**: You could use the Isle of Man model. There is no TB on the Isle of Man, but there are no badgers either.

636. **Mr M Clarke**: With all respect, Oliver, it is a different scenario. To my knowledge, Scotland has wide-open, sparse land, whereas we have strips of land, which are two fields or 50 yards wide, stretching from a river to a mountain. I certainly would not want biosecurity measures made compulsory, because that would be unenforceable. As was said before, I do not think that it would have that big an effect. I know from experience — my cattle were not in contact any other cattle — that cattle can still get TB. Therefore, it would just heap more expense on farmers, and you would not endear yourselves to them.

637. **Mr Sinclair**: To return to the point about biosecurity for wildlife, the last thing that we as farmers want is to exclude wildlife. We would rather see healthy wildlife on our land.

638. **Mr Smith**: What the Department said about targets is unfortunate. I do not believe that any project should start without a target, be it long, medium or short term. The medium- to long-term target should be eradication. You cannot start a project on something such as TB, which we have had for 60 years, and not have an eradication policy. I really believe that targets and timescales should be set.

639. **The Chairperson**: OK. Thank you very much, gentlemen.

15 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mrs Dolores Kelly (Deputy Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mr Trevor Clarke
Mrs Joanne Dobson
Mr Chris Hazzard
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Sean McAuley — *Farmers for Action*
Mr William Taylor

640. **The Chairperson**: I welcome William Taylor and Sean McAuley from Farmers for Action. Gentlemen, you are very welcome to the Committee to give evidence to this very important inquiry. The Committee feels very strongly about bovine tuberculosis (bTB). We commissioned the inquiry to look at the ins and outs of the disease and at what the Department is doing.

641. You will have a briefing to present to the Committee. I ask you to be as brief and succinct as possible, and you will take questions from Committee members after that. Without further ado, please proceed.

642. **Mr William Taylor (Farmers for Action)**: Ladies and gentlemen, we are here to ask for the help of all the political parties on bovine tuberculosis. Initially, we want to reiterate the position that Northern Ireland is in and discuss where it is heading. We feel that indecision to date and a failure to deal with the wildlife issue has caused a big problem.

643. The best thing to do is to start with what is going on in western England and into Wales. In our submission, we included a link to a story about a woman who has contracted bovine TB. If any of you have not seen the story, we can pass copies of it around.

644. **The Chairperson**: I think that we have it.

645. **Mr Taylor**: We also highlighted the very good job that 'Countryfile' presenter Adam Henson has done in highlighting that the disease has moved into rare cattle breeds.

646. Bovine TB in western England is completely out of control. It has jumped from cattle to sheep, to goats, to llamas, to alpacas and very much to deer. Worst of all, it has also jumped to humans. We were under the illusion that only three people had contracted bovine TB, but the statistics show that 35 people contracted it in 2009. We are here to tell the Committee that Northern Ireland has slipped as far as it can afford to slip before the disease gets out of control. If England were to implement a badger cull of infected badgers overnight and were to sort out the badger problem, it would still have to deal with all the infected deer. Indeed, our chairman, David Handley, asked me to tell you that he knows many deer stalkers who work on government land and forests in England, who tell him that almost 75% of deer are infected with bovine TB.

647. **The Chairperson**: Sorry, can you tell us the specific area in England where that is the case?

648. **Mr Taylor**: I can come back to you with the details, Paul. That is not a problem.

649. We are concerned, because bovine TB has jumped to deer in Northern Ireland. As you probably all know, one of your MLAs recently had to cull his deer herd to remove tuberculosis (TB), and he blamed a rogue deer. Sitting behind me is Derek Torrens, who, for the first time, has bovine TB on his farm. I should say that it is actually an inconclusive result. However, the affected animal has now

been valued to go for slaughter, and we will not know conclusively until it is slaughtered. Derek's farm is close to a forest at Ballybogey near Portrush, and, in recent times, he has had two or three deer on his land. The connection is that his affected animal was part of the young stock that was outside. Derek also has badgers on his land that do not have TB and have not given his farm any trouble for decades.

650. We are here today to ask everybody to come together on the TB issue. That should be done from a cost point of view and a practical, common-sense point of view, but, more so, to put an end to the risk that Northern Ireland is facing of this moving into humans, and all the suffering that goes with that. I have been reading that a lot of eminent people have been before the Committee to explain to you how complex the disease is. It is OK until it comes to your door. Then it is a different story.

651. The idea is that all the MLAs pull together and agree on a cull of infected badgers as the first move to eradicating bTB. However, even if that is done immediately, we must bear in mind that we are still left with the deer problem to deal with. Department of Agriculture and Rural Development (DARD) information on the TB situation, which is sent to Brussels once a year, states:

"DARD recognises that the involvement of wildlife, mainly badgers, must be addressed if eradication is to be achieved".

652. I think that that statement from, I think, 2010 says it all.

653. **The Chairperson**: What is the context of that statement? What document is it from?

654. **Mr Taylor**: It is one that Brian Walker did. I think that he submitted it to you.

655. **The Chairperson**: Did he do that as part of this inquiry?

656. **Mr Taylor**: No. He stated that DARD has an obligation to produce an annual report on the eradication of TB for the European Commission. Are you familiar with that? Do you want me to carry on?

657. **The Chairperson**: That is what DARD has submitted to the European Commission?

658. **Mr Taylor**: Yes. It refers in detail to a report approved for 2010 by Commission decision 2009/883/EC, and we invite all who study that response to read the document closely. That is where that comes from.

659. You wanted us to keep our presentation short and to the point. You have the gist of everything that we have been putting to you and trying to make clear. This is the time for the politicians in Northern Ireland to stand tall and protect Northern Ireland and the image that it is trying to create for food exports. We see the efforts that are being made to try to project the fact that agriculture is going to be Northern Ireland's saving grace, but, in the countryside, farmers cannot do that with one arm tied behind their back. The risks involved in letting the TB situation slip further out of control must be considered, and the fact that it has moved into the deer species is of real concern.

660. **Mr Sean McAuley (Farmers for Action)**: You may be aware that Professor Chris Pollock was appointed by the Welsh Government as acting Chief Scientist in Wales. He pulled out because of the Welsh Government's decision to go down the road of vaccination rather than a badger cull, which they had initially indicated that they would do. He points out the various constraints that there are with vaccination and the fact that animals remain infected, even after they have been vaccinated. There are other leading people in other jurisdictions who are not happy with the whole thing.

661. **The Chairperson**: I have a number of questions, and then I will open it up to members. You have come out very strongly in favour of a cull. Some would say that the research on culling and, obviously, experience in England shows that it disperses the badger population and spreads the disease to some areas around the testing area. How would you respond to that? You mentioned other wildlife issues and the other types of

animals that are now contracting the disease. Is culling the only way in which TB will be eradicated? I think that I heard you right. Did you say that it is not the full solution but part of the solution that has to be commenced?

662. **Mr Taylor**: That is correct. We take your point about the English cull. However, it must be borne in mind that it was targeted at one particular area. We should make it clear that we want to see a full Northern Ireland cull, not an experiment. If you are doing a full Northern Ireland cull, you should not get any of the peripheral problems that arise. The problem with the English cull was that it was an experiment and not a full-blown cull. The professional people know how to handle badgers and extract those that we are looking for. DARD has that information and knows the hotspots and where to go to get the job done. It would probably require one cull followed by a second, minor cull to mop up anything that was missed. It may not be completed the first time around, but it would be an awful step forward.

663. How can those who support the badgers sit back and watch animals suffer? We in the farming community have done our bit to try to stop our cattle suffering. We have co-operated with DARD and done everything that we have been asked to do. We have jumped through hoops to ensure that we do our best to prevent the cattle from suffering. However, it is also not in the farmer's nature to leave wildlife suffering. We cannot see how the badger people can object to putting animals out of their misery.

664. **Mr McAuley**: I do not know whether any of you saw 'Countryfile' on Sunday night, which showed a farmer in England who has worked for over 30 years to build up a special herd of long-horned cattle. Adam on 'Countryfile' had to walk away because the herd was being slaughtered as the result of TB. What William said is right: it is not fair on the badger population either to have those infected animals throughout the country.

665. **The Chairperson**: Has your organisation looked at whether a suitable vaccination is available and whether it is, in your eyes, practicable?

666. **Mr Taylor**: Our chairman said that vaccination is all good and well-intentioned. It is OK to go out and vaccinate cattle, because DARD has a databank with tag numbers and everything. You can start a vaccination scheme for Northern Ireland for the cattle side, and you can start and finish it if the finance is there to do it, and if it is deemed to be wise to do so. However, how are you going to achieve that on the badger side? You have a number of problems. First, if you do not go ahead with a cull, you will be trying to determine between badgers that are infected and those that are not, and you will have to vaccinate them all. You are still left with the problem of the animals with TB, for which the vaccination serves no purpose. You would have to carry out the vaccination successfully so that every badger were done, and, without a cull, we think that vaccination would be meaningless.

667. **Mr McAuley**: The sheet of paper that I just handed to the Committee shows the thinking of the professor in Wales. He did not believe that vaccination was the answer to the problem because infected animals could still be there even after they had been vaccinated.

668. **The Chairperson**: We will get that copied for members now.

669. We have heard from experts who say that TB is a very complex disease and that there are many strains, even in our small Province. They can pop up anywhere and everywhere, and sometimes that in itself is a mystery. Sometimes the testing is not all that accurate, and sometimes the disease can stay in an animal without that showing up through testing. When you look at all the complications around the disease, how much weight are you attaching to transmission from wildlife?

670. **Mr Taylor**: First, the Isle of Man does not have any badgers, and it has no TB. The only example in its history that it can point to was in the north of the

island where there was a minor incident of avian TB — the bird type — and that was as a result of a skirmish with one animal, and that was it. Secondly, Scotland and the north of England have badgers, but they have no TB problems, other than something imported, which has perhaps dragged those areas into something. Obviously, Scotland's badgers are without TB.

671. **The Chairperson**: What do you put Scotland's success down to? A lot of people would say that it is to do with topography, geography and the sparse areas in which cattle roam.

672. **Mr Taylor**: Probably the main factor that has been a help to Scotland is the fact that testing on farms all around Scotland, Northern Ireland, England and Wales identified where the TB areas are and stopped those cattle moving northwards. Apart from that, Scotland has been really lucky to get off as lightly as it has. The disease has not spread through the badger population and has not reached there yet. For all that we know, all of that may be in front of Scotland if things do not happen.

673. **The Chairperson**: Finally, how much more can the farming community and industry do on biosecurity? Could farmers be incentivised by wrapping biosecurity up in a farm modernisation scheme or something of that nature so that you help them to go through with the changes? That would go some way to preventing or eradicating the disease on farms.

674. **Mr Taylor**: You have to bear in mind that, until a cull of infected badgers takes place, the farmer is really working with one arm tied behind his back. He is doing his best. The only thing that has come to light is that if there is a problem, it is when a reactor animal is identified, as, in many instances, it stays too long on the farm before it is removed by DARD. That is not a good thing. With any disease, swift action brings things to an end. The English situation says it all: it has taken no action, and look where it is.

675. **Mr McAuley**: Sometimes, our own Department leaves a lot to be desired. Obviously, we are not at liberty today to go into how it is handling various aspects. As William rightly pointed out, animals are being left on farms. The big problem is that we seem to be testing and testing yet going nowhere. We are scared that, sooner rather than later, the farmer on the ground will be asked to pay for testing. Any of you who are farmers will know that, at the minute, the last thing that you need is another cost appearing on the farm. It has been hinted at by various people in government that, eventually, it will stop the payment. By all means, if we see something moving in the right direction, there is not a problem. However, we have been at this for long enough now. In many ways, the Department's response, from our point of view, leaves a lot to be desired.

676. **Mrs Dobson**: Thank you very much for your presentation. We seem to see research followed by research on the issue, with little focus from DARD on producing an effective eradication strategy. What is your opinion on the research that DARD has carried out? Do you believe that tackling TB has become over-complex because of that research?

677. **Mr Taylor**: Can we call a spade a spade?

678. **Mrs Dobson**: I think that you have already. *[Laughter.]*

679. **Mr Taylor**: When we read the research, it is not hard to see who is coming at it from a genuine perspective and who is not. The professor in Wales resigned over the head of what he saw as a common-sense issue. He knows what the problem is and how it should be dealt with. It is what he went to veterinary college to learn about. That is where he got his education. Brussels is telling us that we have to eradicate the disease, and a badger cull will be part of making that happen.

680. There are those who say they are experts who come at it from another angle and stall progress, as they have been with DEFRA in England. I think that

they have been winding up successive Governments in England to keep the stories in that vein because of the votes issue. At the end of the day, it is not hard to separate the wheat from the chaff in the reports that have been done. I am afraid that those who do not favour a badger cull have ulterior motives.

681. **Mrs Dobson**: There is no point in asking you, if you were the Agriculture Minister tomorrow, what you would do, because I think that I already know what your answer would be.

682. **Mr Taylor**: That is why we want all MLAs from all parties to get behind us. That is the only way that we see of getting progress on this issue. Northern Ireland is unique in not having any opposition parties in Stormont; everybody who came into government agreed to try to make it work. You guys could do a lot to show England and Wales the way forward, and the results would speak for themselves in a year or two, provided you guys pull together and put a badger cull into operation as a first step.

683. **Mrs Dobson**: Do you believe — as we on the Committee do and the Audit Office has urged — that DARD should set a target Northern Ireland to become TB free and work towards that target?

684. **Mr Taylor**: The answer to that is really to think where you will be if you do not do something. We would like to go on record that we would come back in 12 months and say, "We told you so; there's the statistics". We will come back the following year and say, "We did tell that it will jump species again". We are on a slippery slope here, and it is time for politicians to step up. You know where we are coming from. If all you guys would agree to pull together on this issue, nobody will lose votes. You have a strong hand to play with badger supporters: all you have got to do is turn to them and say, "Are you happy to see animals suffering? Because we are not". You have got to take the lead as professional politicians.

685. **Mrs Dobson**: Do you agree that private vets are dealing with the consequences of DARD's failure to get to grips with TB, and that farmers are left to deal with it? Do you lay responsibility for that with DARD?

686. **Mr McAuley**: The private vets are doing their job on farms. They are having to test cattle. Many farms are being subjected, as mine was at the end of March, to an unnecessary TB test because of an animal that was sold. Even though I completed a clear TB test a month after an animal left the herd, DARD's rules and regulations meant that my animals had to be tested again. I was 99% sure that the test would be clear, and it was. You said something about DARD meeting targets: we have no confidence in DARD meeting any targets, because it does not seem capable of meeting targets.

687. **Mrs Dobson**: I declare an interest as a farmer, and I know exactly what you mean about continuous testing. DARD often ignores suggestions from private vets that would reduce expensive overlaps between them and DARD, such as using lay testers. Do you feel that DARD should work more closely with private vets to deliver cost savings to the industry and, ultimately, to the taxpayer?

688. **Mr Taylor**: We would much prefer the implementation the badger cull, which would solve the whole lot of the issues.

689. **Mr McAuley**: Let us get to grips with the problem here. We keep talking about a cull and vaccination, but nothing happens. The thing continues. We have spoken about a lady who caught TB. People across the water have caught TB. How long will it be before some farmer or someone working with livestock here catches it? That scenario is even worse than TB being in the animals.

690. **Mrs D Kelly**: Thanks for your presentation. To follow on from some of Jo-Anne's points, do you think that the Department is committed to eradicating this disease? You obviously have

very severe doubts about that. If the Department is not committed, why not?

691. **Mr Taylor**: This all goes back to farming, with very few exceptions, being in financial crisis. The truth is that the veterinary profession is awfully glad of the TB money that keeps them in business. In fairness, if we remove that money, how will we keep vets in business in the countryside? It is obvious that farmers cannot afford to pay them what is needed to sustain the large animal veterinary practices. To answer your question, Dolores, that influence coming through from DARD from the veterinary side concerns us. That is not spoken about. We are here today to speak, and that is exactly what we are doing. We are using parliamentary privilege, shall we say, to try to tell the truth, if that is possible. However, you asked us the question and I hope I have answered it. Maybe I have not.

692. **Mrs D Kelly**: I want to share with you a response I just received to a question I tabled to the Minister in relation to the cost of compensation payments for bovine TB infection in the 2011-12 financial year. I have been told that £12·9 million was the total compensation payment for animals removed for the control of bovine tuberculosis infection in that financial year. I want to ask the Department — I hope the Committee will support me in this — to provide a full and detailed breakdown of how those costs were incurred and to whom payments were made. The way the answer reads suggests that the £12·9 million was paid exclusively to farmers.

693. **Mr Taylor**: I was just going to say that to you. I think that is what that refers to, so the cost of paying private vets and whoever else to do the testing, etc, is another story that you have not received just yet.

694. **Mr McAuley**: Dolores, the document 'Reply to secondary DARD consultation on compensation for TB/Brucellosis' states:

"DARD recognises that the involvement of wildlife, mainly badgers must be addressed if eradication is to be achieved."

695. We then have to ask why DARD is not implementing that. That is why we are so negative on DARD because we are not seeing any positive results coming from the Department.

696. **Mrs D Kelly**: I hope that you will be reassured that this Committee has prioritised the bovine TB inquiry because we are not convinced that the Department, in not setting itself targets, is committed to the eradication of the disease.

697. **Mr Irwin**: Thank you for your presentation. I declare an interest, being a farmer myself, and I am only too aware of the problem of TB. There is absolutely no doubt that badgers and wildlife are a major part of the problem. I know we have statistics from the Department that say, I think, only 16% of infection comes from badgers. In my eyes, that may be initially the case. Once an animal is infected, however, the disease then transfers to other animals.

698. I got a phone call only this morning from a man in Northern Ireland, although not in my constituency, who had a major breakdown. He had not bought any animals in a good number of years except from one herd, which is still TB free. He ensures that that is the case and that is why he buys them in. In one herd, he lost 96, with another 181 down this week. He has a forestry area behind him and it looks as though wildlife exclusively is causing the problem.

699. The Department, a number of years ago, promised that a wildlife survey would be done. To my knowledge, that was never done. Do you not believe that the Department has dragged its heels on that and that a wildlife survey should have been done, especially in instances where large numbers of animals have gone down and there is forestry behind them? It seems almost criminal on the part of the Department that it is not investigating that much more deeply. Do you agree?

700. **Mr McAuley**: William, I will comment on that and give another example. As I mentioned to William earlier today, I have two neighbours who, within the past five or six years, built two new houses. In both cases, planning permission was granted but when the sites were inspected, work was halted because there were badger setts and they were disturbing the badgers. It cost both gentlemen in excess of £500 to employ staff to come from Queen's University to issue a piece of paper to say the badgers were OK. They could then continue building their houses. Obviously, the badgers were being well looked after.

701. By the same token, the badgers regularly cross the road by one of the houses and you regularly see dead badgers lying on the road. No provision is made for the badger crossing the road, which was one of the points one of those gentlemen made to me. He said that he regularly went down to the end of the lane and there was a dead badger on the road. Nobody was worried about the badgers crossing the road, where a pipe, for example, could have been put under the road. Yet and with all, he said that simply because he was building a house and driving past a badger sett on a regular basis, it cost him a lot of money. He is a farmer, and his other words were: "I wish the Department was as concerned about the problem we have with TB and badgers as they were about the badger sett that was sitting beside my house."

702. **Mr Irwin**: I think many farmers feel that those who are highly involved with wildlife do not seem to have any problems with good animals being slaughtered but they have a problem with infected badgers being killed. This seems crazy to farmers.

703. **Mr Taylor**: William, I take it that you are referring to deer as the problem with the farmer who you mentioned.

704. **Mr Irwin**: Deer may be a problem there, too.

705. **Mr Taylor**: What we find hard to accept is that Northern Ireland is free of snakes and of X, Y and Z animals. How did we get to a situation where we have deer roaming free in Northern Ireland without DARD doing something about it years ago? I am sure that most here can remember a time when there were no deer in Northern Ireland that were not in captivity. So that has been allowed to slip, and we are starting to reap the consequences. DARD needs to explain how deer came to be running about. We have our own answers to some of these things: people have been very careless to let deer out in the first place. However, DARD needs to explain how it allowed that to happen. As you point out, William, DARD needs to get to grips with the deer issue and get something done about it.

706. **Mr Buchanan**: I agree with you folk that the Department has really dragged its heels on this. It has not brought forward a strategy or a way to deal with or tackle it. It should have done so. Therefore, DARD is at fault and, weighed in the balance, it is found wanting on this particular issue. There is no getting away from it.

707. However, you talk of a cull of badgers right across Northern Ireland: in other words to get rid of the badgers completely.

708. **Mr Taylor**: No. Sorry. We referred to infected badgers. We were careful to use that word.

709. **Mr Buchanan**: If we look at the figures, we find that badgers are responsible for 16% of the TB in cattle. If we do that cull completely, we will still have a large percentage of cattle that is liable to be infected by TB.

710. **Mr Taylor**: William Irwin pointed out correctly that we should try to reach a day when all the cattle of Northern Ireland are free of TB, if it is achievable. Say we kept all the cattle in Northern Ireland inside for 12 months and eventually got all the herds clean. It is always very noticeable when the cattle are inside in the wintertime, then, all of a sudden, there are clean tests in the

spring. However, the minute they go out to grass, things start to go belly up. We could have all the cattle of Northern Ireland clear-tested because we kept them in for 12 months, in houses where badgers do not have access to contaminate them to the same extent, but if we then put them out to grass again and we still had infected badgers, we would be back to square one. We have to take this by the scruff of the neck, and deal with the cause of the problem.

711. **Mr Buchanan**: I absolutely agree with you, but I heard an example the other day of a farmer who had cattle in and four new calves were born. They had never been out, but when they were tested, they were infected with TB. Obviously, there is something else causing this as well.

712. **Mr Taylor**: I should point out that there are badgers which come in to feed in the same place as livestock. We are talking about isolation, if we are to achieve what I was trying to explain. In certain instances, badgers come in and feed, so it is not impossible that that is what has happened.

713. **The Chairperson**: In answer to Tom's question, you said that you would cull only diseased badgers, as opposed to conducting a complete cull. Has your organisation any idea of how that can be achieved? Obviously, there will have to be trapping, testing and everything else that goes along with it. It will not be done through free shooting.

714. **Mr Taylor**: No. We are not advocating that. We are saying that it should be done as it was done with brucellosis; where one animal is down, you slaughter the herd because it is such a deadly disease. DARD obviously knows where the hotspots are, where TB recurs again and again. We have to go into those areas and take out the badgers in the vicinity. We do not have a choice. Bear in mind that badger numbers in Northern Ireland are not way down at the levels they used to be; they have increased significantly. So, you are going to have to have a cull of infected badgers. What we mean by that is a cull of badgers in the hotspot areas. A second cull to mop-up what you have missed would be inevitable.

715. **The Chairperson**: Do you have a fear that using that method would disperse the badger population to other areas, which would then spread the disease in the badger community? How would you get around that? We talked about a Northern Ireland Province-wide cull of infected badgers. What are the practicalities of culling diseased badgers only while preventing the dispersal of the badger population to other areas?

716. **Mr Taylor**: I understand where you are coming from. The English experience has highlighted an issue that arises when you just target one cull area. Remember, if you have cull areas back to back in certain hotspot areas, you will automatically be creating a shield around them. That is why I said that there will probably be a need for a second cull. Anything that happens to escape to the periphery may cause you a problem at a later date.

717. There is argument about badgers moving and escaping because of the upset that happens when the culling takes place, but with a wee bit of professionalism a lot of that could be avoided. Do it professionally, and do not let us hear talk of farmers being involved in this. The job of a farmer is farming: we want to see professional people carrying this out. That has to be made very clear and be done on a methodical basis with the DARD evidence of where the areas are and what needs to be done.

718. **The Chairperson**: You raise a very good point about the use of experts. However, it is very clear that what is being proposed in England is farmer led. Do you endorse that way forward?

719. **Mr Taylor**: No, absolutely not. That will not work in England, and it would not work here. Farmers do not have the time to do it properly. Farmers doing something on an ad hoc basis when they get a bit of time is not the way a professional cull will work. We saw what

happened initially with foot-and-mouth disease. Tony Blair really did not know how to handle such a catastrophe, and it was not until the army guy they called in took charge that the situation started to move forward. This is a job for the professionals.

720. **Mr McAuley**: The other aspect is that if we want the statistics and figures of what we are going to gain from the exercise to stand up, doing it willy-nilly will not prove anything. This has to be done properly. The issue is too important and too big to the industry to not be dealt with properly. We cannot keep on, and DARD cannot keep on, saying, "We will look at this, we will look at that and we will look at the other thing", and not seeming to get anywhere.

721. **Mr McMullan**: Thanks for your presentation. Would you say that the English model was wrong?

722. **Mr Taylor**: Do you mean the cull exercise that happened in England?

723. **Mr McMullan**: Yes.

724. **Mr Taylor**: Yes, I would, from the point of view that it is misleading. When you read into the results, the cull was effective in the area designated. The problem seemed to be that they did not use professional people, which led to some of the badgers escaping outside the circle. That is why the results do not stack up; it caused infection outside the cull area. However, you must appreciate that, within the cull area, it was a success. That is why we are making the point that the cull has to be done right across Northern Ireland, where it is required, to take out the infected badgers. It must be a professional cull.

725. **Mr McMullan**: You are asking for a cull right across the Six Counties?

726. **Mr Taylor**: Yes, where applicable.

727. **Mr McAuley**: In infected areas where there is high incidence of bovine TB, Oliver; not just willy-nilly throughout the countryside where people feel like it. The Department could go on one of its grandstand runs some day and decide to do something silly like that, but that is not what we are looking to do. This thing has to be done properly, because the findings have to be correct and have to stand up to scrutiny.

728. **Mr McMullan**: Whose findings on a hotspot would you believe, if it is not the Department running out about the countryside? Who would you believe if a report is put in front of you?

729. **Mr Taylor**: You must go back to what I referred to. Remember the story in the Isle of Man, where there is no badgers and no TB, and remember Scotland and the north of England, where badgers do not have TB and, therefore, there is no TB issue with cattle. You have to keep going back to that to see why that is working, and the point that always comes back at you is that the badgers are causing the ongoing re-infection.

730. **Mr McMullan**: Badgers in Scotland are not causing it.

731. **Mr Taylor**: That is because they do not have TB.

732. **Mr McMullan**: Is that not a scientific answer?

733. **Mr Taylor**: If the badgers do not have TB, they cannot spread it.

734. **Mr McMullan**: Why do they not have TB? That is your next question.

735. **Mr Taylor**: Diseases have to start somewhere, and unless you deal with them, you will not —

736. **Mr McMullan**: I go back to my original question: who do you believe if a report was put in front of you that says that there is a hotspot in a certain place? Do you believe the reports on roadkill and all that?

737. **Mr Taylor**: We have no reason —

738. **Mr McMullan**: I am not homing in on that.

739. **Mr Taylor**: We have no reason to doubt the information that DARD has put forward. The farmers who talk to DARD say that they are in a hotspot area and

that they and their neighbours have TB issues.

740. **Mr McMullan**: Would you believe the Department if it put a report in front of you that identified a hotspot?

741. **Mr McAuley**: Yes, Oliver, provided that it is carried out properly.

742. **Mr McMullan**: Could you explain that wee thing about the veterinary influence? I am a wee bit perturbed about that. What are we getting at here?

743. **Mr Taylor**: The bottom line is that there is a financial crisis in the countryside. Let us face it: the supermarkets have been screwing us over for years, and the only thing that makes money for a farmer nowadays is something that the world market is short of, which, at the minute, is grain and oil seeds, and even lamb is slipping out of that equation. So, the supermarkets can screw down on any other commodities that are virtually well supplied in Europe. They have left farmers in a position now where they avoid big veterinary bills, if they can possibly manage it. If the vets were to take the TB testing issue out, the large animal practices in the countryside could not exist; they would not have the income to be able to stay there. Therefore, we think that the veterinary profession in Northern Ireland in DARD puts the thing forward but pulls back at the same time.

744. **Mr McMullan**: What are we saying? Can we be more explicit —

745. **Mr Taylor**: I am saying that it is difficult for the vets to shoot themselves in the foot.

746. **Mr McMullan**: We seem to have a problem shooting anything here at the minute. What exactly are you saying here? Are we saying that the veterinary —

747. **Mr Taylor**: I am saying that I want Bert Houston to come out tomorrow morning and say, "Right, Agriculture Committee, we back what you want. We want this TB thing cleared up, and we want a badger cull." That is the place to start, and common sense and the scientific evidence tells us that. It is all there to back us up, and if we do not do it shortly, as William and others have pointed out, the deer issue will overtake it. Given the current evidence on the deer side, it is time that DARD started deer roadkill tests around the country to see just how widespread TB in deer is.

748. **Mr McMullan**: Would you believe a DARD report on the testing of deer?

749. **Mr Taylor**: I do not see any reason why not.

750. **Mr McMullan**: When DARD did the report on deer, it found that the study in Northern Ireland shows that incidences of TB in deer are small.

751. **Mr Taylor**: How long ago was that, Oliver?

752. **Mr McMullan**: It does not give a date here, so I take it that it is within the past year or two.

753. **Mr Taylor**: Watch the date, because, from our information, the TB in deer has only started to get out of control within the past year or two. If the report is older than that, that is concerning. However, you made the point that there is TB in deer.

754. **Mr McMullan**: They say that it is in only a small percentage, maybe 21% or 22%.

755. **Mr McAuley**: It is still there.

756. **Mr McMullan**: Fair enough.

757. **The Chairperson**: By way of information, the officials said that they had culled deer.

758. **Mr McMullan**: We have not even got round to discussing foxes, moles or anything else yet.

759. **Mr McAuley**: We do not have moles here.

760. **Mr McMullan**: Well, we have foxes here. To cut a long story short, we have listened to presentations from scientific people, and every one of them is against a cull. The Agri-Food and Biosciences Institute (AFBI) — were representatives from AFBI here?

761. **The Chairperson**: Yes.

762. **Mr McMullan**: AFBI is against a cull. Queen's University is against a cull.

763. **The Chairperson**: I do not think that we can say that they are all against a cull.

764. **Mr McMullan**: If you look at the reports, you will see they say that a cull is not the answer. That is another way of putting it.

765. **Mr McAuley**: So what is their solution to the problem?

766. **Mr McMullan**: Their solution is scientific. This is where it gets very confusing. We are looking for the Department to say that TB will be eradicated by a certain date.

767. **Mr Taylor**: The people you are referring to who are not in favour of a cull have had their way now for decades, and it has not worked. What we are saying is that, at the minute, the problem is very serious because, across the water, the disease is jumping species, and that has started to happen here now. So, if you as responsible MLAs want to help Northern Ireland's food exports on the way and prevent human beings from getting bovine TB, you need to start with a badger cull. Get it under control and sort it out, so that we do not have a badger in Northern Ireland with TB, and keep your eye on deer and foxes. In the meantime, we need an update on the incidence of TB in deer. If it is it in rogue deer at all, it is a problem. If it is there at all, it is a problem. Remember, it is not in deer in Scotland, and Scotland has a lot of deer.

768. **Mr McMullan**: Scotland seems to have a lot of something. There is nothing and anything in Scotland, from what I can see.

769. **Mr McAuley**: The Department in Scotland works more closely with farmers on the ground than our Department. I had another dealing with it recently and referred the thing back to Scotland. However, I am not going to start on that here. I can assure you that I wish I were in Scotland. I had to take the issue pretty far to get it resolved here. I wish I were in Scotland when I hear about the way its Department looks at things and works closely with farmers; it does not seem to work against farmers.

770. We need only look at the shambles our Department made of single farm payments. That carries on from year to year; it is a disgrace. We will go down the same road with this if we are not careful. This problem could ruin our agrifood sector. Bear in mind that it is the sector that everyone is now being told will lead the economy out of recession. However, it will not do so if we do not have an agrifood sector and a Department of Agriculture and Rural Development that are fit for purpose.

771. **Mr McMullan**: The last thing is what would happen if a cull were to take place. The first thing you would have is a court case. Somebody would take a court case.

772. **Mr Taylor**: Well, let us go to court and do our stuff if we have to.

773. **Mr McMullan**: Do you think that you would win that court case?

774. **Mrs D Kelly**: Chair, can we move on?

775. **Mr Clarke**: Hypothetical.

776. **Mr McMullan**: Sorry; are you getting bored down there?

777. **The Chairperson**: We are going to move on. That is hypothetical to a degree.

778. **Mr Clarke**: We are bored of you.

779. **Mr McMullan**: You need to look at yourself.

780. **The Chairperson**: Members, we are here to listen to a presentation and ask questions; not to ask questions of each other.

781. **Mr McAuley**: What would happen if we had a cull and found that badgers were infected with TB? Surely we are duty bound to act if an animal is not well. If your dog is not well at home, you take it to the vet, and if the animal cannot be cured, it is put down. We have animals with TB running through the countryside, and it is not right that that is allowed in

a species that is not well. We must treat them like we would a sick animal.

782. **Mr Taylor**: May I just make one small point about the agrifood sector? Eighty per cent of our goods are exported. Only a year or two back, Holland put the brakes on calf exports from England to Holland because TB-infected calves got through the net. That is worth remembering.

783. **Mr Swann**: I am sorry that I missed your presentation. We have taken a lot of evidence on badger culls and their successes in England, Wales and Scotland, but some of the most telling evidence — I do not know whether you have seen it yet, gentlemen — comes from the four-areas trial down South, which showed that an effective badger cull reduced bovine TB by up to 60% in areas that were naturally geographically enclosed. That is the Republic of Ireland's science to show that a badger cull is a step forward. It is not a complete solution to the removal of TB, but it is something that we should definitely be considering and is something that the Department should consider carefully.

784. There was talk about farmers being used to cull and remove badgers. I agree with what you said, because we have heard about a farmer in England who indicated that he was willing to do that. He then was subject to attack and abuse from the pro-badger lobby, so the last thing that we want to do is put our farmers not only under the threat of TB but under the threat of physical violence.

785. Everyone has said that removing reactors from cattle is one of the biggest problems in the herd in Northern Ireland. I asked DARD officials about that the week before last, and they told us that they were meeting their targets and were 93% within the EU target of 30-day removal, but they had all sorts of ways of measuring that 93%. Do you have any evidence from your members about how the delay in removing reactors is causing farmers stress because they have to look for additional housing and feed to cope with the pressures that are caused there, not to mention the risk of cross-infection if their cattle are not properly segregated?

786. **Mr Taylor**: Would you like us to make some of that information available to you?

787. **Mr Swann**: Yes, even anecdotally.

788. **Mr Taylor**: Lyle Mackey, who could not be here today, made the point that he had a neighbour who was recently abused about the length of time that sick animals were left on his farm before they were taken away, so we will come back to you on that, Robin.

789. **Mr Swann**: There is another issue not directly connected with TB. This inquiry came about as a result of the Public Accounts Committee (PAC) inquiry into the cost of TB. Two proposals were put in front of this Committee on farmers being compensated for the loss of animals: the first was a table valuation, which we rejected; and the second, which may be out to consultation, is a capped value. The Department seems to have it in its head that putting those economic measures in place will do away with what it classes as fraudulent claims. The Department seems to be of the opinion that a number of farmers are using TB as a money-making exercise. One of its officials who appeared before the Committee more or less stated that and was taken to task. Do you see any way forward?

790. **Mr Taylor**: Brian Walker's point on DARD and its fraud issue is that it uses the word "fraud" to cover its own weaknesses or to cover up whatever it wants covered up at times, or so it would appear. For those of you who do not know him, Brian Walker is a solicitor from Portadown, and he is also a farmer.

791. **Mrs D Kelly**: I know him all right. *[Laughter.]*

792. **Mr Taylor**: His name goes before him. Brian made the point that, if there is all this fraud, how come there are no court cases in the farming community by way of evidence? The evidence is not there to back up what DARD says about fraud. The concerning aspect is the cost of

TB, and the fact is that what the farmer is trying to get for his animal is being reduced and reduced. Derek Torrens's valuation as of yesterday proves that valuation has got to the point now where it is not realistic, so the farmer is yet again trying to carry a cost in the countryside while beating his head against a brick wall to try to keep money coming in to keep his farm afloat.

793. More importantly, Brussels has said that having a TB eradication policy is a duty of GB and Northern Ireland. As I understand it, Brussels backs that up with 35% of the compensation money, but, the way that things are going, that will be cut. I think that that is the intention from Brussels, because it is asking for evidence to show what you are doing to eradicate it. If you are not coming up with proper answers to eradicate the disease, that is a concern.

794. **Mr Swann**: A bigger concern, William, was finding out that DARD did not begin to draw down that money until 2009. Its eradication programme was not strenuous enough to enable it to draw down the European money to help, so it has been getting it for only the past three years. Your point is very valid. The link is tenuous at the minute.

795. **Mr Clarke**: I also apologise for being late and missing your presentation. I listened to someone speaking for quite some time earlier who asked you whether you would believe scientific evidence, and you said that you would. Tests have found 21% of the deer population to have been infected. How do you judge that figure?

796. **Mr Taylor**: As I said, the deer situation is a moving target, if you will excuse the pun. It is not that many years ago since there were no deer running around Northern Ireland. A few broke out all of a sudden, and, of course, now they are breeding.

797. **Mr Clarke**: What do you think of the fact that 21% of another animal is carrying TB?

798. **Mr Taylor**: It is a disgrace.

799. **Mr Clarke**: That is what I thought you would say.

800. DARD has spent millions. All that we have heard during this inquiry is that millions are being spent on strategy after strategy after strategy. What have you seen delivered by those millions over the past number of years?

801. **Mr Taylor**: Nothing.

802. **Mr Clarke**: That is also what I thought you would say.

803. You can probably detect that I am in favour of a cull, whether that be Province-wide cull or targeted. It is easy for people to suggest that it will not work. I do not know how they can suggest that it will not work until it is attempted. We could pick any hotspot in Northern Ireland and have a targeted cull there. As we discussed two weeks ago, as far as I can see, the next time that the matter will be really debated by the Department is 2015. Dear knows how many more millions will have been spent by then. If a cull were started soon, we could have a measurement by 2015 of whether it works. I do not know whether you share my viewpoint, but the problem that I see with the strategy is that, by 2015, all that we will have is another viewpoint rather than anything having been commenced to tackle the problem.

804. We can listen to all the scientific evidence that we wish. However, unless the scientific people, to whom some people in this room attach an awful lot of weight, come up with a proposal to eradicate TB, it will be more wasted money. How do you feel about that?

805. **Mr Taylor**: We have said all along that, when you listen to them, you really need to know professionals' backgrounds and where they are coming from. Are they from the badger lobby? What is pulling their strings? It used to be the case that, when you listened to somebody from a scientific background, you did not have to worry whether there was corporate influence or animal-lover influence. All those things come into play now, which must make life

impossible for you guys, who are trying to do your job effectively.

806. You hit the nail on the head. We have had years of inaction. We have listened to all these people, and nothing has changed. In fact, things are getting worse, in that TB has now jumped species. The bottom line is that to take no action is unforgivable.

807. **Mr Clarke**: I tend to agree with you. I read in your presentation about deer and other animals. DARD needs to be seeking them out actively and carrying out more tests. Regardless of whether the survey was last year or two years ago — the author of the question does not even know when the survey was carried out, so it could be from five years ago — 21% is 21% too many.

808. **Mr Taylor**: It is.

809. **Mr Clarke**: It is a worrying development for Northern Ireland that the disease is jumping from species to species. The sooner that that is tackled, the better. Committee members have differing opinions on culling badgers. I am not an environmentalist particularly, but I do not wish to see the destruction of animals any more than most of the affected farmers do. However, it may be needed for protection.

810. We take tours in this Building. We take people into the Senate Chamber and talk about the three great industries that we had in Northern Ireland in 1923: agriculture; shipbuilding; and the linen industry. The farming industry is the only one that we have left. If the Department does not tackle the issue, we can scrub that one off the ceiling as well. We will have nothing left in Northern Ireland. All that we seem to be doing is to be pouring millions and millions of pounds into more surveys and inquiries rather than tackling the issue. It may turn out that a cull will be carried out and it will not prove to be beneficial. However, DARD could then score culling off the list and say that it has tried it, but it has not worked and has made no difference.

811. In England, there was a cull. When I came into the room, it was being suggested that it was effective, but there may have been a spread. However, I may have picked that up wrong. It does not necessarily mean that it was effective. It could mean that everything in the area was not culled. That is how it looks to me.

812. **Mr Taylor**: That is why we insisted on professionals doing the job. We do not know whether England used professionals or whether the people used needed then to learn something that they had missed, and that is fair enough.

813. To return to your point, we said that there should be a cull across Northern Ireland, targeting the TB hotspots, so that there is no escape.

814. **Mr McAuley**: I am not sure whether you were present at the time, Trevor, but I said that a top scientist in Wales resigned over the U-turn by the Welsh Administration when they decided to vaccinate rather than cull. He felt strongly enough about that to resign, because he saw flaws with vaccination, and he wanted to see a cull in affected areas.

815. I hear different people talking, and I think that I need to stress again that we want to see only infected areas, or hotspots, in Northern Ireland being targeted. Initially, that may have come across wrong. I think that people had picked up from what we said that we want to see the whole countryside being targeted, but TB does not cover the whole countryside. We need to see action in infected areas, and, as you rightly said, Trevor, we need to see the results in order to know where we stand.

816. **The Chairperson**: OK. Thank you very much for your presentation and for your answers to our questions.

817. **Mr Taylor**: May we just say one thing on a lighter note?

818. **The Chairperson**: Are you going to tell us a joke?

819. **Mr Taylor**: We will see how you take it.

820. We like your determination. The questions that we have been asked have said a lot, and we hope that you

succeed between all of you. However, the downside is that if you do not succeed, we will tell the farming community at the next election to vote for whichever party supports a badger cull. Thank you very much.

821. **The Chairperson**: OK. Thank you very much.

22 May 2012

Members present for all or part of the proceedings:

Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mr Trevor Clarke
Mr Chris Hazzard
Mr William Irwin
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Bert Allison	*Vet NI*
Mr Kevin Corry	
Mr John Johnston	
Ms Lindsey Read	

822. **The Deputy Chairperson**: I welcome Bert Allison, John Johnston, Kevin Corry and Lindsey Read. You are all very welcome.

823. **Mr Bert Allison (Vet NI)**: We are all veterinary surgeons currently employed in general practice in Northern Ireland. We attend to the everyday veterinary needs of animals on the farms of our clients and provide advice to herd owners. We also carry out a certain amount of certification work, mostly to do with export, in our role as authorised veterinary inspectors (AVIs). It is fair to say that, nowadays, we spend less time treating sick animals and more time trying to eliminate disease on farms. We do that by initiating vaccination programmes, improving management, improving housing and so on. The kind of benefits that we hope to see from that approach include things like better welfare conditions, more efficient production, less use of antibiotics and so on. In short, we are looking for healthy animals, healthy farms and healthy food that we can all eat, with all of that leading to a healthy economy.

824. Moving on to TB, the North of Ireland Veterinary Association (NIVA) represents about 90 practices, currently employing around 300 private veterinary practitioners (PVPs) to carry out TB testing in conjunction with other work that we do on farms. In rural veterinary practice, the income from testing is, without doubt, an important part of our earnings, but vets see TB as another infectious disease, albeit a very complex one, which has ramifications for animal health and welfare as well as serious zoonotic potential.

825. Although we appreciate that there are many difficulties and unknowns in dealing with this disease, we, as a profession, are disappointed that TB is still with us after approximately 60 years of testing. Therefore, we are grateful to the Committee for Agriculture and Rural Development for asking us to present some of the views that we, as workers at the coalface, might have on the TB eradication scheme.

826. The three areas that we feel best qualified to speak on are biosecurity, presented by Lindsey; the wildlife factor, presented by Kevin; and the TB test, presented by John. I will ask Lindsey to speak about biosecurity.

827. **Ms Lindsey Read (Vet NI)**: Thanks very much. Many commercial livestock producers and governments view the health of their livestock as a means to an end. Consequently, most producers and governments apply only sufficient measures to maintain the minimal required standard to herd health to achieve the productivity and freedom to trade that their business model demands.

828. In 2001, the devastating foot-and-mouth disease outbreak highlighted to everyone the role of animal movements and the spread of infectious disease. Furthermore, in some cases, infection spread across farm boundaries by the movements of people and equipment. The name given to the strategy to prevent the spread of infectious disease in those ways is biosecurity. In 2001, the introduction and enforcement of

strict biosecurity measures and the slaughter of infected animals and the animals at a high risk of becoming infected were grimly accepted as essential steps to eradicate the infection and regain freedom from the disease.

829. Those fundamental principles of infectious disease control are not new to us when we review our battle against bovine TB. Unfortunately, after 60 years of testing cattle here for bovine TB and failing to achieve disease-free status, despondency has clouded many producers to see bovine TB — both the disease and attempts at its eradication — as an unpleasant fact of life and another mark on the calendar. Currently, bovine TB has a morale problem. We must remember that, in its most basic form, bovine TB is a highly infectious disease. As margins tighten, it becomes even more important to ensure the efficiency of production through the control of infectious disease such as bovine TB. Without question, the cornerstone of effective infectious disease control is herd biosecurity. Other diseases where biosecurity is an essential part of the approach to control are bovine viral diarrhoea (BVD), infectious bovine rhinotracheitis (IBR), Johne's disease, leptospira hardjo and salmonellosis.

830. Those production diseases may go unrecognised as national outbreaks, but, nevertheless, quietly cause massive insidious losses, such as poor fertility and increased culling rates, costing our industry millions, and, more than that, there is the human cost of ruining the livelihoods of individual farmers and the knock-on effect that that has on our rural community as a whole.

831. We believe that many sectors of the cattle industry here, not least producers themselves, harbour our same passionate desire to improve the health and welfare of our cattle. Several European countries have already successfully eradicated BVD, and others are well progressed in their eradication programmes. There are growing calls from within the industry here for the creation of a Province-wide cattle health scheme, enabling our producers to unite and tackle the aforementioned infectious production diseases head on. Those calls echo our steadfast desires and are music to our ears. We are delighted to acknowledge Minister O'Neill's commitment yesterday to support this industry-led initiative.

832. Currently, most cattle farmers here take few health precautions when introducing purchased animals to their herds or at farm boundaries. At the heart of the concept of herd biosecurity is the process of risk identification and risk management, which ultimately leads to good protection for the herd from infectious disease. Attention to detail and vigilance at all times are vital for improved biosecurity to be a success. We believe that herd biosecurity is an essential, basic element of preventative veterinary medicine, and we as veterinary practitioners are ideally placed to provide education, advice and guidance to farmers on how to best apply those measures to their individual situation and livestock enterprise.

833. **Mr Kevin Corry (Vet NI)**: Thank you, Lindsey and Chairman. We at the Association of Veterinary Surgeons Practising in Northern Ireland (AVSPNI) and the NIVA cannot ignore the fact that the levels of TB in Northern Ireland's cattle population are not solely down to that specific group. Wildlife has a significant role in the propagation of the disease. Primarily, the focus of attention is on badgers, but also of concern is the contribution of deer. We feel that in dealing with bovine TB, as well as continuing with the ongoing cattle test and surveillance programmes, we should be actively researching the effects of wildlife on the spread of bovine TB. The factors that drive badger-to-cattle and cattle-to-badger spread need further investigation so that more effective protocols can be put in place to eradicate bovine TB. We support any movements by the Department of Agriculture and Rural Development (DARD) to push the research forward, and we look forward to hearing its plan in the future.

834. The amount and spatial extent of contact from infected badgers in our ecosystem and the effect that has on farming business models need to be examined so that the impact of differing strategies can be assessed. A lot of attention is given to the different views on whether to catch, test, cull or vaccinate the badger population. When veterinary surgeons qualify, we take an oath to protect and maintain the health of animals and to always put their welfare first. Therefore, we, in partnership with people who have expertise in badger husbandry and welfare, need to formulate a systematic and scientific programme that takes into account all the variables concerning wildlife. Whatever approach we take, it must be for the long-lasting benefit of the cattle and wildlife populations of Northern Ireland.

835. New Zealand appears to have had success in dealing with bovine TB and has similar wildlife reservoir issues, namely possums. We, therefore, feel that there would be considerable merit in studying its methods for handling the situation.

836. Finally, our associations agree that it is important that we do not just do something that might look good on paper. Cattle TB and wildlife are connected. I remind you that vets do not want to go out and just cull badgers; we took an oath to protect all animals. That said, we need to work alongside others to research and test whether culling and vaccination are viable and effective in reducing bovine TB, while increasing welfare in badgers by reducing bovine TB incidence in their population. All stakeholders need to be on board in bringing that forward if the cattle and wildlife populations are to have a bright future.

837. **Mr John Johnston (Vet NI)**: Thank you, Kevin and Mr Chairman. As private veterinary practitioners, we carry out approximately 90% of the annual herd tests in Northern Ireland, as well as a percentage of the risk and reactor tests. What that basically involves is our receiving monthly allocations of work from DARD. Since testing tends to be seasonal and mostly during the shorter days of winter, we regularly work six days a week to complete those allocations and to ensure that farmers are not penalised by restrictions on their herd for the test not being completed in time. We feel that farmers rely very much on us to deliver that essential service. Lay staff in our practices are also involved in TB testing, in that they organise the tests on a weekly basis and, as far as possible, facilitate the synchronisation of brucellosis testing on the same herd. On completion of the tests, the results are uploaded via the animal and public health information system (APHIS) to the local divisional veterinary office. We are an essential conduit of information between DARD and farmers, and vice versa.

838. We firmly believe that bovine TB testing in Northern Ireland is of the highest standard and certainly the most intensively controlled and audited in the British Isles, if not Europe. AVSPNI and NIVA members remain very proud of that fact. We remain committed to the detection and removal of infected cattle from the country's herds. We must also recognise the very important contribution of the farming industry in complying with the requirement to muster cattle for testing in respect of the cost around farmers' labour and time and also the possible loss in livestock thrive or milk production or the possible injury to animals during the testing process. We seek to minimise that as far as possible. To that end, we recently approached government with offers to take on such work as further brucellosis sampling to give efficiencies of scale for both parties and increased synchronisation of tests on farm. We were disappointed when that proposal was not taken up. We felt that our proposals made sense for the animals, the farmers and DARD in savings through economies of scale.

839. We fully recognise the impact of a TB breakdown to a farmer on a personal level and the devastating effect that that can have on a farmer and his

family. Another approach that we made to DARD recently was an offer to apply DNA tissue tags to reactor animals at the time of detection on farm. That is an attempt to reduce fraudulent activity. It is something that our members are currently willing to do free of charge.

840. We, as a profession, remain committed to working with farmers and DARD to do everything that we can to eradicate bovine TB. As part of that commitment, AVSPNI held a TB forum on 1 February this year, at which over 120 vets heard from various speakers of the highest calibre on topics relating to this very complex disease. More recently, we have also entered discussions with DARD officials with a view to forming a partnership with DARD and private vets involving what would be a risk-sharing and, ultimately, cost-sharing approach to the eradication of TB.

841. We note the Public Accounts Committee's suggestion that DARD investigates lay testing and the subsequent pilot scheme that DARD carried out last year. We are still awaiting DARD's analysis of that pilot with interest, but we firmly believe that the premise of the Public Accounts Committee's suggestion is flawed. Indeed, we wonder whether any of the individuals ever set foot on a farm in Northern Ireland when a TB test is being carried out on that farm. Certainly, to the inexperienced eye, lay staff ought to be less costly than qualified vets, but experience demonstrates to us that the presence of vets on farms and in the rural community in Northern Ireland certainly offers much more than an opportunity just to inject tuberculin and complete a TB test. We are convinced that any move by DARD to employ lay testers at the expense of veterinary practices will bring many significant disadvantages in farm health, animal welfare and surveillance for disease such as epizootic outbreaks, Schmallenberg or even the production diseases that Lindsey spoke about earlier. Removing that work from private practices also seems to be directly at odds with the Executive's strategy of enhancing the capacity of the private sector and the capability of Northern Ireland small businesses, which is what we are. It also risks the export-led growth from the agrifood sector that the Executive are so keen to promote. If there is no veterinary involvement in the TB testing process, lay-tested animals will not be eligible for European trade.

842. More clarity is needed around the way in which some of the terms that are involved with TB are used. The term that we picked up on was "no visible lesions" and the way in which it is used in communication with farmers. Unfortunately, many of our farmers believe that to mean "no disease present". Such miscommunication is particularly serious in the event of a herd being broken down with one reactor that does not show lesions; that herd and that animal is then categorised by DARD as "TB not confirmed". We strongly recommend that such animals and herds should be categorised as "early-stage infection". Some education of the wider agricultural industry is needed to increase its understanding of the true nature of what is a very complex disease. To summarise and be very clear, we, as vets, want to eradicate TB, not just control it. We are practical people and have been used to solving problems on farms, so we share the frustrations of farmers and DARD that it has taken so long to do this. We welcome any measures that may ultimately take us closer to the complete eradication of TB and welcome the opportunity to move on to other diseases where we feel that we are falling behind other member states, such as BVD, IBR and Johne's disease. Thank you once again for the opportunity to share some of our knowledge of our normal day job, which is disease eradication.

843. **Mr Allison**: I will just summarise things. The veterinary associations believe that, given the complexities and the unknowns of this disease, DARD is, in general, doing a good job in its handling of the eradication scheme. However, looking forward, there are a few things

that we would like to see. First, we would like to see further development of the partnership that has already been forged between PVPs and DARD. That partnership provides a forum for discussing matters such as supervision of skin testing, the physical difficulties that arise when carrying out the skin test on farms to the required standard, and so on. Secondly, we encourage the Minister and DARD to develop a full strategy for the eradication of TB. We want to be key stakeholders in the design and implementation of that strategy. We see ourselves as being useful mediators between DARD and the herd owners, hopefully having the trust of both.

844. We would like to see veterinary associations and their members being fully utilised in testing and teaching and advising on biosecurity. We would also like to see that type of advice extended to other diseases, not just the notifiable diseases such as brucellosis, but some of the episodics such as foot-and-mouth disease and production diseases such as BVD and Johne's, which have already been mentioned.

845. It is worth having a closer look at what is being done in New Zealand, where the conditions are pretty similar to ours. They have had a particular problem with TB in cattle and in wildlife, mostly in possums. They appear to have had reasonable success in its eradication. They used a three-pronged approach, which is sometimes referred to as a three-legged stool approach. PJ Rodgers produced a paper in 2009, and the three legs of the stool were, first, testing and removal of infected cattle and deer; secondly, control and movement from infected herds and areas into clean areas; and, thirdly, the control of vector population, in other words, control of wildlife.

846. In Northern Ireland, we feel that we have progressed quite well in the first two stages, but the third leg of the stool is still missing. While we appreciate that there is no magic wand that we can offer, in an ideal world, we feel that an effective badger vaccine that would lock up the disease in the animal and increase resistance to the disease in clean animals, which could be given orally in bait, for example, would be of immense value.

847. **Mr Byrne**: Thank you for your opening submissions. We will take some questions from members in a moment, but, at the outset, I will ask one or two questions. It is fair to say that this has been a 60-year programme. The question is this: has it been successful? Secondly, why has Scotland been more successful in the eradication of disease, with it enjoying disease-free status, while we do not?

848. **Mr Johnston**: As to whether it has been successful or not, we will have to say that we certainly have not eradicated the disease, but the programme seems to keep it controlled.

849. **The Deputy Chairperson**: Has it been moderately successful?

850. **Mr Johnston**: It has had some success in that the incidence has dropped significantly since the start of the programme, but we seem to have reached a plateau that we cannot get below at this stage. For eradication purposes, we need to look at all the factors involved in the complexity of the disease to try to reduce the incidence further.

851. With regard to your question about Scotland, we are not experts in this area, but the layout of farms here is somewhat different from the layout of farms in Scotland. We tend to have fragmented farms in Northern Ireland, with various pockets of land often separated by upwards of 10 or 15 miles, whereas Scotland seems to have larger blocks of farms. That means that animal movements within holdings are reduced in Scotland, and we feel that that may be a factor here with the transmission of TB.

852. **Mr Irwin**: You are very welcome. I declare an interest as a farmer, and I employ private vets.

853. I accept that private vets have worked very hard over the years in relation to keeping TB under control. What would you say to the Department when it tells

us that departmental vets find more TB than private vets?

854. **Mr Johnston**: I assume you are referring to a statistic that was thrown out in recent weeks and months.

855. **Mr Irwin**: Yes.

856. **Mr Johnston**: We have watched with interest that statistic appearing over the past number of years. Certainly, it would suggest that departmental vets are more likely to detect non-negative animals than PVPs. We feel that that is a statistic in isolation. We asked the Department why it did that and got no answer. From our point of view, we feel that as a statistic in isolation it means nothing because we should be looking at other statistics around that, such as lesion rate of reactors for both groups of testers and any subsequent infection detected post-testing for both groups of testers.

857. Basically, there are two groups of testers testing two different populations of animals. As I said in my introduction, we perform 90% of the annual herd tests, which would be the low-risk tests. If we find reactors within those herds, they almost certainly then move to departmental staff, and that is a high-risk test at that stage. The Department often carries out the check tests around the reactor herd, which are also high-risk.

858. We had that statistic analysed in 2009 by Peter Cripps of the University of Liverpool. Although he found statistically that the figures were treated properly, he raised issues as to the data being used, including what I just said, which is that the allocation of the testing was biased. We are doing the low-risk testing and the Department is doing the higher-risk testing.

859. We went back to DARD with that, and it said that the figures had been equalised between ourselves and DARD staff. We have great difficulty in understanding how that can be done but we are not statisticians so we obviously cannot query that to any great extent. However, we feel that to equalise that you would have to take out every factor within every breakdown in Northern Ireland and analyse it, and I do not think that could be done.

860. The one thing that we have come to learn about those statistics is that we are not going to get hung up on the figures. We would rather accept the fact that as long as both groups are testing to a high standard, and given that we are the most audited testers in Europe, we are not overly concerned about the figure. We feel that it should be let go and forgotten about.

861. **Mr Irwin**: In relation to badgers and wildlife, a large number of animals recently went down on a farm where the farmer bought in animals from only one farm, and he has forestry behind him. I would like your take on this, but to me it seems odd that the Department does not go into that farm and find the cause. If the farmer has not been buying animals in and the infection is not coming from the local area, it would look highly likely that it is wildlife. I would have thought that the Department should be doing an in-depth survey on such farms to ascertain whether or not wildlife is to blame and what the situation really is. However, that does not seem to be happening. Am I right in that?

862. **Mr Allison**: Yes, I agree with you. I was at a farm recently that had about 180 animals. One side is bounded by the River Bann and the other is pretty well closed off. So, it is a fairly well closed off area and nothing is bought in. I tested the 180 animals and got 35 reactors. That farm had been clear for a long time and you certainly wonder where that infection came from. I know that it is not practical to investigate all cases but there are cases where it is worth having a look.

863. Going back to the question about the difference between PVPs and departmental staff, one big difference must be ongoing infection. If you are testing a herd that is clear, there is probably no infection in the animals or the wildlife adjacent to or on that farm. Once that becomes a reactor herd, it is taken over by departmental staff, but you know that somewhere on that farm

there has been an infection, be it from wildlife or other cattle. We do not know what the exact process of infection is between wildlife and cattle and cattle and wildlife, and I think that comes back to what you said about the need to investigate that further. However, it is must be very difficult to analyse those results properly if you do not know the mechanism of transmission between wildlife and cattle. That perhaps ties into the previous question. I agree with you that there should be a bit more investigation, particularly in those strange cases in which there was no previous infection and nothing was brought in; you have to ask where the TB comes from in those cases.

864. **The Deputy Chairperson**: Robin, you are next for a question.

865. **Mr Swann**: Thank you very much, Deputy Chair, and congratulations on your new appointment.

866. **The Deputy Chairperson**: Thank you.

867. **Mr Swann**: Folks, thank you very much for your presentation. You referred to the New Zealand model and said that the only leg of the stool that we are missing is to do with the prevalence of TB in the wildlife population. What was the prevalence of TB in possums in New Zealand? How did that compare with the prevalence of TB in badgers here, which DARD estimates at between 20% and 25%?

868. **Mr Allison**: I do not know, but it was probably pretty similar. I know that it was pretty high.

869. **Mr Swann**: Chair, it might be handy to get that report. Was it the 2009 report by Rodgers?

870. **Mr Allison**: Yes.

871. **The Deputy Chairperson**: The Committee Clerk will take a note of that and we will see what the comparisons were.

872. **Mr Swann**: I am not questioning your professionalism in any way, but from a number of previous presentations it could have been construed that it is not in vets' financial interest to eradicate bovine TB and that it is a good money-spinner that keeps people employed. How do you respond to that? Do not get me wrong, that view was not expressed by Committee members. It came from other areas, and I think that it would be worthwhile to give you the chance to reply.

873. **Mr Johnston**: We obviously do not feel that that is a fair comment. As I outlined, it is not just vets who are paid. We must also cover hidden costs, such as the paying of lay staff, the running of offices and IT. It is hard work. We work six days a week, often in bad conditions, there are long hours and huge variations between the time that it takes to test 20 animals on one farm and 20 on the next, depending on the facilities. We also provide another service when we are out testing for TB by monitoring animal welfare, herd health and keeping an eye out for the possibility of other diseases, such as epizootic diseases. We are more likely to detect those diseases when we are on farms testing, and that is often the only chance that we get each year to see every animal on those farms.

874. **Mr Swann**: You said that you made an offer to the Department to carry out another form of testing at the same time as the TB testing. What was that again?

875. **Mr Johnston**: It was brucellosis testing.

876. **Mr Swann**: Yes, and the Department rejected that offer.

877. **Mr Johnston**: At present, it feels that it has enough animal health and welfare inspectors to carry out that testing. We offered to do it for some of the smaller herds. If we were carrying out TB testing and there were three or four blood samples to be taken for brucellosis we would have taken those. We were able to show that that would be much cheaper than the Department sending a member of staff perhaps 10 miles out the road. The Department said that it does not need that service, but the offer is there.

878. **Mr Swann**: Is that more about the Department wanting to protect its staff

rather than allowing you to offer a one-package service on site? I am thinking about the opportunity that that would present to farmers; it would allow them to bring cattle in for one test rather than bringing them in for two, with the hardship and difficulty that causes.

879. **Mr Allison**: Generally speaking, the two tests are done at the same time.

880. **Mr Swann**: By two different sets of people.

881. **Mr Allison**: Yes. We do the TB tests and the departmental staff do the blood tests. That is fine; it is a big test and it is very hard to do both. However, what John is getting at is that there are maybe 50 tests for TB, but, of those, only three may be eligible for blood tests, and it would be easy for us to do those tests while we were on site.

882. **Mr Swann**: Yes, and you would not have departmental staff waiting about for those three.

883. **Mr Allison**: Yes, and there are also savings in the associated travel costs and so on.

884. **Mr Clarke**: I want to follow on from that and expand on it further. I do not have a direct question for the panel, but I think that the Committee should challenge the Department on that matter. Given the climate that we are in of efficiencies in government, how can the Department explain that as a more efficient or cost-effective measure? I propose that the Committee challenges the Department on that matter. It defies logic. John said that he is not a statistician. Neither am I, but it does not take a statistician or a mathematician to work that it would be cheaper for private vets to carry out a brucellosis test while they are on site for a TB test than bringing in someone from the Department to follow up with the brucellosis test. I urge the Committee to seek something urgently from the Department on that issue.

885. **The Deputy Chairperson**: The Committee Clerk has advised me that we can write formally to the Department on that issue.

886. **Mr Clarke**: We should do that fairly soon. Having dealt with that, I formally welcome you and the others to the Committee, John. I want to ask about what you said in response to Willie Irwin. I have heard the same rumours that Robin spoke of. He was not making any inference; he just said that the rumours are there, although I do not believe that any of us would necessarily buy into them. Although I am not a statistician, I am interested in the statistics. It is interesting that the Department always puts itself on a pedestal. We continually hear about how wonderful it is, but some of us will have a different view of that. John said that he is not particularly interested in the statistics on PVPs' testing regime versus that of the Department, but, as Committee members who are supposed to be scrutinising the Department, we should be interested in them. The overall aim is to get rid of TB; I am sure that, as vets, you do not want to see TB either. However, while TB exists, we have to deal with it as effectively and as cost-effectively as we can. I fear that the Department puts itself on a pedestal by coming up with statistics to show that its success rates are higher than those of private vets, given the factors in how the Department arrives at that. The Department is not here to defend itself, and perhaps it will do that later. I would like to hear from it on that. More work should be done on that. John, you are selling yourself short because all of these different pieces of the jigsaw are on TB versus the Department as opposed to TB versus the farmers. The Department has to protect itself as well. Every time, it seems to set itself up as being better at something than everyone else. That may not necessarily be the case, and it may be part of the key to some of the science behind it.

887. **The Deputy Chairperson**: Is there a question you want to put?

888. **Mr Clarke**: I will come to it shortly, Chairman.

889. **The Deputy Chairperson**: We do not want to let them off too lightly, with you just praising them.

890. **Mr Clarke**: I will see if I can get in a criticism or two for them as well. I am sure I will manage something; I will try my best. I am criticising the people who are in front of us today for letting the Department off. They have suggested that they are not particularly interested in the statistics, but we should be looking at the statistics because the Department has set itself up. I am criticising you for that, and you should never put yourselves down about that. It is a criticism, and it is probably also a statement.

891. **The Deputy Chairperson**: Any comment from the panel?

892. **Mr Allison**: No. We are not statisticians, and we have to accept what has been said. We maintain that we are very closely scrutinised and supervised. So many factors are involved in comparing non-infected herds and infected herds. My personal view is that it is well-nigh impossible to compare those accurately.

893. **Mr Clarke**: I will expand my question by going back to the question that Willie asked John. You gave figures on the percentage of tests that you carry out. Did you say that, although you do all of those, the Department gets involved if there are reactors?

894. **Mr Allison**: Yes.

895. **Mr Clarke**: How, then, can the Department suggest that it is better at something, given that it is getting, as you put it, the high-risk tests, while you work with the low-risk tests? It is not about statistics, but how can the Department factor in a calculation that makes it look better, if you want to put it that way?

896. **Mr Johnston**: That is the difficulty we have.

897. **Mr Allison**: That is the nub.

898. **Mr Clarke**: That is the nub, and that is the one that we have to explain. If private vets are there — there are many and maybe there would be fewer if we did not have some of the diseases, but that is just a consequence — and can deal with the low-incidence herds, why do they not follow on with the high-incidence herds as well? Why do we need so many departmental vets? Have we created an industry in Northern Ireland with the Department's veterinary industry? What is your view on that?

899. **Ms Read**: That is a very good question. However, with regard to bovine TB, we fully recognise that we need a partnership to work here. The Department needs vets in place, in line with the national disease outbreak policy, so that we are ready to attack another outbreak of foot-and-mouth disease if it were to land on these shores. We recognise our colleagues in the Department, and we want to work along with them to improve the health and welfare of our animals here. I do not think that they are all there just for TB testing. They work hard at their jobs, and we could all work together.

900. **Mr T Clarke**: Do you see that as a two-way?

901. **Ms Read**: I see us as a partnership.

902. **Mr T Clarke**: No. You see them in a partnership with you — sorry, you are in partnership them —

903. **The Deputy Chairperson**: Trevor, can you draw this to a conclusion? We want to move on to Thomas.

904. **Mr Clarke**: You see yourselves in a partnership with them. Do you believe —

905. **Ms Read**: I believe that every single person who has presented to you at the Committee and everyone involved with bovine TB is a link in a chain, from farmers through to the Agri-Food and Biosciences Institute and its research, and everybody else. Looking backwards, we have not gone far enough; looking forward, everyone needs to pull together and move on for the betterment of our industry.

906. **Mr Buchanan**: I apologise for missing your presentation. Perhaps some of what I am going to ask has been covered. I believe that the Department is playing around with TB rather than taking it on and tackling the issue. What

do you believe the Department should do to get rid of it, or, if we are not going to eradicate it, to help to reduce it? Does the Department engage with you in your professional capacity and seek your opinion as to what should be done to reduce TB right across Northern Ireland?

907. **Mr Allison**: I will answer the last part of your question first. The Department does, very much, engage with us. We have started a partnership, which will, hopefully, develop. That partnership will include discussing what happens with TB and other diseases. The whole thing ties together in many ways as there are various diseases on a farm, including TB, brucellosis, and other production diseases such as BVD, and so on, and then there is the brucellosis and the epizootic diseases. It is all very much one package really, and the biosecurity for that is maybe all one package as well. So, yes, the Department does engage with us and asks for our views. That partnership is in its early stages, but it is forming and going quite nicely.

908. What was the first part of your question?

909. **Mr Buchanan**: Do you believe that the Department should be doing more? I do not believe that it is doing anything. What do you think it should be doing to eradicate or reduce TB across Northern Ireland?

910. **Ms Read**: We all have a place in taking ownership of the problem and everybody need to recognise that we have not done enough. I spoke about biosecurity and, from my point of view, as someone who is farm born, bred and raised, we need a change of mindset. We need to recognise the risks. It is not a matter of ticking boxes and thinking that we will tackle TB today, brucellosis tomorrow and BVD whenever. Biosecurity brings everything together. When we step on to a farm or go to the Balmoral show, we have to think about the risks for our animals at home. Everybody can work better. Yes, the Department needs to sit at that table, and we all need to take a good look at ourselves and see how we can go forward. I do not think that it is a point of casting blame. Everyone needs to take ownership of the problem. We all want the same goal: we want a better standard of health and trade for our animals.

911. **Mr Buchanan**: It just seems that this has been running for quite a few years now. Is it a fact that we are only really starting to consider what strategy needs to be put in place with everyone working together to tackle the issue and reduce it? It seems rather late in the day.

912. **Mr Allison**: If you go back to the talk about the three-legged-stool approach in New Zealand where they had the testing and removal of infected animals, we are doing that probably fairly well, given the confines and inadequacies of the test. As regards the control of movement from infected areas or herds into non-infected, we are probably doing quite well, with the APHIS system and so on. The third leg of the stool is the wildlife factor and that, I am afraid, we have not tackled. However, it is all very well us sitting here saying, " Do something about wildlife", but you have to do it in the right way and that is why I said that, if you have a magic wand, a proper badger vaccine would be wonderful, but we have not got it yet. Maybe we will get one in time. However — and, again, it is my personal view — we have to do something about wildlife in the right way.

913. **Mr Johnston**: We tend to look at models from other countries. Every model we look at is different. We need to carry out some research into badger-to-cattle transmission and cattle-to-badger transmission. We would certainly welcome some investigation into that to give us some view on the wildlife aspect. That is only one of the aspects of TB.

914. **Mr McMullan**: Thank you for your presentation. In my opinion, all the talk of private vets and departmental vets and all that takes away from what the problem is all about. We start an argument on who is administrating what, and we are not dealing with the subject in hand. Some of the groups have gone down that line — I will not say which — perhaps for want of a better argument on how to deal with the

problem. Sometimes it is easier to beat somebody with a stick than trying to solve the problem.

915. If we look at New Zealand and other countries that have a good record on TB, should we be going down the line of following everything that they do? Take New Zealand as an example. Everything New Zealand does to monitor or eradicate the disease is important. Incidence of TB is low there and New Zealand is held up as a good example. However, am I right in saying that New Zealand does not offer the same levels of compensation?

916. **Ms Read**: What New Zealand has achieved is very good. Look at Scotland; what it has done is also very good. However, you have to remember that we are each on our own. We farm differently, and geographically we are different. I have been to TB tests with 25 animals and gone to more than five farms. You will not be able to lift another country's model and roll out the same model here. However, there are certainly things to be learned.

917. **Mr McMullan**: That is the point I am making. We can get too hung up on the places that are doing well, but their situations are different to ours.

918. **Ms Read**: That is not to say that there is not something that we can learn from looking abroad.

919. **Mr McMullan**: We can learn from them by asking them questions and we should be able to get that information reasonably quickly. Even if we instigate a programme in the morning, are we are talking about at least five or six years before we get a result? Is that a fair assumption of the time factor? That message needs to be sent out to the public. If we start something fresh this morning, something new, we are talking about a time factor of that scale; is that not so?

920. **Mr Allison**: Yes.

921. **Mr McMullan**: So what do we do in the meantime? Do we sit and beat the Department with a stick, or sit and beat the vets with a stick or try to get the private vets and the departmental vets fighting or what? What do we do in the five-year interim while we are waiting for it to happen? I know that you are frowning at that, Mr Swann.

922. **Mr Swann**: I would just like to know what is the fresh thing that we could do in the morning that could start to —

923. **Mr McMullan**: I am only saying —

924. **The Deputy Chairperson**: A wee bit of order here. One person at a time. Have you another question, Mr McMullan?

925. **Mr McMullan**: No. I am just putting that question to the panel. I think we need to be more focused on the disease and less on the personalities. Sometimes the consultation runs away with itself a wee bit. We have all the information before us. As I said earlier, we need a collective approach. We need to sit down and work out how to take this forward, because it is a long, drawn-out process. That is why I come back to what I said. If we put in something in the morning, the time factor will not give a result at the end of the year or at the end of the second year. As was said before, it could be anything, it could be a five-year-plus programme. We have a long time frame in front of us, if a new programme is to be instigated. We need to get our heads —

926. **The Deputy Chairperson**: Please answer that and then we must move on.

927. **Ms Read**: I acknowledged Minister O'Neill's commitment to the industry-led BVD programme. Lots of other European countries, including the Republic of Ireland, are a step ahead of us with their BVD eradication scheme. It would probably be a voluntary scheme at its outset and a compulsory scheme a year or two down the line, and we hope that our clients and farmers and the producers of Northern Ireland will be enthusiastic and buy into that programme. That buy-in will lead to increased awareness of biosecurity and disease transmission because, as you correctly pointed out, you have a lot of information about the spread of TB,

but every disease-causing organism differs very slightly. It will also lead to improved biosecurity and, if farmers are educated on it and encouraged by it, will reduce the incidences of other diseases out there that are costing our industry millions.

928. Farmers may not even recognise it themselves, but they are aware of it and are working very hard in a situation in which money is tight. The price of lamb is £1·50 a kilo back on what it was last year, and the price of beef is in free fall. The price of milk is coming down too, and farmers are conscious that they want to farm better. We make them aware of issues when we are on the farm, but they need encouragement to try to push further. If one farmer has eradicated BVD and is maintaining a Johne's-free status but his neighbour is not, he is at risk all the time if he does not have good fences. We — when I say "we", I mean everybody involved in the consultation — are doing our producers and farmers a disservice; we need to educate them, encourage them and push on.

929. **Mr McMullan**: That is the most sensible thing that I have heard for a while in the consultation process.

930. **The Deputy Chairperson**: There is nothing wrong with that. I will let your colleague in now as she wants to ask a question.

931. **Ms Boyle**: That is exactly what I wanted to say. I am a newer member of the Committee, and this has been on the agenda for quite a number of months. I thank everybody for their presentations today. Lindsey's presentation was excellent, and I suggest, Chair, that we get a copy of it. If a vaccination programme is to be rolled out, would it be the tuberculin one or another one?

932. **Ms Read**: I think that they are working on an oral BCG vaccine.

933. **Mr Allison**: Probably a BCG vaccine.

934. **Ms Read**: Vaccination of cattle is not really an option because of trade embargos and the fact that cattle are testable, and so on.

935. **Mr Allison**: The other problem is that TB is quite difficult to vaccinate against. A vaccine can work in two ways: it can either lock up infection or, if things are already infected, some vaccines will stop an animal spreading disease to other animals or humans. The other property it has is that it sometimes increases resistance. If you have a healthy animal or healthy person vaccinated, it increases resistance to disease. It can work both ways, so we would like a vaccine that works both ways, can be given orally in some sort of bait so that you do not have to catch an animal to inject it, and is cost-effective. That is asking a lot. We do not have it, but it would be very useful if we had.

936. **Mr Irwin**: I have mentioned this to the departmental vets. As a lay person, I notice that there seem to be different strains of TB, because, in one herd, a couple of animals can go down and it is then cleared up whereas, in the next herd, 100 animals may go down. I am not so sure whether it is a different strain of TB or whether one herd has better immunity than the other herd. Trials probably need to be done on that because something underlying is causing massive outbreaks in a certain herd and, a mile or two down the road in another herd, only a couple of animals go down.

937. **Mr Johnston**: We are particularly interested in the fact that concurrent disease may have a role to play in TB. We are talking about various diseases such as BVD, which lowers the immunity of animals and can open the door for TB to come in, and the possible effect of Johne's. More recently, there has been a suggestion that liver fluke infestation may reduce the immunity of animals and increase the possibility of TB. However, I take on board the fact that there are different strains. There are recognised strains in Northern Ireland. I am not familiar with the possible variations in each strain but concurrent disease on a farm could be a factor with the spread of TB on that farm.

938. **Mr Irwin**: It seems strange.

939. **Ms Read**: A lot of concurrent disease can cause a reaction to the TB test.

940. **Mr Allison**: There is such variation that, as you say, on testing you will find one reactor among 500 animals and you will never see any more; of the 20 animals in the next test that you do, half of them may be reactors. It is very variable, and I do not know why.

941. **The Deputy Chairperson**: There was to have been a review in 2010 of the contractual arrangement between private vets and the Department, but no conclusions have come out. Why is that?

942. **Ms Read**: Colin Harte is still interested in a review of the current contract between PVPs and the Department, and that may happen in the short term.

943. **The Deputy Chairperson**: Given that private vets enjoy a fairly lucrative public sector contract from DARD for testing, could private vets live with a radical approach that involved, say, a 20% cut in the cost of testing? How would that go down with private vets? Would they live with that?

944. **Mr Allison**: Do you mean a 20% cut in what we are paid?

945. **The Deputy Chairperson**: Yes.

946. **Mr Allison**: Well, that would not go down very well.

947. **The Deputy Chairperson**: Obviously there has to be a shake up.

948. **Ms Read**: You must remember that, as John and Bert reiterated, our ultimate aim is to eradicate TB. If the Department decides to cut the payment by 20%, that is fine, our aim will not change. However, the same number of tests will need to be carried out and the Department will probably not be able to cope with that. We have put ourselves in a partnership with the Department and our farmers to move forward in striving for eradication.

949. **The Deputy Chairperson**: We have the farmers, the marts, the Department and the private vets: where must the lead come from to tackle this head on?

950. **Mr Allison**: I think that you have to say the Department.

951. **The Deputy Chairperson**: OK. There are no other questions, so I thank you for your submission and for answering our questions.

952. **Mr Allison**: Thank you very much, Chairman.

953. **Ms Read**: Thank you.

29 May 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mrs Jo-Anne Dobson
Mr Chris Hazzard
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan

Witnesses:

Dr Pól Mac Cana	*Northern Ireland Badger Group*
Mr Mike Rendle	
Mr David Wilson	*Ulster Society for the Prevention of Cruelty to Animals*

954. **The Chairperson**: I welcome to the table Mike Rendle, who is the co-ordinator for the Northern Ireland Badger Group, Dr Pól Mac Cana from the Northern Ireland Badger Group, and David Wilson, who is information officer with the Ulster Society for the Prevention of Cruelty to Animals (USPCA). Gentleman, you are very welcome to the Committee today. This is a very important inquiry for the Committee, and we have been looking at it in great depth over the past number of weeks. Bovine TB is a very important issue for the Committee and for the agriculture industry as a whole, and the Department of Agriculture and Rural Development (DARD) is taking our inquiry very seriously. Without further ado, could you give us your presentation. I am sure that you have a presentation for us. Maybe not?

955. **Mr Mike Rendle (Northern Ireland Badger Group)**: As you know, we have provided a written submission, so we were kind of expecting to be answering questions about it. We are happy to field any questions that members may have.

956. **The Chairperson**: OK. We can go straight to questions. There is no problem there.

957. Obviously, bovine TB is a big issue here, and the wildlife reservoir of bovine TB is a factor. You have stated that the role of badgers and other wildlife in the transmission of bovine TB is poorly understood. Why is that the case? The disease has been around for many, many years, so why is it still poorly understood?

958. **Mr Rendle**: Part of the problem is that there have been 47 years of research into bovine TB, a lot of which has focused on the badger issue, probably disproportionately. It is interesting that, even after 47 years, there is not very much conclusive evidence to show that badgers contribute to any significant degree to TB breakdowns in cattle herds. To answer your question directly, I do not know why that is the case. My view is that badgers are probably not as pertinent to the problem as some people think they are.

959. **Dr Pól Mac Cana (Northern Ireland Badger Group)**: There is another way of looking at it. Most of the conclusions in the science are based on circumstantial evidence. There is no clear evidence about which direction the disease is going in, or even about whether it is coming from a third, fourth or fifth source. Any kind of estimation by vets in any part of the British Isles is conjecture. When vets say that they attribute a breakdown to badgers, a lot of the time it is debatable. How can a vet decide that badgers are the cause? Has he taken samples from badgers on that particular farm on that particular day or over the years? TB is attributed to badgers in an awful lot of cases, but it is not based on hard fact or evidence that badgers on the land were carrying TB. Even if they were, did they give it to the cattle or did they get it from a common source or from the cattle? That is still very much open to debate and has not been proven in any paper, either here, down South or in Britain.

960. **The Chairperson**: I want to turn to biosecurity measures on farms and the need to improve and modernise farms. Do you think that this could be wrapped up in a farm modernisation scheme, whereby farmers could be incentivised to improve their feeding areas and barns to keep wildlife out? Am I right in saying that that is still a problem and a factor in the spread of bovine TB?

961. **Dr Mac Cana**: If you go down the route of believing that the principal cause is wildlife going into sheds and byres, then, yes, of course, any farmer should take that action to prevent the spread of not only bovine TB but any disease — bovine TB is not the only disease that needs to be tackled. At the same time, we think it would be useful to look at DARD's suggestion in its 2002 policy that we look at lateral spread in cattle as a result of nosing and hedging not doing the job it is supposed to do. OK, hedging may be preventing animals from breaking out onto somebody else's land, but it is not preventing cattle-to-cattle contact. It would be useful to deal with that, and it would fit in nicely with some of the biodiversity enhancement elements of policies in the Northern Ireland Environment Agency (NIEA) and perhaps also the countryside management scheme (CMS). By focusing on access to byres and sheds alone, you are assuming that the issue is badgers going into sheds, but there are other amplifier species, such as hedgehogs, feral cats, farm cats and deer. How do you mitigate the impact of those factors?

962. **The Chairperson**: DARD has undertaken research over many years, and it will tell you that it is undertaking more research over a five-year period. What do you think that DARD should be doing in its research? What should it be looking at and concentrating on? Also, for your groups, how much of a priority is the eradication of bovine TB, whether in cattle or wildlife?

963. **Dr Mac Cana**: It is a great priority on two levels, both for the vindication — not vindication, that is the wrong word. From my personal point of view, I would not be against a cull per se if I thought it would work. It is a priority in the sense of getting away from the stigmatisation of the badger and in terms of cattle welfare. We all have family members who are tied to agriculture. It is not as if we do not realise that. We have to think about the person first, but we also have to think about ourselves as taxpayers. We are all paying our taxes to pay for this, so everybody is involved. There are a number of layers and reasons for wanting to get rid of bovine TB; it is not just for the sake of badger welfare.

964. **Mr Rendle**: Speaking for the Badger Group, it is a high priority for us at a number of levels. Moving forward, we would like to see an evidence-based strategy, and we think that Northern Ireland is in a unique position to provide that. We certainly have the expertise. DARD has one of the best sets of data on bovine TB and on the wildlife aspect, and there is a lot more to be done with that. We would like any research programme to be broad. There is also an opportunity to get a better understanding of what role, if any, the badger has. One of the problems, as we see it, is that the whole issue has been polarised for so long. One side thinks that badgers are a problem while the other side thinks that they are not. The middle ground has not been addressed. A lot of resources could have been better spent addressing the middle ground and getting answers to more fundamental questions. As Pól said, a lot of assumptions have been made about the role of the badger in TB, but we simply do not know. We would like to see any research programme trying to answer some of the questions.

965. **Dr Mac Cana**: DARD has a great amount of information on cattle herds. We need to look at this from the point of view of multivariate analysis and ask about the implication for pedigree herds. Genetic similarity means that animals will be more susceptible to a disease if one comes down with it. You have the issue of anergy, which is a big factor with TB. You can have animals that will always test negative for the disease

because their immune systems are so depleted. They will remain in the herd and continually excrete the bacterium around other cattle. That needs to be quantified.

966. As regards farm management, the data that is out there needs to be analysed, including data on numbers of herds, breeds of herds and — I suppose you would not use the word "inbreeding" — how many pedigree herds there are in the cattle industry in Northern Ireland. We need to look at those factors and find out which farms are more susceptible and why. Is it because the badgers always happen to be beside the largest dairy cattle farms with pedigree animals? Could that be the case? We need to look at it from that point of view and see what is going on with that massive amount of data that is sitting there waiting to be researched.

967. **The Chairperson**: David, in your paper on behalf of the USPCA, you said:

"the USPCA regards the proposed culling of badgers as a short sighted attempt at a solution already been tried by the Republic of Ireland with thousands killed over an eight year period, a needless slaughter that failed to make a meaningful impact on disease levels."

I take it that you have been looking very closely at that.

968. **Mr David Wilson (Ulster Society for the Prevention of Cruelty to Animals)**: Yes, I think that my colleagues in the Badger Group can confirm that as well. The USPCA is an animal welfare charity. Our objective in life is to prevent suffering in animals; all animals, regardless of breed, whether it is badgers or whatever. We perceive the slaughter of badgers as being a bit like the shooting of seals. The salmon do not come back; when they are gone, they are gone. The culling of badgers is short-sighted. It will become the only solution in town, if it is a solution. It would be much better for us to put our resources into another solution. We have a lot of pharmaceutical talent in this country. Surely, if we put our resources into developing a vaccine for cattle, it would take the heat off the badger, improve the health status of cattle and perhaps make a little bit of money for the country.

969. Why we have three of four parts of the British Isles doing their own thing is another thing that is lost on us. The Welsh Assembly is dealing with the issue of badgers, the Department for Environment, Food and Rural Affairs (DEFRA) in England is doing the same and we are talking about it today. Would it not be possible to get brains together and come up with a common solution instead of heading off in our own directions?

970. **The Chairperson**: OK, thank you very much. I will open the floor to members.

971. **Mrs Dobson**: I have listened with great interest. Point 4 of the Northern Ireland Badger Group's submission states that a vaccine is:

"the most direct and robust method of dealing with bovine TB".

972. David mentioned putting brains together to try to get a vaccine. When my husband was at Greenmount 30 years ago, people were talking about a vaccine. They are still talking about one, and we are still being told that it will be many years before one becomes available. It is taking some time to get there, and I am sure that the brains have been available in that time. Is a vaccine that does not exist realistically the best suggestion we have for eradicating TB?

973. **Dr Mac Cana**: First of all, all vaccines take years to develop, whether it is in human medical science or veterinary science.

974. **Mrs Dobson**: We have had a lot of years to develop this vaccine.

975. **Dr Mac Cana**: Well, we are talking about maybe five or six years, which is long enough but —

976. **Mrs Dobson**: My husband said it was being mentioned in Greenmount 30 years ago.

977. **Dr Mac Cana**: From our point of view, the vaccine is a short-term fix. In economic terms, we realise that it will not be effective in the long term. I am talking about the badger vaccine. A cattle vaccine could be part of the solution. Are you talking about vaccinations for badgers or cattle or both?

978. **Mrs Dobson**: Both. I want to hear your suggestions about a vaccine for both.

979. **Dr Mac Cana**: Both vaccines should be investigated and rolled out. The badger vaccine is a short-term solution, because we cannot afford to go out year after year vaccinating the next generation of badgers and then the generation after that. It is a short-term solution until we get something sorted out.

980. The cattle vaccine is perhaps a better way forward in the longer term. That has to be done in conjunction with a secondary test to find out whether an animal that has been vaccinated has subsequently become infected with the disease. That is where the vaccine is hitting most of the difficulties. It is not just a matter of putting out a vaccine for the cattle. If that were the case, every cow in the country would be getting the BCG that we all got when we were children. The whole point is that we need to monitor that afterwards and make sure that we can tell which animal has the disease. We are getting closer to that scenario and the science is getting closer to that.

981. **Mrs Dobson**: We are still not there yet.

982. **Dr Mac Cana**: Of course not, no.

983. **Mrs Dobson**: I would like to hear what other suggestions you have.

984. **Mr Rendle**: If I can refer to my earlier point, because of the obsession and the polarised debate on badgers and culling, research into a vaccine has been under-resourced. Over the past few years, there has been a very big shift in that. The conclusive evidence now is that cattle-to-cattle transfer is the primary factor in the spread of TB, so people are taking the idea of a vaccine for cattle much more seriously. So, I think that we are going to see quite a lot of progress in a relatively short period, compared with 30 years ago. Secondly, badger vaccination trials are already under way in Great Britain, so there is a lot of progress being made on the badger front.

985. **Mrs Dobson**: You say in your written briefing that you make a positive contribution to the Northern Ireland bovine TB strategy. However, as the Chair said earlier, and as we on the Committee are all well aware, herd incidence is on the rise, which is a significant cost to farmers in the industry. What specific, positive aspects do you feel that your contribution has brought to the strategy? Will you outline those?

986. **Mr Rendle**: We are waiting for the opportunity to contribute to the strategy. To date, the Badger Group and the Badger Trust, which we represent in Northern Ireland, have not been included in any stakeholder groups or other processes. We have been very much on the outside.

987. **Mrs Dobson**: What did you mean when you said that you make a positive contribution to the strategy?

988. **Mr Rendle**: That is what we want to do; we want to make a positive contribution. We would like to think that we can offer specialist experience and knowledge about the wildlife aspect. The Badger Group draws its membership from people from all walks of life. People do not come to the Badger Group with a very narrow understanding or remit. The group is probably exceptional among many of the groups with an interest in TB in as much as it members do not come from one particular point of view. We have a hybrid vigour in that we have people with different areas of knowledge.

989. **Dr Mac Cana**: It is important to make the point that, although recent figures have shown that the incidence of TB has gone up, from a scientific point of view, you must look at the trend over many years. Looking at the trend over

three or four years is not enough. When work was being done on a trial cull in England, even at the beginning of the study, the scientists were saying, "You have this going on for nine years, but it will take 15 or 20 years to get any meaningful statistics". You cannot base it on a rise in TB over a couple of months. That only means that more animals reacted; it does not mean that the problem is escalating. It just means that there is a fluctuation, just like with any disease, whether in humans, pet dogs or badgers.

990. **Mrs Dobson**: Earlier, Mike mentioned that, 47 years ago, the research was wrongly focused. We have had quite a long time to get this right.

991. **Dr Mac Cana**: I would not say that it was wrongly focused —

992. **Mrs Dobson**: Those were his words, not mine. I wrote them down when he said them.

993. **Dr Mac Cana**: I would not say that it was wrongly focused, but maybe it has been blinkered in a sense. Of course the badger aspect should continue to be studied, but there are wider aspects. We need to look at the escalating deer population. We also have a feral ferret population, which can carry the disease. What are we going to do about that? Hedgehogs can carry it and so can pigs, dogs and farm cats.

994. **Mrs Dobson**: In your briefing, you say that, in relation to badger culling, there is:

"hearsay, misinformation and a genuine lack of understanding of the core issues."

Who do you level that criticism at? Is it the farmers or DARD?

995. **Mr Rendle**: I have read statements in the press from across the community, and I have noticed that many of them are inaccurate. I would not aim that at any one sector or specific individuals. It was just a general observation.

996. **Dr Mac Cana**: It can be mentioned as a general thing; it does not mean that it is a criticism. TB is a very complicated disease and this is a very complicated situation. Do we all understand every aspect of society here? No. A lot of things are based on hearsay. It is not about levelling —

997. **Mrs Dobson**: So you are not levelling that criticism at any one in particular.

998. **Mr Rendle**: It also applies to people on the badger side. I have spoken to people who feel that culling is terrible and that badgers should not be culled. However, those people have no understanding of the issues around TB. They just think that culling badgers is a bad thing to do.

999. **Mr Byrne**: I thank you for your presentation. I have three points. On page 2 of your document, you say:

"There is reliable primary and anecdotal evidence that a minority of individuals ignore, flaunt or exploit existing guidelines and regulations."

What does that mean? What evidence is there of that?

1000. **Mr Rendle**: I am not suggesting that that is systemic. I used the word "minority" —

1001. **Mr Byrne**: Is it real or imaginary?

1002. **Mr Rendle**: It is real. People have been prosecuted for tag fraud; changing the tags on cattle. That has biosecurity and disease implications.

1003. **Dr Mac Cana**: The Department's 2002 policy mentioned that that issue existed. The Department knew that that was a fact back in 2002.

1004. **Mr Byrne**: Are there any quantitative figures for that?

1005. **Mr Rendle**: No. I do not think that there are. I suspect that it is under-reported.

1006. **Mr Byrne**: You seem to be in favour of vaccination of cattle but not in favour of vaccination of badgers.

1007. **Mr Rendle**: We did not say that at all.

1008. **Mr Byrne**: Relatively speaking.

1009. **Mr Rendle**: No —

1010. **Mr Byrne**: I am surprised that you are so keen on vaccination at all. Surely, if

we are talking about animals that will be sold into the food chain, vaccination generally is a worrying aspect of modern life.

1011. **Dr Mac Cana**: Personally, I am not too concerned about vaccination. I might be more concerned about dosing an animal up with antibiotics before it goes into the food chain, but I am not that concerned about an animal that has been treated with an antigen at a certain stage in its life.

1012. **Mr Byrne**: I take it that, on balance, you are more in favour of vaccination of cattle than vaccination of badgers.

1013. **Mr Rendle**: It is not that we are not in favour of vaccinating badgers. We do not have a problem with vaccinating badgers.

1014. **Mr Byrne**: I am just asking about the relative emphasis.

1015. **Mr Rendle**: We think that vaccinating cattle will make a bigger difference to the problem of bovine TB.

1016. **Dr Mac Cana**: From an economic and long-term sustainability point of view, vaccination of cattle is easier and more effective and provides more value for money. You have to catch the badgers, give them a vaccine, and then go out again. You do not have the badgers sitting in a pen waiting to be vaccinated every year. You have to go out and catch them again, which takes an awful lot of money and man hours and is highly ineffective. In the short term, a high level of effort on badger vaccination might be useful. However, in the long term, we cannot afford that.

1017. **Mr Rendle**: The other thing is that by vaccinating badgers we are making the assumption that they are responsible for TB breakdowns in herds, but we do not know that.

1018. **Mr Byrne**: I am referring to your document; that is where I am drawing the inference from.

1019. **Mr Rendle**: You are entitled to draw the inference, but I am telling the Committee that we have no objection to vaccinating badgers. We think that vaccinating cattle would be a better way forward, but there is no reason why both cannot be vaccinated.

1020. **Mr Byrne**: I am raising the issue of vaccination as a method of control in trying to get to a position of Northern Ireland enjoying disease-free status. From what I can pick up, you are emphasising the vaccination of cattle more than anything else.

1021. **Mr Rendle**: No, that is not the case.

1022. **Mr Byrne**: Sorry for getting the wrong impression.

1023. **Mr Rendle**: The vaccination of badgers is widely mooted, and we have no problem with that. We have found that the vaccination of cattle is not so widely discussed, which is why we made a point of mentioning it in our submission.

1024. **Mr Byrne**: Finally, what are your views on the compensation system that pertains in Northern Ireland?

1025. **Mr Rendle**: We made a submission to DARD's recent consultation on compensation. With caveats, we feel that farmers who lose animals to TB should be adequately compensated. We see the compensation scheme as having several benefits. First of all, it is an incentive for farmers to report TB in the open. It could also be used as an incentive to improve biosecurity and promote good animal husbandry.

1026. **The Chairperson**: I have one wee question on what Joe brought out. Mike, you said that it is not yet established that the spread of bovine TB is caused by wildlife and badgers. I have figures here from an EU plan that DARD submitted. DARD reckons that local spread accounted for 25% of the spread. The other figures were: badgers, 16%; purchase of animals, 12%; carry-over, 7%; and other, 5%. Interestingly, there is a "not established" section accounting for 35%, which could tip any of the other sections close to 50%. Are you discrediting those figures?

1027. **Mr Rendle**: I would like to know where they got the figure of 16% from. It may well be that 16% of farms had badgers on them; I do not know. As far as we are aware — and I think that Pól can support this — there are no figures that allow us to attribute cattle breakdowns to badgers. It can only be speculated.

1028. **Dr Mac Cana**: My major concern is that we do not know how those figures were arrived at. Who decided them? It may have been a vet who said to the farmer, "You did not buy in any cattle. I cannot see that the animal is anergic. There is still an animal spurting out disease on the farm. You said that there is a badger in the area so, by default, it must be the badger." Of course, a percentage of those cases could perhaps be attributable to badgers, but there is no scientific back-up for that. The vet cannot say that he definitively knew that or that he is an ecologist who went out to discover what the cause was. The vet is a mechanic of the body; he is not an epidemiologist. He is not chasing badgers to find out where they are going and whether they are going into sheds. They are the Department's figures, but how were they come upon?

1029. **Mr Rendle**: I want to mention the 2004 task force meeting of the bovine TB subgroup. Mr Abernethy delivered a report that suggested that 22·9% of the breakdowns were attributed to badgers. In fact, somewhere else he says that it is suggested that approximately 40% of breakdowns may be attributed to badgers. I do not know where these numbers are coming from either. I would definitely dispute these figures.

1030. **Dr Mac Cana**: From a scientific point of view, it just does not hold water. We need to know how these vets assessed that the badger was the source.

1031. **Mr Irwin**: Thank you for your presentation. I declare an interest as a farmer.

1032. As a farmer, I have noticed a big rise in the badger population on the ground. Is that right? You should know whether there are more badgers in Northern Ireland than there used to be.

1033. I agree with you up to a certain point. The Department has not done enough to deal with the badger issue and ascertain to what degree badgers are responsible for bovine TB. We have seen TB outbreaks in closed herds that had no access to other animals. One particular herd was kept in an area with a forest behind it and nearly 200 animals went down with TB. In that situation, I believe that the Department should be doing more. It should be surveying that farm to assess how that came about.

1034. If the Department were to prove that badgers were the cause of a major TB outbreak on a farm and there were diseased badgers, would you agree to a cull of those badgers?

1035. **Mr Rendle**: We would be reluctant to recommend any sort of general cull because —

1036. **Mr Irwin**: I am not talking generally; I am being specific.

1037. **Mr Rendle**: OK, I am just qualifying what I am saying. However, we would support a catch, test and remove strategy whereby badgers that are tested and shown to be diseased are removed. Is that helpful?

1038. **Mr Irwin**: Well, slightly, yes. I am actually surprised by your answer, but I welcome it.

1039. **Dr Mac Cana**: You asked whether badger numbers are increasing. A recent NIEA survey has shown that they are not.

1040. **Mr Irwin**: We think that, on the ground, it looks that way.

1041. **Dr Mac Cana**: Certainly, I take that on board, but NIEA's data says that they are not, and new data from the South would suggest that their estimate was an overestimation.

1042. **Mr Rendle**: Badger numbers tend to fluctuate during the year, as do numbers of other wildlife species. I have an interest in other wildlife species, and people say to me that there are lots of

such-and-such around this year. There are not; it is just that, because the numbers fluctuate, people happen to see a lot of a certain species at one time. As Pól says, the most reliable evidence suggests that, generally speaking, the badger population in Northern Ireland is stable. Certainly, that would be our observation, too.

1043. To go back to your question about the trap, test and remove strategy, our caveat would be that it must not be used as a reason just to kill badgers. We would like to see it done in a scientific way so that we can find out what the incidence of TB is. We would like the process to be informative, not just one that is used to kill badgers.

1044. **Mr Irwin**: As a farmer, I can assure you that no one wants to kill badgers. In farmers' eyes, culling good animals is worse than culling badgers. There has to be some acceptance of that, too. Large numbers of healthy animals have caught the disease and have had to be culled. You did mention vaccination of badgers, but I noted that, in Wales, a top scientist on the eradication board resigned because they decided to go down the vaccination route rather than have a cull. He said that an infected badger that is vaccinated can live for a number of years and still spread the disease.

1045. **Dr Mac Cana**: It is a process with any vaccination. Do you know what I mean? You can do the same with cattle. Any human child infected with TB who then gets the BCG vaccination is still infected. It is about working with the population to weed out the disease over time. It does not hit the disease and stop it from the outset, and we have to accept that.

1046. **Mr McMullan**: If you do not think the badgers have TB, what do you think spreads it?

1047. **Mr Rendle**: I don't want to nitpick, but we do not doubt that badgers have TB. The DARD road traffic accident (RTA) study and other studies show that somewhere between 12% and 20% of badgers have TB. That does not mean that they are sick or that they can spread the disease. A study in England with the Krebs trials showed that around 2% of badgers possibly have the capacity to spread the disease.

1048. There are a number of gaps in the system that is in place. The most obvious one is the skin test that is used to test cattle for TB. That test misses 25% of infected animals. That means that those animals remain in the herd and can infect other animals in the herd and can be moved and infect animals elsewhere. Now, 25% is a large number. You probably have better figures than I have, but I think that the incidence of TB in Northern Ireland is at 5% or 6% at the moment. While that is not a big figure, it is too big. We want to eradicate the disease. However, 25% of infected animals are not detected when tested. When you consider the 6% level of the disease and the 25% missed just by the test, it puts the whole thing into perspective — at least, it does for us. Whereas, only 2% of badgers are sick enough to spread the disease, if they get the chance. After 47 years of research, no one has shown how badgers give cattle TB. It has never been proven.

1049. **Dr Mac Cana**: It is also important to note that, while it is often quoted that Britain and Ireland have failed to eradicate TB from their herds and the rest of Europe has, in Europe there is a slightly different test. Their approach is one strike and you are out, whereas we have a comparative test, which gives the disease a little bit of a loophole, with avian antigens put in as well. We are giving the disease a chance that it does not have in France or Germany. We accept that and we accept that the test is not infallible.

1050. **Mr McMullan**: Do you agree that in other parts or Europe and the rest of the world, culling infected animals has a good effect in the eradication of the disease. All these studies have been done. Are you saying that all those studies are flawed? You gave examples from England and Wales. Can you explain why TB is so low in Scotland,

when there are badgers in Scotland, and you say that 25% of the cattle are missed and are still in the herd, but it only takes one badger, for example, to move 3 km or 4 km and it can infect more than 25% of a herd?

1051. **Dr Mac Cana**: But there is a presumption that it is the fault of the badger as well. The agriculture varies greatly across Britain and Ireland, and there is no doubt about that. In the hotspots in south Wales or in the west country of England there is really intensive farming. The hotspots here are in the good lands of County Down. The type of land management may be a factor. It is good for production, but it is tough on the animals and reduces their immunity to disease, and they are more susceptible to other diseases due to stress. When there is a large number of animals in one herd, it is stressful for an individual animal, whether we notice it or not, from an immune point of view. It is not just about badgers and their ecology; it is about climate and the other diseases out there that interact with TB and make animals more susceptible or lower protection against the disease. It is very complicated.

1052. **Mr McMullan**: Who would you say has given a reasonable version of the TB scene? Obviously, what we are looking at — I am nearly quoting you in saying this — are reports that are flawed. I say "flawed" because you have disputed the results. Where do you see a reasonable assessment of the whole TB scene, going back to the mid- to late-1940s, through the outbreak of foot-and-mouth disease, when TB went down, before going up again? There is low density of TB in Scotland and differences in density between England, Scotland, Wales, and here. Where would a member of the public go for a clear version of events on TB? If you knock something — culling badgers, for example — you must come up with a reasonable argument as to —

1053. **Dr Mac Cana**: If we knew where to go, we would tell you, and we would be there already.

1054. **Mr Rendle**: That is a very good point, and I think it is because the whole thing has been polarised for so long. There is a great deal of self-interest. People give the point of view that they want you to hear. People cherry-pick. This is one of the problems with inconclusive evidence. We can sit, pick through the evidence and say that badgers are innocent. Someone else can pick through the evidence and say that we need a cull. You can decide what you want. We are suggesting that Northern Ireland is in a position to make its own very objective assessment of what the problem is.

1055. **Mr McMullan**: You say in your submission:

"It is our experience - and we are constantly surprised by it - that some long-established large animal veterinary practitioners have a very poor understanding of bovine TB".

How do you explain that?

1056. **Mr Rendle**: I have spoken to vets who have been out testing cattle, and I have tried to engage them on the bovine TB issue. I cannot, because they do not know anything about it.

1057. **Mr McMullan**: They do not know anything about it?

1058. **Mr Rendle**: No. In fact, on some occasions, I dispute what they think they know. One vet told me that animals rubbing noses over a fence is not a problem.

1059. **Mr McMullan**: So, vets do not know a wile lot about it. Can you tell me about the compensation part of your submission? You state:

"individual farmers that have met the requirements of existing guidelines and regulations should not be penalised financially".

How are they penalised?

1060. **Mr Rendle**: They are not at the moment.

1061. **Mr McMullan**: That is what it says here.

1062. **Mr Rendle**: No; hang on. If —

1063. **Mr McMullan**: I am only reading out —

1064. **The Chairperson**: I think he is talking about the future.

1065. **Mr Rendle**: We are talking about cattle compensation. We are saying that, whatever happens about cattle compensation, we believe that farmers should not be penalised for something that they have no control over. We have put caveats to that in the submission that we made to DARD.

1066. **Mr McMullan**: OK. Thanks for your presentation.

1067. **Mr Buchanan**: It has been an interesting discussion. There has been quite a bit of research into this, and it has been with us for quite a number of years. Different things have been tried, and we have heard about vaccination. We have heard that you are not in favour of culling badgers. Yet, in your concluding comments, you state:

"We believe that TB-free status in Northern Ireland is possible but can only be achieved by adopting a fresh perspective on the problem."

1068. As a Committee, we are looking at the situation to see what can be done and what the Department should be looking at to try to reduce TB or eradicate it if possible — I do not believe that that is possible. If we are take a fresh look at this, vaccination is not perhaps the way forward; culling badgers is not the way forward. You tell the Committee today, in simple terms, what the way forward is. You are saying that we need to take a new, fresh look at the problem in order to see how we should deal with it. This Committee is looking for fresh ideas so that it can inform the Department on how it can deal with the issue and get rid of it. Give us those fresh perspectives and new ideas today.

1069. **Dr Mac Cana**: First of all, you look at all the data on cattle that DARD already has and, more or less, analyse that to death. You look at the relationships between the various aspects of cattle management. You cut down on the chances of farm-to-farm spread of the disease by looking at that honestly. You also look at the issue of private veterinary practices doing tests for their clients. DARD has mentioned that perhaps that is an issue. I believe that DARD officials find 2% more cases of TB than private vets. Is that something that needs to be tied down? Does it need to be more neutral? Does it need to be blind tested in some format? I think that that could be one answer.

1070. If farmers can be incentivised to make stock-proof and contact-proof fences, that would be useful in the wider countryside in general and in preventing not just TB but other diseases. If we still come to the conclusion, through continuing badger research or whatever, that badgers are still an issue, we will come back and look at that very small percentage. If badgers account for 25%, what about the other 75%? As I said, I am not too keen on the science behind that figure of 25%, but you can work on the other 75% quite easily with human intervention. Let us look at those issues, deal with them and make sure that they are crossed off the form.

1071. **Mr Buchanan**: How much longer are we going to look at this before we take action and do something about it?

1072. **Dr Mac Cana**: Until we are happy with the results and the robustness of the science from the culls in the South. Two of the counties involved are just over the border, so they are pretty representative of Northern Ireland. Why reinvent the wheel in that scenario? We have cull data there already. If culling were the way forward, the answers should have come out of the cull research that has already happened. That has been disputed by some of the top scientists commissioned by Westminster.

1073. **Ms Boyle**: Thank you for your presentation, guys. Your paper states:

"The Badger Trust's objectives are to promote the welfare, conservation and protection of badgers ... The Trust ... works closely with Government, the police and other conservation and welfare organisations."

1074. How well is that working, and what more could be done through joined-up working? What more could you, the PSNI

and government do to deal with badger baiting?

1075. Your paper also states that here in the North:

> *"The number of reported badger persecution incidents … increased significantly following the announcement in December 2008 of DARDNI's intention to progress a 'badger prevalence study'."*

1076. When another member asked how many people have been charged and convicted with badger baiting over the past three years, the answer was none. So what more can be done to try to eradicate the problem of badger baiting?

1077. **Mr D Wilson**: The USPCA has been concerned about that for years. We have seen it increase. It was widely reported a couple of months ago, and evidence was put before the public to show that it was going on. Arrests have been made, and progress is being made. People are appearing before the courts. However, you are quite right: for two or three years before that, nobody appeared before a court. I have been in the USPCA for the best part of 15 years, and I cannot remember a successful wildlife prosecution in relation to badger persecution in that time. Part of the problem is that what we are talking about now is the perceived link between badgers and bovine TB. Badgers are being culled unofficially. People moving from the city to the countryside are either coercing farmers or are occasionally having a blind eye turned to their activities. That causes us a lot of concern because we now get more victims. Badgers are being persecuted, torn to shreds and dogs are being equally destroyed in the whole process. Biosecurity is being breached by these boys, who travel from one farm to another in their Transit van with a dog trailer on the back. They use the same implements and tramp over different fields and so on.

1078. There will have to be some science-based solution to this. I do not think for one minute that killing every badger in the country would make bovine tuberculosis disappear. It would not. We even see the cattle as victims in all of this. They are the creatures that are getting the disease and being slaughtered long before their time.

1079. One of the problems is that the PSNI does not have wildlife crime officers with warrant cards. It has one wildlife liaison officer, and that is a civilian post. We would love to see each division of the PSNI having a dedicated wildlife officer. They could do their other jobs as well, but they would be the central point for that division to whom things are reported and would have the knowledge to investigate. Every police force in the rest of the UK has that, and it is very successful. Operations are much more successful over there than they are here, and I think that is the reason.

1080. **Ms Boyle**: Yes, and that is something that I feel could be easily managed. The word on the ground is that this usually happens very early on Sunday mornings.

1081. **Mr D Wilson**: It is predictable in the extreme, like a football match.

1082. **Ms Boyle**: Absolutely, so the PSNI could have a dedicated animal welfare officer.

1083. **Mr D Wilson**: As a charity, all we can do is try to inject a bit of insecurity into their activities to make them feel that they do not have the same run of the country that they had before. However, it is really down to the PSNI. It is also down to the Environment Agency to get in there and investigate sett interference. The whole thing about badger persecution blurs the bigger issue that we are talking about as regards cattle TB. Nevertheless, it is a horror story from our point of view.

1084. **Mr Hazzard**: Thank you for your responses so far. I more or less agree with some of what you have said, especially in regard to the role of badgers and other wildlife in the transmission of bovine TB being poorly understood. I have been on the Committee for only a month, and it is apparent from both sides that the level of understanding is, to say the least, sketchy and there is confusion out there. You touched on the fact that

some EU countries do not leave the loophole that is, perhaps, left here. Will you expand a bit on what exactly you mean?

1085. **Dr Mac Cana**: That is a tough one. It may be that we should debate again whether it would be economical to go down the tougher line of the other countries in Europe. That would have to take into account the prevalence of avian TB in Northern Ireland and the rest of the British Isles in comparison to those countries. We obviously have the comparative tests so that farmers are not losing cattle left, right and centre to TB carried by birds. That may be an avenue of research. We know that the test is faulty.

1086. We know that the guys on Stoney Road here are doing lots of good work to try to find better and more precise tests. However, it may be that we should revisit that whole idea of the single test as opposed to the single comparative test. Ours is a double test that — I am sure that those of you from farming backgrounds know — compares the two, whereas, in Europe, if an animal reacts to the bovine test, you are out. So it is more draconian, but has worked for a lot of those countries. I am not saying that that methodology is totally transferable, but it would be worth looking at.

1087. **The Chairperson**: Have the Badger Group, your sister organisation the Badger Trust or the USPCA ever researched what is done in other European states?

1088. **Dr Mac Cana**: Not that I am aware of. I just know that it is more draconian over there and it works. However, that is in a different climate and a different environment. I am not saying that what works in France will work here.

1089. **The Chairperson**: William, do you want in for a short question, after which I have a couple to ask.

1090. **Mr Irwin**: Very small. We are told that 16% of cattle are infected through badgers. I believe that the proportion is higher, because if you have a large herd and one animal is infected by a badger, the infection spreads through the whole herd. Initially, your figure may be right, but I suspect it is much more than that.

1091. We got a paper here a couple of years ago, maybe slightly longer, on a badger cull that took place in Shropshire in England in, I think, 1982. There was not one case of TB in that area for 10 years. What do you say to that?

1092. **Dr Mac Cana**: That sounds great for them down there. I do not know.

1093. **Mr Irwin**: We got a paper, and that is what it told us.

1094. **Dr Mac Cana**: I have never come across that. I spent four years researching the issue, and, to be truthful, I never heard about that cull.

1095. **Mr Irwin**: I will dig it up for you. We got a paper.

1096. **Dr Mac Cana**: I do not have an answer to that. Do we know that the TB cases were totally wiped out in the badgers in that area? Deer are rife with TB in England.

1097. **Mr Irwin**: I am only talking about that particular area, which was a hotspot.

1098. **Dr Mac Cana**: I do not know. I do not have the answer. I would need to know more about it to throw out an idea, but it would only be an idea.

1099. **Mr Rendle**: One of the problems with culling studies is that they tend to take place in parallel with cattle-based controls. Usually, it is very hard to tell whether any change in the rate of TB is down to the badger intervention or whether it is something to do with the cattle controls, the weather or the time of the year.

1100. Taking Ireland as a single piece of land, there are two fairly different systems of TB control in place in the North and the South. In the South, they cull something like 6,000 badgers every year. The studies that they did down there predicted a fall of between 40% and 90% in bovine TB through culling, but that has not been reflected at all in figures for the changes in the rate of TB

in the Republic. In fact, the rate is very similar to that here. In Northern Ireland, the level of TB was reduced by 50% in cattle without any culling. That size of a reduction has not been seen anywhere else, much less in the Republic.

1101. **Mr Irwin**: I would question that. Where did you get the 50% reduction figure?

1102. **Dr Mac Cana**: DARD.

1103. **Mr Irwin**: Between 1997 and now, there has been no reduction. The level now is very similar, if not higher, to what it was in 1997. Sorry, I mean 1998. There has been a reduction from the height of TB in 2002, which is completely different.

1104. **Mr Rendle**: The 50% reduction has been since 2002, which is when the rate peaked after the outbreak of foot-and-mouth disease.

1105. **Mr Irwin**: That does not give a true reflection of where we are. The rate is probably higher today than it was in 1997 and 1998. There certainly has been no reduction over that 15-year period.

1106. **Mr Rendle**: The other interesting thing is that the Republic of Ireland was deemed to be TB free in 1965, and they certainly were not culling badgers then.

1107. **The Chairperson**: I have a couple of questions, gentlemen, if you can bear with us. You have been here quite a long time, but this is very important to us, and it is good that you have had the opportunity to address some of the concerns that the Committee has.

1108. You talked about the vaccination of badgers being the cheaper alternative to culls, and you go into a wee bit of detail about the badger population. Do you have a concern that even having to capture the badger, either by snare or by cage, will damage the population? It could end up moving badgers around the country, which could have a detrimental effect on the badger itself and heighten the spread of the disease. I know that you are still of the mindset that you cannot blame the badger, but every other body and group that we have talked to would suggest that a reservoir in wildlife has a bearing. How concerned are you about the vaccination programme, the practicalities around that and the damage that it could do to the badger population?

1109. **Mr Rendle**: It is the lesser of all evils. All the culling trials have shown that affecting the dynamics of the badger population potentially makes things worse.

1110. Cage trapping them for vaccination or testing and removal is acceptable to us. There are welfare issues, but we want progress. We very much want to address the middle ground. It would not be helpful to sit and say, "No, you cannot touch badgers." That is not where we are. Two or three of the members have asked what we mean by a fresh approach, but that is our fresh approach. We genuinely want to engage. If people feel that badgers are a problem, let us answer questions about badgers. Cage trapping for vaccination or for testing and removal, if necessary, is not ideal from an animal welfare point of view, but, if it helps to progress the work and answers questions, we would support it.

1111. **Dr Mac Cana**: To clarify, I could not say that badgers do not give any TB. I would not like to put a figure on it or say that that is the main issue. It would be like saying that all cancer is caused by smoking; you cannot say that.

1112. **The Chairperson**: I understand.

1113. **Dr Mac Cana**: If culling happens, it will be intensive and long term. Within every social group, there are animals awaiting the opportunity to take over any free land. That is what they found in the culls in the South. Over the 10 years, they went in and tried to wipe them out. It was not the case that there were five or six years in which there were no badgers in the cull areas. There were always animals trickling in or a residue of animals there. It is a long-term cull. It is not a matter of just going in and, bang, now we are safe for 10 years. We will have to spend a lot of money on it,

and it will be year-in, year-out. It is not a long-term scenario, and the badger population will increase naturally. Unless we take an island approach, it will not work forever.

1114. **The Chairperson**: You talk about the vaccination of cattle as the best vaccination scenario, but take the vaccination that we have for cattle at present. First of all, the EU will not allow because of concerns about the food chain. However, how concerned are you that it would mask the levels of disease to some degree?

1115. **Dr Mac Cana**: As we were chatting about earlier, the development of the vaccination has been slowed down by our desire to try to get a means around that. We have animals that are vaccinated, but we do not have an additional test that could get through the muddiness of that and enable us to say, "No, this animal is excreting a disease. It is infected, not just vaccinated." That is a big issue that we need to get over. We must not mask a disease. I am concerned about that myself from a farming point of view.

1116. **The Chairperson**: Yes. When we have talked to the Department about cattle compensation, we have always said that, before cattle compensation, we need a holistic approach. We need to look at all angles and incorporate everything into an eradication plan. We are not saying that TB will be easy to eradicate. Some people might think that it is impossible, but action would certainly lead to a reduction. Do you see the USPCA and the Badger Group ever getting to the point where you could support an eradication plan that covers all angles and is all-inclusive and might mean a cull?

1117. **Mr Rendle**: Our position, and that of the Badger Trust, has always been evidence led. I cannot second-guess the thing. If someone produces evidence that badgers are a significant factor in herd breakdowns — that evidence is not there yet — we would review our position. We are not at all intransigent about this. We represent a very wide range of people interested in badgers, and not everybody will agree on that. To date, however, everybody has been behind an evidence-led approach, and I do not see that changing.

1118. **Dr Mac Cana**: Perhaps there should be a targeted approach, as Mike was saying, involving capture, tests and, if necessary, removal. My experience, and the research in which I took part, showed that, often, animals in one badger group are clean, and we really want to keep them. Going in and wiping them out just messes up the dynamic of the badger population and lets other animals move over a greater area that is no longer defended. That could make the problem worse, not on a grand scale but locally. As we said earlier, everybody, including farmers, wants to keep the clean animals. I do not see what use a blanket cull would be. It might be a waste of money in the long term.

1119. **The Chairperson**: Have you anything to add, David?

1120. **Mr D Wilson**: Only that I would approve of the trapping method being used to remove infected animals from the scene. I just do not want a hammer to be used to crack a nut. I would like research to be carried out in a confined area and for us to look at the results before considering any widespread cull.

1121. **The Chairperson**: I have only two more questions, I promise. Is there any research on the effect on the ecosystem of removing all badgers?

1122. **Dr Mac Cana**: No such research has been done. I am sure that, under European law, it would not be allowed anywhere in the EU.

1123. There is an issue that another amplifier species could be released, increase in number and, perhaps, maintain the disease. In future, deer will be a big TB problem, as their numbers are increasing. It is not easy, and there will be a shift. Avian TB might be shifted because badgers, whether we like it or not, take an awful lot of bird eggs on the ground. Does that mean an increase in avian TB or implications for testing? I do not know.

1124. **Mr Rendle**: I think that, in that case, it would be important to invoke the precautionary principle, which is the first recommendation of the Northern Ireland biodiversity strategy: if you do not know what the impact will be, do not do it.

1125. **The Chairperson**: What is the current status of the planned cull in England, and what is the Badger Trust's position on that?

1126. **Mr Rendle**: The Badger Trust is taking legal action that will be heard next month. I cannot remember the exact date. It is challenging the coalition Government's plan to license farmers to free-shoot badgers. The appeal has been granted on three grounds. Sorry, I cannot remember the details, but the fact that it has been granted is significant in itself.

1127. **The Chairperson**: Members have no further questions. Gentlemen, thank you very much for your attendance and for answering our questions.

1128. **Mr Rendle**: Thank you. That was a very engaging and helpful discussion.

12 June 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Dr Johanna Judge	*Food and Environment Research Agency*

1129. **The Chairperson**: I welcome Johanna Judge to the meeting. Johanna, you are very welcome to the Committee. You have come the whole way from England, on the mainland. It is very good to have you here for what is a very important review — I am guilty of calling it an inquiry — of the work around bovine TB and how we can go some way to eradicating the disease in the future. We have heard from all sorts of people, and we have heard all sides of the argument. It is very good to have you here to give evidence. Do you have a presentation to give?

1130. **Dr Johanna Judge (Food and Environment Research Agency)**: Just a brief overview of the paper.

1131. **The Chairperson**: That would be great. Please go through that, and we will ask questions afterwards.

1132. **Dr Judge**: I am here to talk about the exclusion of badgers from farm buildings as a measure for reducing contact between badgers and cattle, and, therefore, hopefully reducing TB transmission between the two species.

1133. For a long time it was thought that badgers and cattle came into contact with each other only in pasture; people did not really consider that the badgers went into farm buildings and could come into contact with foodstuffs or the animals in the buildings. Two PhD students did projects that were based on looking at farm buildings using video observation, direct observation and the radio tracking of badgers on four farms near Woodchester park, which is our study area in Gloucestershire. They found that badgers were going into buildings quite regularly. There was not really any barrier to those badgers going into the buildings. A subsequent questionnaire found that the level of biosecurity in relation to reducing wildlife entrance into buildings was quite poor on farms; very few farms considered that part of biosecurity. That led to the larger-scale project that I will talk about today. It was a three-year project that was based in Gloucestershire. We had the aims of determining just how frequent badger visits were to farm buildings, looking at whether there were any simple measures that we could employ to reduce the contact between badgers and cattle in the buildings, and looking at whether putting exclusion measures on some buildings caused displacement of badger activity into other buildings.

1134. On 32 farms in Gloucestershire, we put remote-sensor cameras on the entrance points to feed storage areas, silage clamps, cattle housing, yards and so on. We had those cameras on every night for at least 365 nights in a year. We had something like nearly 300 cameras out for the first year. Those were motion-sensor infrared cameras, so, as soon as something went past the cameras, they took a photo. Of the 32 farms, 19 had visits from badgers. Some of those had only one or two visits recorded over the whole year, but at the other end of the scale, about 10% of the farms had visits on 70% to 80% of nights. Badgers came on five or six nights a week. It was not just one badger, it was not just one incursion a night, and they were not just travelling through the farmyards; they were going into the farm buildings.

1135. We also found that the visits seemed to be associated with dry weather. If there had been rain that day, we saw fewer badger visits to the buildings at night, but, if it had been dry, we saw more. Badger visits occurred throughout the year; they visited even in December and January, when badgers are generally less active. We saw that it was quite a frequent and widespread problem, so we went on to the second stage. We split the 32 farms into four treatment groups. The first treatment group was a control group, so it did not have any exclusion measures put on at all. That was so that we could say that there was not a massive increase in badger activity for other reasons or, similarly, a decrease for unrelated reasons. Eight farms had the exclusion measures put on just the feed stores, and another eight farms had them put on just the cattle housing. That was so that we could look at the displacement and see whether, if we protected some buildings, the badgers would go into other buildings more frequently. We then had the lucky eight farms that had their whole farms protected. The exclusion measures were very simple: they had to be simple, practical and easy to install. They were mainly things like sheeted metal gates, roller doors, some electric fencing and the addition of metal sheeting to rail fences and rail gates. We found that it was important to have a gap of less than three inches at the bottom of any of the measures, otherwise the badgers would still be able to get under.

1136. We put those measures in place and then we ran the cameras for at least 365 days on each of the farms to see what effect those measures had on the level of badger visits to those buildings. We found that, when the measures were in place and when they were properly used, they were 100% effective in stopping badgers going into farm buildings.

1137. Throughout the second year, a badger got into a building only 58 times, and that was because a gate or door had not been closed, the electric fencing had not been on, or something like that. When the measures were used properly, they were 100% effective. We also found that having the measures on the buildings reduced the level of visits to the farmyard as a whole. Therefore, we had less observation of badgers walking through the farmyards. We also found that, if the measures were just on the feed store, it reduced the level of visits to cattle houses and vice versa, which was a bit surprising. Therefore, it seemed to have some sort of protective effect on the buildings that you did not directly put the measures on.

1138. The main conclusions were that the measures were very effective at reducing the level of badger visits although, obviously, they had to be properly maintained and used at all times. We found that we had a bit of a problem with farm compliance, in that farmers would not always use the gates. We put all the measures in place for the farmers who agreed to take part in the study, and we paid for them all. However, some of the farmers did not use the gates one night during the whole year, even though they knew that they were getting badger visits to the buildings. So, we discovered that some sort of education about the frequency of badger visits to farm buildings was necessary.

1139. **The Chairperson**: Thank you very much. I read your paper, and I was struck by the fact that the cost of applying those measures to the farms ranged from £604 to £12,000, with an average cost of just over £4,000. The average cost of applying exclusion measures to both cattle housing and feed storage areas was £3,840 for each farm. That has been derived from a relatively small sample size of eight farms.

1140. **Dr Judge**: Yes.

1141. **The Chairperson**: If you were to take that over a longer period, and you were to take a UK-wide or province-wide average for Northern Ireland, England and Wales, how would those figures change? Have you done any research on that?

1142. **Dr Judge**: It is very difficult to say. I am sure that I do not have to tell any of you who are farmers or who have been on farms that every building on every farm is different. Quite often, every gateway to every building is slightly different. Therefore, there is a lot of customising. Some of it is very small and it is just a case of adding an extra strip to the bottom of a door, or suchlike. It is very hard to give an average price. For example, for the lowest cost of £600, we simply had to put on two new solid gates, whereas on the farm that cost £12,000 we had to secure something like 32 entrances to buildings. It really depends on the size of the farm. It is possibly easier to put the measures in place on new farm buildings and take into account the gaps at the bottom of the doors and the concrete aprons that help to ensure that the badgers cannot burrow underneath. Unfortunately, it is very difficult to give any estimate as to how much it would cost on a wider basis.

1143. **The Chairperson**: You mentioned that, even when the work was done, only 32 of the 40 farms proceeded to the second phase of the experiment. Even though you had paid for the work and it was done, some of the farmers did not use it. Why do you think that was? I suppose it was very frustrating.

1144. **Dr Judge**: It was very frustrating for us. The majority of farmers used the measures and, when we spoke to them about it, they said that, at the beginning, they found it a bit difficult to remember to shut the gates. If it was a rail gate that was already there and we just put metal sheeting on it, they always shut it anyway. However, the extra gates that they had to shut caused the difficulty. The farmers who used it said that, once they started getting into the habit of it, after a week or two it was just that: it was habit. The other famers, I think, never really gave it a chance to start off with and they never took that extra 10 or 15 minutes on the day. We really tried to ensure that it did not add any extra work to the farmer's day, because, as we already know, they can be quite long.

1145. **The Chairperson**: With regard to the experiment, it is OK to have an adequate gate, but what if the perimeter of your building is flawed or has gaps or holes in it? How big an issue do you see that being on farms? Maybe you do not have experience of that in Northern Ireland, but on farms in England, is it the case that there are holes everywhere in barns that can create a risk?

1146. **Dr Judge**: It varies from farm to farm, but we had some farm buildings that were in quite a bad state of repair. However, when it came to things like holes, we just put a small piece of aluminium sheeting over it and that was enough. So, yes, if you have any weakness in your building — for example, if you have sheeting that is not fixed down and that a badger can get underneath, or if you have holes in the wall — that is dangerous. For example, on one of the farms, a bull broke down one of the walls and it was never replaced, so, even though it had secure measures on the doors and so on, it was useless because badgers could still get in and out of the hole that the bull had made. So it is an issue and, when you put in such measures, you have to check the perimeter of all your buildings to make sure that there are no small gaps that badgers can get through. That is the other issue: many people are surprised at just how small a gap badgers can use to get into a building.

1147. **The Chairperson**: I have spoken with the Committee about trying to incentivise farmers to install the measures of which you speak. An incentive might be wrapped around a farm modernisation scheme, or something of that nature. Is there anywhere in the UK that has such a system specifically for the reduction and eradication of TB or another disease?

1148. **Dr Judge**: I do not know of any incentives. I know that in the Welsh intensive action area, all the farms have to undergo a biosecurity check every year, which is not purely about badger/cattle biosecurity, but it incorporates some of the ideas from this project. As for elsewhere, I am not sure. I am

certainly not aware of an incentive for farmers to do that. The Department of Environment, Food and Rural Affairs (DEFRA), the National Farmers Union and the Welsh Government have all organised farmer advice events, where they have asked me and an animal health person to speak and give advice directly to farmers to get across the message that those measures can make a difference.

1149. **Mr McMullan**: How many farms were tested? Was it 32?

1150. **Dr Judge**: Yes.

1151. **Mr McMullan**: Were any of those farms in a hotspot?

1152. **Dr Judge**: The whole county of Gloucestershire is a hotspot area.

1153. **Mr McMullan**: Had any of those farms contracted TB?

1154. **Dr Judge**: None of the farms in the study had never had TB; they had all had TB at some stage or another. Some of them went down with TB during the course of the project, but we were not specifically looking at the effect of the measures on the likelihood of a TB breakdown, mainly because, in order for it to be statistically significant, we would have had to observe thousands of farms or carry on for a number of years. Even if the measures stopped all the TB breakdowns in those 32 farms, it would not have been powerful enough to pick it up in a statistical analysis.

1155. **Mr McMullan**: Did you note what time of year the cattle on those farms contracted TB?

1156. **Dr Judge**: We did not look at the TB breakdowns in this project.

1157. **The Chairperson**: You monitored the movement of badgers in the winter months: that brought up different results, did it not?

1158. **Dr Judge**: Badgers entered the buildings throughout the year, and we had badger visits to buildings every month. There were fewer in December and January, but badgers are naturally less active in those months. However, there were still quite a few visits in those months. Throughout the summer, the badgers went in quite frequently. They did not just enter the buildings in one period of the year.

1159. **Mr McMullan**: Was it at the time of the year that cattle were not in the sheds?

1160. **Dr Judge**: They went into the buildings, both into cattle housing and feed stores, when the cattle were not in the sheds and when they were in the sheds as well.

1161. **Mr McMullan**: Were the badgers tested?

1162. **Dr Judge**: No.

1163. **Mr McMullan**: I have one other question; come back to me in a minute.

1164. **The Chairperson**: No problem. I read somewhere — I cannot remember where — that rainfall made a difference, too. Could you explain that?

1165. **Dr Judge**: We found in this study and in the two previous smaller studies that there was a correlation between the level of badger visits and the amount of rainfall in a day working up to the evening. If it had been raining during the day, there were fewer badger visits to farm buildings. If it had been dry during the day, there were more badger visits to farm buildings. We hypothesise that that is because, when it has been raining, the ground is easier to dig and it is easier for them to get earthworms, but, when it is harder, they go into buildings more frequently to get the readily accessible feed. It is a bit like getting a takeaway rather than making your own food.

1166. **Mr McMullan**: What was the geographical spread in miles or kilometres of the study on the farms?

1167. **Dr Judge**: It was over the whole county of Gloucestershire. I do not know how big Gloucestershire is. It was not a huge distance; the furthest farm was probably only about 40 miles away. It was quite a small geographical area.

1168. **Mr Irwin**: As a farmer, I have some understanding of the problems. You

said that some farms have a number of entrances, and, coming up to 10.00 pm and when in hurry to get to bed, a farmer might not feel like closing 20 or 30 entrances. You can understand that.

1169. It is useful to get the statistics. There are cattle drinkers and cattle troughs in fields, and badgers are out in the fields all the time. So, the problems will not be in the farmyards only. You will have problems in both areas. While it would be good to keep them out of farmyards, I am sure that, in some farmyards, there are not many badgers or no badgers at all. So, to spend all that money to try to close them off is not realistic either. I would have thought that, before you go down that route, you would need to do a risk assessment of the badgers in the area. Is that right?

1170. **Dr Judge**: Yes. The measures that we talk about are of use only if you get badger visits to your farm buildings. At the moment, we are researching a way of determining which farms are more likely to have badger visits so that you can focus your exclusion measures in that way. As I said, all 32 farms were in Gloucestershire, which is a hotspot area for TB and has one of the highest badger densities. So, in some ways, the surprise was that 13 farms did not have any badger visits at all. Following on from this piece of work, we have got further funding to try to determine which farms are more likely to have badger visits so that you can have a cost-benefit assessment of whether your farm is likely to benefit from having those measures installed.

1171. **Ms Boyle**: Thank you, Johanna, for your presentation. I know that we are talking about badgers, but, in one of the introductions, it was said that cattle come into contact with rodents and rodents attack predators. I am just curious about whether any studies have ever been carried out in respect of the link between rats and different rodents?

1172. **Dr Judge**: Previous studies have looked at whether bovine TB is found in any mammal species that we have in the UK, and that has been found to be the case. However, we found that there was a very low prevalence with rodents, and they were not seen to be a particular risk in terms of onward transmission to cattle.

1173. **Mr Byrne**: I thank Jo for the presentation and the paper. In relation to biosecurity on farms, are you making any recommendation or observation about whether metal sheets or electric fences are better?

1174. **Dr Judge**: Electric fencing is very effective against badgers, but, in order for it to be effective, fences have to be very low to the ground. Therefore, we recommend a three- or four-strand electric fence, with the lowest strand being just 10 centimetres off the ground, another at 15 centimetres, another at 20 centimetres and, if you want, another at 30 centimetres. The problem with that is that it takes a lot of maintenance.

1175. We developed a retractable electric fence so that you could have a reel system and pull it across, and, in the morning, you could put it back in, and it would roll up nice and neatly. However, even then, if silage is dropped on the floor or there is a build up of mud, it can affect the electric fencing. Therefore, while it is very effective at keeping badgers out, I suggest that you are better off looking at solid sheeting, roller doors or feed bins. If you cannot protect the whole feed store, you could put the feed into lidded metal bins. That would be easier to maintain than electric fencing.

1176. **The Chairperson**: I have a number of questions around the technology with regard to feeders and apparatus that is used on the farm both in the houses and in the fields. What experience do you have of any new technology that is badger proof or bovine TB proof? Is there work being done there?

1177. **Dr Judge**: There is a little bit of work being done. I have been involved in some discussions with manufacturers of agricultural gates. Some of the things that have been suggested but have not

been properly tested yet are having roller bars on the edge of troughs. Badgers are very good climbers, but, if you had a roller bar, they would be unable to get purchase and would fall off. However, the difficulty we foresee with a roller bar is that if a cow bangs into it and dents it, it will not roll any more and will not be effective. There is also retractable electric fencing. I believe Hotline is now considering making that as a ready-made product. We got all the gates from IAE and gave them feedback about making bigger gates, and we used some wheeled sheeted hurdles, so that the gaps at the bottom are smaller. Therefore, all those things have been discussed, but I am not sure whether they are actually going to do them.

1178. There have been lots of suggestions about various methods and technologies that you could use, such as electrified mats and automatically closing doors, but the difficulty is the cost involved. The more technologically advanced you get, the more likelihood you have of it not working. I recommend using a simple sheet and putting solid gates on. You do not have to replace all your gates; you can just sheet them if you have extra corrugated iron. It is quite cheap to buy aluminium sheeting rather than replacing all your gates with more expensive gates.

1179. **Mr McMullan**: There were 13 farms with no visits at all. Did you look and see where those farms fitted into the cluster of the 32 farms?

1180. **Dr Judge**: By "fitted into", do you mean geographically?

1181. **Mr McMullan**: Yes. Were they on the outside?

1182. **Dr Judge**: No, they were spread across the whole area. The preliminary work that we have done does not seem to indicate that it has anything to do with farms being in a different geographical area. We surveyed in a 500-metre radius around each farm, looking for signs of badgers and badger setts, and we found badger setts near these farms, but the badgers were not going on to the farm or into the farm buildings. There is no quick, simple answer.

1183. At the moment, we are looking at what may be attracting or stopping badgers from going on to the farms. The very early results indicate that it is something to do with the elevation of the farm, the size of the farm buildings, the farm footprint and how busy the farms are. Farms that have people there 20 hours a day are less likely to have badger visits than the smaller farms that have people there only a couple of times a day or during the daylight hours. There was no simple geographical spread of farms that had badger visits and those that did not.

1184. **Mr McMullan**: Were the farms that were getting the most visits dairy or beef farms?

1185. **Dr Judge**: Of the three farms that had visits on over 70% of nights, two were beef farms and one was a dairy farm.

1186. **The Chairperson**: I want to ask about the technology side of things, although this might sound daft. Are there any investigations into instruments that could prevent badgers from coming on to the property, using noise or smell?

1187. **Dr Judge**: We looked at a variety of potential ways to reduce badger visits. Before we started this project, one of my colleagues at the Food and Environment Research Agency did a small experiment with sonic deterrents, which have a high-pitched sound that animals can hear but humans cannot. He put bait points with peanuts out in a field and got the badgers used to coming to them, and after a few days he started setting off the sonic alarm. He found that it was actually an attractant, because as soon as they heard the sonic alarm, they associated it with the peanuts and made their way to the bait points.

1188. **The Chairperson**: Like a dinner bell.

1189. **Dr Judge**: It might have other uses, but it did not make any difference in keeping badgers away. Similarly, there was an idea that squirting the badgers with water might deter them from coming into

certain parts of farms, but we found that that had no effect at all.

1190. A lot of people said that because their dogs roamed the farmyard at night, the badgers would not come in. However, every single farm involved in the project had dogs on the premises, many of which were roaming loose at night, and it made no difference at all. We have a video that shows six badgers eating from a feed store but scattering when an Alsatian came in, but half an hour later they are back happily eating again until the Alsatian comes in again, and this happened four or five times a night. Those sorts of things were tried and were found not to work.

1191. We also tried mesh fencing, which we have seen being advertised as badger-proof. We found that it could not be dug in far enough for the badgers to be prevented from digging underneath it. In some cases, because they are very good climbers, they can just climb over it. We tried a variety of measures, but the simple solutions such as sheeted gates, metal feed bins and roller doors proved to be the most effective.

1192. **The Chairperson**: Is there anything else from your paper that you would like to add that we have not covered in our questions?

1193. **Dr Judge**: I do not think so. We have covered most of the points. At the beginning of the study, we found that farmers, although they may have been aware that there were badgers in the area, were adamant that badgers did not go into their buildings. There is a need to educate people that badgers will go into farm buildings and that it should be regarded as a risk.

1194. We also found that videos recorded as part of the PhD projects showed that badgers and cattle were coming into very close, almost nose-to-nose, contact with each other in farm buildings. However research done in the pasture environment — for which the animals wore radio contact collars that registered when they came within a certain distance of each other — showed that it was quite rare for a badger and a cow to come into close enough contact for us to think that transmission could occur. So, potentially, there may be more of a risk of transmission in buildings than in pasture, although there will obviously be more urine, faeces, and so on, in the pasture.

1195. **The Chairperson**: There are no other comments, so thank you very much for your time. Your evidence has been valuable to the Committee's work and it has been a pleasure to listen to your expertise on the subject.

19 June 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Ms Michaela Boyle
Mr Trevor Clarke
Mrs Jo-Anne Dobson
Mr Chris Hazzard
Mr William Irwin
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Patrick Begg *National Trust*
Ms Philomena Davidson
Ms Heather Thompson

1196. **The Chairperson**: I welcome Heather Thompson, the Northern Ireland director of the National Trust; Philomena Davidson, its wildlife and countryside adviser; and Patrick Begg, its rural enterprises director. You are all very welcome to the Committee for this important review of bovine tuberculosis (TB). I am sure that you have a presentation to give. We will then have questions.

1197. **Ms Heather Thompson (National Trust)**: Thank you very much for allowing us to come here and present to you. We are taking it as read that you have seen and read our submission, so we will go through its keys points and allow time for questions.

1198. It is important to note that the National Trust is not an organisation that is involved and interested in just the environment per se. We also work with a number of farmers and have a farming community within the tenant farmers whom we support across Northern Ireland, Wales and England. It is important that you are hearing us from not just the environmental perspective but the farming perspective.

1199. We are committed to supporting the eradication of bovine TB. It is a notifiable disease of livestock and has the potential to affect the livelihoods of hundreds of our tenants and graziers in Northern Ireland, Wales and England. We have 80 tenants and 100 graziers in Northern Ireland. That gives you an idea how it would work for us. We have 1,500 across the piece in England, Wales and Northern Ireland.

1200. Our approach is to be guided by the best available evidence, drawn from scientific trials and published in peer review journals. We recognise that the control of bovine TB in cattle is contentious. There are social, environmental and economic issues at play. Those are due to rising costs in the UK and in devolved Governments, impacts on farmers, animal welfare and public health concerns, and the link with the badger, a native wild mammal that is protected by domestic law and an international convention, the Bern convention.

1201. We advocate that a comprehensive package of measures, including the prevention of cattle-to-cattle and cattle-to-badger transmission, is necessary to tackle bovine TB. In addition to the present test-and-slaughter regime for cattle, we wish to see increased biosecurity measures, increased frequency of testing, and vaccination of badgers and, eventually, cattle.

1202. We do not object in principle to the culling of badgers where the criteria for such culls to be effective in reducing the bovine TB breakdowns in cattle herds, as set out in the final report of the Independent Scientific Group (ISG), have been met. We recognise that, in practice, meeting the criteria that the ISG set is fraught with difficulties. The Department for Environment, Food and Rural Affairs (DEFRA) has proposed badger culls in England using controlled shooting. That raises issues around animal welfare, health and safety, efficacy and social disquiet.

1203. Culls of 70% of badgers are needed to reduce cattle herd breakdowns significantly in the pilot areas. However, the estimates of badger numbers in the cull areas are probably too imprecise as to be useful. There is no baseline at the moment for the size of the badger population, so to take 70% is a difficult thing to do. The concern is that either too few badgers will be killed, leading to increased herd breakdown incidents through perturbation, or that the removal of too many in total would contravene the Bern convention.

1204. I will now turn to what the National Trust is doing. We are vaccinating badgers on 18 farms on our Killerton estate in Devon, which is a bovine TB hotspot. Our objective is twofold: first, through immunisation, we are working to minimise the risk of badger-to-cattle transmission for our tenant farmers; and, secondly, we are demonstrating an alternative to culling badgers, which is controversial and, in some situations, may be counterproductive.

1205. We did not expect our tenants to support vaccination instead of badger culls for various reasons. Northern Ireland is in a similar situation of trying to understand the difference between the two. During the project, however, which is running from 2012 until 2016, the attitudes of those tenant farmers are being tracked by social scientists from the University of Exeter so that we get an idea and understanding of how that plays out. A recent update on that work indicates that, although most tenant farmers are in favour of culling badgers, they nevertheless support the vaccination programme.

1206. Our vaccination programme is also a demonstration project. Recently, at Killerton, we hosted the Chief Veterinary Officer for Wales, who is charged with delivering a programme of badger vaccination in Wales and was especially interested to hear about the attitudes of our tenants to vaccination as opposed to badger culling.

1207. Where do we believe that we can make a difference? First, we can do so in the field of communication. We applaud the consultation on bovine TB issues in Northern Ireland. We believe that the stakeholder group is inclusive and genuinely consultative, and we have very much enjoyed being able to be a part of that process. Comparing the devolved countries in which the National Trust operates, we believe that the Welsh approach of increasing the rigour with which cattle-to-cattle transmission is minimised is very worthwhile. That includes a national herd health check, a very rigorous approach to reducing the times at which reactor cattle are present on farms, and the imposition of penalties for overdue testing. We continue to support the intensive action area project and will work with the Welsh Assembly Government to help roll out a programme for badger vaccination where appropriate.

1208. Secondly, we would like to have a chance to build on success, and, in Northern Ireland, we supported a case study in County Down where the attributes of farms with and without breakdowns in a hotspot area are being compared. Building on that study, the results of which will be available later this year, we wonder whether the same farms could be subject to more detailed work on increasing biosecurity to prevent cattle-to-cattle and badger-to-cattle transmission, and on increasing badger vaccination. We are offering the opportunity to work further with the Department of Agriculture and Rural Development (DARD) in developing that.

1209. Thirdly, we believe that comparisons with the devolved countries can be very useful and that we can learn from one other. For example, in an attempt to minimise badger culls in their intensive action area, the Welsh Assembly Government commissioned modelling of selective badger culling based on disease status, where only those animals that tested positive for bovine TB were killed. The models of selective culling showed a very clear increased risk of perturbation, and that option was quickly abandoned in favour of a non-selective cull. Now that the Welsh

Assembly Government have decided that culling will not deliver eradication of bovine TB, vaccination that incurs little perturbation risk is the only option to reduce the reservoir of bovine TB in badger populations.

1210. Our overall impression is that the approach to the eradication of bovine TB that has been taken in Wales, which will happen over many years, has much to offer England and, potentially, Northern Ireland. Although one of the key results of the randomised badger culling trials — the reduction in bovine TB among cattle of between 3% and 22% — has often been challenged, 16 years of intensive culling in the South resulted in a similar 22% reduction in bovine TB in cattle.

1211. We conclude that there may be merit in Northern Ireland and the Republic of Ireland collaborating to deploy a multifaceted approach to bovine TB in which cattle-to-cattle measures are strengthened and the wildlife reservoir is reduced through vaccination. It may also be appropriate for Northern Ireland and the Republic of Ireland to push hard for the use of a marketable cattle vaccine.

1212. To sum up, we are happy to work with the Department to achieve its targets for bovine TB eradication. We will be delighted to take any questions that the Committee may have.

1213. **The Chairperson**: Thank you very much for your presentation. You talk in your paper about your farms in Devon, which is a hotspot area. You have vaccinated on one farm and rolled out vaccination on the other farms. Is that right?

1214. **Mr Patrick Begg (National Trust)**: All 18 farms have been vaccinated.

1215. **The Chairperson**: You have vaccinated all 18 farms?

1216. **Mr P Begg**: We are trapping and vaccinating. We are only in year one of the programme, but that is the approach.

1217. **The Chairperson**: Can you give me more detail on that? You are one year into the programme. What are your findings to date? I appreciate that it might be a wee bit too soon.

1218. **Mr P Begg**: It is too soon for scientific results on the effect of the vaccination. We do not know how many of the badgers have been vaccinated and what the hold is on the community. In the first season that we did last autumn, we did not trap as many badgers as we would have liked in such a large area, trapping only around 50 badgers. We have just completed our first proper spring exercise, which is the right time to do this. We managed to trap and vaccinate over 100 badgers, of which over 50% were cubs. That is a great result.

1219. There was an interesting effect of that in the tenant farmer community. When the independent researchers asked them, there was a big jump in credibility for the vaccination trial through our being able to demonstrate how many badgers we have trapped and vaccinated. It felt much more like the exercise would have legs. Previously, our farmers were a bit cynical. They did not think that we would catch badgers and vaccinate them. They asked what the point was. However, they have now shifted quite substantially to the view that this is worth doing. There has been quite a big cultural shift in the tenanted community. Of course, that allows you to have the further discussion about biosecurity and all the things that go along with it. It is about building that bridge into a communication as much as anything, at this stage anyway.

1220. **The Chairperson**: I remind Committee members about the one question rule. If we have time, I promise that we will go around the table again. Oliver McMullan, I have an apology to make. I did not realise that you were back in the room for the previous presentation.

1221. **Mr McMullan**: Can I ask two, then? [Laughter.]

1222. **The Chairperson**: Since I am so good-natured, I will let you ask two.

1223. **Mr McMullan**: I will keep to just the one. Thank you for your presentation.

I apologise to the previous group for leaving.

1224. You talked about the work that you have done in England and the costings. Do you have any plans to roll out the same here? You seem to do a lot of work with the Welsh Government and a lot on your estates. With your experience, can you not roll out the same programme over here, work with the Government, and put your experience and possibly some of your money into hotspot areas here where you own land?

1225. **Ms Thompson**: I will start and then hand over to Patrick. We have engaged very much with the discussion on that. Queen's did a study on Castle Ward, which is one of our properties in County Down, that looked at bovine TB issues. We are absolutely open to having discussions and working with people to try to find a resolution to managing the disease. The pieces of work that we have done have been where government asked us to come in, so we are completely open to that suggestion. Patrick will elaborate on how and why we have ended up where we have with the other two Governments.

1226. **Mr P Begg**: In Wales, we are talking a lot about what lessons were learned. We are not doing anything practical at the moment. There are not any additional trials in Wales at present, but we are talking to the Welsh Assembly Government about what we might do in partnership with them. In England, to demonstrate leadership, we took the step to push forward with the vaccination, because it felt as though there was a lot of prevarication and not a lot of action on the vaccination stuff that had been started at Woodchester in Gloucestershire. I am sure that you will hear about that tomorrow. It felt like a real situation at Killerton, which is a big hotspot, and we felt that we had a duty to do something. We are delighted to do it and to share all the learnings from it.

1227. You asked about investing beyond our boundaries. That is a hard question for us, given all our other liabilities and things that we have to do. However, on our land, it would not be an effective approach to cherry-pick bits of empty land and do a vaccination. You need to take account of scale and the appropriate boundaries, and our very strong view is that it is not just a vaccination question but an integrated package, and all the other measures need to come in at the same time. Vaccination will not cure anything; it helps to minimise effects as part of a set of measures. There is no magic bullet, but we are trying this out alongside biosecurity and all the other things in Killerton to show what can be achieved. It has the natural boundaries that allow you to stop the perturbation effects and understand the effects of what you are doing.

1228. **Mr McMullan**: Do you not have natural boundaries on your ground in County Down?

1229. **Ms Philomena Davidson (National Trust)**: We do have natural boundaries, but they are not big enough. The experiment in Killerton involves 18 farms and is on a very big scale. With that bigger range, you can work with different aspects. The trust financed a very expensive pilot study, and we have put the money into Killerton so that we can learn from the study and disseminate the information to others.

1230. **Mr McMullan**: That is grand.

1231. **The Chairperson**: You got your two, Oliver. [Laughter.]

1232. **Mr Byrne**: Thank you for your presentation. It was balanced, and that is important. Where do you come down on the debate about vaccination and/or culling and cattle-to-cattle and badger-to-cattle transmission?

1233. **Mr P Begg**: We are pretty clear — although you are right to say that our presentation was balanced — in what we say. Eighty per cent of transmissions of bovine TB are from cattle to cattle, and we must sort that out. The other 20% is from wildlife, and we need to do something about that. We cannot leave that alone, so it has to be a package of measures. We prefer vaccination and

feel that, in the long term, that is the only way to go. Cost, complexity, social acceptance and other issues mean that vaccination feels like the right way to go.

1234. However, there may be cases in which culling is acceptable. We do not prefer it, and we will not actively pursue it, but, in certain situations, we would not stand in its way. If our tenants wish to participate in an appropriate scale exercise where the scientific criteria laid down by the Independent Scientific Group are met, such as badger-proof boundaries, an appropriate scale, and an understanding of original badger numbers before you start, that may be appropriate in some circumstances. The Wales intensive action area trial did not involve culling in the end, but it was probably set up to meet those criteria. Does that answer the question sufficiently?

1235. **Mr Byrne**: I am proscribed from asking a supplementary question, so that will be fine for now. [Laughter.]

1236. **The Chairperson**: I will go around again if I can.

1237. **Mrs Dobson**: Thank you for your presentation. I declare an interest as a farmer. Many of us are looking forward to the outcomes of DARD's County Down study, which you mentioned earlier. However, DARD already has the full details of strains of TB at its disposal and has been able to track its movement historically for some time from farm to farm. Should it not use that as a major tool to eradicate TB?

1238. **Ms Thompson**: Sorry, can you repeat that?

1239. **Mrs Dobson**: DARD has had at its disposal the mappings of the strain and the historical movement from farm to farm. Why has that practice not been used to try to eradicate it?

1240. **Ms Davidson**: We have not seen any of the results from the County Down survey. As I understand it, the survey is still running, and we have not seen any interim outcome, so we are not in a position to comment. DARD is working on cattle-to-cattle measures, on biosecurity and on going into hotspot areas and looking at farms that have outbreaks and those that do not. There must be something that we can use from that work to develop a further strategy, because surely there will be a lot of learning opportunities from that work. We would like to see, regardless of the results of the survey, that relationship being built on, behaviours being looked at and a system being rolled out. From what we know of that piece of research, it is something that should be built on.

1241. **Mrs Dobson**: Why has the historical data on the movement of TB from farm to farm not been used?

1242. **Ms Davidson**: I am not sure how far back the historical data goes.

1243. **Mrs Dobson**: We have been told that DARD has details of the movement of TB from farm to farm and information on the strains of the disease, yet that information has not been used.

1244. **The Chairperson**: There is a map of Northern Ireland that is colour-coded to denote strains of TB. You can almost name strains by the territory that they are from. Have you not seen that information?

1245. **Ms Thompson**: No.

1246. **Mr P Begg**: It sounds interesting and useful, though. In the spirit of this research, we absolutely should be building on sound research that demonstrates cause, effect, transmission routes and all those kinds of things. It seems intuitively right to build on that.

1247. **Ms Thompson**: There was a meeting at Greenmount involving number of stakeholders from the farming community and environmental interests. We had a range of presentations that day, at which we were shown some pieces of information for the first time. We were told that we would likely be given that information. However, that has not happened, and there has been no further update since that meeting.

1248. It was an extremely useful meeting, at which those of us in attendance had the opportunity to share our concerns over the farming community's views, the environmental views and the veterinary views. At that meeting, we got some information that we had not seen before, where some of the mapping had been talked about. A further meeting has not been convened, but it was a really good opportunity to have some debate. It is fair to say that, if there is information, it would be great to have some kind of task force that could look at that information together.

1249. **Mrs Dobson**: I am surprised that that has not happened.

1250. **Ms Thompson**: To have those discussions and bring the experience and knowledge that we have from the various different areas would be very helpful. The most surprising thing from that day occurred when we were given a range of ideas about where money might best be spent by the Department on future research. None of the different groupings was far apart on how that might proceed.

1251. We want to be progressive and look for new information so that, rather than do the same pieces of research that have been done in other parts of the UK, we do pieces of research that take us on and progress us so that Northern Ireland can become a leader in how to manage bovine TB better, looking at all the different facets, including cattle-to-cattle transmission, badger-to-cattle transmission and biosecurity measures.

1252. **Mrs Dobson**: You need the information at your disposal to be able to do that.

1253. **Ms Thompson**: Absolutely, and we need to be able to look at what the methodology might be. That is one of the points. We need to be really clear on what the methodology would be and what the criteria would be. You could then assess that on the basis of what your baselines are and what you are trying to achieve. Your control areas have to be 100% controlled, and you need to know what the variables are that you are measuring in each of those areas.

1254. Therefore, there is a huge opportunity for us, and there is money available for us to be able to do some work. It is about making sure that the money is spent in the right place.

1255. **The Chairperson**: Before I bring William in, can you put a date on that meeting?

1256. **Mr P Begg**: It was in November 2011.

1257. **Ms Davidson**: We will get you the exact date.

1258. **The Chairperson**: That would be great to know.

1259. **Mr Irwin**: Thank you for your presentation. I declare an interest as a farmer, so I am fully aware of the problems caused by TB.

1260. Mrs Dobson mentioned the different strains of TB. Part of the problem may be that there are different strains, some of which are very contagious. Having said that, no animal should move from a farm unless that farm has been tested and deemed to be free from TB.I believe that farms with very contagious strains of TB should have to wait longer before being allowed to sell cattle on. That may help. Of course, each herd must be TB-free before animals are allowed to be sold on, but there is obviously a problem there. They have not fully tested some herds, otherwise it would not be spreading.

1261. Do you accept that any vaccination programme will be long term? For instance, as I said earlier, you can vaccinate badgers that already have TB and those badgers could live for many years. The ones that have TB are the problem. A badger with TB that is vaccinated today could still live for years and could continue to spread TB.

1262. Animal-to-animal contact is another issue. One animal in a herd of 300 cows could be infected with TB through contact with a badger. That herd walks through a milking parlour every day and eats out of the same troughs every day, so it is almost impossible

to prevent animal-to-animal contact within a herd. It may be a wee bit easier to prevent contact between herds, but do you accept that, if one animal in a herd contracts the disease, its spread throughout that herd is almost inevitable?

1263. **Mr P Begg**: Yes, that is entirely logical. Part of the answer to your question is, I think, that we are doing the Killerton trial to understand how long it takes to get to effective herd immunity in the badger community. We are doing it for five years, and we will do it rigorously in order to understand, as far as we possibly can, how many of those badgers have become immune to the disease.

1264. You are right; you could not really imagine a situation in which every single badger becomes immune very quickly. However, herd immunity does not require every badger to be immune. Scientists drew this up for me: imagine that there are 20 spots randomly distributed in an area, each representing a badger, and 17 of those are effectively immune. The three badgers that are TB carriers have very little opportunity to interact with cattle, particularly if you have biosecurity measures, etc, on the farm. So, in effect, you have got to the point where, although not absolutely nailed on 100%, you are so close to it that your incidence of breakdowns will decrease substantially.

1265. **Mr Irwin**: Yes; I understand.

1266. **Mr Clarke**: I apologise for not hearing all of your presentation; I had to nip out for a second. Did I pick up that you own in excess of 7,000 acres in Northern Ireland?

1267. **Ms Thompson**: We own 3,100 hectares of farmed land.

1268. **Mr Clarke**: It is interesting to note that you have carried out your surveys in England. Why have you not concentrated any of them in Northern Ireland, given that you own a vast amount of land here?

1269. **Ms Thompson**: We have been working with Queen's University on a study at Castle Ward in County Down to look at some aspects of TB in that area. The work that is being done in England and Wales has been work with government, through the Food and Environment Research Agency (FERA).

1270. **Mr P Begg**: Yes. We privately contracted FERA to do the job, the vaccination trial, but Killerton presents itself as the perfect place to test.

1271. **Mr Clarke**: Who is paying FERA to do that job?

1272. **Mr P Begg**: We are.

1273. **Mr Clarke**: It is interesting that you can take a legal case against a golf course on the north coast but, when it comes to the farmers in Northern Ireland for whom you have responsibility, you do not put your money up and invest in trying to eradicate TB in Northern Ireland.

1274. **Ms Thompson**: I think that that is unfair. Obviously, as an organisation that works across Wales, Northern Ireland and England, and as a charity that receives money from people to look after a range of special places, be they houses, gardens or farmland, the trust must be very clear about how and where it focuses its energy and funds at any one time. The organisation collectively decides where and when to place its funds. As I understand it, Killerton was chosen because of the size of the land that was available and the issues around it. You are looking at 18 farms; it is a huge amount of land, and the trial must be considered on that scale. In Northern Ireland, we do not have any estates of that scale where we could do that piece of work. We would have to have a very strong argument as to why we would spend our money above and beyond our own properties, because, ultimately, we do not have huge amounts of resources that we can just give out here, there and everywhere. We have to be very focused about how we use it.

1275. **Mr Clarke**: What is the average size of the farms belonging to the farmers who pay money towards the trust?

1276. **Ms Davidson**: Tenants can take land from as small as around 20 acres up to a couple of hundred acres. There is quite a range, and it depends on what the farmer wants the land for. If it is his own holding, he might want to extend it.

1277. **Mr Clarke**: So, in Northern Ireland, there are some quite large farms on your ground.

1278. **Ms Davidson**: Yes, two hundred acres would be the biggest.

1279. **Mr Clarke**: In Northern Ireland, 200 acres is a reasonably large farm.

1280. **Ms Davidson**: In some cases, that farm will have more than one farmer on it.

1281. **Mr P Begg**: The average is about 30 hectares per farm. There are 100 agreements across 3,100 hectares.

1282. **The Chairperson**: Of the 80 farms that you have, how many have been struck down by bovine TB in the past couple of years?

1283. **Ms Davidson**: Traditionally, people do not always share that information. They are under no obligation to share with the trust that that has happened, so, generally, we are not told when that happens. Unfortunately, we cannot answer that question.

1284. **The Chairperson**: I understand that. I cannot speak for the Committee at this stage as we are only halfway through the review, but there seems to be a separation between the Department and other bodies with regard to sharing information. Will you distribute the information that you are gathering from Devon to your farming community to make it aware of the findings?

1285. **Mr P Begg**: Yes.

1286. **The Chairperson**: Will that go some way towards educating the farming community?

1287. **Mr P Begg**: Yes, it is our duty to do that. We would not do it if we were not trying to make a difference and help people to understand how they can take more measures to control the disease.

1288. **Ms Davidson**: Communication will be a big part of that package.

1289. **Mr Begg**: In fact, we have done a video already to show how the trapping and vaccination process works to try to demystify it, because some people think that it is terribly complex and causes huge distress to badgers. Having done it, we can show that it does not. We have been sharing that video around. We have just shared it with our colleagues in Wales to help them to understand how they can get across how vaccination can happen.

1290. **The Chairperson**: You mentioned risk. This could well be in your presentation; forgive me if it is. What risks are involved in the work in Devon? What do you mean by risk? One of the risks might be perturbation.

1291. **Mr P Begg**: The perturbation risk is almost zero. We are not seeing any perturbation effect at all on the vaccinated badgers. The social distress that arises from the disruption caused by culling, which we know is a real effect, does not seem to happen with vaccination. That has been backed up in a couple of small trials that have been going on elsewhere. There are other risks. The biggest risk for us is that we do it badly and completely undermine the trust between our tenant farmers and us. So, as much as possible, we are trying to share with them what we are doing, keep the communication good, make sure that they understand the findings as they emerge, and listen to what else they think can and should be done.

1292. **The Chairperson**: You will be sharing that with Northern Ireland farmers?

1293. **Mr P Begg**: There are no walls between what we do. We will absolutely be sharing it around the organisation.

1294. **Mr McMullan**: Can we see that video?

1295. **Mr P Begg**: Yes.

1296. **Ms Davidson**: We have been focusing very much on the vaccination of badgers, but, as an organisation, we

also want to help to push for a cattle vaccine. As an organisation, we will be extremely supportive of that. We believe that Northern Ireland, with the Republic of Ireland, could lead the way in doing that, and we as an organisation really want to push that.

1297. **Mr Irwin**: Just to clarify, I think the situation is that DEFRA has identified a vaccine but Europe will not give clearance for it. It is probably out of our hands until clearance comes from Europe on that.

1298. **Mr P Begg**: There is a political momentum, and it is important to keep it going. With things shifting in France and Spain, where TB starts to become an issue, you can see how Europe might be more receptive, with those big players having to listen to what they need to do. Now is the time for all the Administrations to be pushing hard for cattle vaccines to be put on the fast track.

1299. **The Chairperson**: Thank you very much for your time.

19 June 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mr Thomas Buchanan
Mr Trevor Clarke
Mrs Jo-Anne Dobson
Mr Chris Hazzard
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Ms Jennifer Fulton — *Ulster Wildlife Trust*
Mr Joe Furphy
Mr Conor McKinney

1300. **The Chairperson**: I welcome Jennifer Fulton, Joe Furphy and Conor McKinney. You have tabled a document, which I assume all members have. Without further ado; Jennifer, Conor and Joe, you have a briefing for us.

1301. **Mr Joe Furphy (Ulster Wildlife Trust)**: I will start. Thank you very much for the invitation to be here and for the opportunity to speak on this subject. The Ulster Wildlife Trust is the only conservation organisation that is entirely based in Northern Ireland. We are also the only organisation that deals with all aspects of the environment. We are particularly glad to be here today because the issue that we are dealing with covers a wide range of interests and activities and involves a large number of people. We are only too glad to be part of the process of helping you to come to a proper conclusion on the matter. I will now hand over to my cohort.

1302. **Mr Conor McKinney (Ulster Wildlife Trust)**: Good afternoon. The presentation will be in two parts. I am going to cover general information on badger ecology, social behaviour, bovine tuberculosis (TB) in badgers and the transmission of the disease, and I will then hand over to my colleague Jennifer, who will discuss ways forward.

1303. One of the most notable things about the badger is the black and white colouration. That is a warning sign, generally to attract attention to the powerful jaws. It is just a measure to intimidate. It is a very heavy animal. It can be up to about a metre long and can weigh from 9 kg to 17 kg. You will notice that it has short sturdy legs, on the end of which are very pronounced claws, which are an important evolutionary adaptation to help the animal dig its sett out. It has a greyish colouration, due to dark hairs that are a little bit lighter near the tips. It has great hearing but fairly poor eyesight. It has monochromatic eyesight, which means that it can see limited colours, but it can make out breaks in the horizon. It has an exceptional sense of smell and a muscular snout, which is used to probe and snuff around in the soil for prey.

1304. It is also important to note that, in Northern Ireland, the badger's habitat is generally hedgerows. It is generally woodland elsewhere, but we have such low woodland coverage in Northern Ireland. For that reason, badgers here tend to be found in hedgerows and tall and low scrub. Within Northern Ireland, there is a population of roughly 38,000 badgers. Corrections have been made to that to bring us up to 41,000; I saw that in evidence from Queen's University. In the Republic of Ireland, there are believed to be around 84,000 badgers, and, in Britain, there are believed to be 302,000 badgers. That population figure will become important when we talk about perturbation effects. I will not go too much into the year of the badger. You have that in the presentation in front of you.

1305. The social structure is an important concept in the management of the disease, because badgers will live in

social groups that are centred around a main sett, and they will defend the territory in which they feed. These groups are relatively stable and discrete. For example, in Woodchester Park, we found that there was no change in badgers' social groups over a period of around 30 years. This situation has evolved not because of the co-operative benefits but because of the reduced effort when it comes to sett excavation, which badgers do when the cubs are born. Also, as they have a set territory, it gives them a range of different woodland habitats. That means that they can forage for fruits, nuts and berries in the autumn, and it will give them some pastoral habitat so that they can forage for invertebrates in the wet weather. It gives them year-round feeding. Territories can range from around 38 hectares in good habitats to around 416 hectares in poorer habitats such as bog and moorland.

1306. Badgers are a very heavily protected species, partly because they have been subject to such persecution in the past. We have a significant percentage of the European badger population. I think that over half of the European population can be found within three countries: the UK, the Republic of Ireland and Sweden. They were first protected by the Badgers Act 1973, which was consolidated by the Wildlife (Northern Ireland) Order 1985 and then amended by the Wildlife and Natural Environment Act (Northern Ireland) 2011, known as the WANE Act, which makes it an offence to intentionally or recklessly disturb badgers, obstruct access to their place of refuge or destroy or damage anything that conceals or protects their place of refuge. Badgers have international protection under the Bern convention. It states that any exploitation of wild fauna specified in appendix III, which covers the badger or meles meles, shall be regulated in order to keep the population out of danger, taking into account the requirements of the legislation.

1307. It is important to note that there is a significant reservoir of bovine TB in wildlife. We are not disassociating ourselves from the science. There is a table in members' papers that gives a general overview of bovine TB in wildlife. Another point to note is that, although a lot of wildlife is a reservoir for bovine TB, only badgers, deer and feral ferrets are able to transmit the disease.

1308. There are generally considered to be five different classifications of bovine TB in badgers: those that have been exposed to the disease; those that have been exposed to it but have not become infected; those that are infected but are not infectious; those that are infectious but do not show any symptoms; and those that are severely debilitated and highly infectious. The severely debilitated and highly infectious badgers make up a very small proportion of the badger population. I have read that it is between 2% and 5%, but that varies.

1309. There are a couple of pictures in our paper of what bovine TB in badgers looks like. They show the very progressive stage of the disease. In this state, you see severe emaciation and overgrown fore-claws. The fore-claws are very important for digging, as a badger will dig to clear out the sett and find prey. In this stage of the disease, the badger will become very weak and will have to find easier sources of food. For that reason, they suffer this fore-claw overgrowth, and you will also see that they have sunken eyes. Once badgers are in this state, it is calculated that the mortality rate will double. From about the age of one, it has a relatively constant probability of dying in any subsequent year — about 0·31. In these more aggressive stages of bovine TB, that rate can increase to up to 0·67, so it more than doubles the mortality rate.

1310. As regards the transmission of bovine TB, it is important to realise that this disease is viable in the environment. It can survive within urine for up to three days in the summer and up to 14 days in the winter. Underground, it can last for up to four weeks if there is 80% shade and sterile, moist conditions. So, within setts, this disease can be very viable. You will also find that badgers normally remain two to three metres from cattle.

I think that Dr Judge spoke to you about that research. She also mentioned the fact that radio-collared cattle and radio-collared badgers do not normally come into close proximity to one another.

1311. We have also found that badgers found in farm sheds are three times more likely to be infected with bovine TB than roadkill. That comes back to the fact that badgers that are severely debilitated by the disease will roam a lot further to find easy sources of food so that they can survive. That is linked to the fact that they are very weak. There is some debate about whether the majority of infection occurs in pasture or in sheds. That has yet to be proved conclusively. It is important to remember that cattle-to-badger infection will also occur, and results have shown that that can have a significant impact on badger populations. For example, a failure to control bovine TB in cattle during the foot-and-mouth disease crisis was found to lead to a tripling of the incidence of bovine TB in badgers. That makes sense as a lot of invertebrates are associated with cattle dung, and badgers will dig through that excreta to find sources of food. It is a two-way process.

1312. I am not going to go into too much detail on the perturbation effect as the text on that is in our submission. I am sure that you have heard quite a bit about the notable research in that area, and that is also outlined in our submission.

1313. I am conscious that I am running short of time. I will pass over to Jennifer, who will take you through the toolkit.

1314. **Ms Jennifer Fulton (Ulster Wildlife Trust)**: I will discuss the toolkit and what the Ulster Wildlife Trust sees as the way forward. We looked through the evidence that has already been given to the Committee, and the first thing that struck us was that, although there is quite a lot of research, there are large gaps in the science. We are very encouraged to see that the Department of Agriculture and Rural Development (DARD) has set aside £4 million in the Programme for Government for that research. There are regional differences in farming practice in Northern Ireland and differences in the density and the social structures of our badgers, so the solution we need for Northern Ireland may be different from the solutions in other parts of the UK. We feel that there should be a bespoke solution for Northern Ireland that allows the agrifood industry to maintain its ethical and environmental credentials, because that is what that industry trades on.

1315. One tool that is ready and that can be considered right now, if you wish to do so, is badger vaccination. The vaccine is approved for use and is available by prescription. The process would involve trapping, vaccinating and releasing badgers annually. The vaccine confers a level of immunity to offspring, significantly reduces the progression, severity and excretion of bovine TB and avoids all the issues that go with perturbation. The vaccine has to be administered by a vet or licensed lay operator. You may have noticed that a vaccination programme is under way in Wales. We think that it may be worth considering the creation of a vaccination fund for Northern Ireland, similar to that in England and Wales, which would give farmers and others some financial incentive to vaccinate badgers. One option that may be worth considering is the inclusion of such a fund under an agrienvironment scheme, but you would need to discuss that with Brussels. The Committee members who are going to Gloucestershire tomorrow will see that the costs there have been worked out on a per hectare basis. That may be an option to consider.

1316. The second tool is biosecurity, which was covered during your last evidence session. Our view is that biosecurity is key to addressing the problem, as it would reduce the opportunities for contact and transmission between cattle and badgers. The farm modernisation programme has recently been in the press, and it has a budget of £5·5 million, which could contribute to resolving some of the situation. The uptake of biosecurity training has been disappointing. One option that may

be worth considering is the network of focus farms that we have across Northern Ireland. Those events have been very well attended, and I read recently that 10,000 participants visited those farms over 31 months. That would be a good way of demonstrating best practice. There is also a need for information and practical advice on biosecurity products and technology to help farmers to work out a way forward.

1317. I will now move on to improved diagnostics and movement restrictions. You have heard from the Northern Ireland Audit Office (NIAO) that one in four infected animals is not identified through the current testing regime. You may also have seen the recent research by the University of Liverpool that indicated that about one third of bovine TB cases in England and Wales are masked by the skin test because of liver fluke. Clearly, options to improve the efficacy of the testing are a priority in any eradication strategy. The greatest risk of transmission comes from cattle-to-cattle contact, and we had 600,000 movements recorded on the animal and public health information system (APHIS). That is further complicated by the situation in Northern Ireland, where we have our conacre system, small farms, intensive grazing and boundary fences. Those issues are not easy to resolve.

1318. Something that struck us was farmer support and the possible need for additional farmer support. I know that those of you who are heading over to England are going to see Department for Environment, Food and Rural Affairs (DEFRA) officials. A TB support and advice service for farmers was launched by DEFRA in November 2010. That service provides enhanced support, mainly through private vets, to TB-infected farms and their neighbouring farms. There is also a need to increase support by providing financial advice to help those who are experiencing hardship as a result of TB, because it can close your herd for significant periods of time. There may be the opportunity to look at joined-up service delivery in government, maybe by discussing with Her Majesty's Revenue and Customs (HMRC) issues such as the acceleration of working tax credit applications, where the farmers are eligible. There is still a very low uptake of working tax credits in rural communities.

1319. In the medium to longer term, you have cattle vaccination. I know it has been talked about for a very long time, but DEFRA has invested around £23 million to date in the development of cattle vaccination and the associated differentiating infected from vaccinated animals (DIVA) skin test. Recently, there have also been field-scale trials in Ethiopia and Mexico, which have shown 56% to 68% efficacy when it comes to full protection and a further 30% when it comes to partial protection.

1320. A vaccine reduces the progression, severity and excretion of TB in cattle. The Food and Environment Research Agency (FERA) has put forward a marketing authorisation, which was submitted to the Veterinary Medicines Directorate in Brussels in January 2012. It assesses the safety, quality and efficacy of the vaccine. The outcome is anticipated later this year, and you will probably get an update when you meet officials from FERA or DEFRA tomorrow. Even if the vaccine is assessed as being effective, a change in EU legislation is still required before a licence for use can be granted on a regional scale or within Europe. Also, international accreditation with the World Organisation for Animal Health is required.

1321. A new animal health model is being developed by the EU, which should alleviate some of the issues around existing directives.

1322. The last thing for the future is —

1323. **The Chairperson**: Jennifer, sorry to stop you. I will give you one more minute if that is OK. I am deeply sorry for having to stop you, but we are stuck for time.

1324. **Ms Fulton**: That is fine.

1325. Finally, we have oral vaccinations, which are something for the future and are not likely to be here until 2016.

1326. That is the bones of what we wanted to say. You will see in our paper the conclusions that the Ulster Wildlife Trust has come to on suggestions for the way forward.

1327. **The Chairperson**: Thank you all very much for your presentation. I remind members that we are stuck for time today. So, please keep to one question — no statements, just one question — and if we can go round again, we will.

1328. **Mrs Dobson**: Thank you very much for your presentation. In your briefing, you say that the priorities should be farm biosecurity, a badger vaccine and a cattle vaccine. How do you view DARD's performance to date on each of those three priorities?

1329. **Ms Fulton**: There is certainly a need to do more. Considerable effort and work have been put in to date, but, to move the industry forward, there is a need for a concerted and focused effort in each of those strands.

1330. **Mr Swann**: Thanks for your presentation, folks. Conor, the statistics that you present show that badgers found in farm sheds are three times more likely to be infected than roadkill. Where are you getting that science from? That is something new; we have not heard that before.

1331. **Mr McKinney**: There is science there. I should be able to get a quote for you. I do not have the reference in front of me at present. However, that was something that we found in the literature. I reviewed the literature that we have, and that fact came up within that review.

1332. **Mr Swann**: As I said, we took a lot of evidence from the Department and DEFRA. We have seen statistics on the testing of roadkill, but I have never even heard of a scheme where dead badgers are collected from farm sheds for testing. I know that the Department picks up roadkill to test for TB, but I have not heard of that before.

1333. **Mr McKinney**: I can dig out that paper and send it to the Committee, if you want to see it.

1334. **The Chairperson**: I would be grateful if you could furnish us with that information. We would be interested to see it.

1335. **Mr Irwin**: We all agree that there are a number of issues, badgers being one of them. A leading scientist in Wales recently resigned from the TB eradication board because Wales decided to go down the route of vaccination instead of culling. What is your view of that? Would you agree, for instance, to a cull of infected badgers?

1336. **Ms Fulton**: That research may be one area that you would wish to look at. As a science-based organisation, the Ulster Wildlife Trust bases its decisions on the science that is there at any particular moment. Certainly, from what we read, we see no significant benefit in a blanket cull across Northern Ireland. In particular, given that we are in the midst of a recession, we do not feel that it would be a good use of public funds. Vaccination is the mainstay of our suggested way forward. The research that has been done on the vaccination programme shows that it provides an efficacy rate of 74%. The issue of heavily infected badgers is one that merits research in the future, and it should be a part of the research programme.

1337. **Mr McKinney**: Chair, could I perhaps return to the previous question? The research paper was by Cheeseman and Mallinson, published in 1981. I will provide a reference for that afterwards.

1338. **Mr Swann**: Where was that from?

1339. **Mr McKinney**: It was in the 'Journal of Zoology'. I believe that it was based on research in England.

1340. **The Chairperson**: We will have another round of questions, so everyone will have another opportunity.

1341. **Mrs Dobson**: I see that you support a cattle vaccine. Can a realistic date be set for when it will become

available? Can you give me a wee bit of background on it? Is it correct that a workable cattle vaccine would make the skin test obsolete? I see the reference in your paper to a DIVA test. Will you expand further on that?

1342. **Ms Fulton**: Yes. A new test has been developed to coincide with the vaccination of cattle, and it meets the requirement of differentiating between vaccinated cattle and infected cattle. That was the issue that caused the problem in the first place. As for the timescale for the vaccination, DEFRA had originally hoped that some sort of progress would be made before the end of 2012. I am not exactly sure how that has gone, but no doubt you will find that out when you are in England tomorrow.

1343. **Mrs Dobson**: Is the DIVA test similar to the skin test?

1344. **Ms Fulton**: It is quite similar. There is some differentiation. It is quite a complex research issue. No doubt you will get a full briefing tomorrow.

1345. **Mrs Dobson**: A cattle vaccine would need to be 100% accurate, otherwise the skin test would be obsolete, so I think it would be useful to get more details at some point.

1346. **Ms Fulton**: You will get a full briefing from DEFRA when you are in Gloucestershire tomorrow.

1347. **Mr Swann**: Conor, you mentioned the five types of badger classification, and you said that one was infectious but showing no sign of it.

1348. **Mr McKinney**: Infected but not infectious?

1349. **Mr Swann**: You indicated that a badger could show no sign of having TB but still be infectious. In other words, it would be a carrier. If vaccination against TB creates a badger that, in your words, confers a level of immunity to its offspring, is there a chance that we could create a strain of badger that would be immune but could become a carrier, spreading the disease without suffering from it?

1350. **Mr McKinney**: I do not think so. From what I know of the disease, it does not become infectious until it has advanced and progressed. The disease creates lesions from which bacteria erupt. If, for example, those lesions are in the lungs, the disease will be spread by aerosol transmission, which is how 80% of the disease is transmitted. I believe that vaccinated badgers can transfer some immunity to badger cubs. Have I got the gist of your question?

1351. **Mr Swann**: Perhaps I picked you up wrong, but I thought that you said that badgers could be infectious but not be infected. Does vaccination create an immunity in badgers so that they become carriers but are not infected?

1352. **Ms Fulton**: Yes. It is a bit like the BCG vaccine that is given to schoolchildren. It is the same sort of process. The vaccine confers immunity to stop you picking up the disease.

1353. **Mr McKinney**: It is more of a preventative measure and limits the progression of the disease.

1354. **Mr Irwin**: Is the problem not those badgers that are already infected and then vaccinated? Those badgers are still carriers and can live for a number of years. I think that that is the issue.

1355. We have to cull animals, such as dairy cattle, that have TB. Many of those are good animals and seem perfectly healthy, yet they have to be culled. Do you support a similar cull of infected badgers?

1356. **Ms Fulton**: First, we need a way of knowing that animals are infected.

1357. **Mr Irwin**: That is what I mean. Would you support a cull if you knew that the badgers were infected?

1358. **Ms Fulton**: It depends on the methodology used, and there is still a bit of research to do in that area. As an organisation, if the science is there, we will consider it. However, we would have to look at the research and the efficacy of any tests suggested.

1359. **Mr Clarke**: I had a similar question. Jennifer said that she would not support a blanket ban, and I took from that that she might support a cull. However, Willie then probed my question further, so I suppose that my question has been answered somewhat.

1360. **The Chairperson**: In the event of there being a way of quickly telling whether badgers are infected, have you done any research on the estimated cost and the differential between following a vaccination course and a vaccination/cull course?

1361. **Ms Fulton**: That is one of the gaps in the research. Quite an area of the research, and the economics behind it, needs to be looked at so that we can make best use of it in a strategy for the way forward. The methodology used is key.

1362. **Mr Hazzard**: Thanks for your presentation. Is there any indication of how long the TB virus remains active in badger carcasses?

1363. **Mr McKinney**: I have not come across any research on that. The virus is very viable in the atmosphere, and around 94% of it remains viable after it is exuded from a badger in aerosol form. After that, it has a half-life of around one and a half hours. Therefore, it can remain very viable, and research has shown that it is possible to culture the virus in tissues from one bacillus. It is extremely infectious.

1364. Urine is the other main factor, although it is not as significant a pathway, and tests have shown that the virus can remain viable in urine for up to three days in the summer. That is due to the effects of UV light, and significant UV light will increase the mortality of the disease. In the winter that increases to roughly 14 days. I am unsure how long the virus remains viable in a carcass, but those are indications outwith, when it mixes with air.

1365. **The Chairperson**: I have one further question. In your paper, you referred to joined-up service delivery in government. What discussions, if any, have you had with Departments about some of the issues that you have raised, such as the fast-tracking of applications for working tax credits and farm modernisation schemes? What discussions have you had with government on the reality of those ever happening?

1366. **Ms Fulton**: The involvement of the Ulster Wildlife Trust has been on the Northern Ireland Badger Group, which has predominantly looked at the issue and the science. Our suggestions emerged as we thought through the issue from an organisational perspective, and we will discuss those with the various Departments over the coming months.

1367. **The Chairperson**: Dr Judge said last week that £4,000 could go long a way towards introducing biosecurity measures on the average farm. Sheds could be blocked and gates made solid. Would you support government incentivising the farming community to do that?

1368. **Ms Fulton**: We certainly would. That would be the cornerstone in moving the issue forward, because quite a lot could be resolved through relatively small investment.

1369. **The Chairperson**: Would you consider that to be of higher importance than vaccinating badgers?

1370. **Ms Fulton**: A suite of measures would probably be needed. Vaccination and biosecurity would be two of the top measures in that list, although there are issues around the testing of cattle that also need to be addressed.

1371. **Mr McKinney**: As I said, the disease can also be transmitted from cattle to badgers. A firewall would prevent the two reservoirs of disease from intermingling, especially when we know that the skin test can miss out one in four infected animals. If you focus on separating those two reservoirs, you will stop the disease from intermingling and passing from one source to another. That would definitely be a way forward.

1372. **The Chairperson**: Thank you very much for your time and presentation. I am sorry that we had to push you for time,

especially you, Jennifer, but we do value your contribution on this important issue.

1373. **Mr Furphy**: Thank you very much.

3 July 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Ms Michaela Boyle
Mr Thomas Buchanan
Mr William Irwin
Mr Kieran McCarthy
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mrs O'Neill	*Minister of Agriculture and Rural Development*
Mr Bert Houston Mr Gerry Lavery Mrs Colette McMaster	*Department of Agriculture and Rural Development*

1374. **The Chairperson**: I welcome the Minister, Michelle O'Neill; Gerry Lavery, the permanent secretary; Colette McMaster; and Bert Houston. You are all very welcome. Thank you for taking the time to come here. It is very relevant, considering that this is the last meeting of the Committee before recess. Minister, I am sure that you have a presentation for us. You can go ahead.

1375. **Mrs O'Neill (The Minister of Agriculture and Rural Development)**: Go raibh maith agat, Chairperson. Thank you for the opportunity to brief the Committee as part of its ongoing review of TB. You know my team. I will give a short presentation, and I will be happy to take questions and comments.

1376. It goes without saying that I am very committed to dealing with the eradication of TB in cattle. Tackling the disease is, obviously, a priority for me. I fully recognise the burden that TB breakdowns impose on farm businesses in the North in terms of compliance cost and business risk. There were almost 1,900 TB herd breakdowns in 2011-12, which resulted in almost 8,700 reactor animals being slaughtered and additional risk testing being required in those and contact herds. I acknowledge the valuable assistance that farmers and private veterinary practitioners give to my Department in facilitating TB testing.

1377. In particular, I wish to advise the Committee today on the plans for actions on TB and wildlife, which aim to provide evidence to underpin further interventions in cattle and wildlife and help to guide the TB eradication strategy. As the Committee will be aware from the briefing that my officials provided to its review, we have in place a robust TB eradication programme that is based on testing to detect infected cattle, removing infected animals and reducing the risks of disease spread through movement controls and other biosecurity measures.

1378. We have secured EU Commission approval for our TB eradication programme for 2010 to 2012. EU approval is vital to safeguard our annual £1 billion-plus export-dependent trade in livestock and livestock products. We have a business target to obtain EU approval for the TB eradication programme for 2013 also. Protecting our export status is a fundamental priority for the Department.

1379. Having EU approval in place enables the Department of Agriculture and Rural Development (DARD) to drawn down around €5 million co-funding from Europe each year towards the cost of the TB eradication programme, which amounted to just over £26 million in 2011-12. Some £12·9 million of that cost was due to animal compensation payments; £6·5 million was in respect of tests by private vets; £5·8 million was due to DARD Veterinary Service costs; and £1 million was in respect of Agri-Food and Biosciences Institute (AFBI) costs. I want to see the cost that TB control measures impose being reduced for taxpayers and for farmers.

1380. The TB eradication programme has been effective in reducing the level of disease

in cattle, but, as you know — I am sure that you have found this out through your inquiry — TB is a very complex, multifactorial and challenging disease, and there is no quick fix or simple, cost-effective solution. Eradication cannot be achieved in the immediate future for all the reasons presented to you in recent weeks. Much is still not known about how TB spreads, how it can be diagnosed more accurately, and what can be done to prevent its spread between cattle and between wildlife and cattle. That has been outlined in the wide-ranging evidence to the Committee's review.

1381. Therefore, the priority will be to continue to invest in TB and wildlife research and studies to build the evidence to help to deal effectively with all the disease risk factors and reduce TB further. The Committee will be aware that there is a specific reference in the Programme for Government to funding of around £4 million allocated in my Department's budget to conduct TB and wildlife research and studies.

1382. In order to identify the priority evidence needs, my Department took a comprehensive look at what is known about TB. We commissioned five literature reviews, which were completed in 2011-12. Those were on the areas of TB tests in cattle, TB tests in badgers, cattle-to-cattle transmission, badger-to-cattle transmission and badger vaccination. We have also discussed the evidence needs and their priority with key industry and environmental stakeholders.

1383. A number of studies have been commissioned to help to establish local evidence. We expect to have the results of the TB biosecurity study later this year, and we intend to use them to produce further biosecurity advice for all herd keepers. An assessment has been commissioned of farmers' understanding of and attitudes to applying biosecurity measures when dealing with diseases. An evaluation of the use my Department makes of the gamma-interferon blood test to detect TB in cattle is also under way. The results will better inform the way the test is used in the TB programme. A badger/cattle proximity study, which aims to assess interactions between cattle and badgers in farm buildings and at pasture, started recently in a TB high-incidence area. The results will help to better inform our understanding of disease transmission risks and also where biosecurity measures could best be targeted on farms here.

1384. Discussions held in the past year with key industry and environmental stakeholders have helped to develop the options for further research and studies. In May, my Department hosted an international vaccination experts' scientific symposium in Belfast, which considered all the relevant issues associated with vaccinating the badger to achieve a reduction of TB in cattle. We will use the information from that symposium to inform how best to proceed on badger vaccination on the island.

1385. In addition, AFBI was recently requested to put forward further research proposals across a range of aspects of TB, including the role of slurry in spreading TB; an investigation of the risk factors for herds with multiple reactors and/or chronic TB infection in order to further reduce disease in those herds; and an analysis of the existing molecular strain typing data to determine how that tool can be best applied practically in the TB eradication programme and to provide a better understanding of TB transmission in the North. I know that Committee members have enquired how the strain typing data might be used to help understand the spread of TB between farms. I hope that the analysis that we are commissioning will help to answer that question.

1386. We continue to follow closely the research and studies being conducted in England and Wales and the South of Ireland, including those on the development of an oral bait badger vaccine that can be delivered in a cost-effective way and a cattle vaccine that could be approved for use at international level. We are also watching very carefully what is

happening on the wildlife aspect in England and Wales in relation to culling and vaccination.

1387. I turn now to my own immediate plans for addressing the wildlife aspect. I am convinced that we can do more on top of all the work that I have outlined and on top of our existing programme of work. I am very conscious that any wildlife research that involves intervention would be very costly, and I want to ensure that we get the best value from the funding available. Having considered a range of possible options for research and studies, I see value in undertaking work here that would be unique to the North and not just an expensive duplication of what is happening elsewhere.

1388. Any proposal for wildlife intervention will have to pass the necessary business case. It will also have to comply with relevant legislation and command a wide degree of support from stakeholders. Therefore, following recent discussions with industry stakeholders and informed by the views of the external experts who attended the international vaccination symposium here in May, I have asked my officials to design specific wildlife intervention research. That approach involves testing live badgers, vaccinating and releasing the test-negative ones and removing the test-positive ones. It means that a badger will be removed if it is detected as having TB, but a negative test will result in the badger being vaccinated and released. The approach focuses on removing diseased badgers and protecting uninfected ones. It is a balanced approach that would avoid killing healthy badgers and could lead, in time, to a healthier badger population incapable of transmitting TB to cattle. That is a powerful message and one that, I hope, Committee members, the farming community and environmentalists will welcome. Hopefully, by taking this approach, we will avoid any legal action being taken, as has been seen elsewhere.

1389. The aim of the wildlife intervention research would be to test the effectiveness of the approach on the level of TB in badgers and cattle in the North. It would also generate information to produce a local model that we could use to assess the effectiveness of various wildlife interventions here in the future. That would be the key deliverable of the first stage of the work.

1390. This approach has not been tried anywhere else. Such a test, vaccinate and remove approach was modelled in 2009 as a possible intervention for the Welsh Government by the Food and Environment Research Agency (FERA). The results of that modelling indicated that if a perturbation effect occurred, it would make the TB situation in cattle worse; that is, it would lead to increased confirmed cattle herd breakdowns. Where perturbation was assumed not to occur, the model predicted that the effect of the intervention would be marginally better than cull-only and vaccinate-only approaches. However, no field trials have taken place to test the actual effectiveness of that approach anywhere in Britain or in the South. Based on discussions with the FERA experts who developed the model, we believe that we may not see the same perturbation effect in the North, as the badger social group size here is smaller and badger movement behaviour may be different. I have, therefore, asked my officials to start work straight away on designing and costing this wildlife intervention research.

1391. As I said, it is a completely new approach. We expect the design for such a study to be complex, and we want to make sure that we get it right. There are a number of key steps to be completed. The first step is to commission the necessary modelling using information from the North. That initial modelling will help to ensure that the subsequent design is scientifically robust. The modelling will also help us to identify the optimum location and size for the study and how long it would need to run. It will also help to identify the costs of the wildlife intervention research more clearly, because it is likely to be expensive. In Wales, the initial estimated cost of their vaccination

approach is around £6 million over five years. In England, they were looking at costs of around £50 million because they were having a much larger randomised badger culling trial. So, there is a big difference there. Until we have our modelling detail, we are unable to say what the exact costs will be. At this stage, we expect that the wildlife intervention research would have to be carried out over five years in order to see a measurable effect in badgers and/or cattle. Any intervention will depend on the availability of the funding required, which must be fully justified in cost-benefit terms.

1392. When we have the results of the initial modelling, the next step will be to design the study proposal. A number of other preparatory actions will be necessary, including completing the necessary business case, obtaining the necessary licences and securing the necessary funding. As the badger is a protected species, any direct interventions in the badger population here will be subject to the agreement of the Environment Minister and the issue of the necessary licences. Any interventions must also be compliant with statutory powers and take into account any relevant legal rulings.

1393. I have asked my officials to get the preparatory work for the study under way immediately. The scientific work starts straight away. The timing for the start of any fieldwork depends on the successful completion of the necessary preparatory actions, but I hope that that will be as early next year as possible. I am also asking for officials to maintain and develop stakeholder engagement with the farming, veterinary and environmental representative organisations. Indeed, such a meeting has been arranged for this afternoon to provide the stakeholder group with the up-to-date information that I am giving to the Committee this afternoon.

1394. Finally, I would like to encourage farmers to get involved in any TB and wildlife studies that are commissioned in their local areas. We will use the evidence produced by the programme of TB and wildlife research and studies to inform a comprehensive approach that deals with all aspects of TB and will help to reduce the level of disease in cattle. As I said at the beginning of my briefing, there is no simple solution. There is no quick fix that will eradicate TB. We have to be realistic in that regard, but we also have to continue to drive forward with these measures.

1395. I want to continue to work with the Committee and stakeholders as we develop this enhanced long-term strategy for the eradication of TB in cattle and implement cost-effective disease-control measures to reduce and eradicate the disease. I know that the Committee was concerned that we should have stronger reference to the eradication of TB in the draft DARD strategy 2020. I will, of course, ensure that the commitment to develop the longer-term eradication strategy is reflected in the draft strategy 2020 that we have issued for consultation. I hope that the Committee will be able to support the approach that I am taking. I look forward to hearing your views and conclusions at the end of your review of this very important matter. I also accept that I am announcing this to you just today and that you may have a number of questions. We are happy to take those questions now and in the days ahead.

1396. Before I take your questions, perhaps you will allow me to update you on the recent increase in TB. I know that the Committee is keen to know about that. The recent increase in TB to 6·71% at 30 April obviously has a considerable impact on farmers. Many are asking what is happening and what is being done about it. I want to assure the Committee that the Veterinary Service is working very hard to deal with the spread of the disease. It conducts an investigation of each new breakdown and applies disease-control measures appropriate to the specific circumstances. In most cases, that includes a face-to-face discussion with the farmer. Specialist advice is also provided as required by epidemiologists and scientists based in Dundonald

House and AFBI respectively. Local veterinary officers have access to gamma-interferon testing and strain typing to help them deal with outbreaks. They can also use additional measures to enhance detection and control, such as severe interpretation of a skin test and more frequent herd testing.

1397. I realise that farmers in affected areas may not be aware of all that is being done to address the disease threat or the overall disease position in their area. Therefore, I have asked my officials to look at how we communicate biosecurity advice and make sure that we are getting our message out there as much as we possibly can. I am also grateful for offers made by private vets right across the North, who want to get involved and continue the positive working relationship that we have and make sure that they can get information out to farmers. The vet is often where farmers will go, because they will have built up a relationship over many years. My officials are also, therefore, engaged in discussions with the veterinary associations to see how we can develop that partnership working.

1398. That is an update of the situation. I appreciate that I have read out a lot of information in a few minutes. I am happy to take questions. The full team can assist with any technical details.

1399. **The Chairperson**: Thank you very much, Minister. We are glad that you have the full team available, and we thank you for that. Yes, there is a lot to digest in the statement; I appreciate that. I also see the significance in your statement of the wildlife intervention research and whatever programme will come out of that. Having heard about it for the first time, I think that we, as a Committee, would be very interested in finding out more. I am aware that I have limited members to one question in a round, and I will resist asking about that programme until I see more detail on it. I see it as a move on your part and that of your Department. We have been putting a lot of work into this topic, and I am sure that there has been a lot of pressure on the Department on the issue. You would expect that, as we are the scrutiny body. If we have helped in some way to get you and the Department to this point, we will take credit for that. You understand that we have a role, and we want a successful outcome to a very complicated disease that has affected the industry for so long. I will reserve questions on the wildlife intervention research and the programme that comes out of it until I see more detail. I ask you to forward as much detail as you can, Minister.

1400. My question is about the June monitoring round and the £6 million additional moneys that were required for the increased compensation. I believe that a small fraction of that is on the cattle valuation, and that tends to suggest that more cattle are infected. That seems to be a setback in the eradication plan. How do you view it, Minister? How concerned are you about needing £6 million more on top of the £20 million already needed for compensation rates?

1401. **Mrs O'Neill**: Some of the criticism has been about lack of action or people not seeing action on the ground. The initiative is about trying to address that. This has been a priority for the Department, but we are stepping up the action. It is fair to say that I have been consulting stakeholders, the farming unions and environmentalists, particularly those who are concerned about the badgers. I appreciate that you want to get more detail, and that is fair enough. In the long run, it will be a good initiative in that it will lead to a healthier badger population. It will gather the information that we need for the policy direction and where we go, but no healthy badger will be harmed. That is important. It is action, and it is a very powerful study. It is unique to the North; it is not being done elsewhere. We could just say, "Let us vaccinate every badger" as is happening elsewhere. This is unique to us, is the information that we need and is based on our local situation. That is key to the initiative and is positive.

1402. You asked about the recent rise. We were on a downward trend until autumn last year, and that is when things started to change. Colette could take you through why we think there was a change or why things started to turn around.

1403. **Mrs Colette McMaster (Department of Agriculture and Rural Development)**: I will start, and Bert will perhaps come in on the veterinary side. We had seen a reduction in TB since the peak after the foot-and-mouth disease outbreak. So, it was disappointing to see the recent increase. We have been looking very closely at that in the Department. Bert will say more about this, but it is usual to see some increase in the number of reactor herds during the winter because that is when most of the testing is carried out. However, there has been a higher increase in the number of reactor herds detected this year.

1404. What is interesting is that there has been no change in the TB programme. We have outlined for you at previous sessions that we have a robust programme in place, and we continue to implement that. So, there has not been any particular change that seems an obvious factor in why there has been that change in incidence.

1405. The specialist veterinary epidemiologists have been working on this. We monitor the herd incidence monthly. So, as soon as a change was detected, that was monitored and various investigations are ongoing. A number of factors can cause TB incidence, but it is very difficult to pinpoint any one factor that causes a particular outbreak or set of outbreaks. However, we have been looking at the factors and seeking to prioritise what those may be.

1406. **Mr Bert Houston (Department of Agriculture and Rural Development)**: There has been a concerning increase from a low level of about 4·99% in August last year. Quite rightly, we were expecting an increase over the winter because that is when most of the testing is carried out. As Colette said, that increase was greater this year and, perhaps, extended longer.

1407. The epidemiologists were looking at it over the winter to see what factors may have affected the herd incidence level. They are looking at a number of areas. At this time, however, we have no definitive set of proposals or hypotheses that say what we think definitely happened. That said, we are aware that the increase has been largely across the Province and not in a particular area. The increase has been bigger in some of the general divisional veterinary office (DVO) areas such as Newtownards, Armagh and Newry, which would traditionally have had high levels of TB, if you want to call it that. There have been individual large herd breakdowns, but the overall picture is largely one of an increase across the Province rather than in any particular area. It has not just been large outbreaks within herds. It has been a mixture of individual animals within herds in a large number of herds and individual herds with large numbers of reactors. We are looking into that to see what we can do about it.

1408. **The Chairperson**: You would accept that £6 million, on top of the existing £20 million, is a massive hike.

1409. **Mrs O'Neill**: Historically, we always start with a low baseline, and we always bid. That is how it has always been done in the Department. We always bid in-year for additional funding. That is the reason for the £6 million. It is early days in the monitoring round, so we will continue to bid in-year for that.

1410. **Mr Houston**: Perhaps I could add that the price of cattle is increasing. Obviously, our compensation costs increase as cattle prices increase.

1411. **Mr Swann**: Thanks, Minister, for attending. Unlike the Chair, I have a number of questions on your new wildlife intervention research, and I will try to contain myself to the one at this stage. What will make your testing unique is that you will vaccinate the negatives and remove the positives. Is that correct?

1412. **Mrs O'Neill**: Yes.

1413. **Mr Swann**: I see Gerry nodding anyway. By removing, you mean culling.

1414. **Mrs O'Neill**: Yes; obviously, in a very humane way and within the welfare legislation.

1415. **Mr Swann**: What test do you have to identify whether a badger is negative or positive while it is trapped there and then? We heard that, in England, there is a three-hour period.

1416. **Mrs O'Neill**: I will talk you through our approach. The first step is the modelling. We looked at the Welsh Government model, but we need to apply our local data to that so that we can then decide on the best area to target and the size of the area that we should be targeting. We want to get the science right so that we have real outcomes for the way forward. We have a number of steps to move through, and it is very important that we start the work now and get the science right so that our action on the ground is informed by that.

1417. Colette, do you want to explain the type of the vaccines? We have to work with what is licensed and approved by the EU.

1418. **Mrs McMaster**: I will say a bit about the test. As the Minister said, we will do the modelling work first and then move to the design and consider what test will be used. A range of tests are available, but we have not made a decision at this stage on what test will be used in the study.

1419. **Mr Swann**: Is there a test at the minute that will give you a turnaround, either positive or negative, for TB in that space of time?

1420. **Mrs McMaster**: There is a test available called the Stat-Pak. It is a blood test, but not a lab-based test; it is described as an animal-side test in that you can get fairly rapid results from it and do not need to send the sample to a lab to have it analysed. We will look at that test when considering how we design this. A badger that is captured has to be anaesthetised first, and a blood sample is then taken. That can be processed while the animal is there, and you do not have to go to a lab and wait for results. The results can be available fairly quickly.

1421. **Mr Swann**: Sorry, Chair, I do not want to labour this point, but we have seen the evidence and heard from the people who will be practising this in England and Wales, especially vaccinations. They went against anaesthetising because of the length of time that the badger will be lying there knocked out. What length of time is on the Stat-Pak test? How long will that badger be lying there knocked out before you kill it or do not kill it?

1422. **Mrs McMaster**: We will look at all that very closely, but my understanding is that the process is about half an hour.

1423. **Mr Swann**: What is the reliability of that test?

1424. **Mrs McMaster**: The test is like any test in that there are sensitivity and specificity ratings. I am sure that Bert will say something on that. The sensitivity of a test indicates how likely it is to pick up infected animals, and the specificity is the number of false positives in animals that it is likely to pick up. The Stat-Pak has a fairly high specificity of over 90%. If you use that test, the majority of animals will be positive that you —

1425. **Mr Swann**: It is up to 90% effective and has a half hour turnaround?

1426. **Mr Houston**: The information that we have about the Brock Stat-Pak is that it has a high specificity, which means that, if a badger is negative, a test will not react as a positive. It has what is best described as moderate sensitivity, which increases if the badger is heavily infected. That seems to be the evidence for that test, but, as Colette said, we have not decided on the test that we will be able to use. We need to look at those tests and what is available. Other tests may become available. The Brock Stat-Pak test has been available for a number of years.

1427. **Mr Swann**: Sorry to labour the point, but I just think that the whole crux of your

wildlife intervention research depends on that test. Unless you get the right test, it will be pointless looking at models, scales and boundaries.

1428. **Mrs O'Neill**: That is why we are doing the modelling now. That is important, because you have to decide on the best size of area and location. While we are working on the science, we are also able to work on the vaccinations and tests and make sure that everything else is in place when we go to field early next year.

1429. **Mr Irwin**: I thank the Minister for her presentation. When do you expect the new intervention research study to be completed? If I recall correctly, the previous Minister promised us a wildlife study in 2008. However, I do not think that any of us can recall getting a report on that. It did not seem to take place.

1430. **Mrs O'Neill**: I have carefully considered a range of possible wildlife interventions that could be taken forward, but I have decided that the test, vaccinate and release is the best option that we have. It is the best possible option for proceeding with action on the ground at an early date. As I said at the start, we have quite a range of ongoing initiatives and research. This complements all the stuff that has been done, and it shows real action. Hopefully, as regards confidence among the wider community, people can see that action is being taken forward.

1431. I outlined the research pieces that we have been gathering over the past number of years. We have got quite a lot of information, but we still do not have enough because it is such a complex disease. Until we have the proper information, it is very hard to move forward and to be definitive. The TB test, vaccinate and release is the best possible approach that we could take at this time, and it will add to the evidence that we already have.

1432. **Mr Irwin**: Maybe your officials will answer this question. I will not go into specific outbreaks, but I know of one farmer, whose farm is bounded by a major river and a forest behind him, who had a very serious outbreak affecting a large number of animals. He was totally devastated. When wildlife looked to be the cause of the disease, did the Department do a survey of the wildlife in that area? If not, why not?

1433. **Mrs O'Neill**: We cannot go into individual cases. Bert, perhaps you want to —

1434. **Mr Irwin**: I mean in any outbreak; I am not talking about one specific outbreak. The indications were that wildlife was responsible for an outbreak. It would be reasonably easy to ascertain whether that was the cause if no livestock had been brought in. There was a forest behind this farm and a major river. The farmer's gripe was that the Department did not seem interested in wildlife.

1435. **Mr Houston**: The veterinary officer who is studying the epidemiology of any outbreak will look at what is there and what information is available from the Animal and Public Health Information System (APHIS) about what was bought in. The veterinary officer will also try to discuss with the farmer whether there has been any sharing of breeding animals. He or she will look at the aspects that we can control. As regards surveying for badger setts or badgers in the area, we have no way of knowing whether those badgers have been infected. The badgers may be there, but you cannot lay them as a cause because they are there. In the absence of anything else, the only thing that you can say is that they are a possible cause. That is what happens in any outbreak.

1436. **Mr Irwin**: With all due respect, if no wildlife survey is done, you cannot be sure. I would have thought that that should have taken place when there were indications that wildlife was the problem.

1437. **Mr Houston**: I am questioning whether a survey would have given you any further information. There are likely to be badgers in the area, because badgers are widespread across Northern Ireland. However, you have no information about the status of those badgers.

1438. **Mrs O'Neill**: The other point, which I made in my opening comments, is that farmers are not always aware of what is being done. That sometimes leads to a lack of confidence in what is being done, and that is what I am trying to address. There is a lot that goes on. When the Veterinary Service is alerted to the fact that there has been a disease outbreak, it conducts an investigation and applies disease-control measures. Maybe not all the time, but that often involves a face-to-face discussion with farmers. Following on from that, specialist advice will be provided. However, to go back to my original point, we need to do more about interacting with farmers so that they are aware of what is being done and what action the Department is taking, and we are looking at that.

1439. **Mr McMullan**: Thank you for your presentation, Minister. You are very welcome. With all the research that has been done on TB, have you spoken to the pro-badger lobby? If so, what sort of reaction did you get?

1440. **Mrs O'Neill**: I have been consulting with all stakeholders during the past year and have had a number of conversations with many stakeholders. I know that my officials have conversations on a regular basis. This approach commands broad acceptance, in that no healthy badger will be harmed. That is important. It is about trying to get a balance, and we are mindful of that, given that the badger is a protected species. I met the badger people yesterday and discussed this approach with them. Given the fact that no healthy badger will be harmed, they would be content with this approach. I hope that the farming unions feel the same.

1441. **Ms Boyle**: Following on from that, I am sure that you intend to meet the farmers' union.

1442. **Mrs O'Neill**: We have been engaging with the farmers' union and are trying to keep it up to date with what we are doing and the plans that we are trying to progress. Obviously, we will continue to do that. The stakeholder group will be briefed this afternoon, so, hopefully, everyone will be up to date and know exactly what we are proposing.

1443. **Ms Boyle**: The cost of the initiative is £26 million a year — is that right?

1444. **Mrs O'Neill**: We are currently spending £26 million. We have £4 million set aside for specific TB work in this Budget period. The costs are very varied. The cost in England was £50 million, although it is a different situation and a bigger area, and it will cost £6 million for vaccination in Wales. Until we have done the modelling and worked up the areas that we want to target and the size of those areas, it is hard to predict the cost. However, you are looking at a significant enough cost over the five-year period. All that will be subject to a business case, because I have to go through the normal procedure.

1445. **Ms Boyle**: It will prove to be value for money if we get on top of it.

1446. **Mrs O'Neill**: I believe so in the long term. We will have a healthier badger population at the end of this, and we will, hopefully, have more up-to-date information for developing policy, which will also be value for money.

1447. **The Chairperson**: We will try to go round members again. Minister, so that we do not lose sight of the importance of the wildlife intervention research and the programme, whatever that may be, will you provide the Committee with details? We will certainly look at it and see whether we can form a judgement or seek answers to questions and more information. It is a significant part of your statement today, and we welcome your coming to the Committee to voice your statement.

1448. I want to change tack slightly — in fact, greatly — and ask about the problems that the Department has been encountering during the past week at Dundonald House. I tend to be fairly positive due to the fact that it was a crisis caused by the weather. Taking that into consideration, as always, I try to be fair-minded. However, it adds to the relocation issue. Dundonald House houses a fundamental infrastructure

piece of equipment that supplies the whole estate with electricity, and it failed last week and led to all the problems. If DARD were to relocate, what will be left there? Will it be the responsibility of the Department? How will the building be left, in whatever form or guise, so that that infrastructure will be in place? Are we talking about a new scheme of work that removes that electrical infrastructure from Dundonald House into a new substation? You can see all those questions arising now with regard even to how this estate works.

1449. There is also the animal and public health information system (APHIS), which is an important issue for the Department, and the effect that had over the latter part of last week. Again, that raises questions about the vulnerability of the system in that we were trading blind in our marts a lot of the time, particularly on the Thursday. The livestock market in Ballymena in my constituency was greatly affected on Thursday by the shutting down of APHIS. We all value the system, but we would now be concerned about its vulnerability. What lessons were learned over the past week and what action is now taking place to rectify the situation and make the system much more robust so that in the event of crises and weather it will not require a shutdown that affects the industry from the farmer to the abattoir to the marts and exports?

1450. **Mrs O'Neill**: I will quickly run through the incident with you and will then be happy to pick up on the wider issues. Your point about estate management and where the electrics should be housed is essentially a Department of Finance and Personnel (DFP) issue. It was unfortunate, to say the least, that everything was in the one place that got flooded.

1451. It appears that a culvert in the Stormont estate was blocked and was not able to cope with the unprecedented flow of water as the debris washed down and got caught up in the grille. As you know, Dundonald House was flooded up to nearly 1 foot from the ceiling in the basement. So, for safety reasons, it was necessary to power down all the electrics and all elements of the electricity transmission network. That included the generator connected to Dundonald House.

1452. An emergency plan kicked in. Gerry's team immediately got together. They were called from about 11.30 pm on Wednesday and met at Greenmount the next morning. We had to relocate 800 staff, which in itself was tough. We were lucky that we had the Greenmount campus and were able to go there and use it as a base to establish the incident management team.

1453. As you said, there was temporary disruption to customer-facing services. I was at Greenmount when the team was talking to people at meat plants and those who would be impacted upon. Nearly all 800 staff have been relocated. We are expecting to be out of Dundonald House for maybe three weeks before it is back up and functional again. The IT and telephones are all up and running again and all services are normal.

1454. We attempted to keep all disruption to a minimum, but the APHIS system had to be closed down after midnight on Wednesday. It was made available again on Thursday morning to facilitate the meat plants opening and the meat houses were informed. It closed down again from 1·30 pm to allow the Dundonald House basement to be pumped out. APHIS was fully functioning again by Friday afternoon and has remained available since. There is no good time for such a thing to happen. It was coming towards the end of the week, and we were very mindful of the disruption. Obviously, the APHIS system is key to be able to sell meat and for trade, so we were very mindful of that. We think that we kept disruption to a minimum.

1455. Unfortunately, our backup system is in Craigantlet Buildings, which was also flooded. Those were the problems we faced. With Dundonald House shut down, we could not just automatically switch over, because there was flooding in Craigantlet Buildings. Some may ask

whether contingencies should be so close. However, when the system was fitted 13 years ago, it was a dedicated fibre link so it had to be close, which is why it was in Craigantlet Buildings. That is another example that shows why Dundonald House is beyond its useful life. When we are planning our new headquarters, a lot of lessons need to be learned about where to place the power systems and generators. The wider issue of Dundonald House and all the power being situated there is an issue for DFP. At this time, however, all services have resumed and staff are working.

1456. **The Chairperson**: Members, I know that you will be disappointed when I tell you that we are struggling for time, and I am sure that the Minister is struggling for time. If you have any questions, we could get them in writing for the Committee Clerk to pass on to the Minister, if that would be in order?

1457. **Mrs O'Neill**: Fair enough.

1458. **The Chairperson**: It is valuable to have the Minister here, and members are always keen to ask questions.

1459. I was disappointed about the fact that the marts and markets were coming to me and saying that there was a problem with APHIS and the Department had not communicated with the Committee or me on the matter until I approached the Committee Clerk to approach the Department. I know that we are not a priority and the likes of the Ulster Farmers' Union, the abattoirs and marts will always be a priority. We come second to them, and I fully understand that. However, as Chairman of the Agriculture and Rural Development Committee, I was disappointed that stakeholders were coming and informing me, and then I had to enquire of the Department.

1460. That said, Wendy Johnston contacted me three times on Friday afternoon and late evening, and on Saturday morning, to keep me fully briefed. So, once that link was created, the information passed was very good. It was just the initial response and the fact that stakeholders were coming to me and I was not even aware that there was a problem. I was informed about the problems with the flooding of Dundonald House. I was not made aware of the issue with APHIS, which was the major issue for the Department within the flooding issue. So, please, there are lessons to be learned there. However, once the link was established with Wendy Johnston, there was very good passing of information. I commend your officials for that.

1461. **Mrs O'Neill**: There are always lessons to be learned about communications, but, as you said, my priority was to make sure that there was no disruption to the trade and to try to keep everybody up and running and functioning. It was always intended to brief you as Chair of the Committee. When we review these situations, we always look to improve communications, so we take your point. As you said, when you did get talking to Wendy, you were fully briefed and kept up to date. In fairness, we had pretty positive feedback from the meat plants. Our priority was to make sure that people could still trade and things carried on as normal.

1462. **The Chairperson**: Thank you very much, Minister, for your time. I also thank Gerry and all your officials. It has been very productive.

11 September 2012

Members present for all or part of the proceedings:

Mr Paul Frew (Chairperson)
Mr Joe Byrne (Deputy Chairperson)
Mr Thomas Buchanan
Mr Trevor Clarke
Mrs Jo-Anne Dobson
Mr Chris Hazzard
Mr William Irwin
Mr Declan McAleer
Mr Oliver McMullan
Mr Robin Swann

Witnesses:

Mr Colin Hart	*Department of*
Mr Ian McKee	*Agriculture and Rural*
Mrs Colette McMaster	*Development*

1463. **The Chairperson**: I welcome Colette McMaster, assistant secretary in the Department of Agriculture and Rural Development (DARD); Colin Hart, the deputy chief veterinary officer; and Ian McKee, principal officer. This is our first day back after recess. Colin, you have had two goes at us, or maybe we have had two goes at you; I am not too sure. Please make a brief presentation, after which members will have an opportunity to ask questions.

1464. **Mrs Colette McMaster (Department of Agriculture and Rural Development)**: Thank you for the opportunity to give an updated presentation today and to answer any questions that you may have.

1465. You will recall that we attended an evidence session on 1 May 2012 on the Committee's decision to undertake a thematic review of bovine TB in Northern Ireland. Since then, we have provided the Committee with further written submissions in response to specific questions that have arisen during the review. Officials have also assisted Assembly researchers Mark Allen and Robert Barry in their investigations on your behalf.

1466. On 3 July, Minister O'Neill advised the Committee about her plans for action on TB in wildlife, which aim to provide evidence to underpin further interventions in cattle and wildlife, and help to guide the TB eradication strategy in future. The Minister also referred to the work that is being taken forward by the Veterinary Service, including discussions with the veterinary associations on developing partnership working on TB and plans for improving communications on TB in local areas with affected farmers.

1467. I will provide an update on the developments in TB policy, after which Colin Hart will provide an update on the TB programme delivery and the initiatives that are under way to improve local communications about TB.

1468. As the Committee will know from the evidence that we provided, we have a robust TB eradication programme in place that is based on testing to detect infected cattle, removing infected animals and reducing the risks of disease spread through movement controls and other biosecurity measures.

1469. The programme is approved by the EU Commission and is subject to external scrutiny by the Northern Ireland Audit Office, the Public Accounts Committee, the Food and Veterinary Office of the EC and the EU Commission TB task force experts. The programme continues to be a priority to ensure continued access to the export trade for our livestock products industry.

1470. The range of evidence provided to the Committee has demonstrated that TB is a complex and multifactorial disease that is difficult to eradicate, with no simple, cost-effective solution or quick fix. TB is a dynamic disease and it is disappointing that herd incidents have risen over the past 12 months to reach 6·99% at 30 June 2012. Colin will say more about the veterinary investigations

that are ongoing to understand and identify the reasons for that rise.

1471. This recent rise underlines the fact that much is still not known about how TB spreads, how it can be diagnosed more accurately and what can be done to prevent its spread between cattle and between wildlife and cattle. We know that, to eradicate TB, we need to deal effectively with all the factors.

1472. We will continue to make best use of the tools available from the TB programme. We continue to invest in TB and wildlife research and studies to build the evidence to improve how we deal with all the disease risk factors and reduce TB further. We will also work closely with stakeholders to help to ensure that all farmers are aware of the steps that they can take to maintain good biosecurity to protect their herds.

1473. First, I will outline the recent developments in TB and wildlife research and studies. You will be aware from the Minister's 3 July presentation that officials have been asked to design specific wildlife intervention research in Northern Ireland. That would involve testing live badgers, vaccinating and releasing the test-negative badgers and removing the test-positive ones. As the Minister indicated, the first step in developing that approach is to commission initial modelling work using local information. That modelling is necessary to help to inform the cost and subsequent design of the study and to ensure that its design is scientifically robust.

1474. Over the summer, preparatory scoping work got under way to gather the relevant information from our animal and public health information system (APHIS) data set, our farm business data sets and data on badger population density and social group size. The data has been sent to the Food and Environment Research Agency (FERA) and will be used to build the Northern Ireland model. The modelling work will be undertaken over the coming weeks, and we expect it to be completed in the next couple of months.

1475. Informed by the results of the modelling work, the next step will be the designing of a study proposal. That will require detailed consideration to best meet the practical challenges. It should be remembered that Northern Ireland is the first area to try this test, vaccinate or remove (TVR) approach in field conditions, so we have much to consider in seeking to get it right.

1476. Although no decisions have been made on the type of test to be used during the TVR wildlife intervention research, we will be considering the use of a rapid TB blood test. The test identifies with great accuracy the most highly infected and infectious badgers and then removes an ongoing source of infection.

1477. There is experimental evidence to show that vaccinating test-negative badgers that may be in the early stages of the disease will help to arrest the progression of disease in those animals. Repeat applications of test, vaccinate or remove should successfully reduce the burden of infection in the badger population within an area.

1478. We are very encouraged by the wide spectrum of stakeholder support and engagement for this test, vaccinate or remove research study. Farmer representative organisations, environmental representative organisations and private veterinary organisations are participating fully through the newly constituted TB stakeholder working group on the development of test, vaccinate or remove. All recognise that the TVR wildlife intervention research represents a balanced approach, which will focus on the removal of diseased badgers and protecting uninfected badgers.

1479. The Committee is aware of the other TB and wildlife research and studies that are under way to establish local evidence. Those are a TB biosecurity study; an assessment of farmers' understanding of and attitudes to applying biosecurity measures when dealing with diseases; an evaluation of the use DARD makes of the gamma-interferon blood test to detect TB in

cattle; and a badger/cattle proximity study, which aims to assess the interactions between cattle and badgers in farm buildings and on pasture in a high TB incidence area.

1480. More recently, we commissioned the Agri-Food and Biosciences Institute (AFBI) to develop proposals for further studies, including work to investigate the reasons why the greater number of reactor cattle come from chronic or repeat breakdown herds, and what can be done to address that; and a literature review to establish the TB transmission risk from spreading slurry. We also wish to establish how strain typing information can best be deployed to give maximum practical benefit to the TB programme.

1481. We continue to maintain close contact with research and studies that are being conducted in Britain and the South of Ireland, including the development of an oral bait badger vaccine that can be delivered in a cost-effective way. Meanwhile, a couple of initiatives are planned for this winter aimed at raising farmers' awareness of the steps they can take to reduce the risk of infection to their stock.

1482. In conjunction with the new industry-led organisation Animal Health and Welfare NI, DARD is planning a programme of sessions through the rural development programme to help to raise awareness of bovine viral diarrhoea (BVD) and other production diseases. The aim is to help to make farmers aware of the steps that they can take to tackle such diseases and the economic and welfare advantages of doing so. The programme will also highlight the wider benefits that good biosecurity practice will bring to help to protect against other serious animal diseases, including brucellosis and TB.

1483. Colin will say more about the Veterinary Service initiative, which is aimed at improving local communications about TB with all those affected.

1484. Finally, we listened carefully to the evidence provided to the Committee and will be interested to receive the Committee's considered report. To push further towards eradication, a future TB programme may need to involve a combination of more testing, tighter movement controls, new or improved measures to reduce the risk of disease spread from badgers, as well as between cattle, and changes to current farming practices. However, additional actions must carry reasonable prospects of success. Whatever approach is developed will have to be practical, cost-effective and acceptable in our own particular circumstances. In that regard, we will be interested to receive the detailed findings from your TB thematic review.

1485. That completes my section of the presentation on TB policy. I will hand over to Colin Hart, who will give a brief outline on programme delivery. After that, we will be happy to take questions.

1486. **Mr Colin Hart (Department of Agriculture and Rural Development)**: Good afternoon. As deputy chief veterinary officer, one of my main responsibilities is the delivery of the Department's TB eradication programme. As Colette reminded us, TB is a dynamic and challenging disease. Its multifactorial nature means that changes in disease patterns are hard to fathom. That is very much the position at present.

1487. After seeing a gradual reduction in disease levels over a number of years, it has been disappointing to see that TB herd incidence has risen sharply over the past year, reaching 6·99% on 30 June 2012. The rise remains unexplained. Veterinary Service has continued to rigorously implement the existing TB programme.

1488. We have held in-depth discussions with our veterinary epidemiology experts, AFBI scientists and our front line divisional veterinary office managers. We are seeing a Northern Ireland-specific increase. Nine of our 10 divisional veterinary office areas have shown a rise this year in annual TB herd incidence compared with the previous

13 to 24 months. The rise has been particularly striking in the Omagh area, although most other areas have seen substantial rises. We will continue to consider possible causative factors. It may be that no single issue is causing or driving the disease. TB, as many of the presentations to the Committee explained, is a notoriously complex and multifactorial disease.

1489. I also have responsibility for the partnership that we continue to build with the private veterinary colleagues who deliver TB testing on DARD's behalf.

1490. Also, as indicated by the Minister in her 3 July presentation, I am leading discussions with stakeholders on how we might improve communications between the Veterinary Service and farmers to the benefit of all concerned. As the Minister indicated, we appreciate the offers made by the veterinary associations in assisting DARD where possible in communicating our messages to farmers. That will be very useful, as farmers may be more receptive to accepting good practice advice from their private vet, with whom they have developed a special working relationship over many years.

1491. We are also working in partnership with the veterinary associations in seeking to enhance best practice testing and reinvigorate the drive towards TB eradication. As a result, we have established a TB testing liaison group with the veterinary associations, which underpins our partnership arrangements with some 300 private vets across Northern Ireland in approximately 80 veterinary practices.

1492. I am grateful for the full support of the veterinary associations as we work hard to improve and maintain standards. Our enhanced programme of unannounced audits is aimed at ensuring that testing is carried out to the required standard, whether it is by private veterinary practices (PVPs) or DARD staff.

1493. As I advised previously, over 120 vets attended a TB testing seminar earlier this year, which was organised by the Association of Veterinary Surgeons Practising in Northern Ireland (AVSPNI) in partnership with DARD. I look forward to seeing that engagement develop over the coming years. TB eradication will be the focus of DARD's input to the annual conference of the private veterinary associations in October. The central veterinary theme on our stand will be a partnership approach to TB eradication. I have also been encouraged by the receptiveness of farming representative organisations to developing greater engagement between Veterinary Service and farmers. We are, therefore, developing, in partnership, plans to improve communications on TB in local areas with affected farmers and, indeed, with all who are concerned about the disease and who wish to know how they might play a further role in disease eradication. We are, therefore, working up proposals to host open discussions on TB for interested farmers in local areas. We will be encouraging them to participate to learn more about the disease risk in their local area, what DARD is doing and what they could do to enhance disease protection. Naturally, we will also be there to listen to their views and concerns and to work with them to address the issues that they raise.

1494. We are also developing renewed and simplified TB biosecurity advice for farmers in discussion with our stakeholders. We propose to make this advice widely available, starting with the winter fair at Balmoral this year. There is, of course, a considerable overlap in preventative measures for all infectious animal diseases. As the industry starts to take forward its initiative to eradicate BVD, we will be taking the opportunity to remind farmers that sensible steps to prevent production diseases will also go a long way to keeping TB at bay. I trust that you will appreciate that DARD, therefore, has been listening to comments made generally and at the Committee for Agriculture and Rural Development in particular and that it is responsive to the comments made.

1495. **Mrs McMaster**: As I said at the beginning of the session, we welcome

the Committee's review of this important matter. We will be very interested in the Committee's views and conclusions at the end of the process, and we are happy to answer any questions.

1496. **The Chairperson**: Thank you very much, Colette and Colin, for your presentation. Colin talked about listening to the Committee. I have no doubt that the Committee's work since we started the review of bovine TB has helped to focus the mind of the Department and the actions that the Department has taken. I say that in the sense of partnership, because we feel that we need to tackle this disease more proactively, and the Committee will be there to assist in any way that we can to help the Department.

1497. I have a question on wildlife intervention research and the badger control programme, on which the Minister made an announcement at the Committee before recess. The initial thoughts and responses were that it was a positive thing. It was something that no one else was doing. It was proactive and would, hopefully, bring everyone on board from the agriculture businesses and the wildlife sector to support it. However, since then, we have had nothing of substance on the detail around it. My questioning is around that. Since we started to conduct the review, we have been told by everyone that there is no reliable diagnostic field test for bovine TB in live badgers and that it is not practical for badgers that are infected with bovine TB to be accurately identified in the field. You referred to the Brock Stat-Pak test to do that. I believe that the accuracy of that test was 49%. It might be all well and good in theory that we trap badgers, cull the diseased ones and vaccinate the uninfected ones. However, if we miss 50% of them, we will not be any further forward. That will produce certain evidence to suggest that we have dealt with the badger but still have the disease, so where do go we from here? I worry that that is the conclusion that would be drawn out of that. If that test is not even 50% reliable and accurate, how do we ever proceed in that manner? Is there any exploratory work on trying to get that test up to a higher standard? That is critical. If we do not close the gate on any aspect of this, we will ultimately fail, because the disease will still be present and will still be able to be streamed that way. That is my first question about the accuracy of the Brock Stat-Pak test and how it will affect the research and the whole badger control programme.

1498. **Mrs McMaster**: We have not actually taken decisions as yet, but we are considering the Brock Stat-Pak test as it is the only animal-side test that is currently available. It gives rapid results and it could be completed while the captured badger is anaesthetised. There is that advantage to it. We know that there are obviously other issues with the test. You mentioned the 49% accuracy, which relates to the sensitivity of the test. The test has better specificity than sensitivity, which means that any badgers that it detects as being positive are highly likely to be infected. Indeed, AFBI's assessment of that test is that it is most likely to detect the most infectious badgers, where the disease is in the later stages, which are likely to present the biggest risk of spread to others.

1499. **The Chairperson**: It will still mean that there are reservoirs out there that will be missed, which will mean that there is no way of detecting that at that point. Am I not right in saying that what it means is that the only thing that you can really rely on is the fact that you could be releasing 50% of infected badgers?

1500. **Mrs McMaster**: Any captured badgers that are released because they test negative will be vaccinated first. Some of those being released will obviously be truly negative badgers and they will be vaccinated, so that element of protection will be built up within the badger population. Our understanding of experimental evidence is that vaccination in itself actually slows the progress of the disease in an infected badger, so there is an advantage to that as well. Over time, the vaccination aspect will actually build a level of protection within the badger population.

That is the idea. The purpose of the research is to test the effectiveness of this approach. What we want to be able to do at the end of it is to measure the effect that it has had on the level of TB in badgers and cattle. That is the end purpose and the ultimate outcome of it.

1501. We also know that the Department for Environment, Food and Rural Affairs (DEFRA) has further research ongoing into potential alternative diagnostic tests for badgers. Obviously, we want to keep in touch with that ongoing work and learn from any new developments or lessons that come from it. Ultimately, if it is an approach that proves to be useful or could be considered in the future as a potential approach to use, if there are other tests available that are more accurate, they would be considered.

1502. **The Chairperson**: I understand that it is an ongoing process. Has the Department decided yet what geographical scale or area will be chosen for that research?

1503. **Mrs McMaster**: We have not as yet. The first stage that needs to happen, and which we are engaged in, is the modelling work. The results of that modelling will help us to determine the size of the area that will be used for the study as well as the location of the area, and so on. The modelling work data has been gathered and sent to FERA. We expect to get results from that over the next few months. That is the point at which a decision on the location will be made and the design work for a proposed study can take place.

1504. **The Chairperson**: Is the Department factoring in the associated risks around a control programme, such as legal action, protests and even perturbation of the badger? Is that all being considered? What discussions have you had with the Department of the Environment (DOE) with regard to granting licences for this programme to take place?

1505. **Mrs McMaster**: As this is research that we will be doing, the legal basis is the, I think, agriculture Act.

1506. **Mr Ian McKee (Department of Agriculture and Rural Development)**: The Agriculture (Northern Ireland) Order 2004 empowers us to task AFBI to carry out research. That is the primary power. It will be for the contractor to seek the subsequent licences from DOE or the Northern Ireland Environment Agency (NIEA).

1507. You asked about the relationship between ourselves and NIEA. We have a close relationship, but we have to be careful that its challenge position is not compromised, so we have open lines of communication with it. A NIEA representative sits on the TB stakeholder working group. It is inclusive of veterinary organisations, farming organisations and all the terrestrial environmental organisations. When it comes to the point at which licences are required, the application will go to the Northern Ireland Environment Agency. In turn, it must consult with the Council for Nature Conservation and the Countryside, which is DOE's statutory advisory body. Then it will come back to approvals. The Minister of the Environment has a challenge role there, but we would be applying for that under the scientific procedure side. This is not a Province-wide intervention. Since it is based on science and is a scientific study, that should go forward through the proper channels.

1508. **The Chairperson**: Will they grant licences?

1509. **Mr McKee**: You are asking me to speak for the DOE and the NIEA, and I cannot do that, nor can they comment until they have the scientific proposal and the details, safeguards and checks and balances that will be designed. You are asking a question that I cannot answer. That is their responsibility.

1510. **The Chairperson**: In your answer, you are ruling out a Province-wide programme.

1511. **Mr McKee**: We are proposing a scientific study to see whether this

approach has merit, whether it works and what the effect will be in relation to badgers and cattle. That is where we are. Until those answers are to hand, we cannot speculate on what will happen thereafter.

1512. **The Chairperson**: We have yet to receive any feedback or outcomes on the biosecurity study that has been done. Nothing has been published. Why is that?

1513. **Mrs McMaster**: AFBI is carrying out the TB biosecurity study, and the expectation is that the study will be completed by December 2012. AFBI has had a staff vacancy in a crucial area connected with that study, but that has been resolved, so the work is on track for completion by the end of December. That is why there are no results from the biosecurity study yet.

1514. **The Chairperson**: I will leave it there for the meantime and invite members to ask questions.

1515. **Mr Swann**: Thank you for your presentation. The Minister and officials were in front of us on 3 July with the first airing of their wildlife intervention programme. You will recall, Chair, that that was the first time that any of us had heard about it. I raised concerns with regard to the Brock Stat-Pak test and being able to test live badgers in the field and the number of queries that were around that. If I understand what you are saying, this is scientific research, and you are going to set up a series of computer-based data and modelling, and all the rest of it. That is where we are going with this to see whether it is going to be practicable?

1516. **Mrs McMaster**: That is a scoping phase that is done at the beginning. We need to do that to help us to design the study. It will also help to scope out the costs and make those decisions that we talked about just now around where it would be located, the scale of the study, and so on. Therefore, it is a scoping phase, but the Minister is talking about a field study, which is to apply this approach in the field, but the scoping exercise needs to be completed first.

1517. **Mr Swann**: What is the timeline?

1518. **Mrs McMaster**: We are working with FERA on that. We have sent data from Northern Ireland to help to build the Northern Ireland model, and we expect the modelling bit to be completed in the next couple of months. That will enable us to do the detailed design work.

1519. **Mr Swann**: How long will the design work take?

1520. **Mrs McMaster**: It is really counting back, and we are aiming to work within this time frame. However, the Minister has said that she wants to see the fieldwork starting as early as possible next year. Therefore, that is what we are working towards. We cannot say at this point what date that will happen, but, certainly, we are looking to have something in place by then.

1521. **Mr Swann**: Chair, if you do not mind, I am going to be completely cynical. I think that the Department is on a wild goose chase. When the departmental officials came to us on 3 July, they said that this was going to be something that has never been tried before. Yet, one of the frequently asked questions on the Welsh study into intensive badger vaccination, which was edited in May 2012, was:

"If you are trapping badgers, why not test them for bovine TB?"

1522. That is coming from the Welsh Government.

"There is currently no reliable diagnostic test for bovine TB in live badgers, and it is not practical for badgers infected with bovine TB to be accurately identified in the field."

1523. However, we have a Minister of a Department who is going to commit resource and time into scoping exercises and field trials, which the Welsh Government abandoned in May because the science is not there.

1524. What concerns me is that the Committee took on a serious piece of work in relation to TB, and the Department and Minister came to us in July with a knee-jerk reaction to try to

fob us off to get us off their backs so that we would move swiftly on to another piece of research and another project. The end result is that our agriculture industry and our farmers are going to pay and are going to suffer for this exercise.

1525. I think that the wildlife intervention programme is nothing but window dressing to get this Committee and this study out of the road. I am really concerned about this because I know that there is a lot of good work being done, and there are a lot of good people in the Department who are serious about tackling TB. However, we are going down a line here that is going to take away valuable resource and valuable individuals from something serious. We could look at a better scoping exercise. I think that the Department is flawed in having the wildlife intervention programme. You were talking about sensitivity and specificity. I studied statistics, and I know how percentages can be twisted, but, at 49·2%, I could stand beside a badger in a cage, toss a coin and give you a better specificity.

1526. **Mrs McMaster**: It is not the same as tossing a coin.

1527. **Mr Swann**: With 49·2% accuracy, it is. The specificity of whether you can test those 49·2% positive for TB is the crux of the Brock Stat-Pak. You said in your opening statement that the more infectious they are, the better it is. That is because the more TB there is in a badger, the better the test becomes. Therefore, it is only really going to be of any use with infected badgers.

1528. We are still looking at animal welfare. If you want to go down the line of welfare of badgers in regard to all this, it comes down to the trapping and the time that they are going to spend in the cage.

1529. I would have thought that the Northern Ireland Assembly should at least have the maturity to learn from what the other devolved regions have done. The Committee has spent months looking at research and practices from England and Wales and the four-county trial in the Republic of Ireland. In May 2012, the Welsh said that there was no reliable test. We are wasting time and energy. Our Department is focusing on a modelling and scoping exercise, the crux of which is the ability to test live badgers in-field. That science is not there yet. The model that we will come up with may be of use in future when a more reliable test comes into place, but that science is not there now.

1530. My concern is that if we go ahead with a scoping exercise but put out something that is only 49% accurate, the results of that modelling and scoping exercise are going to come back flawed because the ability to test for TB in badgers is flawed in the first place.

1531. This is not so much a question as a statement of what I think the Department is doing wrong at the moment. Those funds could be better spent and energies could be better placed in other directions. Please do not take this as a criticism of the individuals who are involved in the fieldwork to tackle TB, because I appreciate the valuable work that the Department's staff are doing.

1532. **The Chairperson**: I am going to turn your statement into a question and ask the officials to respond.

1533. **Mrs McMaster**: We cannot really comment on the decision that was made in Wales about their way forward. The distinction is that the Welsh were looking for an immediate intervention approach. You are right; the evidence was not there to use this sort of approach in their situation, which is why they said that they would not go ahead with it as an intervention approach.

1534. We are proposing that piece of research. This approach has not been tested in the field, and that is what we propose to do here in order to test its effectiveness. We are aware of the other approaches that are being taken in England and Wales and our Minister has looked at those.

1535. We can learn from those approaches as they are deployed over the coming

period, but this is a different approach that has not been tested. We believe that it has potential. Our stakeholders across the board support this approach because they see it potentially as a balanced approach. They are also very keen to see whether it would be effective to use in dealing with TB. It has potential here, and we want to explore it to see how it would work here.

1536. We will still be able to learn lessons from the approach that the Welsh have already embarked on, which uses vaccination and the proposed DEFRA approach, which relates to culling. All of that is still tied up in potential legal challenges. There are downsides to other types of approach as well, but this has not been done, and we consider it worth doing.

1537. As for the worth of the results of the modelling and what happens after that, all of it is subject to business case approval by the Department of Finance and Personnel (DFP). Ultimately, it will be subject to a case being made.

1538. **The Chairperson**: How much will it cost?

1539. **Mrs McMaster**: We do not know the cost as yet. That is one of the things that will be better informed by the modelling. Modelling is the scoping phase, and there are a number of decisions and more information that will be available to us as a result of that. It will help scope out what will be involved and, therefore, the potential cost.

1540. **The Chairperson**: How much have we allocated for the scoping phase?

1541. **Mrs McMaster**: The scoping phase will cost —

1542. **Mr McKee**: It will cost between £30,000 and £50,000. The design cost will come from existing DARD epidemiology staff resources. We will work that cost up. There will also be costs for the necessary sett survey when we reach the point when we have an area or areas in view, whatever size they will be. That has to be done as well. That can be taken forward in the relatively near future, once we have the design.

1543. I want to come back to the point about the toss of the coin, if you do not mind, because it is important. I appreciate that it deals with a subset of animals and is random, but the RTA, or road traffic accident, study in badgers indicates that post-mortem examinations show 16% to 20% of them to be infected. So, we should not go away with the idea that every badger in the country has TB and is spreading TB. Badgers are a contributory factor — no one is in any doubt about that — but we have to be proportionate. If we went in with any other intervention, we would take out a lot of animals that are free of disease and, therefore, incur legal action. Of the animals that will be taken in this study, the most heavily infected will be detected by the test. DEFRA and the Animal Health and Veterinary Laboratories Agency are working on other tests that may come along within the time frame and give additional assistance.

1544. The animals that are test-negative may be truly negative, in which case they will be vaccinated and protected. If they are in the early stages, there may be some protective element. However, those animals are likely to be caught again the following year and the year following that. Once they test positive, they will be removed. The average lifetime of a badger is three to four years, so the population in that study area will have turned over in that period. Animals that are diseased will be taken out. Animals that are test-negative will be vaccinated.

1545. Dependent on the FERA modelling and the design, it is hoped that there will be an effect on badgers and cattle over that period. That is what we are trying to do, and all stakeholders right across the range are supportive. This is a way to move forward, build consensus and take people with us. I think that it is to be commended and supported. You have said your piece, and that is my statement in response.

1546. **The Chairperson**: We appreciate that because we need to hear it.

1547. **Mr McMullan**: You will be glad to hear that I do not have a lot to say. We have sat here for long enough at every meeting, with the poor Minister being blamed whether we do something or do not do something. Here we are embarking on something that this gentleman has just said is supported by everybody right across the board. We have no evidence that the Welsh are right in what they say. We should go down the road and do what we are doing at the minute and try it. We have been accused before of doing nothing. We have been told before that this is not something that will be sorted out this year or next year. The programme will take years, so we have to start somewhere. We should stop bashing, tossing coins and doing all sorts of tricks and get on with the programme of trying to eradicate this disease.

1548. I am happy enough that the field-testing can go. One of the things that the Welsh said is that it is not possible to do it within 15 or 30 minutes. Are you are happy enough with what they say in their report about it having to be done in twilight and within a period of up to half an hour, the vaccine having to be taken out of cold storage and whatnot?

1549. **Mrs McMaster**: The practical issues will be an important part of the design phase. All those issues will be looked at, and we will have to get that right.

1550. **Mr McMullan**: Once you get it right, you will be happy enough with that. I think that we should go ahead with this and see how this programme can work. Given what has been spent on the programme, it is not that expensive. We have to start somewhere. I am glad to see something like this getting off the ground, because we will be defeating ourselves if we do not look at the positives of it.

1551. **Mr Byrne**: I thank these people for the submission. We were in the middle of carrying out a fairly intensive report. I am a bit disturbed and worried that this is now a half-baked approach. So many open questions have been raised about testing the suspects. This is really a modelling exercise thus far, which begs the question: are we getting into a scientific project? Meantime, however, the incidence of TB is growing. We have heard no explanation yet about why the incidence has grown so much. We have heard about the RTAs. I would say that most of us have been witness to RTAs involving badgers on the side of the road. At least there is some sort of subset that can provide some information.

1552. I have to be concerned, Chairman, as others are, as to whether it was wise to rush into what has happened and been announced. The urgency was created by the Committee. I know, from the letters I got from a few vets, how angry they were about some of the comments I made. The bunny-hugging had to stop.

1553. In the meantime, the EU is asking questions about the cost of the scheme that we have had for a long time. There are so many open questions. The key question is what is the objective of the Department? Is it to look after the interests of the farmer or the interests of the cattle? Or, is it about seeking a balanced approach to also look after the interests of the badger?

1554. **Mrs McMaster**: The commitment of the Department is to eradicate TB in cattle. That is not straightforward. We need to deal with all the disease factors. That will require us to continue with our TB control programme, which, as Colin set out, deals with and continues the programme based on detecting disease in cattle, removing disease from cattle, and so on. We need to continue doing that, and we may need additional measures to add to and improve on that. We are not aware, at this stage, what the precise reasons are for the rise in incidence, but it is something that we are continuing to look at. That may lead to further measures having to be considered.

1555. Another element is trying to establish the evidence to fill the gaps that we know are there, to help us to better understand what more we can do to help to eradicate TB. That is the role of the

TB and wildlife research and studies. The TVR approach, which we talked about, is a significant part of that. Other research and studies are ongoing —

1556. **Mr Byrne**: Tell me, Colette, at this stage, is the Department aware of what the actual badger population is and the pattern of that population over the past 10 years?

1557. **Mrs McMaster**: A badger population survey commissioned by DARD was carried out a few years ago.

1558. **Mr Byrne**: How many years ago?

1559. **Mrs McMaster**: I think that the number of badgers is about 35,000.

1560. **Mr Byrne**: When was the previous survey done?

1561. **Mr McKee**: The previous survey was done about 10 years before that, and the numbers were slightly higher. There is a fluctuation in the population, so it was within tolerance.

1562. **Mr Byrne**: Is there or is there not a correlation between badger population and the incidence of bovine TB?

1563. **Mr McKee**: The badger population has not exploded. It has not increased exponentially. The population is about 33,000 to 35,000 individuals.

1564. **Mr Irwin**: My question relates to the different strains of TB. My experience is that of a farmer. We have had farms where one or two animals out of 500 go down and other farms where 300 or 400 animals go down. Obviously, different strains are more aggressive than others. Has the Department done trials on identifying those strains? I went to a departmental official once, after a very big outbreak in County Armagh, and the official told me that that strain came from Newtownards and was very aggressive. Obviously, the Department knows that there are different strains and highly aggressive strains. What has the Department done, or what can it do, in relation to that?

1565. **Mrs McMaster**: AFBI has done quite a bit of work on strain typing over a number of years. The Veterinary Service has a comprehensive database of herd- and animal-level information. It has access also to strain typing information from AFBI. AFBI also has information on the strain type of badgers, which was captured in the RTA study. So, a pool of information is available, and Colin will perhaps tell us how that can be used in the programme.

1566. We have asked AFBI to produce a proposal for an evaluation of strain typing data to see how it can be best used in the programme. We want to explore how we can use that information to best advantage. We are waiting for a proposal from AFBI for that work. I will bring in Colin, who will discuss the information that is available.

1567. **Mr Hart**: Thanks, Colette. Perhaps you are asking, William, whether we can link particular strains of TB to those aggressive breakdowns that we see throughout the country. I asked AFBI that, and my understanding is that, at present, there is no linkage with the strain. It is counter-intuitive; you would suspect that some of those really bad breakdowns were caused by certain strains. In fact, there is no evidence at present to show that. That is my understanding of the AFBI research, but we can verify that for you.

1568. If you will allow me to go on for a second, I will discuss the issue that Colette mentioned. We use strain typing routinely. Our veterinary officers (VO) carry out investigations of TB breakdowns. I have some 60 staff doing that throughout the country, but I am not sure that that is always appreciated. At the moment, there are some 60 people out there — the equivalent of 50 full-time staff — spending an awful lot of time on TB. One thing that they now routinely ask for is the result of the variable-number tandem-repeat (VNTR) strain typing from AFBI. At times, that shows us some interesting pictures. For example, it shows us where a new strain, as you mentioned, has come into an area.

1569. By and large, strains are very much geographically located. They tend to be found in wildlife, such as badgers, and cattle in the same area. So, when an animal moves some distance as the result of a sale and brings a strain of TB into a new area, it is quite striking when that animal goes down and tests show that the strain is not local. It allows you to say with a fair degree of confidence that that particular outbreak was caused by a bought-in animal. In fact, because some big beef-finishing units buy animals from all over the place, we tend to find that they could have multiple strains on their farms. Therefore, the work that AFBI has done on strain typing is really exciting. As I said to the Committee previously, it is really useful in getting that wee bit more information.

1570. Unfortunately, if the TB outbreak is caused by the same strain that is in local badgers and all the local farms, it can be quite hard for VOs. Often, they will record that it is "local spread". That just means that the strain is in local badgers or local farms. In other words, they do not know.

1571. William's immediate question is whether the strains are linked to the aggressiveness of the disease. My understanding of a conversation that I had recently with Sam Strain, the expert in AFBI, is that that is not the case. Like you, I questioned that. However, it seems that that is not the case.

1572. **Mr Irwin**: Have you any explanation why one herd could have several hundred animals go down over a few months and in a neighbouring similar-sized herd down the road, where TB is also present, only two animals go down? Obviously, there has to be some explanation why a large number of animals would go down in a herd. I am talking about dairy herds. In the main, beef herds are in one place only for a few months before they are moved on or fattened and killed. Normally, in dairy herds, animals are there for 10 or 12 years in some instances and are, therefore, more liable to contract TB. In seems very strange that large numbers should go down with a bang in one herd and a neighbouring herd down the road that also has TB should lose only one or two animals.

1573. **Mr Hart**: The answer is that that is more complex. There is, perhaps, a combination of factors. Again, AFBI has identified the possibility that the breeding of the animal could be a predisposing factor. For example, a predisposition to liver fluke in the herd can make them more susceptible, and other diseases that they have at the same time can also make them more susceptible.

1574. There are also the animal factors to consider. You have probably heard of TB cases where the veterinary term "anergic" is used, which means that although an animal may be riddled with TB, it has reached a stage where it cannot react to the TB skin test any more. Those animals can be a serious risk to the herd. They could be spreading TB through milk, through the udder and through leaking in the calving pens, meaning that every animal that goes through the calving pen subsequently becomes infected.

1575. We have also had breakdowns where all the age groups were affected because they were all under one roof, so there is clearly a respiratory element to the disease as well. If you have an animal that is coughing large numbers of TB bacteria under one particular roof, all age groups are affected. I have seen that myself. Bear in mind that the infectious dose for TB is minuscule; it could take only one bacterium to infect an animal, whereas in many other diseases, you need something like 100,000 organisms to start off an infection. TB is quite unique: one single organism or a small number can start up that nucleus of infection and spread it very widely. So, what combination of factors leads to a whole herd going down? We see such cases, which are horrendous, such as a herd of 300 with 200 reactors, all with lesions. I have seen them myself, and I have done post-mortems on them in the abattoir. It is quite astounding when you see it, but nobody quite knows yet why it happens, because the same strain in the next

herd has infected maybe only one animal. So, as far as we know, it is not a strain effect; it is probably much more complex than that.

1576. **Mr Irwin**: Following what the Chairman said about the tests, if I am right, the test that is used today probably goes back 50 years. I am not sure. It is a long, long time since I was very small, but given that technology has moved on between the days of the horse and cart and today, surely more should have been done. I am not blaming the Department for that, but it would seem to the average person that we have not moved on in 50 years in testing cattle.

1577. **Mrs McMaster**: You are right. The skin test is standard, and it is the recognised EU test for screening, and it is recognised worldwide for international trade. It is the test that has been used, and it the most reliable test that is available at this time. TB is such a complex disease. Work is ongoing to look at the possibility of new tests, and so on, and we will continue to keep in touch with that. However, it is a complex disease, and it is obviously difficult to come up with a test that improves on the skin test. Supplementary tests approved by the EU, such as gamma-interferon blood tests, can be used not in place of but as a supplement to the skin test. We obviously make use of that test in our programme.

1578. We talked about the limitations of the test. It is a screening test that we use as part of our annual test, and, from the screening point of view, it is useful at herd level, which is how we use it rather than at animal level. The test is probably less accurate or reliable at individual animal level than at herd level, but at herd level, which is where we use it to screen as part of our programme, it helps to mitigate that.

1579. **The Chairperson**: I have a couple of questions on matters that we have not touched on today but that we really need to have some sort of input on for a review. Why has the Department never contemplated finishing units here in Northern Ireland?

1580. **Mrs McMaster**: We have looked at that in the past; in fact, it has been raised by the Ulster Farmers' Union (UFU) in the press. Perhaps that is what you are referring to. We are in discussion with the Ulster Farmers' Union about this. It was discussed last week at our animal health and welfare stakeholder forum with the Ulster Farmers' Union and other key stakeholders. In fact, there is a further meeting tomorrow. So, it is something that we have been doing. Obviously, we are trying to clarify the need that exists, and we are aware of UFU concerns about potential difficulties this winter through a shortage of forage. So, I think that we now have an understanding of the issues and concerns. There is a meeting tomorrow, so not to pre-empt that discussion, I will say that we will have to see where it goes.

1581. It is possibly a different sort of issue than that of the approved finishing units, which we looked at in the past. We looked at industry proposals and drew some up ourselves for industry to look at. Ian can come in on this, but it was very difficult to come up with proposals for a system that would minimise the disease risks and still work at a practical level. That was the issue.

1582. **The Chairperson**: It would aid business in that they could actually get finished in some areas, which they cannot now. I know the severity of the immediate threat, and that is what the Ulster Farmers' Union is talking about, but these have existed in England. I was talking about those. If the Department has information, or even proposals that it was contemplating at one time, we would like sight of them if possible just to see where we would go and what view we would take as a Committee on that. So, the concern is not necessarily directed at the immediate threat that the industry is under, but the issue is just about helping the industry in the fight against bovine TB.

1583. Over the past couple of months, myself and other Committee members visited farmers who have been continuously down with TB and cannot get lifted. I think that, in one case, that has been

the situation since 2007. It is really hard to quantify the stress and pain that the family are going through with being down for so long. Their business is nearly wiped out. Yet all that is happening is testing, re-testing and testing again.

1584. The Committee needs to know the Department's definition of a "chronic herd". Is it to do with time, the number of breakdowns or reactors, or the percentage of the herd that is affected? I know that there is a piece of work on researching chronic herds. Where are we with that? I think that a serious piece of work could be done on that that maybe has not been done but that really needs to be.

1585. **Mrs McMaster**: It is important to do work in that area, and we have commissioned AFBI to develop a proposal to investigate the risk factors that are associated with herds that have persistent or chronic infection so that reducing disease in those herds can be helped. We are waiting for that proposal from AFBI, but we recognise the issue.

1586. **The Chairperson**: Will AFBI define "chronic herd", or have you set that definition?

1587. **Mrs McMaster**: The Department has its own view of what a chronic herd is from its veterinary epidemiology unit.

1588. **Mr McKee**: I spoke this morning to the person who is interrogating all the APHIS data for this. Reviewing all the documentation from 1995 to the present, it seems that quite a number of herds have gone down repeatedly. You could look at the past two years and decide what was a chronic herd in that time frame, but you might miss quite a proportion. So, they are looking to see how far they need to go back to establish what is a chronic herd. That is because a herd that has repeated maybe five times over the past 15 years may be chronic, whereas one that has gone down only twice but that has really been part of a continuous cycle may be different. So, there are issues to be sorted out. If you go too wide, it then becomes just too big a problem. However, around 70% of reactors are coming from about 30% of herds. Now, if we could deal with those 20 or 30 worst herds, we would be greatly reducing the burden of infection. That is where we want to get to. So, veterinary epidemiologists are working on that at the moment, and it will then go across to AFBI for further research into what is causing it. I consider that to be an important area that it is vital that the Department takes forward.

1589. Just when I have the opportunity, I will go back to the other issue, which is the approved quarantine or fattening units. We have looked at that in times past, but we need to be careful. I know that one divisional veterinary officer (DVO) — I will not mention areas or anything — was approached by an absolutely reputable farmer who had a problem. They tried to work together to come up with a set or proposals that would enable him to trade with less testing while ensuring that there was no increased risk to neighbours. They could not square that initiative, which was devised between the two of them. However, word got out that it might be a possibility, and people who perhaps were not as good at gathering animals in for testing might have been interested in it. So, we have to be very careful.

1590. Although there are approved fattening units in GB, I know from visits from the Food and Veterinary Office, as well as from EU task force members, that Europe looked askance at them. Those in GB have not been told to stop the practice, but we do not want to go into something that creates an issue that, first, is ruled against by Europe in a short period, meaning that we lose our approval for our programme and that, secondly, by dealing with one issue, could create a bigger problem for neighbours because we are doing less testing in that area.

1591. However, the main problem that is coming forward is that the terminology that was used was "approved fattening units", but when we asked the question about it, we were told that it is a welfare issue that is current, needs to be dealt

with, and for which there is discretion for dealing with. We will take it forward with the Ulster Farmers' Union.

1592. Sorry, I may have confused the two issues.

1593. **The Chairperson**: No. You have not; you actually clarified them.

1594. **Mr McKee**: That is OK.

1595. **The Chairperson**: Do you want to ask a question, Oliver?

1596. **Mr McMullan**: No, Chair. Mr McKee has cleared the issue up for me.

1597. **The Chairperson**: There is one question that we have to tackle. Forgive me, members, but we have to make sure that we are as thorough as we can possibly be, because this is our last chance with the Department. This issue concerns cattle history, pedigree and the genetics of the beasts, and the relationship between buyer and seller. It can also be a sensitive issue, of course, as it affects business. Where are we in that regard? Where are we with cattle history, movements of cattle and everything else? How much does the Department feel that it has to close down on that issue and restrict it to help in the fight against bovine TB? I know that that is a very sensitive issue, but the Committee needs to assess it.

1598. **Mrs McMaster**: I will start to answer that question, and others can come in on it. Obviously, we have information in APHIS, as well as historic information. An issue of data protection needs to be looked at. From DARD's point of view, the information comes from our system. This has come up in our work with the industry as it develops its BVD initiative. It is an issue that is absolutely between two herd keepers, a buyer and a seller. If they ask for information, they will be provided with it. It is up to industry to extend it beyond two buyers, if they wanted to do so. However, for government, there are legal issues on data protection to consider.

1599. **The Chairperson**: Are you satisfied that there are adequate standards?

1600. **Mrs McMaster**: Standards in relation to?

1601. **The Chairperson**: In relation to knowledge. Are we there with best practice? Are you content with the way that people buy and sell?

1602. **Mrs McMaster**: I will ask Colin to come in on that.

1603. **Mr Hart**: We had that discussion with our stakeholders only this week. Best practice would be to operate a closed herd, but, as you would imagine, when we mentioned that to stakeholders, it was pointed out, quite fairly, that the majority of farmers in Northern Ireland are not in the nice position of being able to operate a closed herd.

1604. Your question, Chairman, is very pertinent because buying in from a reputable source is next to the best practice of keeping a closed herd. What is a reputable source when it comes to TB, and how much information can you get on that? A farm-to-farm sale is probably a good idea, especially if you know the person you are buying off, because they will probably tell you straight the way that things are. A regular supply, such as that that the pig industry has operated for years, between a breeder and a finisher would be a very reliable way to do things, particularly if you build up confidence that the breeder's cattle are generally free of TB when you get them tested. However, there are other permutations, and if you start to take this through the supply chain, you will see that it gets more complicated. I reiterate Colette's point: the industry could probably do a lot more to set its standards, and, as a vet, I would encourage that. It would be very good practice to take that a stage further.

1605. **The Chairperson**: OK. Ian, do you want to come in on that?

1606. **Mr McKee**: I just want to say that in recent days, the industry in England has been having a conversation — "conversation" is the word that it is using — about risk-based trading, and it will be interesting to see how that develops. The industry may be able to

come up with a protocol to ensure that, as far as possible, risk is taken out of its trading arrangements, because half the country has a TB problem and the other half does not or it is not as apparent. There may be some pockets, but it wants to ensure that the diseased part does not infect the undiseased part. So, the industry is talking about risk-based trading. That could change the dynamic, and good practice from anywhere can be imported.

1607. **The Chairperson**: No other members want to come in. Thank you very much for your time and attendance today. It is very much appreciated. You know how important the issue is to the Committee, and I know that it is important to you.

Appendix 3

Written Submissions

Appendix 3 – Written Submissions

1. Agri-Food and Biosciences Institute
2. Animal Health and Veterinary Laboratories Agency
3. The Association of Veterinary Surgeons Practising in Northern Ireland and the North of Ireland Veterinary Association
4. The Bow Group
5. Council for Nature Conservation and the Countryside Submission
6. Dairy UK
7. Department for Agriculture and Rural Development
8. Dr E F Logan
9. Food and Environment Research Agency
10. Farmers for Action
11. Livestock and Meat Commission
12. National Beef Association
13. Northern Ireland Audit Office
14. Northern Ireland Badger Group
15. Northern Ireland Agricultural Producers' Association
16. National Trust
17. Queens University Belfast
18. Ulster Farmers' Union
19. Ulster Wildlife Trust

AFBI letter re. Bovine TB

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Stella McArdle
Clerk to the Committee for
Agriculture and Rural Development

19 April 2012

Dear Stella,

RE: Review of Bovine Tuberculosis – AFBI written submission

I would like to thank the Northern Ireland Assembly Committee for Agriculture and Rural Development for the recent invitation for AFBI to make a written submission and to give a presentation during your thematic review of Bovine Tuberculosis (TB).

As the Committee will be aware, Bovine TB is the most complex and difficult endemic animal disease currently facing Government, the veterinary profession and the farming industry in the UK and Ireland. AFBI has substantial scientific expertise and experience in Bovine TB, which should be relevant to your review and we are very happy to accept your invitation.

Enclosed is a written submission which provides a brief summary of the current scientific evidence on the main issues listed in the Committee's Terms of Reference for their thematic review on Bovine TB as well information on AFBI's statutory and research work on the disease. A background on AFBI and the staff attending is supplied as an appendix.

We look forward to a helping the Committee in whatever way we can during the review.

Yours sincerely

Professor Seamus Kennedy
Chief Executive

Agri-Food & Biosciences Institute (AFBI)

Committee for Agriculture and Rural Development
Review of Bovine Tuberculosis

Written Evidence from the Agri-Food & Biosciences Institute (AFBI)

Background to Bovine TB (bTB) Work at AFBI

1. AFBI's work on bTB includes a range of statutory and analytical testing for DARD, as well as a significant programme of research supported by DARD and other research funders.

Statutory and analytical work

2. The statutory and analytical work on bTB undertaken at AFBI is in direct support of the NI control program, and as required by European legislation. This work includes confirmation of bovine TB using a combination of histology, culture and molecular confirmation; performance of supplementary (blood) testing using interferon gamma (IFNG) assays; high resolution strain typing of TB isolates; and the laboratory examination of road kill badgers. DNA forensic typing of cattle by AFBI is also used by DARD to investigate potential cases of cattle identity fraud. All statutory tests are performed to EU and international methodology and to the ISO/IEC 17025(2000) accreditation quality standard.

AFBI bTB Research

3. AFBI has an international reputation for its research work on bTB, with key staff active in collaborative, international research networks. In total, AFBI staff have published or co-authored approximately 140 refereed scientific papers on bovine TB, as well as numerous non-refereed papers, scientific conference talks and technology transfer events. The work includes applied and basic research, reflecting the mix of DARD and externally-funded work.

4. The organisation has secured substantial external (non-DARD) funding for research in TB in a competitive, international field. The majority of these external projects are undertaken in collaboration with world-leading institutes across the UK, Ireland, and elsewhere, and allows NI to benefit from the latest international research findings. Recent external funders include the EU, Defra, the Biotechnology and Biological Sciences Research Council (BBSRC), and Science Foundation Ireland.

5. Core DARD research funding in key areas such as TB molecular biology and immunology has been, and remains, critical to both this research effort and the statutory testing programme, and is necessary to maintain the capacity and expertise needed to undertake high quality internationally competitive research.

Introduction to Bovine TB

6. Bovine TB, which is caused by the bacterium Mycobacterium bovis, is generally recognised as the most difficult endemic animal disease problem in the UK and Ireland.

7. BTB is primarily a chronic respiratory disease of cattle, which in the advanced stage, is associated with loss of productivity. The causal organism presents a potential risk to human health, although such infections are now rare in developed countries due principally to the introduction of milk pasteurisation. Control of the disease is required under European legislation.

Bovine TB Transmission

8. The epidemiology of bovine TB is complex, with current evidence indicating both cattle and wildlife sources of infection. The relative importance of these two sources is not known and importantly will vary across regions and over time, with factors such as the adequacy of cattle control measures, the infection pressure in wildlife populations and the degree of interaction between cattle and wildlife species being relevant.

Cattle-to-cattle transmission

9. BTB is primarily a respiratory (lung) disease of cattle and prior to the introduction of test and slaughter programmes, cattle-to-cattle transmission would have overwhelmingly predominated.

10. The predominant mechanism of cattle-to-cattle transmission is via aerosol involving close contact between animals. Indirect transmission via faeces and contaminated objects is thought to be much less important, but cannot be discounted. Milk-borne infection (e.g. from cow to calf) can also occur on occasions.

11. Recent evidence, including collaborative work undertaken by AFBI and the Roslin Institute (University of Edinburgh), indicates that cattle vary in their genetic susceptibility to infection, raising the prospect of breeding animals with increased resistance to bTB. Variability in the susceptibility and infectiousness of individual animals due to non-genetic effects, such as inter-current disease and physiological status, are also likely.

Wildlife-to-cattle transmission

12. Wildlife reservoirs of bTB infection are recognised in a number of countries, including possums in New Zealand, white tailed deer in Michigan USA and wild boar on the Iberian peninsula. A wildlife source was first suspected in GB due to persistent foci of bTB infection in SW England and infected badgers were detected in Gloucestershire in 1971. Reports of infected badgers followed from the RoI and from 'Road Traffic Accident' surveys in NI.

13. Although bTB infection has been recorded in a range of both domestic and wildlife species, only badgers and possibly deer in some localised areas, are thought to be significant in the UK and Ireland. The evidence implicating badgers in the epidemiology of bTB includes the recorded occurrence of the infection in badgers; spatial similarities in the strain types infecting badgers and cattle; and the results of badger removal trials which have either increased or decreased the incidence of TB in cattle.

14. Badger to cattle transmission is thought to occur either directly via aerosol transmission when there is close contact between the species or indirectly via contaminated urine or faeces. Current evidence would tend to favour direct aerosol transmission though this is not conclusive. There is also published evidence from GB indicating cattle-to-badger transmission.

BTB Control: Cattle Testing

15. Control of bTB was first initiated due to the human health risk with voluntary test and slaughter schemes introduced in the UK in the 1930s and later followed by compulsory schemes. Prior to the introduction of control schemes, infection in cattle was widespread with some estimates indicting 20-40% of cattle to be infected.

16. The aim of test and slaughter programmes is to detect and remove infected cattle as early as possible and thereby minimise the likelihood of further cattle to cattle spread. Importantly the effectiveness of these programmes depends on the accuracy of the tests used, as well as the nature of infectious contacts between animals.

17. Skin testing remains the standard test used in bTB control schemes worldwide, albeit in slightly different formats. The UK and Ireland use the single comparative intradermal tuberculin test (SCITT). This test has a very high specificity (~99.9%) meaning that there

are relatively few false positive reactions. Estimates of sensitivity, which is a measure of how good the test is at detecting infected animals, are however variable (~55-90%). Recent estimates tend towards the lower end of this range and test sensitivity could probably be best described as moderate. Overall sensitivity of the SCITT at a herd level is however higher particularly with regular testing and when used with greater frequency in breakdown herds.

18. Efforts to develop alternative blood based tests have been hampered by the complex nature of the disease. The most common alternative test in use, including at AFBI, is the interferon gamma (IFNG) assay. This test has a higher sensitivity, but in its current format is more costly than the SCITT test and has a lower specificity (higher numbers of false positives), which limits its application to high risk situations.

19. There is evidence to indicate that bTB test sensitivity may be reduced by other diseases including Johne's disease and fluke infestation. This evidence includes work by AFBI in collaboration with University College Dublin, which has demonstrated experimentally that co-infection with the common parasite liver fluke reduces the immune response to bTB, as measured by both the skin and IFNG tests.

Biosecurity

20. Fundamentally BTB is an infectious disease (albeit that this appears variable) and biosecurity measures to limit transmission are a necessary part of control.

Measures to minimize cattle to cattle transmission

21. A broad range of measures have been proposed to prevent cattle to cattle transmission, based on minimising the likelihood of both direct and indirect transmission. These include cessation or limiting cattle purchases; pre- and / or post-movement testing; preventing close contact between neighbouring herds; biosecurity awareness;cattle and effluent management; and avoiding sharing equipment, etc.

Measures to prevent wildlife to cattle transmission

22. Measures to prevent wildlife to cattle transmission are more uncertain due to the more limited evidence base. For convenience these measures can be divided into measures at housing and at pasture. Measures at housing include preventing direct badger-cattle transmission by preventing badger incursions into farm buildings and preventing direct/ indirect transmission by stopping badger access to feed and silage stores. Measures at pasture are aimed mainly at stopping indirect contact and include raising feed and water troughs, fencing off access to badger setts and alterations to grazing patterns.

Dealing with TB in Wildlife

23. Dealing with TB in wildlife, and in badgers in particular, presents fundamental difficulties and can have unintended consequences. Direct intervention options are either badger culling or vaccination.

Badger culling

24. The results of badger culling interventions and trials are complex, and we have included only salient points here. In GB a series of badger culling approaches were undertaken during the 1970s, 80s and 90s with few conclusive outcomes. The Krebs review (1997) led to establishment of the Randomised Badger Culling Trial (RBCT) which compared proactive (area based) and reactive culling (in response to individual farm breakdowns) to areas where no culling took place. In brief, proactive culling in the trial was associated with a modest beneficial effect (decrease in bTB) within the cull area but an initial detrimental effect (rise in bTB) in the 2km surrounding area (attributed by the authors to the so-called perturbation

effect). Preliminary results from the reactive culling element showed a detrimental effect in the prevalence of bTB in local herds, and this part of the trial was stopped early. Results from the 'Four Area Trial' and the earlier East Offaly project in Ireland have shown beneficial effects from an area based culling approach.

25. The potential benefits of area-based culling do however need to be balanced against the ecological impact and the significant economic cost. Extrapolation of trial results to other areas with differing parameters such as badger densities, cattle density, husbandry and testing regimes, also requires a significant caution. Culling of small targeted areas will also have very limited impact on overall regional or national bTB levels.

Badger Vaccination

26. Currently there is one licensed vaccine (BCG), but notably this is an injectable vaccine and requires badgers to be caught (cage trapping) with all of the associated costs. Experimental and field data have shown the vaccine to give reasonable protection, but large field trials to demonstrate the impact on cattle bTB levels have not been undertaken. Further work on oral delivery vaccines is on-going in both GB and Ireland.

Overview of AFBI TB Research

27. Due to the complex nature of bTB including the organism itself, the response of cattle to infection, the limitations of currently available diagnostic tests and vaccines, and major gaps in our knowledge of interactions between wildlife and cattle, disease eradication can only be based on increased emphasis on research.

Molecular and strain typing research

28. AFBI scientists have been at the forefront of developing strain typing methods for M. bovis, including the identification of genetic markers that are used internationally. These rapid and high-resolution techniques are applied routinely in NI as an aid to identifying sources of infection and for surveillance purposes (e.g. to track emerging strains). This surveillance has shown marked geographical clustering of strains, suggesting that the epidemic tends to be driven by local transmission events.

29. Importantly the integration of strain typing information with cattle movement and test data has started to answer fundamental questions about bovine TB epidemiology, including issues such as: is there strain variation in virulence?; are there strains which evade current skin tests?; how do cattle and wildlife strains compare?; what is the role of cattle movement?; how do NI strains compare to strains in GB, Ireland and beyond?

30. The work on strain typing has also led to other significant areas of investigation. Examples include the work on genetic susceptibility referred to earlier. A further recent pilot study with the University of Glasgow is using whole genome sequence methods to compare cattle and badger isolates at the highest level of detail possible and to model transmission events

Immunology research

31. Understanding the cattle immune response to infection is crucial to understanding bTB and to developing improved diagnostics and vaccines. Bovine TB immunological R&D at AFBI has included: understanding the early immune response; disease transmission between cattle; developing new diagnostics reagents; trialling novel vaccine candidates; and characterising the effects of co-infection on disease development and diagnosis.

32. Some examples of early work include the characterisation of the cells involved in the early immune response. Work in collaboration with other groups demonstrated the potential of a unique antigen, ESAT6, which is highly specific to TB and now used in the IFNG test. Central to this work has been the development of bovine models of infection that closely mimic

natural infection using high containment facilities. AFBI's infection model is used widely in international collaborative research projects.

33. Bovine and human TB have many striking similarities. The expertise established at AFBI has attracted collaborative research from experts in human TB, leading to the sharing of diagnostic reagents and opportunities to evaluate potential new vaccines. Recently AFBI secured EU funding to develop a ferret infection model (to mimic badger infection). Work using this model has started to evaluate a novel vaccine candidate, which may offer advantages over the current TB vaccine (BCG) in conferring protection in animals that are already infected.

Epidemiology and Ecology R&D

34. Routine data collation and the majority of epidemiological research on bTB in Northern Ireland has to date been undertaken in-house by DARD's Veterinary Service. AFBI has however been recently funded by DARD to undertake three projects including: the TB Biosecurity Study, an analysis of IFNG testing and an ecological project on cattle-wildlife interactions. These projects are on-going at present.

Future TB Research Needs

35. While significant bTB R&D has been undertaken both in NI and elsewhere, the challenges of bTB control are immense, with a multiplicity of factors driving both short and long-term disease trends.

36. Research in a number of areas is needed to address this challenge. In relation to cattle some examples include work to better understand: cattle to cattle transmission and the circumstances in which it most occurs; the impact of genetic and non-genetic effects on susceptibility; the effect of intercurrent diseases, including their impact on skin and other tests; improved bTB diagnostic tests including further development of IFNG and other assays; improved understanding of the general and molecular epidemiology of the disease.

37. In relation to wildlife, there is the need to better understand badger-cattle interactions and how best to minimise contact between these species. Work in relation to vaccine efficacy, improved vaccines and vaccine-delivery mechanisms are also long-term requirements.

38. In 2010, DARD commissioned AFBI to undertake four reviews of the scientific literature on cattle and wildlife bTB issues to help inform DARD considerations of future R&D needs. These reviews are available on the DARD website.

19th April 2012

Appendix 1

Agri-Food & Biosciences Institute (AFBI)

The Agri-Food & Biosciences Institute (AFBI) was created on 1st April 2006 as an amalgamation of the DARD Science Service and the Agricultural Research Institute of Northern Ireland (ARINI). AFBI is a DARD Non-Departmental Public Body (NDPB) responsible for undertaking research and development, statutory, analytical, and diagnostic testing functions for DARD and other Government departments, public bodies and commercial companies.

Staff Attending

Professor Seamus Kennedy, AFBI CEO

Professor Seamus Kennedy was appointed Chief Executive Officer of AFBI in January 2011 after having acted in that role since December 2009. Previously he was Deputy Chief Executive Officer of AFBI and Head of its Veterinary Sciences Division (VSD) since formation of the Institute in April 2006. He joined VSD in 1980.

He is a graduate in veterinary medicine, has specialised in veterinary pathology, is a Fellow of the Royal College of Pathologists, a member of the Royal College of Veterinary Surgeons, and a diplomate of the European College of Veterinary Pathologists.

He was President of the European Society of Veterinary Pathology from 2006 to 2009, and is author of over 130 refereed papers on animal disease. He is a member of the Editorial Boards of the Journal of Comparative Pathology and the Irish Veterinary Journal. He has made numerous invited presentations at national and international scientific conferences and is author of several book chapters. He was a visiting Professor of Veterinary Pathology at Purdue University, Indiana, USA in 1987.

Dr. Stanley McDowell, BVM&S MSc DLSHTM PhD MRCVS
Senior Veterinary Research Officer and Head of Bacteriology Branch AFBI

Dr Stanley McDowell graduated in veterinary medicine from the University of Edinburgh in 1987 and joined VSD as a Veterinary Research Officer in 1990.

He has an MSc in Epidemiology from the University of London, the jointly awarded post-graduate diploma of London School of Hygiene and Tropical Medicine and a PhD for studies on the epidemiology of Salmonella and Campylobacter in production animals. He has been responsible for leading statutory and analytical work on a number of bacterial and zoonotic infections. His research interests have included the food-zoonoses, antimicrobial resistance, brucellosis and work on bovine Tuberculosis. He is the author of over 20 refereed papers, has acted as a reviewer for a number of scientific journals and served on numerous regional and national expert panels.

In October 2010 he was appointed as a Senior Veterinary Research Officer and Head of the Bacteriology Branch, with responsibility for a programme of statutory, analytical and research work on the major veterinary bacterial diseases including bovine tuberculosis, brucellosis, paratuberculosis, and the food-borne zoonoses.

Dr Sam Strain BVMS PhD MRCVS, Veterinary Research Officer AFBI

Dr Sam Strain has worked as a Veterinary Research Officer AFBI since 2004. He is currently head of the AFBI Statutory TB and Brucella Culture Laboratories which provide bacterial diagnostic support to the DARD TB and Brucellosis eradication schemes, and the AFBI TB immunology group which undertakes the laboratory testing of the blood based interferon-gamma TB test on behalf of DARD.

He qualified from the University of Glasgow Veterinary School in 1992, where he also completed a PhD in ruminant immunology in 2001. Prior to this he worked as a general practitioner in mixed mainly cattle veterinary practice for approximately ten years in Scotland and in Northern Ireland.

He is the principle investigator on a number of research projects involving bovine tuberculosis and Johne's disease. His particular interests include the immunological responses to bovine TB and Johne's disease in cattle with a recent emphasis on the effect of co-infection with liver fluke on TB diagnosis. Other areas of his work have included developing models of TB infection in wildlife as tools for the current and future evaluation of wildlife vaccines and in the evaluation of novel vaccines for the control of bovine Johne's.

Dr Robin Skuce BSc PhD, Veterinary Research Officer AFBI

Dr Skuce is a recognised specialist in the application of molecular biology to the diagnosis and tracing of infectious diseases. He has a BSc in Microbiology, a PhD in Molecular Virology and undertook post-doctoral research on the attenuation of poliovirus vaccine strains at the University of Reading.

Since his appointment as Veterinary Research Officer in 1991, Dr Skuce has become recognised internationally for developing new DNA fingerprinting tools to study the evolution and transmission of important bacterial pathogens, bovine and human TB in particular. More recently he has initiated research with collaborators in Edinburgh and Glasgow to investigate genetic predisposition to bovine TB and transmission chains in bovine TB outbreaks, respectively.

Dr Skuce has authored over 50 peer-reviewed publications, several textbook chapters and has been an invited speaker at numerous national and international scientific meetings and conferences. He acts as a reviewer for several veterinary and bio-medical journals and funding bodies and as a external PhD examiner. He has been an invited tutor on the international "TB molecular epidemiology" course at the Institut Pasteur (Paris), a scientific programme auditor at the USDA National Veterinary Diagnostics Centre and invited to lead an EU-TAIEX mission on bovine TB molecular detection and typing.

AHVLA Badger Control Presentation

defra
Department for Environment Food and Rural Affairs

Badger Control in England

AHVLA
Animal Health and Veterinary Laboratories Agency

Badger control

defra
Department for Environment Food and Rural Affairs

- Current approach based on cattle measures alone has failed.
- No single solution to tackling bovine TB –need to use every tool in the toolbox.
- No other country in the world with a similar reservoir in wildlife has eradicated TB from cattle without stringent wildlife control measures.

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defra
Department for Environment Food and Rural Affairs

The Coalition Government committed, as part of a package of measures, to develop affordable options for a carefully-managed and science-led policy of badger control in areas with high and persistent levels of bTB.

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Types of evidence

defra
Department for Environment Food and Rural Affairs

- Scientific - commitment to be 'science led'
- Cost – commitment to be 'affordable'
- Deliverability – commitment to be 'affordable' & 'carefully managed'
- Public opinion
- Legal-risks

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The Evidence Base: The RBCT

Primarily from the Randomised Badger Culling Trial:


letters to nature

transgressive phase of lake sedimentation and most closely associated with the equally minute, and equally abundant, acanthodian *Mesacanthus*. It seems likely that they were transported from a sheltered shallow-water environment and deposited *post mortem* in relatively deep water. The exceptional preservation of internal skeletal details might be associated with

Impact of localized badger culling on tuberculosis incidence in British cattle

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RESEARCH ARTICLE OPEN ACCESS

The Duration of the Effects of Repeated Widespread Badger Culling on Cattle Tuberculosis Following the Cessation of Culling

Article Metrics Related Content Comments: 4

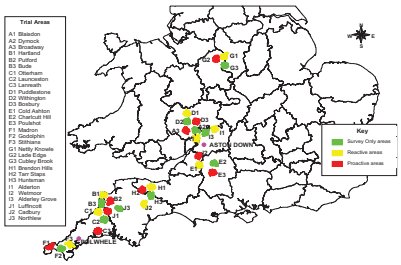
Helen E. Jenkins[1], Rosie Woodroffe[2], Christl A. Donnelly[1,*]

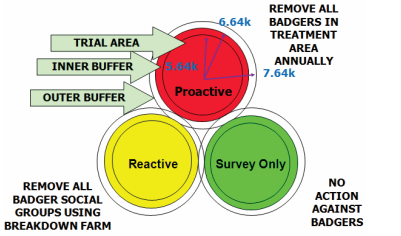
1 Department of Infectious Disease Epidemiology, Imperial College London, London, United Kingdom, 2 Institute of Zoology, London, United Kingdom

ELSEVIER

The effects of annual widespread badger culls on cattle tuberculosis following the cessation of culling

Helen E. Jenkins [a], Rosie Woodroffe [b], Christl A. Donnelly [a,*]





- 9 years (1998-2007)
- 30 x 100km^2 areas
- Nearly £50m taxpayer investment

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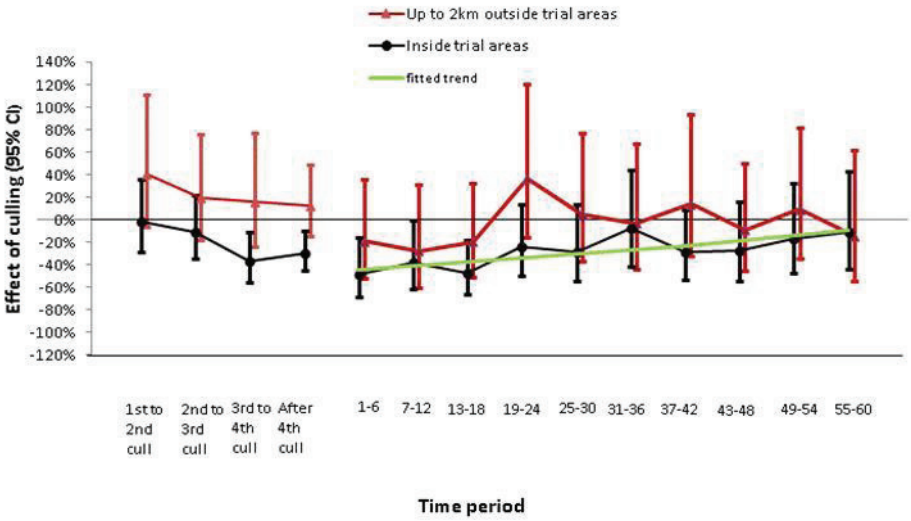
The Evidence Base: The RBCT



Veterinary Laboratories Agency

Figure courtesy of Christl Donnelly, updates Jenkins et al (2010) PLoS ONE

The Evidence Base: The RBCT

- Therefore, if done on a...
  - **sufficient scale,**
  - **in a widespread, coordinated and efficient way,**
  - **and over a sustained period of time,**

  ...culling would reduce the incidence of bovine TB in cattle in high incidence areas.

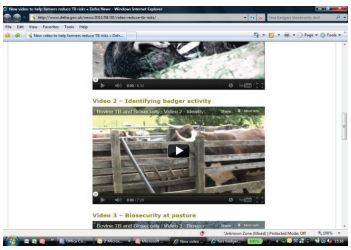
The Evidence Base : Vaccination

- Reduces progression, severity and excretion of TB
- Not 100%; spectrum of protection with no benefit in infected animals
- No evidence of effect of on cattle TB
- Limited experience of use in the field, high cost
- Modelling predicts 5 years culling prevents more CHBs than 5 years vaccination
- Advice: culling carried out in line with the strict licensing criteria will have a greater impact on the spread of TB to cattle than vaccination, but value in offsetting perturbation risks, exit strategy?, use at edge of epidemic?

The Evidence Base: Biosecurity

defra
Department for Environment Food and Rural Affairs

- Suitably tailored & consistently applied measures can reliably exclude badgers from some farm buildings
- Difficulties in preventing contact at pasture
- Consider at individual farm level
- Vary widely in cost & practicality
- No evidence of effect on cattle TB
- Advice: Important role to play alongside other measures, but alone won't lead to substantial reduction in cattle TB



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The Badger Control Policy

defra
Department for Environment Food and Rural Affairs

- To allow Farmers & Landowners apply to Natural England for licences to cull under Protection of Badger Act (1992) and Wildlife & Countryside Act (1981)
- Farmers pay for cost of culling, Government cost of monitoring and policing
- Precautionary approach: pilot in 2 areas first, assessment of effectiveness & humaneness of controlled shooting overseen by an independent panel of scientific experts

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Culling Licence Criteria

- **To increase chance of overall net benefit and mitigate risks associated with perturbation**
- **Based on evidence from RBCT**
  - Area greater than 150km^2 with access to >70% of the area
  - >70% reduction in badger numbers 'simultaneously' over 6 weeks, annual culls for at least 4 years
  - Where possible, boundaries or buffers (includes ring vaccination)
  - Compliance with statutory TB controls , awareness bio-security
  - Cage trapping and shooting and /or controlled shooting of badgers by competent operators

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Pilot areas

- Precautionary approach
- Allow test of assumptions about humaneness and effectiveness of controlled shooting
- Overseen by independent panel of scientific experts: animal welfare, pathology, badger ecology, population biology, statistics, marksmanship and management of wild animal populations
- To report within 6 weeks after first annual cull completed
- Decision on continued use of controlled shooting/wider roll-out of policy made after pilots

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Next steps

- Judicial Review hearing was held on 25-26 June
  - Challenged on 3 grounds: whether correct power used for policy and whether policy could meet the statutory purpose of that power; whether the scale of the economic impact assessment considered by the SoS was adequate; & whether the SoS was legally allowed to issue guidance to Natural England under section 15 of NERCA.
  - Outcome due before end July (possibly sooner)
- Natural England currently considering license applications from 2 areas, decision due following outcome of JR
- Culling expected to commence in Autumn this year

- Thank you for listening.
- Any questions?

AHVLA Vaccination Presentation

Badger and Cattle TB Vaccines

Update for NI ARD Committee

3rd July 2012

AHVLA
Animal Health and Veterinary Laboratories Agency

Developing badger and cattle TB vaccines:

- Developing TB vaccines for badgers and cattle is a high priority Defra.
- We have invested over £39 million on TB vaccines and associated diagnostics R&D since 1998, with a commitment to invest a further £20 million between 2011/12 – 2014/15.
- Vaccines R&D is carried out at the Animal Health and Veterinary Laboratories Agency (AHVLA) and the Food and Environment Research Agency (Fera) with their national and international collaborators.

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Current state of play with badger and cattle TB vaccines:

- Injectable BCG vaccine for badgers:– successfully licensed in 2010.
- Oral BCG vaccine for badgers:– still at research phase and not yet licensable.
- Injectable BCG vaccine for cattle:– research completed and application for licensing made to the Veterinary Medicines Directorate in January 2012. EU legislation prohibiting use is perhaps the biggest challenge.
- Diagnostic test to differentiate infected from vaccinated animals (DIVA test):– prototype test based on the gamma-interferon test developed, validation data being generated - further data from use in vaccinated animals in the field will probably be needed.

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Injectable Badger Vaccine – Regulations:

- BadgerBCG classified as a Prescription Only Medicine – Veterinarian (POM-V) - available through National Veterinary Services (NVS) and Centaur Services Limited (and from this year through Dunlops).
- Under the Veterinary Surgery (Vaccination of Badgers Against Tuberculosis) Order 2010 trained lay vaccinators are allowed to vaccinate badgers by injection (under the direction of a local veterinary surgeon). 73 lay vaccinators currently trained.
- Under the current Veterinary Medicines Regulations veterinary surgeons may prescribe BadgerBCG for use in wild badgers without first carrying out a clinical assessment of the animal in their care as vaccination of badgers for TB has been authorised by the Secretary of State.
- http://fera.defra.gov.uk/wildlife/ecologyManagement/documents/vetGuidelines.pdf

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Injectable Badger Vaccine: Costs and Use

- BadgerBCG costs between £13.94 -16.52 (+VAT) per dose.
- Requires cage trapping – deployment costs ca. £2,250 per km^2.
- Annual vaccination is recommended in view of the approximate 30% annual turnover of the badger population.
- BadgerBCG is currently used in the Defra-funded Badger Vaccine Deployment Project and by the Welsh Government in their badger vaccination project.
- To date limited private uptake, principally by the National Trust, Gloucestershire Wildlife Trust, Badger Trust.
- As part of the badger control policy Defra will provide some limited funding (up to £250,000 per annum) to support vaccination activity and to train lay vaccinators. 26 approved applications for grants towards training and certification for 2012/13.

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Injectable badger vaccine: Effectiveness (1)

- Laboratory studies with captive badgers have shown that vaccination of badgers by injection with BCG reduces the progression, severity and excretion of *Mycobacterium bovis* and is safe for use.
- A four-year licensing field study demonstrated that vaccination with BCG resulted in a 74% reduction in the proportion of wild badgers testing positive to the antibody blood test for TB in badgers (Chambers et al. 2010).
- However, as the blood test is not an absolute indicator of protection from disease, the field results do not tell us the degree of vaccine efficacy.
- Further analysis of the data from the field study has been carried out.

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Injectable badger vaccine: Effectiveness (2)

- BCG is not 100% effective in preventing TB in badgers – expect a spectrum of protection - no benefit in already infected animals.
- In a sustained vaccination campaign the benefits are expected to accrue over time as the number of successfully vaccinated badgers increases, previously infected animals die off and herd immunity builds up in the badger population.
- While we expect badger TB vaccination to result in reduced transmission of TB to cattle, we have no empirical data on this. A large scale field trial, on the scale of the Randomised Badger Culling Trial (RBCT), would be needed to categorically show this.
- We are working with our scientific advisors to see if analysis of cattle data collected during ongoing and future deployment of badger vaccine can be used to measure reduced Cattle Herd Breakdown.

- focus group set up with English, Welsh, Scottish, NI input

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Current state of play with the oral badger TB vaccine:

- Deploying BCG in baits is a potentially cheaper and more practical way of vaccinating badgers in the wild than the injectable vaccine.
- Currently at the research stage – efficacy, safety, bait development, bait deployment optimisation studies underway.
- AHVLA and Fera are working with collaborators and industrial partners in the Republic of Ireland, France, Denmark and New Zealand.
- **Progress relies on scientific breakthroughs as it is a novel technology (compared to injectable BCG) therefore uncertain in outcome and timing but our aim is to develop and licence as quickly as possible.**
- Cannot say with certainty if/when oral badger vaccine deployed in field.

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Current state of play with the cattle TB vaccine:

- Experimental vaccination-challenge studies:- BCG reduces the progression, severity and excretion of TB in cattle.
- Field vaccination studies:- BCG in bovine neonates in Ethiopia demonstrated protective efficacy of between 56% and 68% (Ameni et al. 2010).
- Licensing studies now completed at AHVLA:-
  - Efficacy of BCG in neonates and older cattle
  - Demonstrate safety of BCG in neonates and cattle in each trimester (allows for vaccination in all age groups)
  - Determine duration of immunity (demonstrated out to one year)
- Licensing portfolio submitted to VMD. If satisfied with the results, VMD would be able to provide 'agreement in principle' to license but would not be able to grant an MA due to EU prohibition on TB cattle vaccines.

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EU prohibition on cattle TB vaccination (1)

- Vaccination of cattle against TB is currently prohibited by EU legislation, because BCG vaccination can interfere with the tuberculin skin (and gamma interferon) tests.
- Relevant legislative barriers include:
  - TB vaccination of cattle is prohibited in EU Member States with national TB eradication plans co-financed by the EU (Directive 78/52/EEC).
  - OTF (Officially TB Free) herd accreditation and export trade in live cattle requires tuberculin skin testing (Directive 64/432/EEC). BCG vaccinated cattle could give false positives to the prescribed tuberculin skin tests.
  - Trade in cattle products is tightly controlled by Reg (EC) 853/2004. BCG vaccinated cattle could give false positive results on the skin tests, meaning that they would become TB reactors and their milk could not enter the human food chain.

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EU prohibition on cattle TB vaccination (2)

- Defra is working with the EU to change the current legislation. Early discussions indicate the EU will need:
  - Evidence that the vaccine is safe and effective
  - An internationally validated DIVA test which must be at least as good as the current skin test
  - Acceptance from other Member States
  - Confidence that it will not lead to reduced effort on other control measures
- An opportunity to lift the prohibition has been created by the drafting of the new European Animal Health Law. When the new EU AHL is enacted we hope it will give us a framework to remove the ban; but even then we still need to make this happen - that will require secondary legislation.
- We must not underestimate the difficulties involved.

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DIVA Test

- BCG vaccination of cattle can trigger a positive to both the SICCT skin test and the interferon gamma blood test.
- Studies at AHVLA demonstrate that 80% of BCG vaccinated but uninfected animals were skin test positive 6 months post vaccination although this drops to about 10% 9 months post vaccination.
- Therefore we need a DIVA test to Differentiate Infected from Vaccinated Animals.
- Vaccinated animals that are not infected with TB but test positive to the skin test will be negative to the DIVA.

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DIVA test development

- Based on the gamma interferon test, but the DIVA uses defined antigens that are present in *Mycobacterium bovis* but absent in BCG (whereas avian and bovine tuberculins used in standard test)
- Currently seeking advice from the OIE (World Organisation for Animal Health) on approach to validate the DIVA test
- Would only need to be used in vaccinated cattle which tested positive to the gamma interferon or skin test

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Cattle TB vaccine: What does the science tell us?

- BCG vaccination reduces the progression, severity and excretion of TB and could reduce transmission between animals - will not always prevent infection.
- Could be a useful tool, but not perfect - will still need other TB control measures including tackling addressing TB in the wildlife reservoir.
- Vaccination affects the skin test – but we can now reliably differentiate between vaccinated and infected animals.
- Likely to need annual re-vaccination.

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AVSPNI & NIVA Submission

The Association of Veterinary Surgeons Practising in Northern Ireland

N.I.V.A

Submission on behalf of Association of Veterinary Surgeons Practising in Northern Ireland and the North of Ireland Veterinary Association (Regional Division of the British Veterinary Association (BVA)) to the ARD Committee Review on Bovine Tuberculosis.

1. The Association of Veterinary Surgeons Practising in Northern Ireland (AVSPNI) represents almost 300 veterinary surgeons engaged in clinical practice in Northern Ireland

2. The North of Ireland Veterinary Association (NIVA) is the representative body for the entire veterinary profession in Northern Ireland and the local division of the BVA, which represents 12,500 veterinary surgeons across the UK.

3. The primary aim of a veterinary surgeon is animal health and welfare; no single element of this has more impact than disease eradication. Veterinary surgeons in Northern Ireland, both in practice and within the Department and AFBI, are committed to playing their part in driving forward the eradication of bovine TB.

4. NIVA and AVSPNI would like to thank the ARD Committee for the opportunity to submit evidence to their Review on Bovine Tuberculosis (bTB). We note that the focus of the Committee's review will be on the preventative measures which should be taken in order to reduce the risk of infection. Our submission therefore concentrates on three main areas, biosecurity and cattle movements, wildlife, and bTB testing where we feel that measures could be improved upon or put in place to assist in reducing the risk of infection.

Biosecurity / Movements

5. Commercial livestock producers and governments are primarily inclined to view the health of their livestock as a means to an end, as much an end in itself. As a result, most farmers and governments apply only sufficient biosecurity[1] to maintain the level of herd health necessary for the productivity and freedom to trade which their business model demands.

6. We believe that there is potential for the degree of biosecurity in the cattle sector in Northern Ireland to be greatly improved, and thus the incidence of bTB reduced. However, we acknowledge that this will require a significant expenditure of effort and resources, and note that at present the cattle sector lacks the necessary economic drivers to change cattle farming and business practices.

7. After more than sixty years of testing cattle for bTB, many of those involved in cattle farming now consider bTB as "just a fact of life", albeit an unpleasant one, rather than a disease that they could and should be actively preventing. In order to ensure that Northern Ireland can move towards bTB eradication we believe that it is necessary to re-kindle the cattle industry's enthusiasm for herd health, and to provide tangible economic drivers for change.

8. One such driver could be the creation of a Northern Ireland wide cattle health programme for Bovine Viral Diarrhoea (BVD), Johne's disease and Infectious Bovine Rhinotracheitis (IBR) eradication. We believe that there is real enthusiasm for such a scheme among many cattle

1 The prevention of disease causing agents entering or leaving any place where farm animals are present (or have been present recently).

farmers and feel that the Scheme would be ideal to engender renewed enthusiasm for herd health.

9. A key element of the programme would be a formal commitment to specific biosecurity practices, which would in time become mandatory for all Northern Ireland cattle producers. Biosecurity measures might include:

   a. Integrating production (birth to beef or purchasing direct from known sources rather than open livestock markets);

   b. Insisting on pre and post movement testing of purchases;

   c. Quarantining of purchases;

   d. Avoiding showing livestock;

   e. Restricting use of outlying farms and unfenced land to crops or conservation;

   f. Fencing off high risk areas (badger setts, deer forests);

   g. Preventing wildlife access to feed-stores;

   h. Controlling visitor access to farm premises, land etc.

10. The local veterinary profession is ideally placed to provide advice and guidance to individual farmers on how best to apply these measures to their individual livestock enterprise.

11. A cattle health programme encompassing enhanced biosecurity measures would improve cattle health as a whole and therefore also have a positive impact on bTB. Such improvements would be particularly timely, as many of the other industry elements that impact on biosecurity are also currently positive. NI has the best cattle tracing system in the world; economic indicators are positive in the cattle sector; cattle movements are now lower than those in GB; livestock are spending more of their lives indoors, due to changes in beef production and marketing, and in dairy nutrition and milking practices; and there is increasing market sensitivity to animal health and welfare, and to potential human health issues such as Johne's / Crohn's Disease.

12. The government also has much to gain given the potential risk to our trade with Europe, Scotland and the Republic if levels of bTB and other diseases are not sharply reduced. bTB remains a significant economic issue at national level with ~ 8100 cattle being culled early, and the bTB programme costing an even higher percentage of the agriculture industry's total annual value.

Wildlife / Research

13. NIVA and AVSPNI are clear that wildlife (primarily badgers) contribute significantly to the levels of bTB in our local cattle population, and that any attempt to eradicate the disease from cattle without simultaneously dealing with the reservoir of infection in the local wildlife population is unlikely to succeed.

14. That said, any strategy for the control of the spread of bTB from wildlife to cattle must be based on valid scientific knowledge, and there remain a number of research gaps. Research is needed into the factors that drive badger/ cattle spread so that biosecurity strategies can be made more effective. In addition, the amount and spatial extent of contact from infected badgers in the Northern Irish ecosystem and farming business model needs to be examined so that the impact of a range of local or wider cull or vaccination strategies can be assessed.

15. Applied research is also urgently needed into the effectiveness of a composite catch / cull / vaccinate / test (to differentiate infected / vaccinated badgers) strategy in the local physical and social environment, so that such a strategy can be sustainable and defensible in the

long-term, and yield results in the badger and cattle population that are of clear and lasting benefit.

16. NI should also participate in development and trialling of an oral badger vaccine at the earliest opportunity, bearing in mind the likely time-frame of such a programme, it is essential that an active engagement in this is made as soon as possible.

17. These strategies would also be very beneficial in addressing the health and welfare of the badger population which is currently significantly compromised by the levels of bTB it experiences.

18. We are concerned that only limited resources appear to be being committed to the problem of bTB in farmed and wild deer. While we recognise that deer are de minimis as a reservoir, compared to badgers, in the fullness of time this too must receive attention.

19. Finally we note the success with which the New Zealand cattle industry has addressed its bTB problem despite a similar wildlife reservoir (possums) with less than 100 herds presently affected.

20. We suggest there would be considerable merit in a study visit to New Zealand of interested parties; government and private vets, farmers, processors, wildlife experts to learn from their experience.

21. Finally, while the Associations agree it is important not just to do something "for the sake of doing something", or "to be seen to be doing something", we consider there would be significant merit in the Department engaging in an early "Catch / Test / Cull" trials as part of a local disease control initiative or a wider biosecurity / Herd Health Scheme. Apart from any intrinsic benefit, this would go a long way to help counter the perception among farmers that "there is nothing we can do /what is the point of trying" that is currently the common justification for failing to apply other simple biosecurity measures or changes to high-risk business practices.

bTB Testing

22. In Northern Ireland the overall standard of bTB testing is without doubt the highest and the most intensively controlled and audited, in the British Isles and Europe. However it is a source of real concern to the profession that for those currently entering the profession in 2012, so little has changed from the time of James Herriot, when he started bTB testing in 1942.

23. Nonetheless, while the veterinary profession would welcome the opportunity to move on from the successful control of this disease to others such as BVD, Johne's etc., NIVA and AVSPNI members remain committed to the detection and removal of infected cattle from our clients' and the country's herds.

24. In the meantime the profession strongly believes that the presence of a vet on each cattle farm at least once a year is a significant contribution to general animal health, animal welfare and disease surveillance. In this respect, vets in private veterinary practices would particularly welcome the opportunity to become more involved with farmers in developing strategies to reduce the risk of infection entering their premises (for example through the Cattle Health Programme described above); and to expediting its removal if found.

25. NIVA and AVSPNI have approached government with offers to take on other work such as Brucellosis sampling and thereby avail of efficiencies of scale for both parties; and increased synchronisation of tests on farm, and were disappointed when this proposal was not taken up.

26. NIVA and AVSPNI recognise the important contribution of the farming industry in complying with the requirement to muster cattle for testing, both in terms of the opportunity cost

around the farmer's labour and time, and the loss in livestock thrive and milk production, and through injury.

27. NIVA and AVSPNI have noted the Public Accounts Committee's suggestion that DARD investigate Lay Testing and DARD's subsequent pilot. While we await DARD's analysis of the recent Lay Testing pilot with interest, we believe the premise underlying the PACs suggestion to be flawed.

28. At first sight lay staff ought to be less costly than qualified veterinarians, but the presence of vets on the farm and in the rural community offers much more than just a facility to inject tuberculin. Any move by DARD to employ lay testers at the expense of veterinary practices could bring many marginal disadvantages in the areas mentioned above e.g. on farm health and welfare surveillance, the close relationship with and knowledge of client's livestock and farms. It is also directly at odds with the Executive's strategy of enhancing the capacity of the public sector and the capability of Northern Ireland's small businesses and of promoting export-led growth from the agri-food sector, as "lay tested" animals may not be eligible for European trade.

29. If forced down this road, however, some practices might be prepared to employ lay testers, especially if they were able to do other work e.g. sample for the Brucellosis scheme too. But as Associations we consider that even this would be a less than helpful development, as it would lead to the reduction in numbers of qualified vets in the food animal practices, and so could have significant negative effects on the veterinary services available to livestock producers in small villages and remote rural areas, including those that DARD would wish to call upon in the event of epizootic disease like Foot & Mouth Disease.

30. Similar risks could attend the adoption of a serological test for bTB. However the Associations are hopeful that by the time such a test has been developed to a standard where it can be used as a routine tool for diagnosis of bTB, the focus of practice and the industry and Department will have moved on to the other cattle health programme recommended above, enabling the resulting benefits of such a test to farmers to be realised without jeopardising the benefits currently provided to the wider industry and rural community as a consequence of the present technology and delivery arrangements.

31. We believe that more clarity is needed around the understanding of the term "no visible lesions" and the way that this term is used in communications with farmers, many of whom believe that this means "no disease present". This miscommunication is propagated in the case of a herd with just one reactor that shows no lesions; APHIS categorises this as "TB not confirmed". We would prefer to class such animals as "Early stage infection" and feel that some education of the wider agricultural industry is needed to increase its understanding of the true nature of the disease.

32. As part of its on-going commitment to TB eradication, AVSPNI held a TB Forum on 1st February, 2012 at which over 120 vets heard speakers of the highest calibre on topics including the progress being made in the TB programme in the Republic of Ireland and the impact of wildlife controls of levels of TB; an update on the epidemiology of bovine TB and the interaction of cattle movements, local disease levels and wildlife factors on the incidence levels; the practicalities and implications of wildlife and cattle vaccine developments; alternative tests for bTB and their advantages and disadvantages; and the role of concurrent diseases such as Johnes disease and liver fluke infection in the detection and spread of TB. As a profession, we cannot stress enough our commitment to see this disease eradicated.

BOW Group Submission

Common Sense and Bovine TB

A report by Graham Godwin-Pearson with a foreword by Brian May | Follow us on Twitter: @bowgroup

Executive Summary

- The Government is choosing the wrong method for tackling bovine Tuberculosis (bTB) in England. Recent, large badger culling trials (11,000 badgers) have demonstrated projected efficiency in reducing bTB in cattle of just 12-16% (depending on the model) over 9 years.
- Badger culling has been demonstrated to lead to perturbation - a social fracturing that actually helps to spread bTB outside the affected area.
- In contrast, trials of vaccinating a proportion of the wild badger population with BadgerBCG has shown to reduce the incidence of positive serological TB test results by almost 74%.
- Just 15% of badgers carry bTB and poor biosecurity likely plays a much bigger role in the spread of bTB. Serious lapses, whereby landowners have been re-tagging and transporting infected cattle, are of deep concern.
- Compensation payouts for bTB should be linked to fulfilment of biosecurity best practice.
- Simple, cost effective measures are available to physically separate badgers from cattle and can reduce the incidence of infection.
- The population of foxes is likely to increase in areas where badgers are culled, leading to additional problems for farmers. Foxes also impact adversely on a number of species, including hares, a UK BAP species in decline.
- Badger culling is likely to be more expensive than the Government would hope, when additional policing, the resulting spread of bTB and the delay to research of other, more effective methods of reducing the disease are taken into account.
- Badger culling is deeply unpopular, with The Bow Group's own, independent market research confirming that 81% of people are opposed to the Government's plans.
- The architect of the Randomised Badger Culling Trial (RBCT), Lord Krebs, is also opposed to further culls, as are many leading scientists, conservationists, wildlife experts, the media and celebrities.
- The Government should establish a working group on vaccination and invest in this method of reducing infection in the wild badger population.

Foreword by Dr Brian May CBE

This carefully researched paper, for perhaps the first time, clearly explains the reasons why current Government policy to cull badgers in an attempt to control bovine TB in cattle is based on false assumptions and faulty reasoning.

The fact that the Bow Group is firmly housed within the body of the Conservative Party debars any suggestion that there might be political reasons for the arguments that are so forcefully made here. It becomes clear that the current determination of the Government to adopt a policy of violence against the very creatures that farming has infected with disease has been strongly influenced by perceived loyalties to certain sections of farming and business interests in the countryside. It is equally clear that claims that this is an issue that only affects farmers are also false. The future of our countryside and the wild animals that inhabit it affects every one of us who live in these islands - everyone who cares what kind of a Britain our grandchildren will inherit.

The arguments laid out in this paper have nothing to do with sentiment. They reveal the simply shocking misrepresentation of the facts that have been laid before the farmers of this country by union representatives and the Government they elected. The truth is that, despite all the appealing exclamations that *'something has to be done',* the current thing that is being done, which will require farmers to dig deep in their pockets, will probably fail to improve the bovine TB problem, and may well make it worse.

This is based on the available empirical evidence being offered by the entire scientific community, except some those employed by the Government at this time.

In the two years I have been involved in seeking the truth about cattle, badgers and bovine Tuberculosis, I was at one time almost convinced that I was wrong. I too was, for a moment, taken in by the picture painted by those who have been 'itching to go out and kill badgers' since long before the present Parliament was elected. It was a picture of badgers coughing and sneezing and falling down dead in front of cows, who were bound to be infected by the festering carcasses of small wild animals. "All we want is healthy cows and healthy badgers," was the argument, which has been used even by David Cameron himself as recently as last month. But nothing could be further from the truth. The truth is that badgers deal very well with the disease that they have caught from cows. They live normal lives for the most part, and can even have healthy offspring while their bodies are fighting the infection. And claims that most badgers in TB hotspots are infected are completely unsupported by evidence and are in blatant conflict with the conclusions of the RBCT report, which noted that most badgers, even in areas with the highest rates of infection by cows, were NOT infected by the disease.

The Government is heading towards licensing the shooting, with high-powered rifles, in the dark, thousands of healthy wild animals, in a scheme that cannot succeed in helping the farmer. This paper details the path towards the only course of action that can succeed in eradicating bovine TB: vaccination.

This is a battle that must be won, to save our wild animals, and to equip Britain with an evolving humane and viable farming industry in the coming years. The decision to cull must be reversed before irreparable damage is done.

Dr Brian May CBE

Mar 2012

The Bow Group

The Bow Group is a leading think tank based in London. It is the oldest centre-right think tank in the United Kingdom and celebrates its 60th Anniversary this year. Founded by a group of recent graduates including Geoffrey Howe and Norman St. John Stevas, its past chairmen have included Michael Howard, Christopher Bland and Norman Lamont.

Since its foundation, the Bow Group has been a significant source of policy ideas and many of its papers have had a direct influence on Government policy and the life of the nation. Many of the Bow Group's alumni currently sit in Parliament, including five former officers who were elected at the 2010 General Election. The Bow Group Council is presided over by Lord Howe and chaired by Cllr. Ben Harris Quinney MSc.

If you would like to write for the Bow Group, please contact the Research Secretary, Richard Mabey at research@bowgroup.org.

Dr Brian May

Dr Brian May CBE is perhaps best known as a leading rock musician who penned lyrics and played guitar for Queen. He is also a scientist with a PhD from Imperial College, who has co-authored with Sir Patrick Moore.

A Conservative voter his whole life, he states that he didn't vote Conservative in May 2010 due to the Party's policies on badger culling and other animal welfare issues, an area in which he works a great deal, including founding the charity Save Me (www.save-me.org.uk).

A note about this paper

The scientific information in this paper has been carefully researched and verified, independently, by leading experts in the field of bTB.

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Key Quotes

"[The badger cull trials] will be difficult to police, difficult to carry out; there's no end of difficulties".
Rt Hon David Cameron MP

"Badger culling is unlikely to contribute usefully to the control of cattle TB in Britain, and [we] recommend that TB control efforts focus on measures other than badger culling."
The Independent Scientific Group on Cattle TB

"You may think that culling is the answer and it sounds easy to start with but it can very well make things much worse. Survivors will carry the disease into areas that have hitherto been unaffected. There's good scientific research available to show that culling badgers can make things worse and not better."
Sir David Attenborough

"Badger vaccination could help reduce the prevalence and severity of bovine TB in a badger population and thereby reduce the rate of transmission to cattle."
Defra report

"It was a mistake to imply it was possible to have a science-led policy. The science base is relatively minimal, and essentially a political decision had to be made. The government have dug themselves into a hole. My personal opinion is not to cull."
Science advisor to Defra, in The Guardian

"A vaccination programme, if proven effective, offers considerable potential and a much more publicly acceptable way of tackling this issue."
Marina Pacheco, CEO, Mammal Society

"It sticks in my throat to condemn a species to death when such a policy, predicated on a hypothesis which has been discredited by a valid scientific experiment, would not even deliver the result that the 'users' of the policy (cattle farmers & their customers) desire."
Graeme Archer, columnist, Daily Telegraph

"The Government's position is very hard to understand. There is strong evidence that badger vaccination works, and that mass culling doesn't. On the contrary, it can lead to an increase in TB because it causes badgers to migrate. So even while intelligent and effective solutions exist, the Government is opting for a remedy that is both deeply unpopular, and which stands a very good chance of making the problem worse."
Zac Goldsmith MP

"Ministers have ignored scientists' advice that a cull will have a marginal effect on bovine TB and presents a serious risk to taxpayers if farmers are unable to cull for 4 years. ...Natural England estimate that up to 130,000 badgers could be killed, wiping them out in some areas, and breaching international wildlife treaties."
Mary Creagh MP, Shadow Defra Minister

Introduction – Why the Government should abandon badger culling trials in favour of vaccination

In July 2011, the Government announced plans for new badger culling trials to take place in England in autumn 2012. The culling is an attempt to control the spread of bovine Tuberculosis (bTB), which, in 2010-11, cost the taxpayer £91m.[1]

Badgers are regarded as carriers of the disease and it's thought that contact between cattle and badgers can result in infection and bTB 'breakdowns', leading to movement restrictions and compensation. The culling scheme, announced by the Department for Environment, Food and Rural Affairs (Defra) under the stewardship of Rt Hon Caroline Spelman MP, anticipates allowing farmers to form their own collectives for 'free shooting' of badgers in areas where cattle are affected by bTB.

The culls have been planned for areas of more than 150km^2 in West Somerset and West Gloucestershire and Defra anticipates a further ten cull sites each year.

The decision originates from a Defra consultation conducted from Sep - Dec 2010, which presented six options to Government, ranging from continuing 'with the current [coalition] policy – culling is not permitted except in exceptional circumstances or if there is new scientific evidence' up to issuing licenses to allow farmers to take matters into their own hands.[2]

This Bow Group Target Paper is designed to tie together the practical, financial and environmental issues surrounding the Government's proposals, concluding that badger culling is ineffective, costly and inhumane.

It discusses the results of the previous Randomised Badger Culling Trial (RBCT) and the costs of committing to and completing the proposed culls. It also assesses the benefits of vaccination and improvements in biosecurity as an alternative paradigm, citing research into badger vaccine trials and biosecurity methods.

Much of the research cited in this paper is Defra's own, commissioned and conducted during and after previous badger culling trials.

Public opinion polls, the Bow Group's own market research and leading TB experts have given clear signals that the Government's approach is wrong and this paper explains why. It goes on to recommend alternative courses of action in tackling the problem of bovine TB.

[1] Bovine TB Eradication Programme for England, Defra 19 Jul 2011, available here: www.defra.gov.uk/publications/files/pb13601-bovinetb-eradication-programme-110719.pdf
[2] Bovine Tuberculosis: The Government's approach to tackling the disease and consultation on a badger control policy, Summary of consultation responses, Defra 19 Jul 2011, available here: archive.defra.gov.uk/corporate/consult/tb-control-measures/bovinetb-summary-responses-110719.pdf

The badger and the law

The European Badger (*Meles meles*) is a species common to much of Europe, covering the whole of the UK, Ireland and every mainland European country from Portugal to the west of Russia, excluding northern parts of Norway, Sweden and Finland. The range of *M. meles* includes northern borders of the Middle East and the southern Caspian Sea coastline.[3]

The species has long been persecuted, with badger baiting becoming a popular sport in the 18th and 19th centuries, before it was outlawed in Britain in 1835, with the *Cruelty to Animals Act*,[4] which came about following lobbying by the Royal Society for the Prevention of Cruelty to Animals (RSPCA), founded in the previous year.

Badgers are protected by the *Protection of Animals Act 1911*[5] and listed in the *Convention on the Conservation of European Wildlife and Natural Habitats* (the *Bern Convention*), which came into force on 1 Jun 1982, to protect European Wildlife and Natural Habitats. The convention aims to conserve wild flora and fauna, protect their habitats, monitor vulnerable species and assist with legal and scientific issues.[6]

Cruel treatment to and causing the death of a badger constitute offences under the *Protection of Badgers Act 1992*[7] – these offences include tampering with a badger sett and even possession of a badger (other than for the purpose of nursing an injured animal back to health). Convictions for such offences stretch to six months in jail, a fine of up to £5,000 and community service.

Despite this long history of legal protection for *M. meles*, investigations in 2009 by the *Sunday Times* and the *BBC* discovered that badger baiting is still practised in the UK and Ireland (where similar laws exist).[8] [9] Baiting is widely considered to a cruel and clandestine activity.[10]

Protection is not absolute and Natural England can provide licenses (as can the Welsh Assembly Government and Countryside Council for Wales) in exceptional circumstances. Illegal activities are treated seriously, with the RSPCA and other groups contributing to criminal cases, including the use of forensic and DNA techniques.[11]

As well as being a heavily protected species, *M. meles* is also an iconic species, popular in literature and the national psyche.[12] [13] [14] [15]

[3] The IUCN Red List of Threatened Species™, Jan 2012
[4] *Cruelty to Animals Act 1835*, Public General Statutes passed in the fifth and sixth year of the reign of His Majesty King William the Fourth
[5] Protection of Animals Act 1911, available via www.legislation.gov.uk/ukpga/Geo5/1-2/27
[6] Convention on the Conservation of European Wildlife and Natural Habitats 1979, available here: conventions.coe.int/treaty/en/Treaties/Html/104.htm
[7] Protection of Badgers Act 1992, available here: www.legislation.gov.uk/ukpga/1992/51
[8] Exposed: The evil world of badger baiting, *Sunday Times* 22 Feb 2009, available here: www.timesonline.co.uk/tol/news/world/ireland/article5781271.ece
[9] Badger and deer crime on the rise, *BBC News* 4 Jun 2009, available here: news.bbc.co.uk/1/hi/scotland/8082232.stm
[10] Griffiths, H.I., Thomas, D.H., Council of Europe, *The conservation and management of the European badger (*Meles meles*)* 1997 (ISBN 9287134472)
[11] Badgers & the law, available here: www.rspca.org.uk/allaboutanimals/wildlife/laws/badgers
[12] Badger Cull: Are we silly to be so sentimental? *BBC* 19 Nov 2010, available here: www.bbc.co.uk/news/magazine-11380921
[13] Varley, S., *Badger's Parting Gifts* 1992 (ISBN 0006643175)
[14] Lewis, C.S., *Prince Caspian: The Return to Narnia* 1951 (ISBN 0-02-044430-3)
[15] Dann, C., *The Animals of Farthing Wood* 1979 (ISBN 0434934305)

Tuberculosis in cattle

Tubercle bacillus (TB) is a common, infectious disease caused by various strains of mycobacteria, in humans usually *Mycobacterium tuberculosis*, in cattle usually *Mycobacterium bovis*. It is spread via the aerosol effect (coughing and sneezing) and can be lethal. All but eradicated in humans in Western Europe, with UK incidence rates of 0.015% in 2007, it is still a major problem in developing nations.[16]

Bovine tuberculosis (bTB) is a major problem for the health of British cattle herds.[1] In the 1930s, unpasteurised milk was a public health risk, since tuberculosis could pass from the milk of infected cows into humans.[17] The Government introduced a test and slaughter policy in the 1950s, which, in concert with pasteurisation as routine helped to reduce the risk to human health.[17] TB can be carried by many domesticated species, including cats and dogs, and some governments enforce restrictions to halt the disease in animal populations – for example, ownership of gerbils is forbidden in the state of California.[18]

M. bovis is able to pass between animals in close contact and the incidence of bTB has actually increased within British herds in recent years. In the last 25 years, due largely to increased cattle movement, it has spread to become endemic in excess of 39,000km^2 of England, particularly in the south and south-west, with additional 'hotspots' in West Wales and the Peak District.

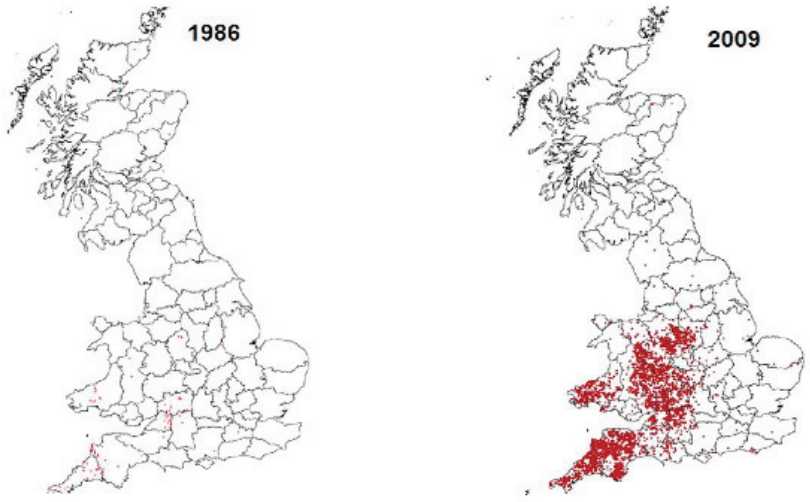

Figure 1 - Geographical distribution (point location) of herds sustaining new breakdowns of bTB in 1986 and 2009 (source: Veterinary Laboratories Agency)

In Nov 2008, the Government established the Bovine TB Eradication Group for England (TBEG)[19] to address the impact of bTB and assess the practical and financial implications of various measures, including biosecurity and vaccination.[1]

[16] World Health Organization (2009). "The Stop TB Strategy, case reports, treatment outcomes and estimates of TB burden". *Global tuberculosis control: epidemiology, strategy, financing. pp. 187–300.* (ISBN 9789241563802)
[17] Measures to address bovine TB in badgers, Defra 30 Nov 2011, available here: http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/bovine-tb-impact-assessment.pdf
[18] 14 CA ADC § 671 Barclays official California code of regulations; Title 14. Natural resources; Division 1. Fish and game commission – Department of fish and game; Subdivision 3. General regulations; Chapter 3. Miscellaneous.
[19] Bovine TB Eradication Group for England, Defra, available here: archive.defra.gov.uk/food farm/farmanimal/diseases/atoz/tb/partnership/eradication-group/index.htm

This is important work - in 2010-11, bTB cost the taxpayer £91m in England, approx. 3% of gross output of GB cattle enterprise and 7% in the south-west.[17] The TB research budget has been protected from significant cuts – currently £7.9m in 2011-12.[1]

Sixty years after it began, the regular test/slaughter of cattle still forms a key component of bTB control (as well as observations made at abattoirs) and affected herds are routinely placed under temporary movement restrictions upon discovery of bTB breakdowns. In 2009, evidence of bTB was found in 10% of British herds, leading to the slaughter of 35,000 cattle. In 2010, slightly fewer than 25,000 animals were slaughtered.[20]

Over the next decade, the Government estimates the cost of bTB to be £100m per year, double the cost of the last ten years. Defra has reduced the number of herds it tests for bTB, although the department's statistics show that the disease is on the rise – a 4.4% increase in the number of new incidents in Jan-Aug 2011, compared to the same period in 2010.[21]

The role of badgers in bTB

While the spread of bTB between individual cows is the biggest cause of an individual infection, the issue is complicated by failing biosecurity (see **Biosecurity**) and because wild badgers can act as reservoirs of the disease.[1] [22]

It has long been known that TB can be transmitted between cattle, between badgers and between the two species, and badgers seem an obvious scapegoat, since their territories often overlap with dairy and cattle farms.[1] Badgers can carry *M bovis*, and confirmed infection rates in non-bovine animals are extremely low – in 2010, there were just 93 incidents across pigs, camelids, sheep, goats and park and farmed deer.[1]

However, underlying levels of *M. bovis* in British badgers are also extremely low. The Food and Environment Research Agency (FERA) has led Road Traffic Accident (RTA) surveys, collecting dead badgers from the roadside to test for *M. bovis*. RTA surveys between Nov 2000 and Dec 2004 in seven counties discovered an average prevalence of just 15%.[23] Other trials within RBCT showed this prevalence to be as low as 11.3%.[17]

Undisturbed, badgers do not migrate a great deal. Their setts are vast, some with dozens of entrances, and are passed down through generations. Each social group defends a territory, usually less than 1km^2. At high population densities, many badgers never leave the social groups into which they were born.

This means that, if harbouring TB, a stable individual group of badgers is unlikely to pass the disease onto other groups[24] or to cattle herds outside the sett area. In fact, studies have shown that the spread of bTB *between* herds is most likely to occur when cattle are transported around the country.[25]

[20] DEFRA Bovine TB statistic for Great Britain, 2009, available here: archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/stats
[21] Bovine TB in Great Britain - GB national statistics, Defra Nov 2011, available here: www.defra.gov.uk/statistics/foodfarm/landuselivestock/cattletb/national/
[22] England farmers 'live with' bovine TB slaughters, *BBC* 29 Apr 2011, available here: www.bbc.co.uk/news/uk-england-13227095
[23] FERA Badger vaccination Q&A for veterinarians, FERA, available here: www.fera.defra.gov.uk/wildlife/ecologyManagement/documents/vaccinationFAQs.pdf
[24] Cheeseman, C. L., Wilesmith, J. W., Stuart, F. A. and Mallinson, P. J. 1988b. Dynamics of tuberculosis in a naturally infected badger population. - *Mamm. Rev*. 18: 61-72.
[25] Gilbert, M., et al., Cattle movements and bovine tuberculosis in Great Britain. *Nature*, 2005. 435(26): p. 491-496; and: Carrique-Mas, J.J., et al., Risk of bovine tuberculosis breakdowns

The Government's plans

The Government is committed to tackling bTB and Defra's advice is that there is no single solution.

In a document published in July 2011, entitled Bovine TB Eradication Programme for England,[1] Defra laid out a set of key measures aimed at reducing bTB. These measures are:

1. Cattle surveillance and control measures to address cattle to cattle transmission.
2. Promoting good biosecurity, to address transmission between cattle, and between badgers and cattle.
3. Control of TB in badgers, to reduce transmission from badgers to cattle in TB endemic areas.
4. Measures to tackle TB in non-bovine farmed species (including pigs, goats, deer, sheep, alpacas and llamas).
5. Advice and support for farmers.
6. A targeted research and development programme.
7. Robust governance, monitoring and reporting arrangements.

Defra's recommendations for curbing bTB in British herds are based on three broad approaches:- a comprehensive approach: tackling TB in cattle, non-bovine farmed animals, and wildlife, addressing all transmission routes to tackle TB in cattle (cattle to cattle and between badgers and cattle) and making best use of all available tools; a risk-based approach: targeting controls on disease risk, based on veterinary advice and discretion, and making the best possible use of resources; and a staged approach: seeking to stop the disease spreading in the short-term, bringing it under control, and ultimately eradicating it.[1]

Defra describes how ongoing work in the areas of cattle testing, movement restrictions, surveillance, guidance for farmers and monitoring is helping the situation, although bTB appears to be still increasing; Defra concludes that tackling *M. bovis* in wild badger is essential.[1] The report recommends 'a carefully managed and science-led policy of badger control'[1 26]

A 2010 consultation on a proposal to issue licenses (under the *Protection of Badgers Act 1992* and the Wildlife and Countryside Act 1981) to farmers and/or landowners to cull and/or vaccinate badgers to prevent the spread of bTB was followed by a public consultation, which received almost 60,000 responses on the matter.[2]

In this consultation, six policy options were suggested:[2]

Option 1 To continue with the current policy – culling is not permitted except in exceptional circumstances or if there is new scientific evidence.

in post-foot-and-mouth disease restocked cattle herds in Great Britain. *Proc. Soc. Vet. Epid. Prev. Med.*, 2005. Nairn, Inverness 30 Mar -1 Apr 2005.

[26] Consultation: Bovine Tuberculosis: the Government's approach to tackling the disease and consultation on a badger control policy, Defra 8 Dec 2010, available here: http://archive.defra.gov.uk/corporate/consult/tb-control-measures/index.htm

Option 2 To introduce a policy of culling badgers, managed and delivered by Government, or contractors acting on behalf of Government.

Option 3 To introduce a policy of vaccinating badgers, managed and delivered by Government, or contractors acting on behalf of Government.

Option 4 The farming industry to deliver culling in line with a set of strict criteria developed by Government in consultation with the industry. Natural England would assess and issue licences to those applicants meeting the criteria.

Option 5 Farmers and landowners encouraged to make greater use of vaccination to tackle TB, using the newly available injectable badger vaccine. It is already possible to apply to Natural England for licences to trap & vaccinate badgers.

Option 6 Issuing licences under the *Protection of Badgers Act 1992* for industry to cull badgers, subject to a specific set of licence criteria. Farmers will also be able to apply for licences to vaccinate badgers. Under this option they will be able to use vaccination either on its own or in combination with culling.

Defra's recommendations led the Government to prefer Option 6,[17] which enables farmers and landowners to decide for themselves which control measures to use. This means that farmers can choose whether or not to trap and vaccinate badgers, trap and shoot them, or shoot them by seeking them out in the open. The Government's reasoning was that Option 6 is cost-effective, since farmers and landowners will be covering the costs of the trials.

However, Option 6 is more expensive than it looks at first glance. Defra's impact assessment suggests that issuing licenses to use a combination of culling and vaccination in one area of 350km^2 is between £3.74m and £6.38m, with a best estimate of £4.56m (including administration of £1.40m, the financial cost to farmers of the initial increase in bTB in neighbouring areas (see **Perturbation**): £0.5m and Government costs of licensing, monitoring and compensation for increased bTB: £3.11m). Policing costs are likely to be much higher than initial estimates, which is accepted in the impact assessment (see **Cost to the taxpayer**).[17]

Currently, the Government's plans include two cull areas of 150km^2 each, in West Gloucestershire and West Somerset, where Defra requires at least 70% cooperation with local landowners. Defra anticipates a further ten cull sites each year and has confirmed that it's likely that, should 'free-shooting' be ruled out after the first year of the trials, farmers and landowners will be legally obliged to trap and shoot.

Either way, it is estimated that 70,000 – 105,000 badgers will be culled,[27] with farmers required to kill at least 70% of the badger population within each culling area, but leading to a net reduction of just 12-16% in the incidence of bTB over 9 years.[1]

Serious concerns have been raised about the safety of landowners and members of the public and a possible increase in wildlife crime, especially an increase in badger baiting. Particular concern was raised in relation to public safety on public footpaths and bridleways within the culling areas.[2]

[27] Badger Culling Will Go Ahead In 2012, *Guardian* 14 Dec 2011, available here: www.guardian.co.uk/environment/2011/dec/14/badger-culling-2012

Randomised Badger Culling Trial

There has been much badger culling over the last thirty years, but following the recommendations of the Krebs Report,[28] the Randomised Badger Culling Trial (RBCT, also called the Krebs Trial) was designed to test the effectiveness of badger culling as a means of controlling bTB once and for all.

The RBCT (1998 - 2007) was by far the largest trial to be undertaken, as well as the best designed. Countless scientific appraisals were conducted throughout and after the RBCT and much of the research quoted in this paper cites these appraisals.

The trial was funded and managed through the TB Division of the Animal Health and Welfare Directorate and overseen by the Independent Scientific Group on cattle TB (ISG), chaired by Professor John Bourne.

The Krebs trial was great in scope. Thirty, high-risk, 100km^2 areas of England were chosen and grouped into ten sets of three areas (triplets). Within each triplet, the RBCT utilised three broad approaches:

- Badgers were culled in a widespread fashion on all accessible land in one area (proactive culling).

- In the second area, localised culling was conducted in response to a confirmed case of bTB leading to movement restrictions placed on that herd (confirmation via post-mortem examination and/or culture). This reactive culling targeted badgers only in those setts that overlapped land within the farm of the infected herd ('reactor' land).

- The third area received no culling (survey only).

Animals within the RBCT were trapped in baited cages and shot.

Much of the scientific work was halted temporarily in 2001 due to the Foot and Mouth Disease (FMD) outbreak, when field teams were not allowed onto farms. The same teams were also involved in the FMD crisis.

The proactive culling arm of the RBCT led to a modest reduction in the incidence of bTB within the culling areas, but an increased incidence on adjoining lands that were not culled. During the period of culling, the detrimental effect on neighbouring land was sufficient to cancel out the benefits inside the culling areas, leaving no overall effect. However, after culling was halted after 5 years, detrimental effects disappeared more rapidly than beneficial effects, and the overall effect was a small benefit. The net benefits from proactive culling were projected to be greater in larger areas (because the size of the adjoining area would be relatively smaller).

Overall, Defra estimated that culling an area of 150km^2 would lead to a net reduction in bTB of 12% (with a confidence interval of 3-22%) or 16% (with a confidence interval of 8-24%) over 9 years, depending on the assumptions used.[29]

Reactive culling was suspended in Nov 2003, after research published in *Nature* discovered that it actually increased the incidence of confirmed bTB cases in the broader area of the cull

[28] Krebs JR, Anderson RM, Clutton-Brock T, Morrison WI, Young D, Donnelly CA: Bovine tuberculosis in cattle and badgers. *London: MAFF Publications*, PB3423; 1997.
[29] Bovine TB: The Scientific Evidence, Final Report of the ISG on Cattle TB, available here: archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/report/final_report.pdf

by 27% (see **Perturbation**, below).[30]

Subsequent research by the ISG demonstrated a lower population density of badgers in these reactive cull areas and that prevalence of *M. bovis* in badgers in these areas was heightened.[31]

The ISG published its final report in 2007, after years of research, the culling of approximately 11,000 badgers and a cost to the taxpayer of £50m.

The ISG's own conclusion reads, "After careful consideration of all the RBCT and other data presented in this report, including an economic assessment, we conclude that badger culling cannot meaningfully contribute to the future control of cattle TB in Britain."[29]

This report affirms on this basis that killing badgers could actually increase the spread of bTB in areas around the cull, making matters worse.[29]

These facts are accepted in Defra's Nov 2011 impact assessment.[17]

Perturbation

So when a herd with a confirmed case of bTB had its movement restricted and badgers in the local area culled, why were other herds in the neighbourhood more likely to contract bTB?

The answer is down to an effect known as perturbation. Badgers are intelligent, social animals and even though their huge, complex setts may be retained and reused by the same group for generations, they can migrate into land vacated by their culled neighbours. Immigrant badgers can then be exposed to infection and subsequent movements distribute the infection over a wider area. The effect was described by the ISG.[32]

Socio-spatial organisation of badger populations is shown to degenerate, increasing the overlap between the ranges of groups.[33]

[30] Donnelly C. A., Woodroffe R., Cox D. R., Bourne J., Gettinby G., Le Fevre A. M., McInerney J. P., Morrison W. I. 2003 Impact of localized badger culling on tuberculosis incidence in British cattle. *Nature* 426, 834–837, available here: www.nature.com/nature/journal/v426/n6968/full/nature02192.html

[31] Woodroffe, R., Donnelly, C.A., Cox, D.R., Gilks, P., Jenkins, H.E., Johnston, W.T., Le Fevre, A.M., Bourne, F.J., Cheeseman, C.L., Clifton-Hadley, R.S., Gettinby, G., Hewinson R.G., McInerney, J.P., Mitchell, A.P., Morrison, W.I. & Watkins, G.H. (2009). Bovine tuberculosis in cattle and badgers in localized culling areas. *Journal of Wildlife Diseases* **45**: 128-143

[32] Woodroffe, R., Donnelly, C.A., Cox, D.R., Bourne, F.J., Cheeseman, C.L., Delahay, R.J., Gettinby, G., McInerney, J.P. & Morrison, W.I. (2006). Effects of culling on badger (*Meles meles*) spatial organization: implications for the control of bovine tuberculosis. *Journal of Applied Ecology.* **43**: 1-10.

[33] Tuyttens F. A. M., Delahay R. J., Macdonald D. W., Cheeseman C. L., Long B. & Donnelly C. A. 2000b. Spatial perturbation caused by a badger (*Meles meles*) culling operation: implications for the function of territoriality and the control of bovine tuberculosis. *J. Anim. Ecol.* **69**: 815-828.

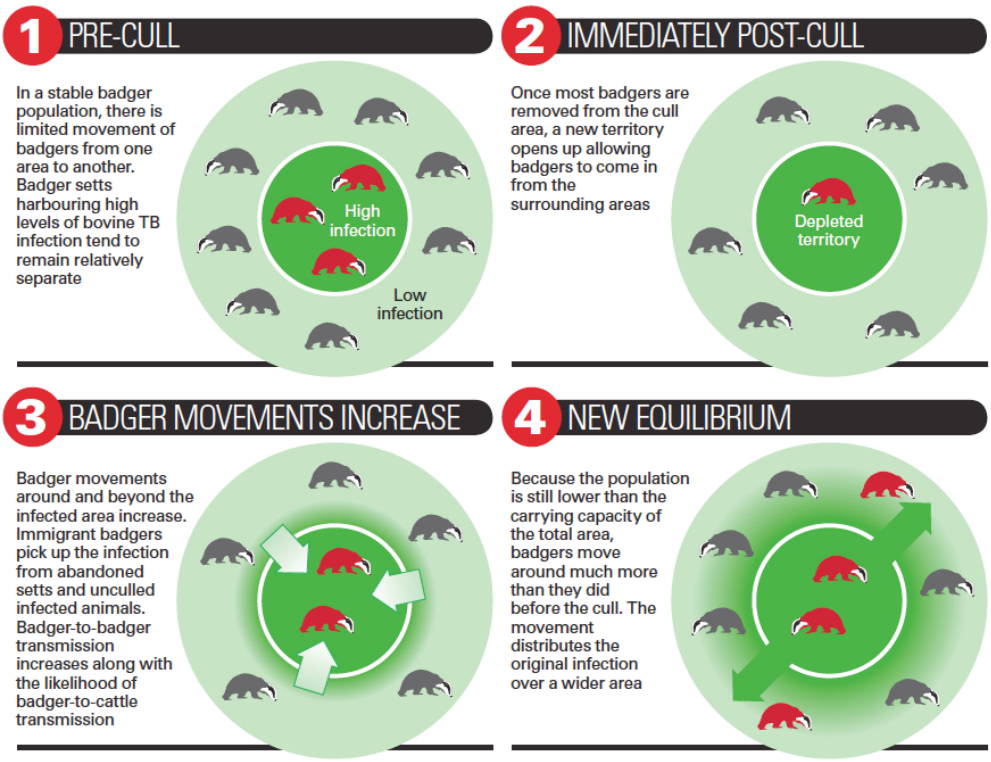

Figure 2 - The "perturbation effect" (source: The Wildlife Trusts)

A study conducted by the Wildlife Conservation Research Unit (WildCRU) at the University of Oxford, in collaboration with the Central Science Laboratory in York, between Apr 1999 and Sep 2003, examined the impact of culling on badger population demography, social organisation, dispersal and bTB epidemiology. The study compared a reactive culling area and a survey-only area within the RBCT.

The trial identified that, after 34-44% of badgers within social groups were culled, amongst the survivors, overlap between social groups and aggression increased in targeted groups and their neighbours. As a result of this badger migration, TB prevalence increased in groups neighbouring removals, particularly among cubs.

These animals travelled further following culling and dispersal increased significantly. The Oxford study considered the increased stress of social disruption within badger groups also caused immunosuppression and enhanced expression of the disease.

The authors of the report concluded that perturbation should be considered when formulating policy and that culling badgers may be an ineffective approach to controlling bTB levels in cattle.[34]

Even more thorough data emerged from the ISG's reports, which showed the behavioural effects of culling, genetic evidence of consistently increased dispersal[35] and consistent evidence of increased prevalence in both proactive[36] and reactive areas.[31]

[34] Project SE3108: A field study to reveal the effects of perturbation, and to model the epidemiology of TB in disturbed badger populations, Defra 2004, available here: randd.defra.gov.uk/Document.aspx?Document=SE3108_2791_FRP.doc

[35] Pope, L.C., Butlin, R.K., Wilson, G.J., Woodroffe, R., Erven, K., Conyers, C.M., Franklin, T. Delahay, R.J., Cheeseman, C.L., & Burke, T. (2007). Genetic evidence that culling increases

Separate research conducted by Imperial College and published by The Royal Society in 2011 highlights the increase in incidence of bTB in recent decades, despite the culling of a total of approximately 20,000 badgers between 1975 and 1997 even before the Krebs Trial. The research included a case-controlled study involving 1,208 cattle herds and provided evidence that localised badger culling, conducted in the RBCT in response to a confirmed outbreak of bTB, led to increased bTB incidence in nearby herds. Furthermore, Imperial College discovered that the presence of any reactive badger culling within 1km of a herd more than doubled its risk of bTB, even when accounting for other local factors. The research concluded that localised approaches to bTB were ineffective and counterproductive.[37]

Defra's impact assessment report on the forthcoming culls recommends that 'criteria proposed for licensing specify that the area will have boundaries or buffers to mitigate the negative effects in neighbouring areas caused by perturbation of badgers' social groups'.[17]

In other words, in order to contain the additional bTB risk in neighbouring herds, Defra is recommending that culling trials take place in areas where movement of badgers is naturally restricted by geographical features – of course, in reality, natural geographic boundaries are extremely rare in TB-affected areas of Great Britain. Even if badger culling trials were successful, they would not be scalable.

We've been here before

It is because of the effects of perturbation that Professor Lord (John) Krebs, who was the government advisor responsible for the RBCT in the 1990s and the architect of those early trials, has gone on record to say that culling was "not an effective policy" and that it would be a mistake.[38]

Lord Krebs cites the results of the research he recommended as the reason the proposed culls should not be conducted, stating, "You cull intensively for at least four years, you will have a net benefit of reducing TB in cattle of 12% to 16%. So you leave 85% of the problem still there, having gone to a huge amount of trouble to kill a huge number of badgers. It doesn't seem to be an effective way of controlling the disease."

Lord Krebs is referring to the official figures, which state that culling reduces bTB infection by 12-16% over a total span of 9 years.[29]

Krebs' solution is to tighten the country's biosecurity to reduce the likelihood of cattle coming into contact with badgers and other sources of the disease and to prevent infection being passed between herds. Long-term, the peer recommends continuing to develop vaccines that would become commercially and legally viable – so, Defra has invested more than £30m since 1998, in partnership with the Veterinary Laboratories Agency.

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badger movement: implications for the spread of bovine TB. *Molecular Ecology* **23**: 4919-4929.

[36] Woodroffe R., et al. 2006 Culling and cattle controls influence tuberculosis risk for badgers. *Proc. Natl Acad. Sci. USA* 103, 14 713–14 717, available here: www.pnas.org/content/103/40/14713

[37] Vial F., Donnelly C. A. 2011 Localized reactive badger culling increases risk of bovine tuberculosis in nearby cattle herds. *Biol Lett*, available here: rsbl.royalsocietypublishing.org/content/early/2011/06/29/rsbl.2011.0554.full.pdf+html

[38] Badger culling is ineffective, says architect of 10-year trial, *Guardian* 11 Jul 2011, available here: www.guardian.co.uk/environment/2011/jul/11/badger-culling-ineffective-krebs

Krebs says that the best prospect of controlling bTB would be through a cattle vaccine and associated diagnostic test, although immunising cattle against TB is currently prohibited under EU law (see **Irony in Europe**). The difference between when Lord Krebs published his results and recommendations in 1996 and today, is that vaccines are now available for badgers.

Speaking to the Bow Group in Feb 2012, Lord Krebs said, "Defra has said it wishes its policy for controlling TB in cattle to be science-led. There is a substantial body of scientific evidence that indicates that culling badgers will not be an effective or cost-effective policy. The best informed independent scientific experts agree that culling on a large, long-term, scale will yield modest benefits and that it is likely to make things worse before they get better. It will also make things worse for farmers bordering on the cull areas. Furthermore, it is not a credible national strategy. It is hard to imagine that the policy could be deployed over the whole 38,000km^2 of TB affected farmland, which would involve killing perhaps a quarter of the UK badger population, year after year.

"Instead the focus should be on further improvements to bio-security and vaccination. The long-term aim must be a cattle vaccine with a marker to distinguish vaccinated from the infected cattle."

Would widespread badger vaccination work?

Injectable Badger Bacillus Calmette-Guérin (BadgerBCG) is identical to the BCG vaccinations with which British school children were immunised aged 13 between 1953 and 2005.

BCG injections were so effective in British children during this time that cases of TB in the human population disappeared.[39] In fact, by 1988, the number of reported incidences of TB had fallen to such low levels that, statistically, 12,000 children would need to be immunised in order to prevent one case of TB.

Despite a budget of less than £1m per year (a total of £16m since 1994), an injectable BadgerBCG was licensed in Mar 2010 and is now available on prescription.[1]

Defra admits that 'Laboratory and field studies have demonstrated that vaccination of badgers by injection with BCG significantly reduces the progression, severity and excretion of TB infection.'[1] However, the report continues: 'While we would expect vaccination of badger populations to result in reduced transmission of TB to cattle, we currently have no direct experimental evidence on this, other than from computer modelling. Therefore the precise contribution badger vaccination could make to reducing disease in cattle is unknown. Determining this in a scientifically robust way would require large-scale field trials and be very costly.'[1]

However, field trials of the BadgerBCG vaccine have been taking place for years – such trials were the policy of the previous Government - and there is clear evidence that deployment of the vaccine is effective in reducing bTB in badgers.

For example, in 2008, a vaccination field trial led by The Food and Environment Research Agency (FERA), involving a population of more than 800 badgers in a high-risk area of Gloucestershire, demonstrated a 73.8% reduction in the incidence of positive serological TB test results in wild badgers.[40] [41]

[39] Styblo K, Meijer J. (1976). "Impact of BCG vaccination programs in children and young adults on the tuberculosis problem". *Tubercle* 57: 17–43, available here: www.sciencedirect.com/science/article/pii/0041387976900155

[40] Report of GCP (veterinary) study on wild badgers 2009, Defra 2009, available here: randd.defra.gov.uk/Document.aspx?Document=SE3250b.pdf

The cost of the trial was under £500,000 and savings are being made in subsequent trials. Defra has also committed to a programme of commercial training courses for badger vaccinators, with the first course run in Oct 2010.[1]

Further to that work, vaccination programmes continue - in 2010, FERA vaccinated 541 badgers across 93 premises, covering an area of approximately 9,000 ha. Last year, 628 badgers were vaccinated across 86 premises, covering 8,400 ha.[23]

Badger vaccination trials sponsored by the Government took a step back however, when in Jun 2010, it reduced the plans to vaccinate badgers from six areas to just one.[42]

Despite this, badger vaccine trials continue in the charitable sector. In May 2011, the National Trust began the largest ever field trial of BadgerBCG (conducted by FERA) over a 20km^2 area of the Killerton Estate near Exeter. Individual badgers are trapped, vaccinated and visibly tagged to ensure that they are not vaccinated again in the same study.

Mark Harold, Director for the National Trust's South West region, says, "This programme will show how badgers vaccination can be deployed over a large area, and will pave the way for more widespread use of vaccination as an effective alternative to culling.

"We're in a unique position as a major landowner to help find a solution to the blight of bovine TB that costs millions and affects farmers' livelihoods. We recognise that both cattle to cattle transmission of bovine TB as well as badgers infecting cattle need to be tackled.

"Whilst a vaccine for cattle is some way off, and there are wider regulatory issues making this difficult, giving the badgers a vaccine to stop the spread of bovine TB is a practical way forward and the recent evidence is that it works and is effective."[43]

Full results of the National Trust-led vaccination programme will be available by 2014.

The National Farmers' Union (NFU) and the Badger Trust have also been working together on vaccination trials in Shropshire and Derbyshire. Trials began in 2011 and are resuming in the spring of 2012.[44]

FERA is confident that the use of BadgerBCG reduces the severity of the disease in those that become infected after vaccination, limiting the potential for transmission to cattle. It is considered safe for people and badgers and only a proportion of a susceptible population of badgers requires the immunisation to significantly reduce the spread of the disease within groups and therefore transmission to cattle.[23]

Since the perturbation effect is caused only by permanent loss of individual badgers from a social group, extraction of individuals for the purpose of vaccination (a maximum of 12 hours – and not out of the animals' territories) would not lead to perturbation. FERA has identified

[41] Chambers B. et al (2010). "Bacillus Calmette-Guérin vaccination reduces the severity and progression of tuberculosis in badgers", *Proc. R. Soc. B* 22 Jun 2011 vol. 278 no. 1713 1913-1920, available here: rspb.royalsocietypublishing.org/content/278/1713/1913.full.pdf+html
[42] Changes to badger vaccine deployment project, Defra 24 Jun 2006, available here: www.defra.gov.uk/news/2010/06/24/tbbadger-vaccine/
[43] The National Trust South West Blog, *National Trust* 20 Apr 2011, available here: www.ntsouthwest.co.uk/2011/04/new-programme-to-demonstrate-badger-vaccination-as-effective-alternative-in-bovine-tb-control/
[44] NFU and Badger Trust work on joint TB vaccination project, NFU 15 Nov 2011, available here: www.nfuonline.com/Media_centre/2011/NFU_and_Badger_Trust_work_on_joint_TB_vaccination_project/

that the routine trapping and sampling of badgers at its Woodchester study site for more than 30 years has not led to perturbation.[40]

If vaccination can lead to a 73.8% (4-fold) reduction in the incidence of positive serological TB test in badgers and the natural prevalence of bTB is just 15%, a widespread vaccination programme could significantly reduce the overall disease burden.

Badgers have a life span of 3-5 years, with an annual population turnover of 30%. Theoretically, therefore, the number of individual infected badgers would decrease by 30% annually over the course a successful vaccination programme and the proportion of infected badgers would reduce to a lower still percentage over 5 years, since new infections would be rare and the small percentage of infected animals would die out naturally. Annual vaccinations are recommended to protect new cubs.

In 2010, FERA conducted some research aimed at investigating the impact of badger vaccination on bTB levels in cattle, comparing vaccination with culling.[45]

Their model used four potential strategies:- do nothing, badger culling (150km^2), badger vaccination (150km^2) and culling in a core area (150km^2) with a ring of vaccination around it (150km^2), over five years. The results demonstrated that vaccination would prevent fewer breakdowns than culling and carried no risk of the negative effects associated with culling.

FERA predicted that in both the ring and the core areas, several years of culling would actually increase prevalence of bTB in badgers due to perturbation, an effect demonstrated empirically by the RBCT. The proportion of TB-infected badgers dropped from the offset and continued to do so using the vaccination-only model.

The paper was also clear that the only way to see a reduction in bTB in cattle through a programme of badger culling is to combine it with a vaccination programme of the same size around the cull. However, with this approach, the vaccine would be less effective in an area subject to culling-derived perturbation where a higher proportion of the badgers are infected.[45]

If badger vaccination alone results in positive outcomes without any of the negative impacts associated with culling, then it is obvious that more emphasis should be placed on vaccination as a means to address bTB in cattle. Gordon McGlone, CEO of Gloucestershire Wildlife Trust, says, “We now have the prospect of a [vaccine] solution. Our worry is that culling badgers will take things in the wrong direction.”

The only current method for immunising badgers is via injection; however, Oral Badger BCG is being developed in collaboration with other countries, including the Republic of Ireland and New Zealand and Defra has invested £6m on this research since 2005.[1] It is possible that an oral vaccine could be available here as soon as 2015, resulting in potential cost reductions for vaccination programmes.

On the subject of vaccination, Defra contradicts itself: Despite the supposed lack of scientific evidence that BadgerBCG works and its own investment in the vaccine, in its impact assessment on the 2012 culling trials, Defra recommends that, as well as using natural boundaries to stop badgers relocating, the vaccine is deployed in rings around the trial zones in order to mitigate the effects of perturbation.[17]

Vaccines are available commercially, there are private companies offering vaccination as a service and scientists, landowners, charities and wildlife groups are investing in and deploying BadgerBCG. However, there isn’t even a working group dedicated to badger or

[45] Comparing badger (*Meles meles*) control strategies for reducing bovine bTB in cattle in England, Defra Nov 2010, available here: archive.defra.gov.uk/food-farm/animals/diseases/tb/documents/8control-strat-report.pdf

cattle vaccines (the TBEG focuses on culling and does not include any representation from vaccination).

So strongly do pro-vaccine supporters believe in this solution that following the release of the trial sites in Jan 2012, charity The Wildlife Trusts announced a plan to begin vaccinating badgers with injectable BadgerBCG within the trial areas.[46]

Irony in Europe

Cattle in the UK are routinely vaccinated against diseases, but the use of TB vaccines is banned under EU law (*Directive 78/52 EEC, 1977*).[47] This is because, ironically, the bovine BCG vaccine interferes with the mandatory tuberculin skin test. Cattle that had been vaccinated would technically fail the test, meaning they couldn't be declared Officially TB Free (OTF) for trading and the EU has also imposed a ban on trading non-OTF cattle (*Directive 64/432/EEC, 1964*).[48]

Defra is approaching this conundrum in three ways – developing a test that can differentiate between the vaccine and the tuberculin skin test, working with the EU to change legislation that permits the trade of cattle that have had the test and continuing research into a bovine BCG, so that when the law changes, immunisation is ready.

In late 2011, following years of research into bovine BCG[49] since the Krebs report was first published, Defra submitted a candidate vaccine to the Veterinary Medicines Directorate for 'marketing approval', which is the first step towards the availability of a vaccine for use in the market. A further £9.3m has been budgeted over the next 4 years for research into a cattle vaccine.[50] Field studies in Ethiopia[51] and Mexico[52] have demonstrated the protective effect of cattle vaccination to be between 56% and 68%.

However, Defra believes that an opportunity to change EU legislation to permit the use of a bovine BCG would not be available until 2015, with application in the field unlikely until 2017. Defra's own report states "We are continuing to invest heavily in research, in particular to develop a cattle vaccine and an oral badger vaccine. However, these are still many years away and we cannot predict with any certainty when they might be ready to deploy."[1]

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[46] Wildlife Trusts to vaccinate in pilot badger cull areas, Wildlife Trusts 19 Jan 2012, available here: www.wildlifetrusts.org/news/2012/01/19/wildlife-trusts-vaccinate-pilot-badger-cull-areas

[47] Council Directive 78/52/EEC of 13 Dec 1977 establishing the Community criteria for national plans for the accelerated eradication of brucellosis, tuberculosis and enzootic leukosis in cattle, available here: eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31978L0052:EN:HTML

[48] Council Directive 64/432/EEC of 26 Jun 1964 on animal health problems affecting intra-Community trade in bovine animals and swine, available here: eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31964L0432:en:NOT

[49] SE3212 Testing TB vaccines in cattle, available here: randd.defra.gov.uk/Document.aspx?Document=SE3212_2831_FRP.doc

[50] Cattle vaccination, Defra 6 Feb 2012, available here: www.defra.gov.uk/animal-diseases/a-z/bovine-tb/vaccination/cattle-vaccination

[51] Ameni, G., Vordermeier, M., Aseffa, A., Young, D.B., Hewinson, R.G. 2010. Field evaluation of the efficacy of Mycobacterium bovis Bacillus Calmette-Guérin against bovine tuberculosis in neonatal calves in Ethiopia, *Clin. Vaccine Immunol.* 17: 1533-1538

[52] Lopez-Valencia G., Renteria-Evangelista T., Williams Jde J., Licea-Navarro A., Mora-Valle Ade L., Medina-Basulto G. (2009). Field evaluation of the protective efficacy of *Mycobacterium bovis* BCG vaccine against bovine tuberculosis. *Res Vet Sci.* 2010 Feb; 88(1):44-9. Epub 2009 Jun 28

Biosecurity

One of Lord Krebs' original recommendations was to improve biosecurity on farms to limit the damage of bTB within herds and to contain it within geographical areas. This would have the effect of preventing its spread to other farms and wildlife in other areas.

This means implementing measures to:

- Limit contact between cattle and local wildlife, particularly badgers
- Frequently conduct bTB testing and subsequently slaughter infected cattle
- Eliminate the spread of bTB between herds

One of Defra's recommendations is to keep badgers away from cattle.[1] The Central Science Laboratory (CSL) in York conducted an experiment to assess whether it was possible to reduce contact between badgers and cattle within farmyard buildings and what the likely cost of such measures would be. The research, between Nov 2005 and Oct 2009, was in response to a theory by the same group (following a trial between 2003 and 2005) that visits to farm buildings by badgers could be important in transmitting *M. bovis*.[53]

CSL's research team excluded badgers from farm buildings in which cattle and cattle feed were housed using solid metal gates, gates with adjustable metal panels, solid metal fencing, feed bins and electric fencing. The team monitored badger activity using motion-triggered, infrared cameras for at least 365 nights on each of the farms in the study.

Comparing with controls, CSL discovered that badgers were not able to access buildings if exclusion measures were used. When consistently employed, these measures were 100% effective in preventing badgers accessing buildings.

CSL noted that badger exclusion measures needed to be individually tailored to fit each potential entrance point and that the variation in outlay and upkeep for farms of different sizes would vary. However, its calculations revealed that farms could exclude badgers from cattle with 100% certainty for between £604 and £12,482 (a mean of £4,045). This cost would apply in the first year, with farms paying only for maintenance in subsequent years.

To put that figure into context, the cost of a single cattle herd breakdown was estimated to be around £27,000 in 2009. In 2010-11, this cost was re-evaluated at £30,000.[54] While 10% of British farms every year are subjected to a breakdown in the worst effected areas, it is fair to conclude that the mean cost to farms in these areas is £3,000 per annum.

In the west and south-west of England, 23% of farms were subjected to breakdowns in 2010, putting the per-farm mean annual cost in that region at around £6,900.[55]

CSL concluded that methods of physical separation could be highly effective in eliminating contact between badgers and cattle, which in turn could lead to reduced disease transmission risks.[53]

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[53] An experiment to assess the cost-effectiveness of farm husbandry manipulations to reduce risks associated with farmyard contact between badgers and cattle - SE3119 2009, available here: randd.defra.gov.uk/Document.aspx?Document=SE3119_8676_FRP.doc

[54] Judge J, McDonald RA, Walker N, Delahay RJ (2011) Effectiveness of Biosecurity Measures in Preventing Badger Visits to Farm Buildings. *PLoS ONE* 6(12): e28941. doi:10.1371/journal.pone.0028941, available here: www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028941

[55] Next steps to tackle bovine TB in England, Defra 19 Jul 2011, available here: www.defra.gov.uk/news/2011/07/19/next-steps-to-tackle-bovine-tb-in-england-2/

Defra is currently in the process of awarding research funds to examine the proportions of infectious badger-cattle contact that occurs indoors and outdoors.

Whether or not badgers are coming into contact with cattle, if infected animals are moving around the country or between herds, it is clear that bTB will continue to spread. Around 40% of all cattle move each year and a report published in *Nature* in 2005, following research conducted by the Environmental Research Group Oxford Ltd. (ERGO), concluded that the movement of animals between farms is a critical factor in the increase in bTB.[56]

Defra itself admits that "cattle controls… are not working"[1] and a number of reports have suggested that farmers appear to have broken rules surrounding biosecurity.[57]

This has been well documented in Wales. A report published by the Welsh Assembly Government in Oct 2008, detailing the 2006-7 biosecurity Intensive Treatment Areas (ITA) across approximately 100km^2 of high-risk Carmarthenshire and Pembrokeshire border country, reveals that in some cases, veterinarians regard biosecurity as "appalling".[58] In one example, a farmer claiming to own a 'closed herd' was buying cattle from his sister, whose herd contained cattle that had been tested as TB-positive.

The ITA trial was voluntary, allowing farms to participate if they so wished. In total, 107 cattle farms volunteered – 86 of these were eligible and received 2 biosecurity risk assessment visits during the 15 months of the ITA. However, where participation was not in the farmers' interest (e.g. those with high numbers of cattle movements), they did not volunteer, which de-normalised the results.

Steve Clark, spokesman for the Badger Trust Cymru, said, "Cattle movements have been shown to be the cause of the vast majority of TB outbreaks. If farms whose business practices put them most at risk are allowed to simply opt out of disease control measures, bovine TB will continue to spread. That is a completely unacceptable burden on taxpayers."

The ITA report concludes that farmers could be given financial incentives to implement biosecurity measures. Steve Clark disagrees, "Why should taxpayers be expected to pay farmers to take common sense measures to control the spread of bovine TB amongst cattle? Given that taxpayers also compensate farmers for this disease, it's a double whammy. Instead, minimum standards of biosecurity should be a legal requirement, with deductions made from European farm payments if the standards are not implemented."

In England in Apr 2011, it emerged that cattle farmers in the South West and Midlands had been illegally swapping ear tags.[59] This meant that they might have been retaining animals infected with bTB in their herds, while sending healthy but less-productive animals to slaughter in their place.

Despite the risk of six months in jail and fines up to £5,000 for spreading TB or 10 years' imprisonment and unlimited fines for fraud, Defra themselves admitted that they were

[56] Gilbert, M., A. Mitchell, D. Bourn, J. Mawdsley, R. Clifton-Hadley and W. Wint (2005). Cattle movements and bovine tuberculosis in Great Britain. *Nature.* **435**, 491-496.
[57] "Appalling" biosecurity on farms is the true cause of bovine TB spread, says Badger Trust Cymru 2008, available here: www.nfbg.org.uk/_Attachments/Resources/277_S4.pdf
[58] Enticott, G. (2008), Evaluation of the South West Wales Biosecurity Intensive Treatment Area, Cardiff University, available here: new.wales.gov.uk/depc/publications/environmentandcountryside/animalhealthandwelfare/diseasesurveillancecontrol/bovinetb/reportofbiosecuritytreatarea/evaluationoftheswwalesareae.pdf?lang=en
[59] Farmers accused of cheating on TB slaughter rule by swapping cattle tags, *Guardian* 31 Mar 2011, available here: www.guardian.co.uk/uk/2011/mar/31/farmers-cheating-tb-swap-tags

investigating serious breaches.[60]

Obviously, retaining cattle that has tested positive to bTB in a herd is likely to increase the risk of TB spreading to other animals and to local wildlife. If that herd is moved, the risk extends to other herds.

Another investigation revealed that a TB-positive animal from Cornwall had been transported to an agricultural show in Warwickshire, which potentially spread the disease to many other cows and herds at the show and subsequently to the farms to which they returned.

At the time, the Minister of State for Agriculture and Food, Rt Hon Jim Paice MP, said, "I am absolutely appalled any farmer would deliberately break the law in this way. The vast majority of farmers with TB in their herds are doing the right thing, and it's reprehensible that anyone should be trying to get around the tough measures that are helping to control TB in cattle. Anyone doing this sort of thing will be caught and have the book thrown at them. We are introducing this extra safeguard to minimise spread of this devastating disease to other herds and wildlife."

In a written Ministerial Statement, Paice, said, "Anyone who retains TB test positive cattle increases the risk of disease spread within their herd, to their neighbours' herds, and to wildlife. We are moving quickly to introduce new measures to prevent this occurring in future."[61]

Defra immediately announced that cattle testing positive for bTB would also be DNA tagged, with random testing or where fraud is suspected.[60]

The Badger Trust was suspicious of this reaction by Defra, stating that, "Defra's sudden, massive and expensive response to the scandal of farmers switching ear tags to foil bTB controls suggests these crimes are widespread rather than local."[62] The charity subsequently wrote to the Prime Minister, the Deputy Prime Minister, the Secretary of State for Environment, Food and Rural Affairs and the Minister of State for Agriculture and Food to demand answers.

However, compensation payouts for bTB are the same, regardless of biosecurity measures, or lack thereof.

Effect on the ecosystem

Whenever a species is selectively extracted from its habitat, there is a consequence to the ecosystem. What happens when you destroy a large proportion of a population of badgers in a specific area of British countryside?

CSL conducted a survey of selected species in four of the ten RBCT triplets between 2000 and 2007. They were attempting to identify what effects a reduced badger population would have on the local ecosystem, comparing proactive badger cull areas with matched no-cull areas.

[60] Cattle testing positive for TB to be DNA tagged, Defra 31 Mar 2011, available here: www.defra.gov.uk/news/2011/03/31/cattle-bovine-tb
[61] House of Commons Written Ministerial Statements 31 March 2011, *Hansard* 31 Mar 2011, available here: services.parliament.uk/hansard/Commons/ByDate/20110331/writtenministerialstatements/part006.html and here: www.theyworkforyou.com/wms/?id=2011-03-31a.109.2
[62] Badger Trust demands answers on cattle TB frauds, Badger Trust press release 7 Apr 2011, available here: www.badgertrust.org.uk/_Attachments/Resources/498_S4.pdf

From pre-cull to the second year post-cull, CSL estimated that fox densities increased on average by 92% in proactive areas, while declining by 60% in no-cull areas. This heightened fox population remained while badger numbers remained low.

Other species fluctuated considerably, with some species declining as a result of the increase in fox numbers. Species suffering a decline included hares, whose young (leverets) are predicated by foxes. This species is of conservation concern under the UK BAP.[63] The exact mechanism for the increase in fox numbers is unclear, but it is likely to relate to a reduction in competition for breeding sites and foxes using abandoned badger setts.

Unlike badgers, foxes are widely considered to be a predator of agricultural livestock,[64] often held responsible for the loss of lambs, piglets and poultry. Foxes can also have a major impact on endangered bird species, particularly on ground-nesting seabirds.[65]

A badger cull, as opposed to a vaccination programme, in addition to not reducing bTB, is likely to have a negative impact on the ecosystem, adding to one set of problems with another.[66]

Animal welfare campaigners and charities are keen to emphasise that badger culling is likely to be inhumane. The ISG's final report on the RBCT suggested that, within the group that was trapped, while injuries sustained by badgers were relatively low in number (1,119 badgers were recorded to have sustained injuries between 2000-2005 - a total of 8.4%), concern was expressed about the cubs of breeding female badgers culled. These infants would be underground and most likely die of starvation or dehydration.[29] The RBCT included a three-month closed season to attempt to limit the effect.

'Free shooting' of badgers is also likely to be inhumane. Badgers are large creatures that live in social groups and exhibit complicated brain functions[67] and can certainly experience pain in a similar way to humans.[68] While badgers have not been observed using tools, related species have.[69]

Inaccurate marksmanship and use of shotguns mean that a badger may not be killed on the first shot. A fatally wounded badger could take hours or even days to die. During Defra's 2010 consultation, respondents expressed concern at the lack of scientific evidence on either the effectiveness or humaneness of shooting free-ranging badgers.[2]

The RSPCA has expressed concern that local extinction of the badger could result, writing to Defra that, "Monitoring badger populations will be very important. Whether culling might, contrary to the Bern Convention, be detrimental to the survival of a population is a real concern."[2]

[63] UK BAP priority terrestrial mammal species, UK Joint Nature Conservation Committee 2010, available here: http://jncc.defra.gov.uk/page-5170
[64] Macdonald, D.W. (1984) A questionnaire survey of farmers' opinions and actions towards wildlife on farmlands. *Agriculture and the environment.* (D. Jenkins, ed.) pp171-177. ITE Monks Wood, Huntingdon.
[65] Seymour, A. S., Harris, S., Ralston, C. and White, P. C. L. (2003) Factors influencing the nesting success of Lapwings (*Vanellus vanellus*) and behaviour of red fox (*Vulpes vulpes*) in Lapwing nesting sites. *Bird Study* 50; 39-46
[66] The ecological consequences of removing badgers from an ecosystem - ZF0531 2007, available here: randd.defra.gov.uk/Document.aspx?Document=ZF0531_6288_FRP.doc
[67] Pease, Alfred Edward (1898). *The badger; a monograph*. London: Lawrence & Bullen, ltd.
[68] Don E. Wilson & David Burnie, ed (2001). *Animal: The Definitive Visual Guide to the World's Wildlife (1st ed.)*. DK Publishing. pp. 86–89. ISBN 978-0789477644
[69] Rosevear, Donovan Reginald (1974). *The Carnivores of West Africa. London: Trustees of the British Museum (Natural History)*. ISBN 056500723x.

Cost to the taxpayer

The Guardian newspaper has called the proposed cull trials a "zero-cost, zero-sense policy". The first half of the statement couldn't be further from the truth – even though farmers will be using their own equipment on their own land, the actual cost of culling is likely to be high.[70]

If Defra is correct in assuming that 'free-shooting' will be the most common method applied by farmers and landowners, the smallest costs are the administration and preparation of the trials, the culling itself, the scientific studies and tests that will follow. Farmers and landowners are expected to pay for their own materials, but estimates of Government costs suggest that free-shooting will cost around £300 per km^2. The NFU's estimates, based on 'testing the market', would be £250 - £317 per km^2.[71]

Defra's impact assessment[17] suggests that the cost of each cull is between £3.74m and £6.38m (per 350km^2 area – NB, not per 350m^2 as in Impact Assessment), with a best estimate of £4.56m. This is broken down as follows:

- Administration costs £1.40m
- Perturbation in neighbouring areas £0.50m
- Licensing, monitoring and compensation for initial bTB increase £3.11m

- Total **£4.56m**

It is clear that a large part of this cost relates to perturbation. However, these official figures appear conservative. For one thing, if 'free-shooting' is ruled out after the first year of the trials (meaning that farmers and landowners will be legally obliged to cage trap and shoot for the remaining period of their licenses), total costs will rise to around £2,500 per km^2.[72]

The Welsh Assembly Government has estimated, in its similar trial cost assessments, that the cost of culling would be approximately £2,830 *per badger.*[72]

Defra's impact assessment says, 'There are considerable uncertainties around the central estimates.' For one thing, Defra requires that landowners should cull 70% of badgers in each area, but it is unclear how culling would be monitored and by whom to ensure this figure is reached.

Any badger culling costs will have to be considered in the context of budget spent in this area already. In England, where trials have been completed exhaustively before, costs have amounted to around £50m.

The cost of policing the trials is also likely to be high. Public opinion is strongly biased against culling and demonstrations and activism are likely to stretch resources, at a time when, post-Olympics, police budgets will be struggling to grant officers long-awaited holiday leave. The trials will last for more than six weeks, and will include evenings, nights and weekends, when police overtime is most expensive.

In a Written Answer on 20 Feb 2012, Jim Paice MP hinted that the cost of policing is somewhat open-ended. An initial estimate, developed between the Association of Chief Police Officers (ACPO) and the Home Office, of £0.5m per area per year (£8m total), is also

[70] David Attenborough: a badger cull could worsen TB in cattle, *Guardian* 14 Jul 2011, available here: www.guardian.co.uk/environment/2011/jul/14/david-attenborough-badger-cull
[71] Badger cull: Ball now firmly in farmers' court, *Farmers Guardian* 3 Jan 2012, available here: http://www.farmersguardian.com/home/business/badger-cull-ball-now-firmly-in-farmers'-court/43884.article
[72] Badger culling: Q&A, *BBC* 4 Jun 2010, available here: www.bbc.co.uk/news/10227556

likely to be conservative.[73]

In addition to the above, the Summary of costs in the impact assessment itemises the following:

- Licensing	£377,000 / area (4 yrs, highest in yr 1)
- Coordination	£20,000 / area / yr
- Culling using cage trapping	£2,500 / km^2 / yr
- Culling using controlled shooting	£300 / km^2 / yr
- Culling using a combination of methods	£1,000 / km^2 / yr
- Vaccination	£2,250 / km^2 / yr
- Monitoring	£737,000 / area / yr
- Policing	£500,000 / area / yr

Using the most basic assumptions, including that a vaccination programme would place no extra demands on the police, it's easy to see that culling areas would need to be larger than 400 km^2 in order to cover the additional policing costs.

According to scientific studies mentioned in this paper, perturbation causes an increase in cases of bTB in neighbouring areas when badger culling is permitted. It will therefore be impossible to eradicate bTB in British herds by culling alone – moreover, culling will only serve to worsen the spread of the disease, reducing any potential savings.

Ultimately, badger vaccination is a cheaper method. During current small scale studies, Gloucestershire Wildlife Trust has undertaken to keep accurate records of costs.[74] These are summarised as follows (Yr 1 costs to show licensing etc.):

- Equipment and training	£6,958
- Certificate of competence (5 vaccinators) (since reduced)	£2,065
- Consumables (incl. vaccine)	£405
- Staff costs	£4,640
- Year 1 total	**£14,069**
- Total annual costs over years 2-5	£29,212
- Average annual cost	**£8,656**

This is equivalent to an average of £51 per hectare, or £765,000 per 150km^2.

The Trust also calculated the costs of vaccination for their 66 ha farm holding to be approx. £2,856.[74] These costs are, in fact, higher than they would be, should the Government adopt a large vaccination programme (DEFRA's figures for vaccination are half).

A British private sector group, Brock Vaccination, comprises former government experts in Gloucestershire, Devon and Shropshire offering a professional service of badger vaccination to landowners nationwide. Brock Vaccination has identified economies of scale when vaccine programmes are more widespread.

It estimates the cost of vaccinating badgers to be £34 per hectare, or £510,000 across a 150km^2 area. Cost depends on badger density, ease of access to land and accurate estimates follow badger activity surveys.

Long term, it is reasonable to assume that a widespread and sustained badger vaccination programme could increase immunity in the badger population and significantly reduce the proportion of infected badgers within 5 years, saving the Government a greater burden.

[73] Bovine Tuberculosis: Disease Control [95074], *Hansard* 20 Feb 2012, available here: www.publications.parliament.uk/pa/cm201212/cmhansrd/cm120220/text/120220w0001.htm

According to Gloucestershire Wildlife Trust, further savings could be made through mass-production and distribution of traps, a free Advisory Service (which would also make uptake easier) and improvement in FERA's licensing process, which is seen as a potential barrier to uptake.[74] Costs of vaccination programmes will also reduce with oral vaccines.

The greatest cost of culling, however, will be the delay in finding a long-term solution to the problem of bTB. Despite £30m already spent on developing vaccinations, many of these trials have been pushed to the back burner to accommodate the culling trials, meaning a permanent immunisation of the country's badger and/or cattle populations is in danger of being hindered for years. Despite these costs, badger culling will only reduce bTB by between 12-16% over 9 years,[29] saving the Government a maximum of between £12m and £16m pa.

However, even if a culling or vaccination programme were so successful that it eradicated bTB in the badger population and eliminated transmission of the disease from badgers to cattle, Britain would still have a major problem with bTB.

The weight of public opinion

Public opinion is firmly opposed to the cull.

The Government's own consultation in Dec 2010, aimed at gauging the public reactions to a potential badger cull, revealed from almost 60,000 responses that 69% of people were completely opposed to a cull. 31% of people were in favour of a cull and vaccination programme, while 0.015% (just 9 people) wanted a cull with no vaccination.[2]

An opinion poll commissioned by the BBC and conducted by GfK NOP from 3-5 Jun 2011, indicated that 63% of Britons in both town and country oppose killing badger to curb bTB. The majority opposed culling in every age region, every age group and both genders. In the same poll, 31% were in favour and 6% undecided. Interestingly, the poll revealed that the issue was not necessarily a town vs. country issue – the cull-opposing majority was 57% in urban areas, 59% in rural areas and 68% in mixed urban/rural areas, where support for the cull was just 26%.[75]

More than 100,000 signatures were handed into the Government in Oct 2011 to protest the plans, gathered by the RSPCA, the League Against Cruel Sports and the campaign group 38°.[76]

Independent, national market research commissioned by the Bow Group in Feb 2012 reveals that almost half of people of voting age consider that the Government does not consider the interests of Britain's wildlife at heart. Only 10% of people believe it does.

The research indicates strong opposition to the badger cull (81% in total strongly opposed to mildly opposed) with just 3.4% strongly in favour of the cull.[77]

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[74] Nature Reserves Badger Vaccine Deployment Programme 2011, Gloucestershire Wildlife Trust Oct 2011, available here: wt-main.live.drupal.precedenthost.co.uk/sites/wt-main.live.drupal.precedenthost.co.uk/files/Gloucestershire%20Vaccination%20Programme.pdf

[75] UK public opposed to badger cull, opinion poll suggests, *BBC* 8 Jun 2011, available here: www.bbc.co.uk/news/science-environment-13684482

[76] RSPCA: On the fourteenth day of Christmas a badger cull is confirmed, *politics.co.uk* 14 Dec 2011, available here: www.politics.co.uk/opinion-formers/rspca-royal-society-for-the-prevention-of-cruelty-to-animals/article/rspca-on-the-fourteenth-day-of-christmas-a-badger-cull-is-co

[77] The political impact of the proposed badger cull trials - Study report (AGR poll), *The Bow Group* Feb 2012, available here: www.thebowgroup.org

The media is divided on the cull, with much of the mainstream media opposed. As far ago as May 2008, professional statistician, Orwell Prize political blogging winner and *Telegraph* and *Guardian* columnist Graeme Archer said in *ConservativeHome*, "it sticks in my throat to condemn a species to death when such a policy, predicated on a hypothesis which has been discredited by a valid scientific experiment, would not even deliver the result that the 'users' of the policy (cattle farmers & their customers) desire."[78]

Other papers, including *The Independent*,[79] *The Guardian,*[80] *Daily Mail*[81] and *The Telegraph* have expressed opposition;[82] even the *Financial Times* has hinted at it.[83] *The Mirror* is opposed[84] and according to the *Mirror* and a BBC report, the Shadow Environment Secretary has written to 25,000 Labour supporters, asking them to lobby their MPs on the subject. Labour has also launched an online petition, called Can The Cull.[85]

In the plotline of the long-running Radio 4 soap *The Archers* in Jan 2012, Ambridge residents voted to vaccinate their badger population, rather than participate in a cull.[86]

Trade publications aimed at the farming community largely retain an unbiased viewpoint, remaining factual and quoting both advocates and opponents of the cull.[87]

In early Feb 2012, it emerged that the culling trials could even be unlawful and result in legal proceedings. The Badger Trust has launched proceedings against Defra on the sanctioning of badger culling trials on several grounds, including cost and the fact that culling would in fact likely spread bTB further.[88] Defra declined to comment.[89]

Conclusions

Bovine tuberculosis needs to be tackled. In 2010/11, it cost the taxpayer £91m (compared to

[78] Save the badger (response to "Badgers: time for a cull?") *ConservativeHome* 12 May 2008, available here: conservativehome.blogs.com/centreright/2008/05/alex-wrote-this.html
[79] Majority objected to badger cull before policy was approved, *Independent* 29 Jul 2011, available here: www.independent.co.uk/environment/nature/majority-objected-to-badger-cull-before-policy-was-approved-2327913.html
[80] Badger culls don't stop tuberculosis in cattle – the evidence is clear, *Guardian* 11 Aug 2011, available here: www.guardian.co.uk/environment/blog/2011/aug/11/badger-cull-dont-stop-bovine-tb
[81] 'A black day for badgers': Cull will see 30,000 mammals wiped out in bid to combat bovine TB, *Daily Mail* 20 Jul 2011, available here: www.dailymail.co.uk/news/article-2016470/UK-badger-cull-30k-mammals-wiped-bid-combat-bovine-TB.html
[82] Badger cull: the doubts remain, *The Telegraph* 16 Dec 2011, available here: www.telegraph.co.uk/earth/countryside/8961393/Badger-cull-the-doubts-remain.html
[83] Spelman faces backlash on limited badger cull, *FT* 4 Jul 2011, available here: www.ft.com/cms/s/0/86c6eef2-a670-11e0-ae9c-00144feabdc0.html#axzz1lDop3tjj
[84] Labour leads badger cull opposition, *Mirror* 19 Aug 2011, available here: www.mirror.co.uk/news/latest/2011/08/19/labour-leads-badger-cull-opposition-115875-23355107/
[85] Labour - Can The Cull, available here: campaignengineroom.org.uk/can-the-cull
[86] The Archers 25 Jan 2011, *BBC Radio 4*, temporarily available here: www.bbc.co.uk/iplayer/episode/b01b1g9d/The_Archers_25_01_2012/
[87] Reaction to badger cull announcement, *Farmers Guardian* 19 Jan 2012, available here: www.farmersguardian.com/home/latest-news/reaction-to-badger-cull-announcement/44305.article
[88] Badger Trust gives DEFRA notice of legal challenge, Badger Trust 9 Feb 2012, available here: http://www.nfbg.org.uk/_Attachments/Resources/638_S4.pdf
[89] Badger Trust announces cull legal challenge, *Farmers Guardian* 9 Feb 2012, available here: http://www.farmersguardian.com/home/livestock/badger-trust-announces-cull-legal-challenge/44744.article

metal theft - £770m).

However, badger culling is impractical and not scalable. Exhaustive research conducted before and during the Randomised Badger Culling Trial (RBCT) demonstrates an efficiency in reducing the incidence of bovine TB (bTB) of just 12-16% over 9 years. Were culling to be conducted nationally, at best it would reduce the cost to the taxpayer of bTB from £100m pa to £84m pa.

Furthermore, culling has been scientifically proven to lead to perturbation, an effect by which badger social groups are fractured and individuals spread. This actually increases the risk of bTB in herds neighbouring the cull area by 27%.

Cattle vaccination is in its early stages of development, with inoculation of cattle herds currently banned under EU law and no hope of reprieve until 2017. However, bovine BCG is undergoing testing in preparation for market availability and a change in the law.

Vaccination of wild badger populations (within which, by the highest estimates, only 15% of badgers carry bTB), however, is a step that landowners can take now. Trials of vaccinating a proportion of the wild badger population with BadgerBCG has shown to reduce the incidence of positive serological TB test results by almost 74%. Because of the 3-5 year lifecycle of *M. meles*, it is considered that vaccinating only a proportion of the wild badger population could have a major impact on bTB within 5 years.

Costs of vaccination are also lower, when taking into all factors, including the additional burdens of policing and perturbation, inevitable under culling plans.

Cattle housed indoors can be separated from badgers using physical measures, such as metal gates and electric fencing, for an average of just over £4,000 per farm in the first year, with much smaller maintenance costs in subsequent years. This compares to an average cost of bTB to British farms in bTB areas of £3,000 per farm pa, with south-west farms spending an average of £6,900 pa on breakdowns.

Biosecurity measures have been shown to be lacking, with some farmers breaking regulations and not containing infected cattle. An improvement in the enforcement of cattle movement restrictions and tougher sentences for offenders would go some way towards tackling the primary reason for bTB spread – cattle movement.

Badger culling is also incredibly unpopular, with national polls averaging between 66% and 81% against the cull and almost 100% in favour of vaccination. Media outlets have mirrored this opinion and there is even a legal challenge against the trials.

The species is protected legally and since illegal badger baiting remains popular, concerns have been raised that the cull could see an increase in wildlife crime. Culling is inhumane and also likely to disrupt local ecosystems, potentially leading to local extinction.

On 20 Mar 2012, the Welsh Assembly Government scrapped its plans to cull badgers, focusing instead on vaccination.[90]

[90] Welsh badger cull scrapped in favour of vaccination, *BBC* 20 Mar 2012, available here: www.bbc.co.uk/news/uk-wales-politics-17435827

Nine recommendations

We recommend that the Government revisits the scientific results of the RBCT and reassesses Defra's consultation report:

1. The Government should adopt Defra's 'Option 1', retaining the legal *status quo* for the badger and not issue licenses for culling.

2. The same investment planned for culling trials should be invested in widespread badger vaccination programmes organised by wildlife groups and coordinated by Defra in the south-west.

3. Efficiencies should be made in the certification process for vaccinators, to reduce the cost of licensing for the purposes of badger vaccination.

4. Landowners should be supported to improve biosecurity on farms, with guidance issued regarding physical methods of badger-cattle separation. It should be made clear to farmers that investment in metal gates and electric fencing is 100% effective and considerably cheaper than the cost of a breakdown – prevention is better than cure.

5. Breaches of biosecurity laws should be fully investigated and penalties for such crimes improved to serve as a deterrent.

6. The size of compensation payouts to landowners *in lieu* of bTB breakdowns should be linked to efforts to maintain good biosecurity on farms, including exclusion of wildlife and best practice on-farm and in-transit.

7. A Government/industry working group should be established to take forward badger vaccination, with representation from Defra, scientists, landowners (incl. the National Trust), the private sector, wildlife groups and others. This group should share resources and best practice.

8. Defra should complete the development of a cattle vaccine this year and secure change within the EU to permit commercial deployment.

9. TB research should continue to be protected from significant cuts and development of an oral vaccine for badgers should continue.

We believe that continuing with current proposals could prove extremely costly to the Government, in terms of both public finances and public opinion.

Contributors and Acknowledgements

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Council for Nature Conservation and the Countryside Submission

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Wildlife and Bovine Tuberculosis

1. Introduction.

CNCC is a Statutory Advisory Council to the Department of the Environment, providing scrutiny of a range of designations and advice on a range of topics relating to nature conservation and the countryside. CNCC has been involved over a number of years with DARD Stakeholder Groups looking at the issue of wildlife and Bovine TB. Our remarks are limited to issues involving wildlife as we are not qualified to consider any other aspects of the disease.

2. Wildlife species involved.

The species primarily involved in discussions about bTB is the Badger. It has become clear that badgers are susceptible to bTB, and many badgers have died from the disease, often following painful and unpleasant symptoms such as open rupture of salivary and sub-maxillary glands. It is also clear that badgers may then infect cattle, and as such represent one of the main routes of transmission and spread of the disease. What remains unclear are the exact pathways for transmission of the disease from cattle to badgers, from one badger to another, and from badgers to cattle. Finally it is important to recognise the close association between cattle and badgers. Badger distribution and abundance correlates very closely with that of cattle in Ireland, indicating that areas suitable for grazing are also ideal for badgers. The presence of cattle dung as a source of food for invertebrates, including a range of beetles, flies and earthworms, may also be important in providing a staple diet for badgers.

The other animals that may be involved in the transmission of bTB are deer, with populations of three species, Red, Fallow and Sika, now increasingly common in the NI countryside, and two other species, Muntjac and Roe, apparently illegally introduced relatively recently. As yet TB infection in deer is relatively low, at about 5% of those tested, and the infection appears to be limited to the digestive tract, unlike cattle where it is found in a range of other organs and glands. At present deer probably represent a limited risk to cattle, but as populations are steadily increasing and ranges are spreading this situation may change.

3. Culling.

There have been many calls for badgers to be culled to try to stop this route of transmission of bTB. While we have not culled badgers in NI there is now a considerable body of experience from culls in RoI and England, as well as some good scientific data on the effects of culling from some of these experiments. It should be noted that there are two different types of cull: the reactive cull, removing badgers where there is an established bTB outbreak in herds in a locality, and the pro-active cull, where badgers are removed as a precaution, usually over a wider area.

4. Culling experience.

In RoI there have been two major trials of pro-active culling, which have been reported as being successful in reducing bTB infection in cattle, but as yet there have been no detailed results or analysis published, so it is difficult to gauge how successful the trials have been. There has also been a lot of reactive culling, but this has not been carefully monitored. In England the large-scale Randomised Badger Culling Trial showed a clear increase in cattle infection with reactive culling (this part of the trial was rapidly abandoned), and a major problem with 'perturbation' (increased movements and disturbance to social structures) to badger populations with proactive culling. Various studies have shown that badgers are more likely to become infected if they move about more, and that groups of badgers that experience more movements are also more likely to become infected. As a result bTB may decrease in the areas where badgers are culled, but increase significantly in the adjacent areas. One study concluded that 'culling could not make a meaningful contribution to disease control'.

5. Other issues associated with culling.

CNCC believe that there are a number of other issues that make culling an unattractive option in tackling bTB. These are:

- Public opinion – while there may be support for culling badgers among the farming community there is little sympathy for this position among the wider public. The recent filming of badger baiting has aroused a considerable depth of feeling of revulsion at killing badgers.
- Legal problems – attempts to introduce culls in both England and Wales have led to legal challenges which have delayed progress significantly and led to vast increases in the cost.
- Badger status – the badger is protected under Schedule 5 of the Wildlife Order and the Wildlife and Natural Environment Act (2011) – 'Animals which are protected at all times'. Any culling activity would require a licence from NIEA, who would have to be convinced of the need, effectiveness, and humane methodology of the proposed actions.
- Effectiveness – studies of the methodology of culling suggest that it is relatively easy to remove about 75% of badgers in an area, but the final 25% of the population requires a great deal of effort and time. Often this effort is not made and culls are signed off as complete when actually only about 80% of the badgers have been removed. The remaining population provides a reservoir for the disease which then spreads rapidly again as a a result of perturbation effects. There may also be an issue with landowners who are not prepared to let badgers be killed on their land.
- Cost – the implication of this is that to carry out an effective and humane cull will require enormous resources, with the risk of making matters worse if the extra effort is not made.

6. Alternative measures.

CNCC believe that there are a number of measures that can be undertaken to reduce the impact of badgers on bTB in cattle. Clearly the most important is to maintain the current regime of testing cattle on a regular basis, combined with careful measures to restrict movement of cattle that are either infected or may have had contact with infected animals.

These measures have been effective in reducing levels of infection over the past few years, and are necessary to prevent any increase in infection, such as was evident when testing was suspended during the Foot and Mouth outbreak in 2001.

It is to be hoped that the Case Control Study undertaken by DARD in 2011 may turn up some results showing the effect of various farm management practices which may help to provide guidance for farmers.

Two other main avenues are currently being explored in England, with some success, and we believe that these should be developed in NI. These are explored below.

7. Managing contact between badgers and cattle.

In the absence of detailed knowledge of how the disease is transmitted between badgers and cattle, it seems logical to attempt to reduce contact between the two species as far as possible. This is difficult when cattle are out at grass, though direct contact is unlikely unless a dead badger is nosed by cattle. However closer contact is much more likely when cattle are housed, and badgers may enter cattle houses in search of food, particularly when badgers suffering from advanced stages of bTB may find foraging in the wild more difficult. Trials on exclusion measures have shown that it is possible to exclude badgers completely from houses and yards using badger-proof gates or electric fencing, as long as the defences are properly maintained. This relatively simple measure seems a sensible precaution for farmers to take.

8. Vaccination.

Vaccination has long been a vital tool in tackling serious diseases in humans, including Tuberculosis where the BCG vaccine has all but eradicated the disease in many countries. The EU Animal Health Strategy is based to a large extent on shifting the control of a number of diseases from test and slaughter to vaccination as a cheaper and more effective solution. However vaccination of cattle against bTB is still some distance off, with no tested vaccine yet available, and the serious problem of how to distinguish between vaccinated and infected animals.

Badger vaccination on the other hand appears to be a viable option. An injectable vaccine has been available since 2010, and trials have been under way at several sites in SW England, including Woodchester Park (Food and Environment Research Agency), the Killerton Estate (National Trust) and several nature reserves belonging to the Gloucester Wildlife Trust. Badgers have been trapped and injected, and then re-trapped to determine levels of antibodies present. The main problem is the cost of injecting the vaccine, but it is hoped that an oral vaccine will be available by 2014 following trials that are now under way. However initial results are very encouraging, and it appears that some immunity is passed from mother badgers to their cubs, so that it may not be necessary to vaccinate all badgers to have a significant and lasting effect.

Trials are also being undertaken in the Republic of Ireland to determine the effectiveness of the vaccines in providing protection against infection in badgers. It should however be stressed that as yet there is no clear indication of the effect on infection in cattle, and that may take some time to determine.

It should also be pointed out that following legal difficulties in setting up a cull, the Welsh Assembly Government has introduced a programme of badger vaccination.

9. Conclusions.

CNCC strongly believes that culling is not the best way to deal with the issue of bTB in badgers. We suggest that it would be an expensive, controversial and difficult method to employ, that could have serious negative effects beyond the areas which are actually culled. We recommend that trials with vaccination of badgers are undertaken in NI to help establish

how effective a programme might be. We also recommend that further serious thought is given to farm management practices that would minimise the contact between cattle and badgers.

Yours sincerely,

Patrick Casement
Chairman

Dairy UK Submission

Dairy UK (NI) Position on Bovine TB

Healthy dairy cows and a healthy wildlife population should be the goal in seeking to eradicate bovine TB through the implementation of a carefully managed science-led programme.

If the disease is allowed to continue to spread, the result will be many more wildlife suffering a debilitating and painful death, and many more dairy cows will have to be culled.

Urgent and effective action needs to be taken to address this disease which impacts on the health and welfare of wild and farmed animals alike. We would support a science based approach to tackling Bovine TB.

Bovine TB is one of the most serious problems facing the dairy industry at present. It results in the slaughter of dairy cows and inflicts severe damage on the financial and emotional well-being of dairy farmers and the rural communities they are part of.

Dairy UK (NI) welcomes the Committee's intention to carry out a thematic review of bovine TB. The failure to control the disease has resulted in unnecessary financial losses to the sector and considerable psychological stress to farmers affected by TB outbreaks. The resulting lack of confidence about the future has reduced the willingness of some farmers to invest in their businesses.

Dairy UK (NI) applauds the Committee's willingness to address this problem. Dairy UK (NI) would like to see a control policy that finally eradicates the disease, gives confidence to farmers and ensures a healthy environment for both dairy cows and wildlife.

DARD Letter re Bovine TB Review

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Date: 24 April 2012

Dear Stella

DARD Submission – ARD Committee TB Thematic Review

Further to your letter of 27 March 2012 to Colette McMaster, I enclose a brief written submission and associated annexes on the control of Bovine Tuberculosis in Northern Ireland. This paper outlines the strategy DARD has in place for the reduction and eradication of Bovine Tuberculosis and the progress made towards implementing the recommendations in the 2009 Public Accounts Committee Report 'Control of Bovine Tuberculosis in Northern Ireland'.

Officials will be pleased to appear before the Committee at the evidence sessions on 1 May and 3 July 2012 in relation to the Committee's Thematic Review of Bovine Tuberculosis.

Should you require further information or clarification please do not hesitate to get in contact.

Yours sincerely

Joe Cassells
Departmental Assembly Liaison Officer

DARD Submission

Review of Bovine Tuberculosis

Background

1. Bovine Tuberculosis (bTB) is an infectious bacterial disease of a wide range of mammals, including cattle, wildlife and humans. Clinical disease in cattle is chronic, debilitating, and treatment is difficult. Bovine TB is a very complex and multi-factorial disease that remains one of the most difficult animal health problems in these islands. Even though the disease has been the subject of detailed scientific research over many decades there remain many unknowns about this disease.

2. Eradication of bTB in cattle is unlikely to be through the total biological extinction of the organism, but rather through the reduction in the population to a level where it is insignificant in effect. This may be achieved by testing and removing animals already infected in a population, and by reducing the risks of other animals becoming infected through, for example, biosecurity measures to reduce the risk of bovine TB being introduced and spread within herds.

3. A statutory TB programme has been operating here since 1959. TB controls are required by EU Commission legislation including the European Trade Directive (EU Directive 64/432). Details of the history and configuration of our statutory TB controls and how they are operated here are contained in the draft NI TB Eradication Plan 2013, which has recently been submitted to the EU Commission for consideration. A copy is attached at **Annex A**.

4. TB disease levels in cattle in NI have fallen considerably since the introduction of the statutory disease controls and more recently since a relative peak of 10.21% in February 2003 following a suspension of herd testing during the FMD outbreak in 2001. Steady progress was made since then, with the herd incidence being reduced to 4.99% by 31 August 2011. It is therefore extremely disappointing to note the recent rise in TB herd incidence to 6.51% at 28 February 2012. Graphs showing the NI TB Herd and Animal Incidence levels are attached at **Annex B**.

5. While it is usual to see an increase in the number of reactors over the winter months when more herd testing is completed, the increase in the number of new reactor herds since September 2011 has been higher than anticipated, especially when compared with 2010. There is no obvious reason for this increase. There has been no change made to the TB programme since January 2010, when the removal of animals as reactors that are inconclusive at second consecutive test was introduced. Our Veterinary Epidemiologists have been investigating the disease pattern and DARD's Veterinary Service has held a number of meetings to identify possible causes. Initial analysis shows that the increase is not the result of large scale breakdowns in a particular area of NI, but a general rise in most – but not all – areas. We will continue to monitor the situation to seek to establish if the increase represents a fundamental change in the relatively level trend that the incidence has followed since 2007, to understand what is driving the change and to counter it.

6. DARD remains committed to reducing and ultimately eradicating TB in cattle here.

Progress/Implementation of 2009 PAC Recommendations

7. The NI Audit Office (NIAO) published its Report on The Control of Bovine Tuberculosis in NI on 18 March 2009. The Report examined the progress DARD had made on the control of bovine TB following the last examination carried out by the Public Accounts Committee (PAC) at Westminster in 1993-94. The PAC hearing to consider the NIAO report took place on 26 March 2009 and their report was published on 29 June 2009. The Memorandum of Reply was laid before the NI Assembly on 16 September 2009.

8. Following the PAC report, DARD has conducted a very significant programme of work to improve upon various parts of the TB Eradication Programme. A summary of progress on the PAC recommendations is attached at **Annex C**.

TB Eradication Programme

9. The fundamental principles of bTB intervention in cattle centres on the detection of diseased or high-risk animals; the compulsory removal of those animals from their herd of origin to slaughter; and the restriction of movements of cattle from infected herds until they are tested clear.

10. The current DARD bTB Eradication Programme involves regulation of cattle movements, compulsory annual testing of all cattle herds using the Single Comparative Intradermal Tuberculin Test (SCITT) – a skin test - in line with EU Directive 64/432, removal of animals that give a positive reaction to the skin test, and tracing and testing of contacts. It also involves routine abattoir surveillance of all slaughtered bovines. Use of gamma interferon blood testing as a complementary test may be deployed in some circumstances.

11. Where bovine tuberculosis is detected in a herd, valuation and removal of reactors to slaughter is actioned with compensation payable to the farmer. Live animal movement restrictions and increased frequency of testing is implemented until the herd tests clear of disease.

12. Following a confirmed TB breakdown, adjoining farmers are alerted and their herds may be allocated a contiguous risk herd test. Cattle which have left a herd prior to infection being found are traced, placed under movement restriction and tested. If it is not possible to test the traced animal then a herd level test is considered in the recipient herd. Where relevant, the herds from which a TB reactor has originated or moved through are tested. A more detailed breakdown of the testing/ movement/ compensation procedures is provided at **Annex D**.

13. A graph detailing the costs of the TB programme is provided at **Annex E**.

DARD Strategy for the Reduction and Eradication of bTB

14. DARD annually seeks, and has gained, EU Commission approval for each of the NI 2010, 2011 and 2012 bovine TB Eradication Plans. This means we are able to secure some £4-£5 million per year co-funding from the EU Veterinary Fund.

15. Considerable work has been undertaken to enhance the TB eradication programme in recent years:

- From 1 January 2010 those cattle that give an inconclusive result to a second consecutive bovine TB test are removed as reactors.
- DARD's delivery of the TB programme has been improved through monitoring Key Performance Indicators.
- The testing process has been improved by better supervision of and communications with Private Veterinary Practitioners (PVPs).
- We are reviewing the way we use the gamma interferon blood test in the TB programme to ensure we are making the best use of it.
- From 1 December 2010, we use DNA identity tags on reactors to help reduce the potential for fraudulent animal substitution between the time of animal valuation and slaughter.
- DNA tagging will progressively be applied at the earlier stage when a reactor is identified.
- We are funding local TB and wildlife research and studies.
- We continue to learn from the research experiences of other regions.

16. Our TB eradication plan is vital to supporting NI's £1,000 million plus export dependant trade in livestock and livestock products. At any time over 90% of herds in NI are able to participate fully in the export trade because of this.

Bio Security

17. As TB is an infectious disease observing good practice with regard to bio-security is key to preventing re-infection.

18. DARD issues advice on how farmers can help to protect their herd from TB. This includes the practical steps farmers can take to reduce the contact between their cattle and other cattle; and between cattle and badgers. In every herd breakdown a Veterinary Officer will give biosecurity advice and a copy of the "TB in Your Herd" booklet is issued (copy attached at **Annex F**).

19. The Bio-security Code for NI farms, which was drafted jointly with industry representative organisations, outlines the actions which should be taken at the farm-gate and on the farm and emphasises how farmers and those who keep animals can minimise the risks to their stock. The "Bio-security Code for NI Farms is attached at **Annex G** and it is available on the DARD website at:

http://www.dardni.gov.uk/biosecurity_code_booklet_for_northern_ireland_farms.pdf.

20. DARD has commissioned a TB Bio-security Study aimed at determining if there are any differences in the characteristics of herds that have recently had a TB breakdown against those that have had no recent history of a breakdown. The results are expected later in 2012. (More detail is available on the DARD website at:

http://www.dardni.gov.uk/index/animal-health/animal-diseases/tb/tb_biosecurity_study.htm

Vaccination

21. Vaccination of cattle against bTB is currently prohibited by Council Directive 64/432. However, Defra has invested considerable research funding towards the development of a viable cattle vaccine. While indications are positive at laboratory level, much will depend on successful trialling in field conditions; obtaining the necessary vaccine licences; approval of the EU Commission; and securing agreement of the authorities in export markets.

22. There continues to be considerable work in these islands in relation to developing a vaccine for badgers against bTB. An injectable badger vaccine has been licensed for use in the UK. The development of an oral bait vaccine for badgers is still under development. Badger vaccination is currently being field trialled in the south of Ireland and in Britain. DARD continues to maintain contact with this on-going work to develop a vaccine for badgers.

23. DARD is hosting an International Vaccination Scientific Experts' Symposium during May 2012. The symposium is to assess current knowledge and scope whether badger vaccination offers a practical option. The outcomes of this symposium will help inform future policy.

Research into bTB

24. TB is a very complex disease. As indicated in the Programme for Government, we have secured £4 million in the DARD budget to undertake a programme of TB and wildlife research and studies to help ensure we have an evidence based TB Eradication Programme. Literature Reviews have been conducted in relation to cattle and badger TB tests, TB transmission between cattle and between badgers and cattle, and in relation to badger vaccination. We have also engaged with industry and wider stakeholders to help us identify and refine our TB evidence needs and priorities.

25. A summary of the bTB research projects undertaken, underway and planned, is attached at **Annex H**.

Dealing with TB in Wildlife

26. While it is established that there is a link between TB in badgers and TB in cattle, the scientific evidence from Britain and the south of Ireland around the impact of the removal of badgers on TB in cattle is complex. In GB culling has led to a reduction of TB in the cull area but a perturbation effect is believed to have led to an increase in TB outside the area.

27. An outline of the TB programmes in operation in England, Scotland, Wales, and the ROI and their respective approaches to the wildlife issues is available in 'Bovine TB – comparative models for compensation and eradication/control' which was published by RaISE in November 2011 (**Annex I**). A summary of developments in England and Wales since November 2011 is attached at **Annex J**.

28. It will be necessary to show that there is an economic benefit of any proposed intervention in wildlife. This may be difficult as illustrated by Defra's Impact Assessment on wildlife intervention options (copy attached at **Annex K**).

29. As the badger is a protected species, any intervention in the badger population will require the agreement of the Environment Minister, the issue of the necessary licences, and the availability of substantial funding that will be needed. Any intervention would also have to be compliant with DARD's statutory powers and take cognisance of any relevant legal rulings in Britain.

Department of Agriculture and Rural Development
TB Policy and Veterinary Service TB Programme
24 April 2012

List of Annexes

Annex A	NI TB draft Eradication Plan 2013
Annex B	Graphs showing the NI TB Herd and Animal Incidence levels
Annex C	Summary of progress on the PAC recommendations
Annex D	Testing/movement/compensation procedures
Annex E	A graph detailing the costs of the TB programme
Annex F	"TB in Your Herd" booklet
Annex G	The Bio-security Code for NI farms
Annex H	Summary of bTB research projects undertaken, underway and planned
Annex I	Bovine TB – comparative models for compensation and eradication/control (RaISE/Mark Allen)
Annex J	Summary update on bTB programmes in England and Wales since November 2011
Annex K	Defra bovine TB wildlife intervention financial impact assessment

Annex A

Standard requirements for the submission of national programmes for the eradication, control and monitoring of the animal diseases or zoonoses referred to in Article 1(a)[1]

1. Identification of the programme

Member State: United Kingdom (Northern Ireland)

Disease(s)[2]: Bovine Tuberculosis

Request of Union co-financing for[3]: 2013

Reference of this document: Bovine Tuberculosis 2013

Contact (name, phone, fax, e-mail): Stephen Martin, 028 90524826, 028 90524340, stephen.martin@dardni.gov.uk

Date of submission to the Commission: 20 April 2012

2. Historical data on the epidemiological evolution of the disease(s)[4]:

In 1949, Northern Ireland (NI) introduced the Tuberculosis (Attested Herds) Scheme designed to encourage the establishment in NI of cattle herds officially certified as free of bovine tuberculosis. The objective then, as now, was the eradication of bovine TB from the NI herd. A voluntary register of attested herds was established. Two consecutive negative intradermal tests at two months interval were necessary to register.

By 1956, 1,209 herds were registered. Lists of attested herds were published to guide herdkeepers who wished to purchase such certified cattle.

Even with these limited measures, the incidence of bTB decreased steadily and the Voluntary Attested Herds Scheme was ended and eradication areas declared where compulsory testing would be carried out.

A transitional period between April and August 1959 saw an increase in uptake of voluntary testing. In April 1959 over 50% of NI herds were attested or supervised, by March 1960, 88% of cattle in NI were attested and on 25 November 1960, NI was declared an attested area.

Since the introduction of compulsory testing in 1959, bovine tuberculosis has been reduced to, and maintained at, a much lower level, but not eradicated. See Fig.1

Herd testing in NI has been subject to differing test intervals. It has, however, been applied uniformly throughout the country with no areas of reduced testing at any time. During the period of 1966 to 1976, levels of disease were low enough to warrant a reduction of intensity of the live animal surveillance programme. Later disease increase was responded to by reducing the inter-test interval. See Fig. 2

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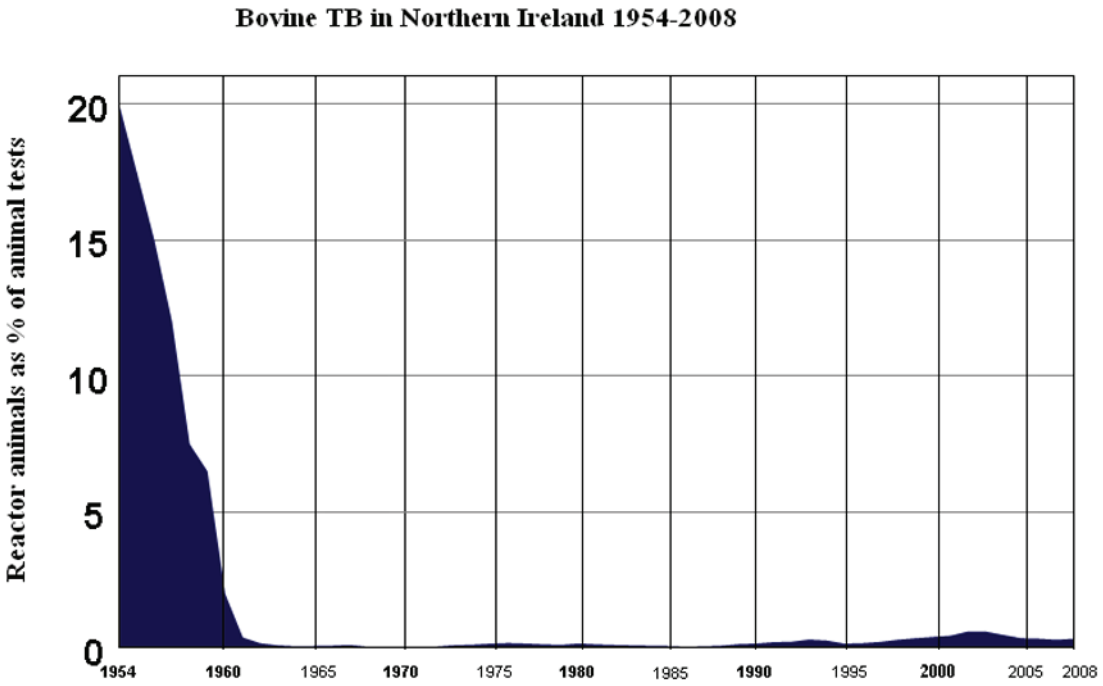
1 In the case of the second and subsequent years of a multi-annual programme that has already been approved by a Commission Decision, only section 1, section 7 and section 8 need to be completed.

2 One document per disease is used unless all measures of the programme on the target population are used for the monitoring, control and eradication of different diseases.

3 Indicate the year(s) for which co-financing is requested.

4 A concise description is given including target population (species, number of herds and animals present and under the programme), the main measures (sampling and testing regimes, eradication measures used, qualification of herds and animals, vaccination schemes) and the main results (incidence, prevalence, qualification of herds and animals). The information is given for distinct periods if the measures were substantially modified. The information is documented by relevant summary epidemiological tables (in point 6) complemented by graphs or maps (to be attached).

Fig. 1



Note: that the full abattoir post-mortem examination (PME) surveillance remained unchanged throughout.

Note: that NI has been on annual testing entirely since 1983.

Fig 2 Herd testing intervals in NI 1959 - present

Year	Type of herd testing
1959-1965	Annual testing
1966-1971	Biennial testing
1972-1976	Triennial testing
1977-1982	Biennial testing
1983 - To date	Annual testing

Current Demographics

There are currently 1.6 million cattle in NI, distributed among 20,500 farm businesses with cattle (June 2011). Dairy cows make up 18% of the national herd while beef cows account for 17%. Based on cattle TB tested in herds, the mean herd size has increased from 56 cattle in 1990 to 78 in 2011, an increase of 39%. However, the data are strongly skewed to the right and the median was 38 for all TB herd tests in 2011. Over half of the herds (58%) in NI have fewer than 50 cattle.

The cattle population increased by 50% in the forty years before 1989 and by approximately 6% thereafter. These increases preceded a significant rise in the incidence of bovine tuberculosis, suggesting an association with high stocking density.

The cattle agricultural industry in NI is largely grass based with feed conservation and winter housing as significant features.

Herd and cattle density is highest in the south and west, with the highest concentration, 6.6 herds per square kilometre in Counties Armagh and Down (Figures 3 and 4 (overleaf)–

Method = Kernel Smoothing; bandwidth = 10km). Herds in the north and east tend to be larger than those in the south or west (median 20.4 and 15.2 eligible cattle respectively).

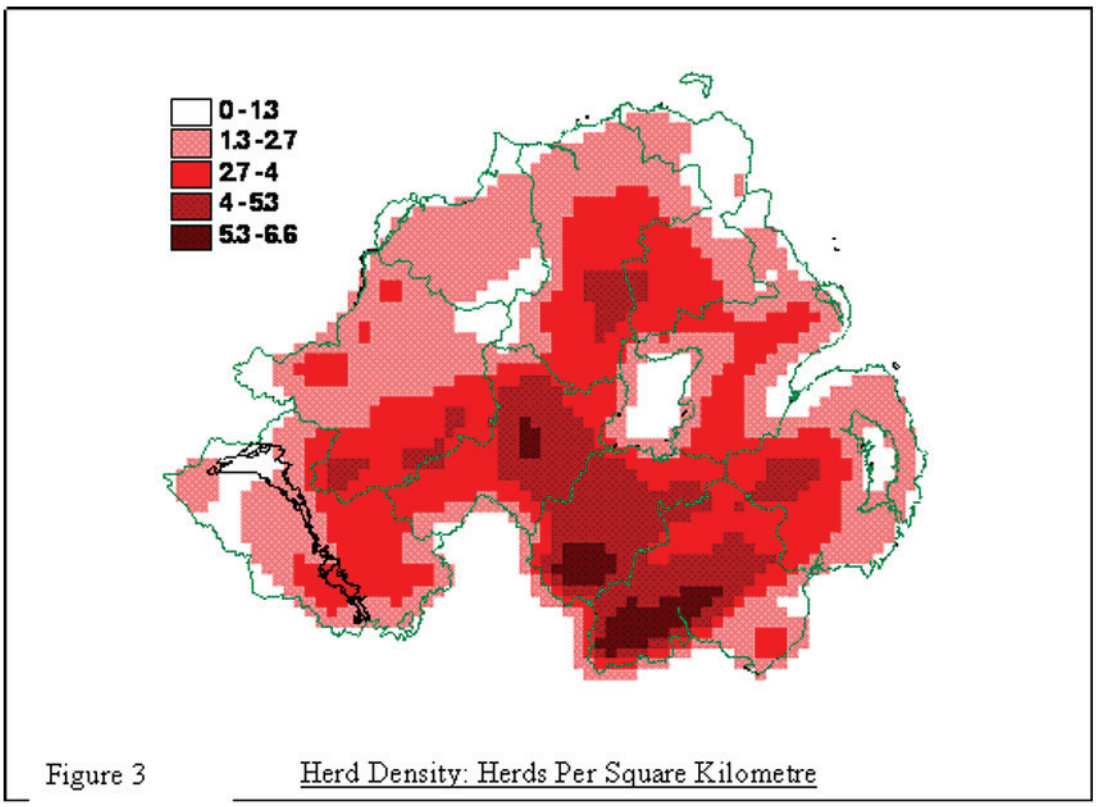


Figure 3 Herd Density: Herds Per Square Kilometre

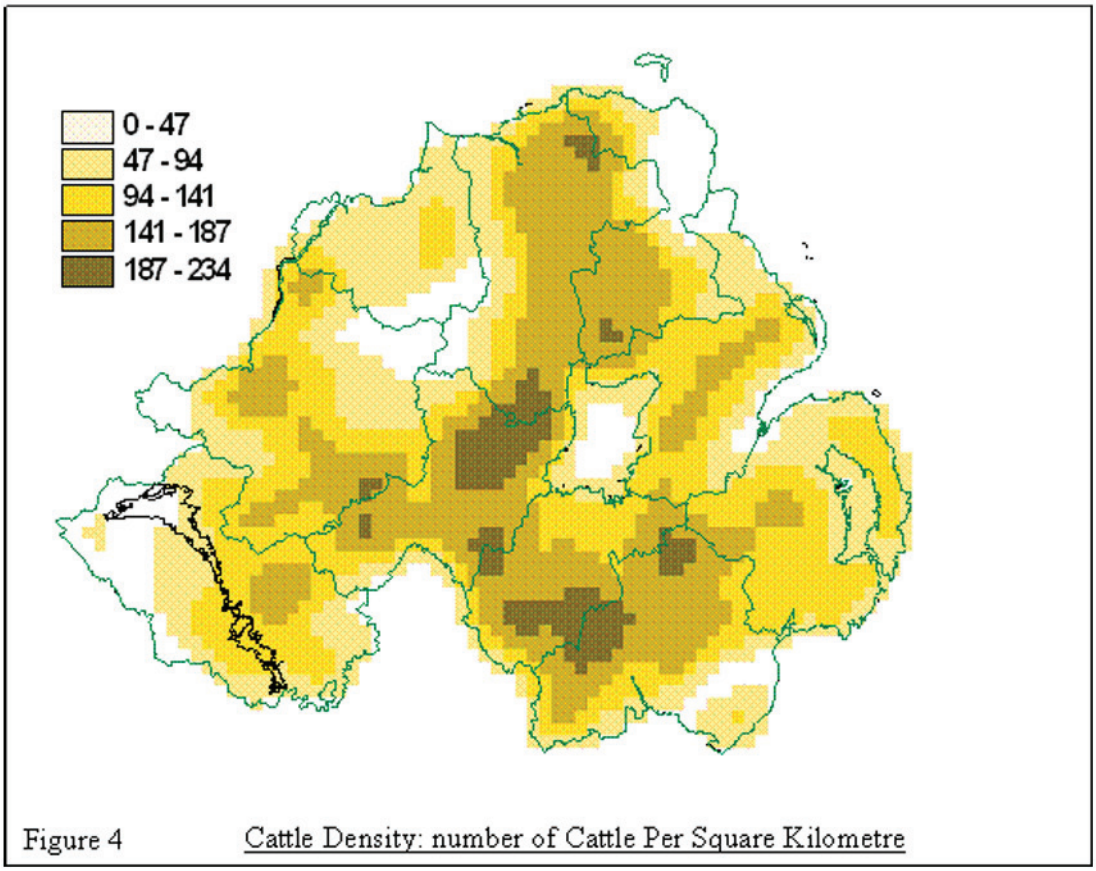


Figure 4 Cattle Density: number of Cattle Per Square Kilometre

Epidemiological Unit

A herd is described in domestic legislation as "a group of animals kept, managed, or housed together, on a holding in such a manner and under such conditions as will, in the opinion of

a veterinary inspector, minimize the possibility of infection to any other animals whether kept on the same holding or another holding." [Tuberculosis Control Order (NI) 1999 (as amended), Part 1 S2 (1)].

Due to the small median herd size and fragmentation of land parcels, disease control measures have been developed to accommodate these features of NI agriculture and minimise disease risk accordingly.

Several cattle groups with possibly different owners, may be maintained in such a manner that contact exists that will increase the risk of disease spread. These groupings may range from routine and permanent to the transitory. Each herd will have a unique herd number and identified keeper.

When cattle have such contact, the herds will be termed "associated" and recorded on APHIS (Animal and Public Health Information System, the DARD real-time computer database) and, significantly, will be subject to the same level of status, movement control and epidemiological investigation as the group with the lowest status. Any movement restriction and status will remain until all component parts of the herd have completed any required restriction, testing etc. regime and herds may not be disassociated until all have regained Officially Tuberculosis Free (OTF) status.

Disease statistics record each herd separately, therefore an epidemiological episode at one holding with several associated diseased herds will be recorded as several episodes.

Farm fragmentation is a considerable feature of cattle agriculture in NI, including the temporary leasing of land for summer grazing. Parcels of land remote from the home farm, no matter the distance or ownership, are regarded as part of the holding and are subject to identical restriction and epidemiological investigation as the rest of the holding.

1995- Present, Recent Disease Trends

The period of the late 1990s saw, as a trend, a steady increase in herd incidence, to a peak in 2002/2003. Since 2004 there was a steady trend in reducing herd and animal incidence until 2007. Since then the trend has remained reasonably level until late 2011, when there was an unanticipated upturn in incidence.

Note that NI had an FMD episode during 2001 during which there was a suspension of both routine farming practices and routine tuberculin testing. See Figs 5& 6

Fig. 5

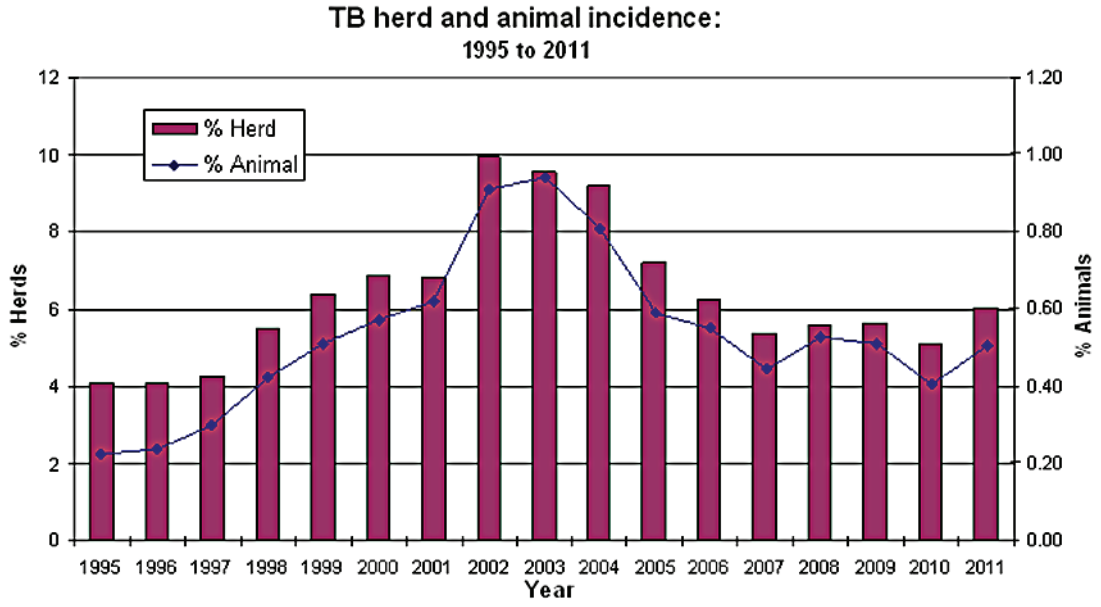
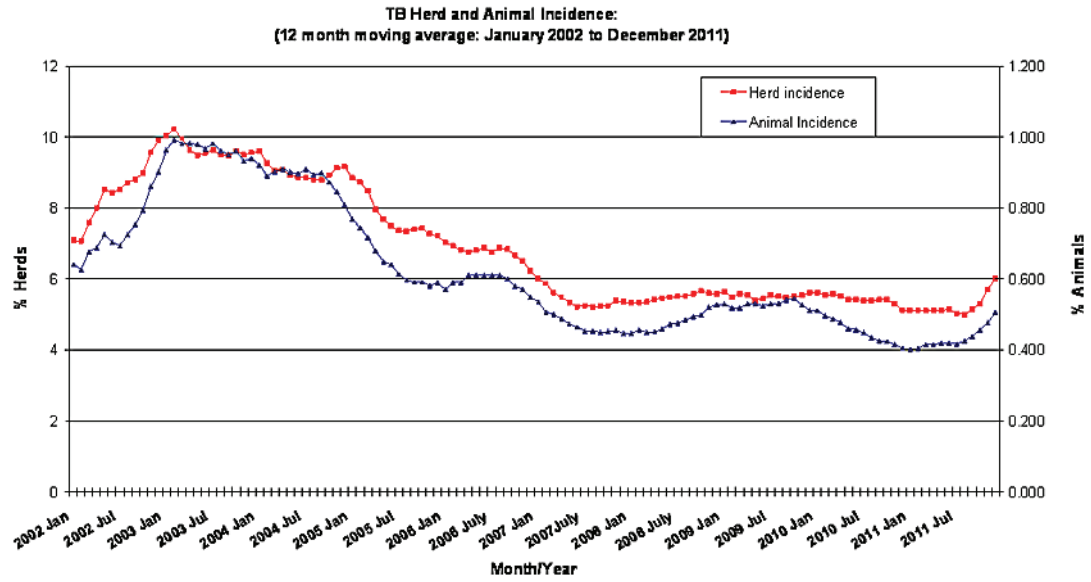
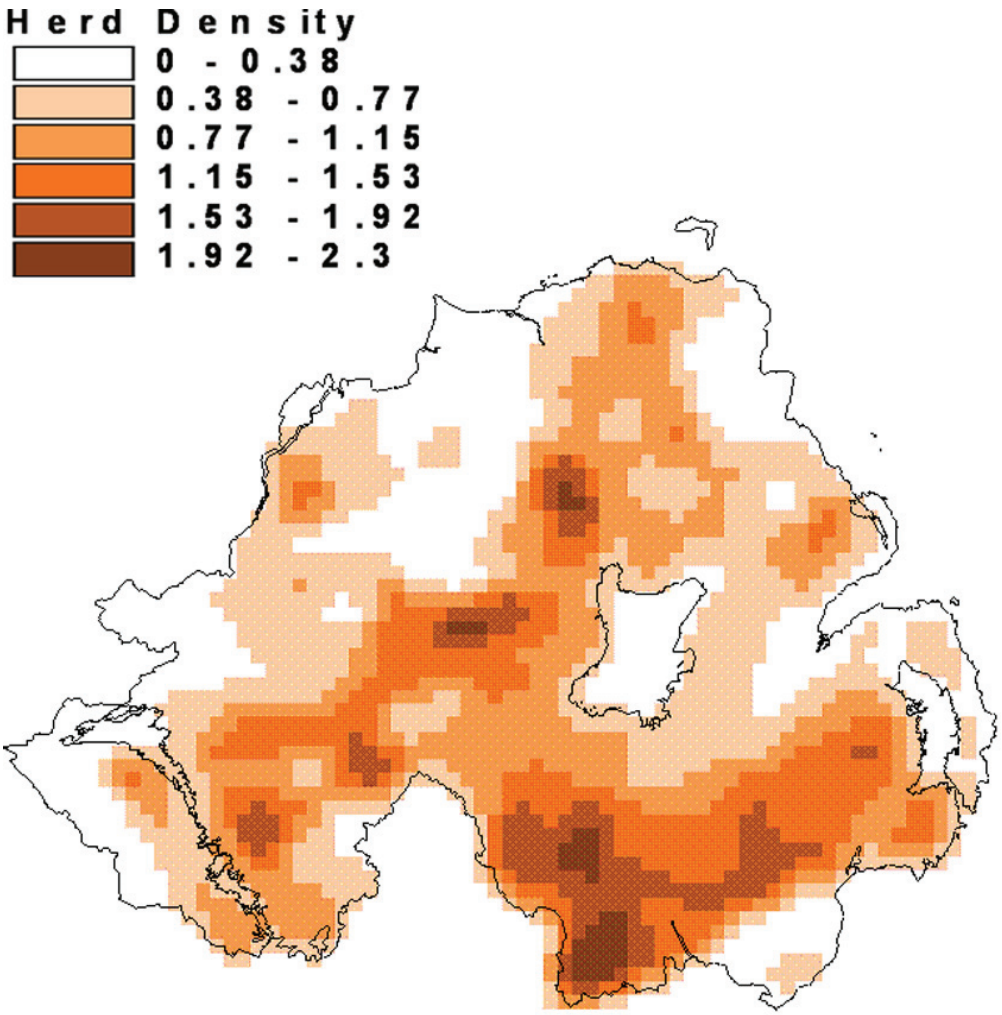


Fig. 6



Although breakdowns are distributed throughout NI, traditionally the preponderance of infection has been in the southern parts of NI. Reasons for this are presently unclear: spatial analysis has demonstrated that the concentration of infection in the southern part is not entirely explained by the underlying distribution of herds and cattle. Fig. 7

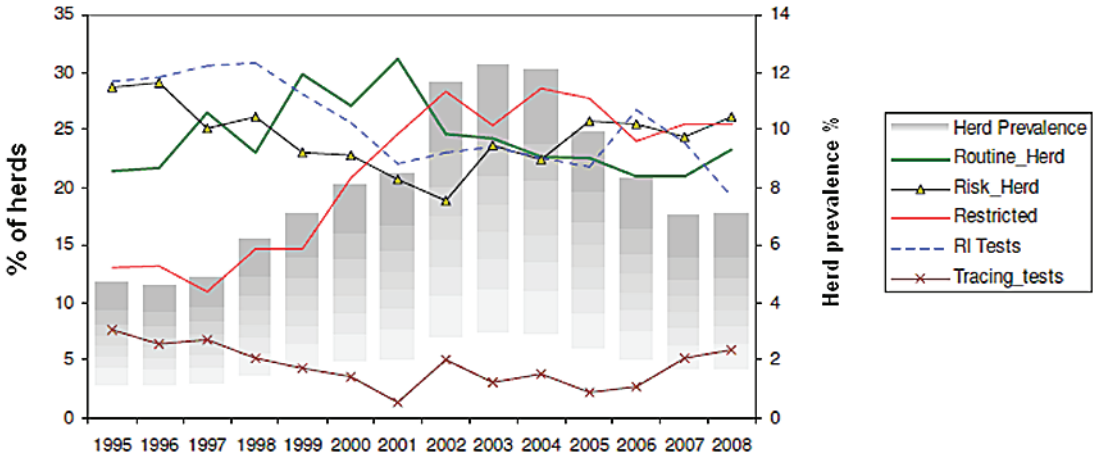
Fig 7 Herd Density, based on TB-Positive Herds, Cumulative, 1995 to 2004, herds/km2



Approximately 80% of reactors are removed under standard interpretation of the Single Intradermal Comparative Cervical Test (SICCT), 14% under severe interpretation, while the remaining 6% are taken using epidemiological data and stricter interpretation criteria. All reactors are removed by government-contracted hauliers to one specific abattoir where they are examined for evidence of TB infection.

TB tests on the APHIS real-time computer database are labelled according to the reason for the test. There are specific test type categories for each type of test, allowing the data to be examined in different ways. One example is the division of tests into routine, restricted, or risk type. "Routine" tests are those conducted in Officially Tuberculosis Free herds where there is no discernible risk of infection. "Restricted" tests apply to herds with infection, while "Risk" tests are those where cattle have some potential link to infection.

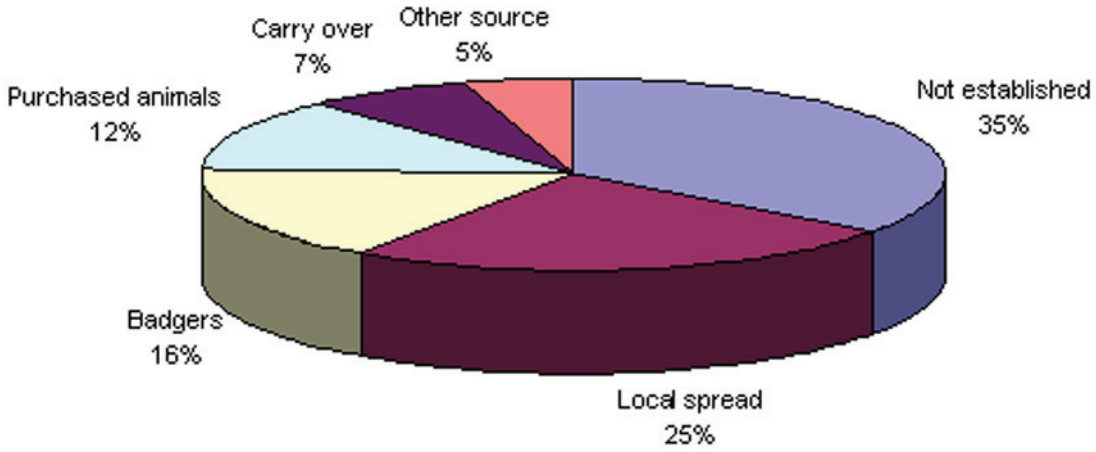
Fig. 8 Graph showing both % test positive herds by test type and % herd prevalence



Contiguous tests are undertaken in herds that are in close proximity to infected herds, usually neighbouring them, and the higher prevalence for both reactors and lesions confirms the importance of this type of testing. This is consistent with the results from epidemiological consideration undertaken by local Veterinary Officers who attribute 25% of breakdowns to "Local Spread" (Figure 9). This is not, however, prescriptive as to the source of the outbreak in that no investigation is undertaken of infection levels or the role of badgers in the outbreak. The badger (*Meles meles*) is a protected species in NI and no culling or disturbance of them, without licence, is permitted. Thus the term "local spread" merely refers to infection being disclosed in a herd that is in proximity to another diseased herd, with little certainty in most cases as to the means of spread.

Fig. 9 Putative Infection Sources Field Recorded (with >80% confidence) cumulative 2002-2010

Infection sources for confirmed TB herd breakdowns in 2002-10 for all DVOs (n=8,562)

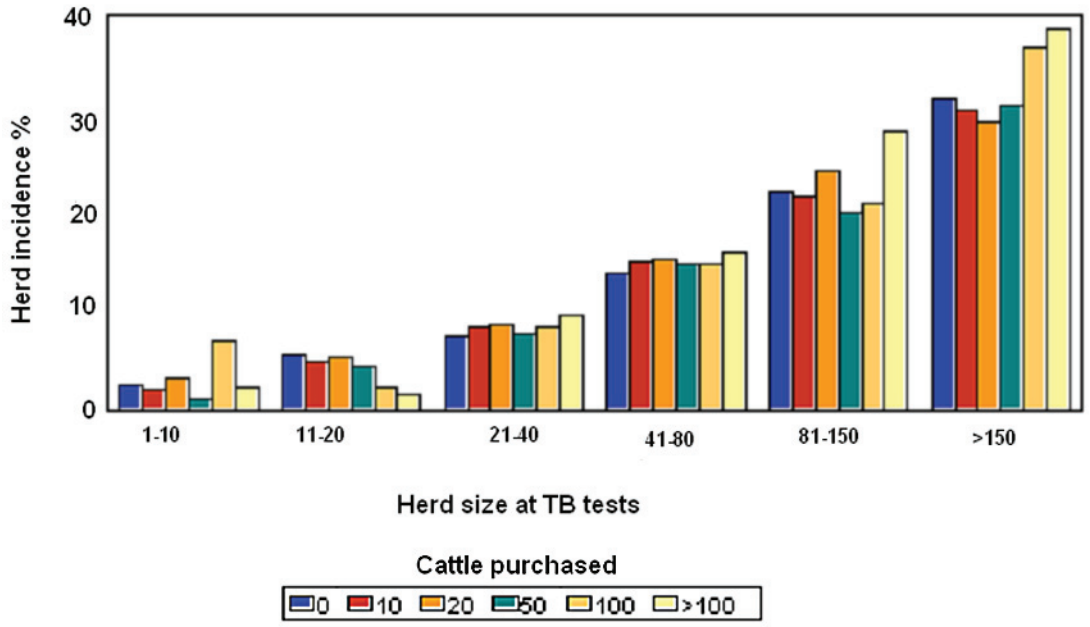


Various factors are thought to have contributed to the rise in disease incidence from 1990 to 2003. These include the following:

- The nature of farming in NI and recent changes therein;
- The role of wildlife, in particular, the Eurasian badger Meles meles; and
- Programme-related factors.

The farming industry in NI is traditionally characterised by high movement of cattle between and within herds; small, fragmented farms; and a high dependency on rented pasture ("conacre"). Between-herd movement is a marked feature of the cattle industry and is regulated. In 2000, 563,000 cattle, equivalent to 33% of the national herd, were recorded on the APHIS database as having moved between herds or to markets. Figure 10 shows the risk of a breakdown after adjusting for the confounding effect of herd size. There is a clear increase in risk associated with increased herd size, but the effect of purchases is equivocal in small to medium herds, which comprise the majority of herds in NI. The extent of cattle movement between premises used by a herd – so-called "within-herd" movement - has been the subject of a field study involving a year-long monitoring of all within-herd movements in a random sample of herds. The role of within-herd movement in TB epidemiology is unclear but it is likely that such movement, together with increased stocking densities and the poor economic status of farming in recent years, must play some role in disease maintenance and spread. It should be noted that all fragments of land used by a herd that becomes a breakdown are subject to the same disease control procedures, including those covering lateral risk.

Fig. 10 Risk of breakdown in the period January 2001-August 2002, stratified by the number of cattle purchased in the year 2000



Programme Development

Although the TB Programme has been in existence for many decades, it is not static. It develops strategically in response to disease levels, resource, epidemiological and novel scientific information. To ensure strategic direction is given to the programme a management structure is now in place, comprising of:-

- TB Steering Group – to oversee strategic direction.
- TB Policy Development Group – to develop proposals / manage specific projects.
- TB Programme Delivery Group – to ensure effective delivery of this programme and monitor key performance indicators

This structure brings together key persons from policy, veterinary and scientific research to give coherence to TB policy development and delivery.

Enhanced management controls with the development of a regularly applied suite of management reports of key performance indicators and routine audits have been established.

These are supplemented by central audit of specific cases including the application of discretion allowed at field level.

A number of Programme critical control points have been recognised and developed into Key Performance Indicators. These are designed to identify if there are areas that need development or resourcing. Parameters are measured monthly and delivery achievement is illustrated in a matrix and overall format.

DARD has in place a robust formal field assessment of delivery of test performance by private veterinarians under the Programme. This monitoring has been extended to those veterinarians and registered technicians directly employed by the Department of Agriculture and Rural Development (DARD in NI).

To strengthen our ability to counter fraud and to establish if a cattle identity has been altered following disclosure of a reactor, DNA sampling for comparative examination may be used.

Routine DNA sampling of reactors is conducted by the application of a DNA identity ear tag at valuation. A tissue sample from the animal's ear is harvested in a tamper-proof container

and stored in a freezer. This allows comparison with an animal bearing the same identity presented for slaughter under the Programme, should there be any subsequent query about the identity of an animal. Routine surveillance to cross-check the DNA from an animal at slaughter with DNA of an animal valued has been introduced.

Further extension of this process is underway allowing the harvesting of tissue sample at time of disclosure of test result.

Wildlife

Mycobacterium bovis has been isolated from deer and badgers in Northern Ireland. It has also been isolated from the otter (*Lutra lutra*).

Deer

There are 3 main species of wild or feral deer in Northern Ireland: *Dama dama* (fallow deer), *Cervus nippon* (sika deer) and *Cervus elaphus* (red deer). A proportion of the red deer are enclosed. A survey carried out in 1995, in which deer of the three species were sampled, demonstrated a prevalence of 5.8% (397 deer sampled). A small surveillance exercise carried out in 2009, in which fallow and sika deer were sampled, revealed a prevalence of 2% (146 deer sampled). The low number of deer (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role in the epidemiology of bovine TB is likely to be limited if not entirely insignificant.

Badger

DARD recognises that the involvement of wildlife, mainly badgers, must be addressed if eradication is to be achieved although the extent of the badger contribution to the incidence of disease has not been quantified.

A Badger Stakeholder Group was formed in 2004 in NI, which was tasked with assessing the available information and considering the potential need for a badger management strategy within NI.

Following consideration by the Badger Stakeholder Group of the evidence available from the completion of various extensive trials elsewhere (most notably the Randomised Badger Culling Trial in GB) and the adoption of lethal intervention as a policy to control bovine TB in cattle in another Member State (the Republic of Ireland (ROI)), it was concluded in their report, published February 2008, that no recommendation could be made on the way forward for NI without first undertaking work to gather information specific to the NI situation. The Badger Stakeholder Group agreed that this should include:-

i. a survey of the badger population in NI to determine the number and distribution of badgers,

ii. developing a proposal for a study of the prevalence of bTB infection in badgers,

iii. assessing the available evidence in relation to the role of badgers in bovine TB to inform an appropriate course of action in NI, including whether it is appropriate to run a badger culling pilot,

iv. considering participation in a vaccination trial, and

v. undertaking a cost benefit assessment of the future options for any proposed badger management strategy in NI, once the information arising from the above actions is available.

The assessment of available scientific evidence was conducted in 2008 and it was concluded that there is robust evidence that badgers are involved in the transmission of infection and contribute to the incidence of disease. However, there is little evidence upon which to base

an estimate of the magnitude of the badgers' contribution to disease incidence. Evidence that intervention in badger populations is likely to achieve a cost effective overall reduction in disease incidence is weak. It was concluded that there was enough evidence to rule out a proactive cull of badgers as a cost effective means of reducing disease levels in cattle.

Following the completion of the work of the Badger Stakeholder Group, DARD established new arrangements for engaging with stakeholders on all aspects of TB policy. Since summer 2008, the Department has been working in partnership with leaders of key industry and veterinary organisations in the TB Core Stakeholder Working Group to identify more clearly what could be done to move further towards the eradication of TB in NI. Key wildlife interests have been engaged as part of this process. This has been a new partnership approach to this very complex and difficult disease problem. The work undertaken through these new stakeholder arrangements informed the Ministerial statement on the way forward on TB.

In December 2008 the then Minister of Agriculture and Rural Development made a statement outlining the way forward for TB. The long term goal is eradication and, as TB is a complex multifaceted disease, a holistic approach is to be adopted. There are 3 main strands that will be addressed in the strategy, including addressing the wildlife factor. From the wildlife perspective the priority for the first 5 year phase of the strategy will be to pursue the necessary information gathering actions and research to fill the critical knowledge gaps and build the evidence we need to make informed policy decisions about wildlife intervention in NI.

Among the information gathering actions in phase one of the Ministerial TB strategy, each of which will contribute to the evidence required are:-

- undertake a Badger Population Survey (see below, completed 2008)
- progress plans for a Badger Prevalence Survey (see below)
- progress plans for a TB Biosecurity Study to evaluate cattle and badger-related risk factors on both TB infected and clean farms in a TB high incidence area (see below)
- develop plans for a Badger Removal Trial
- support the development of vaccine for badgers (in communication with GB and ROI).

These actions will be subject to the agreement of the Minister for the Environment, where necessary, and to a business case and bids for the substantial additional funding that will be required.

Badger Population Survey

To date, two country-wide surveys have been completed to allow a fuller understanding of the number and distribution of the undisturbed badger population in NI.

The first survey was in 1994. The badger population in Northern Ireland was estimated in 1994 at 38,000 with a mean sett density of 3.51/km2. It was found that a high preponderance of setts occurs in hedgerows and it was postulated that this increases the proximity of badgers to cattle, and therefore, the potential for inter-species transmission[5].

The second survey was in 2007/2008. The badger population in NI during 2007/2008 is estimated at 33,500 animals in 7,500 social groups giving a mean estimated density of such groups as 0.56 per square kilometre. It was observed that there was a positive association between areas of improved grassland and arable agriculture, and habitat cover. Density was correlated with land class, the highest densities found in drumlin farmland areas and marginal uplands. Due to the prevalence of favourable landscape features, Counties Down and Armagh had the highest density of badger social groups.

5 Feore S.M. (1994) The distribution and abundance of the Badger Meles meles in Northern Ireland. PhD thesis. Queens University of Belfast.

Badger Road Traffic Accident Survey

Badgers are a protected species in NI and culling for TB control purposes is not permitted. *Ad hoc* surveys, using badgers killed by cars, have been undertaken in the past but a province-wide survey has been ongoing since the mid 1990's. An interim report has been published which noted the following:

- The prevalence of *M. bovis* in badgers was 17%.
- TB infection is geographically widespread in badgers with no evidence of clustering and no apparent association, *at regional level*, with the distribution of infection in cattle.
- Herds immediately adjacent to infected badger carcases did not have a higher risk of infection compared to those adjacent to TB-negative animals. However, a higher proportion of herds within 3km of a positive carcase had TB compared to those within 3 km of a negative carcase and the difference was statistically significant.

The provisional conclusions arising from the survey was that there did appear to be a link between the distribution of infection in both species, although this did not indicate causality, i.e. direction of spread.

Badger Prevalence Survey

The main aims of this proposed survey are to provide baseline information on the level of M. bovis infection in badgers, against which the effectiveness of any possible future intervention (e.g. vaccination, removal, changes in biosecurity or a combination of these) may be measured and to establish the geographic distribution of bTB infection in the species. In addition it is also intended that the Survey will:-

- assess the extent of bias in the Road Traffic Accident survey;
- assess the association between *M. bovis* strain types in badgers and cattle through strain typing;
- estimate the within-sett prevalence in badgers;
- assess the efficacy of diagnostic blood tests for TB in badgers;
- determine *M. bovis* lesion and infection distribution in badgers; and
- gather more information on the number and spatial distribution of badger setts across NI building upon work already undertaken.

While an Economic Appraisal for the Badger Prevalence Survey was approved by the Department of Finance and Personnel (DFP) in December 2009, this may have to be revisited as potential cost increases are likely. In addition, the outcome of legal challenges to proposed badger interventions elsewhere in the UK must be clarified before any decision is taken on how best to proceed in NI.

TB Biosecurity Study

A TB Biosecurity Study was conducted in a TB high incidence area in Co. Down. The Study is designed to compare farm characteristics in both herds that have recently had a TB breakdown and those that have had no recent history of a breakdown in this TB high incidence area. Consideration of selected cattle and wildlife risk factors are key elements of this research. As well as establishing relevant farm business information, a survey of on-farm buildings and a farm boundary survey was carried out. Radial badger sett survey work on and around the main farm buildings of participating farms was also undertaken. The findings of the Study should be available later in 2012. The conclusions will inform evidence-based biosecurity advice to be provided to livestock farmers and will inform policy decisions.

Other evidence gathering projects

DARD was successful in securing an additional £4million for TB Research and Wildlife Studies and some research projects have already been commissioned with other projects to follow. A fundamental analysis of DARD's use of the gamma-interferon (IFN-g) test in its TB Programme is already underway as is a Badger-Cattle Proximity Study using data loggers, GPS positioning technology and fixed location camera to assess badger-cattle and cattle-cattle interactions of (a) farm yards and feedstores, and (b) pasture in a TB high incidence area. The review of the gamma interferon blood test is to ensure that DARD is making the best use of it in the TB programme.

In addition, an International Vaccination Experts' Scientific Symposium is planned to take place in NI in May 2012 to consider the potential of vaccinating one species (badger) to effect a reduction of disease in another (cattle); how best to maximise the effectiveness of this tool etc. The objectives for this symposium are to identify and evaluate factors that may determine the effectiveness of a TB vaccination strategy in wildlife, particularly the Eurasian badger, which will result in a reduction in bTB incidence.

A review into the effect slurry spreading may have on transmission of TB will be conducted to establish 'the role of slurry in spreading TB and whether it should be treated or disinfected prior to spreading'.

Also a fundamental analysis of DARD's use of Variable Number Tandem Repeat (VNTR) strain typing of TB has been commissioned with the aim of informing how best the technology may be deployed to provide practical benefit to the TB Programme.

In addition, a project to investigate the risk factors for herds with persistent and/or chronic infection in order to further reduce disease in those herds will be undertaken.

DARD continues to develop collaborative links with work ongoing in England and ROI regarding the development and trialling of vaccines for bovine TB in badgers. Vaccines developed for badgers may be the most feasible solution in the long term. NI continues to learn from experiences in other regions of the UK. For example, NI is learning from Scotland as to how they attained official TB free status; from Wales as to their Intensive Action Area and badger vaccination proposals; from England as to their Badger Vaccine Deployment Project and from their commitment to develop affordable options for a carefully-managed and science-led policy of badger control in areas with high and persistent levels of bovine TB in cattle; and from the ROI as to their badger vaccine development and deployment. We are also interested to see how the Welsh and English badger control strategies evolve and are implemented and whether they successfully withstand legal challenge.

DARD continues to work in partnership with the NI Agri-Food and Biosciences Institute (AFBI) to establish critical knowledge gaps in relation to TB and to identify and explore further research and development options that would complement and assist current research. AFBI and DARD's Veterinary Epidemiology Unit (VEU) conducted a number of literature reviews to identify and fill our critical knowledge gaps in relation to bovine TB generally and also to wildlife in particular. The TB literature reviews being carried out by AFBI were: (i) cattle to cattle transmission; (ii) badger to cattle transmission; (iii) cattle bTB tests and effective deployment; and (iv) bTB tests in badgers. DARD's VEU conducted a literature review on badger vaccines.

Decisions will be made later in 2012 on which additional TB Research and Wildlife Studies will be commissioned over the next 3 years.

Wildlife Advice

Herdkeepers, both during a disease episode and as part of a broader biosecurity education programme, are given advice, both oral and written, on non-lethal biosecurity measures to

adopt to reduce potential contact between infected wildlife and cattle. All herdkeepers are sent an advisory booklet on biosecurity including this advice (see web link below)

http://www.dardni.gov.uk/biosecurity-code-booklet

In conclusion, DARD is taking an evidence based approach to the wildlife strand of its TB strategy, the outcome of which will be informed policy decisions on wildlife intervention in NI.

Programme Related Factors

During the last 15 years, NI has experienced a Newcastle Disease epidemic (1997), Foot and Mouth Disease epidemic (2001) and BSE. All 3 diseases, but particularly BSE due to the long duration, have resulted in re-prioritisation and diversion of resources for varying periods. Although the effect of these diseases on TB prevalence is difficult to determine or define, they are likely to have had a negative impact.

3. Description of the submitted programme[6]:

The targets:

Ministerial Direction

- In 2008, the then Minister of Agriculture and Rural Development made a statement that confirmed that the aspiration of the policy remains the eradication of bovine TB, and recognised the necessity of taking a phased strategic approach. Fundamental to the achievement of this aspiration is the recognition that it is necessary to take a holistic view, seen as a three-stranded approach to (1) control cattle to cattle spread, (2) address any wildlife component, and (3) create a partnership with the agricultural industry in the delivery of the strategy. The first period of five years will, through partnership working with an established core group of stakeholders, lay the foundations for future phases. Early goals are to maintain compliance with EU legislative requirements and produce more effective and efficient ways to reduce transmission from both cattle and wildlife.

DARD strategy and aim for bovine TB control in cattle in NI are contained within three published documents.

a) DARD Strategic Plan 2006-2011

Goal 3 : “to enhance animal, fish and plant health and welfare”

b) DARD Business Plan 2011-2012

2011-12 Targets

“achieve and maintain annual EU approval for the NI TB Eradication Programme”

b) DARD Veterinary Service Business Plan 2010/2011:

A key objective in this business plan, contributing to Goal three of the DARD Strategic Plan 2006-2011, is to

“Eradicate or considerably reduce the level of animal diseases that have public health or economic importance”.

Plans for 2012 and beyond are due shortly. There will be no reduction in the commitment to address animal diseases.

6 A concise description of the programme is given with the main objective(s) (monitoring, control, eradication, qualification of herds and/or regions, reducing prevalence and incidence), the main measures (sampling and testing regimes, eradication measures to be applied , qualification of herds and animals, vaccination schemes), the target animal population and the area(s) of implementation and the definition of a positive case.

Control Procedures

NI bTB presents a distinct epidemiological picture to that in GB and it has had a separate control programme since the inception of controls. It therefore has a distinct and stand-alone NI TB Eradication Plan 2013, presented under the auspices of the UK Plan.

Current Procedures

(a) DARD has a surveillance, compulsory removal and compensation programme. Surveillance is organised in two fully integrated approaches: PME; and live surveillance.

(b) All animals slaughtered for human consumption undergo Post Mortem Examination (PME) as required by Council Directive 64/433 EEC. All such PMEs are completed by DARD staff. Results are available on APHIS immediately. Full integration allows immediate action to be taken by field staff, such as suspension of trading status, movement controls applied and further epidemiological measures to be instigated. Further laboratory investigations pursuant to PME findings are also fully integrated, ensuring continuity of information and security of actions. Such further investigations are carried out by the Agri-Food and Biosciences Institute (AFBI) Veterinary Sciences Division (VSD) laboratory, with full integration of results on APHIS. This surveillance approach includes the population of animals at routine slaughter and the population of reactor animals removed under the programme. AFBI is a DARD sponsored non-departmental public body.

(c) Live animal surveillance is undertaken using three methods.

- Export certification uses the Single Intradermal Test and interpretation as required by CD 64/432 EEC. Results are recorded on APHIS.
- Herd and animal testing, outside export certification as above, uses the single comparative intradermal tuberculin test (SCITT) as described in CD 64/432 EEC. Results are recorded on APHIS. More severe interpretation of the SCITT results is used where considered epidemiologically necessary, and in any case where disease is confirmed.
- Gamma interferon assay as described in CD 64/432 EEC (as amended by Regulation 1126/2002 EC) is used where considered epidemiologically necessary. It is always used as a supplementary test to the SCITT in these situations. Results are recorded on APHIS.

  All skin testing is carried out by DARD veterinarians, DARD registered technicians, DARD approved private veterinarians contracted to do so either by DARD in the case of surveillance or by the herd keeper for export certification.

  DARD registered technicians are personnel directly employed by DARD to under undertake tuberculin testing for disease control. A small number (3) have undergone extensive training, supervision and examination before registration.

  All herds in NI at all times are allocated an OT herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). These statuses are as defined in CD 64/432 EEC. In addition to CD 64/432 EEC requirements, where any herd in NI discloses more than five skin reactors without regard to confirmation, or where considered otherwise epidemiologically prudent, the herd is made OTW. The status reason describes the specific details of why the herd has the status allocated. The next test type describes the test that is set and best describes the test type requirement.

  Movement control from all herds, at all times, is controlled by a combination of the herd status and status reason applicable to the herd. As all movements must be

recorded on APHIS, including those to market and abattoir, immediate movement control is applied.

(d) All herds in NI are tested annually as a minimum. All animals over 6 weeks of age must be presented for test in OTF herds. Failure to test results in the OTF status being suspended immediately in all cases. Therefore NI is fully compliant with CD 64/432EEC in that any herd that has not been subject to an annual test loses OTF status immediately. Further delay in testing will result in automatic increased movement sanctions and downgrading the herd status to OTW.

(g) Herds may also undergo increased frequency of testing. This is in accordance with CD 64/432 EEC where a herd is suspected of being diseased or had disease confirmed. In addition, herds may be subject to increased testing frequency where epidemiological investigations disclose an increased disease risk, such as tracing or contiguity. For example, some 26.8% of herds in NI had more than one TB test in 2011.

(h) Animals may not move out of a herd during performance of a test except, with the permission of the competent authority, directly to slaughter in NI.

(i) There are no exemptions to the above testing programme at either animal level or herd level.

4. Measures of the submitted programme

4.1. Summary of measures under the programme

Duration of the programme: A voluntary Tuberculosis (attested herd) scheme was introduced in 1949 and in 1959 compulsory Tuberculin Testing was introduced. This programme has been constantly applied and developed since.

The table below details the history of testing bovines for Tuberculosis in Northern Ireland.

Duration of the programme:

First year:

- Control
- Testing
- Slaughter of animals tested positive
- Killing of animals tested positive
- Vaccination
- Treatment
- Disposal of products
- Eradication, control or monitoring.

Last year:

- Eradication
- Testing
- Slaughter of animals tested positive
- Killing of animals tested positive
- Extended slaughter or killing
- Disposal of products
- Other measures (specify):

All cattle in NI routinely slaughtered for human consumption receive a post-mortem inspection in EU approved establishments. All lesions suggestive of TB are sampled and forwarded to AFBI for appropriate laboratory analysis. All information obtained is passed to the field veterinarian responsible for the farm of origin of the slaughtered animal. This transfer of data is in realtime and fully integrated on APHIS.

4.2. Organisation, supervision and role of all stakeholders[7] involved in the programme:

The Veterinary Service of the Department of Agriculture and Rural Development (DARD in NI) is the designated Competent Authority for the control of bovine tuberculosis in NI under Council Directive 64/432/EC.

Policy responsibility in DARD lies with the Animal Health and Welfare Policy Division which is part of the Central Policy Group. Delivery responsibility belongs to Veterinary Service, with Veterinary Service Headquarters managing compensation payments and contract management.

A TB HQ Team has a range of functions including monitoring of the programme, project management, change management and the provision of veterinary advice. Veterinary Service Field side is divided into 10 areas, called Divisions, which are further subdivided into patches. Each Patch has a nominated Veterinary Officer. Field staff involved in tuberculosis control are: administrative staff, Veterinary Officers, Animal Health and Welfare Inspectors and Valuation Officers.

A DARD Veterinary Epidemiology Unit, an Enforcement Unit, and other specialist advice is available as required in the programme.

PME surveillance and sampling is undertaken in abattoirs. All such examination and sampling is conducted by DARD staff. Reporting is direct and immediate through APHIS.

TB testing is undertaken only by DARD approved Veterinary Surgeons, using the Single Comparative Intradermal Tuberculin Test (SCITT) for internal control. Most testing is carried out by PVPs under contract to DARD but the Department also uses contract-based specialist veterinarians, VOs or registered technicians in specific instances.

Herdkeepers nominate a PVP for tests that are not directly completed by DARD. All PVPs must be DARD approved to TB test.

Approval of testing veterinarians requires the completion of field training, field practical examination and attendance at a training seminar. PVPs and directly employed TB testers are subject to routine audit of performance. This includes audit of technical application of the test under field conditions.

Laboratory testing for tuberculosis control is currently carried out at Veterinary Sciences Division, part of the Agri-Food and Biosciences Institute (AFBI).

Herdkeepers are legally obliged to notify suspicion of the disease and present all animals for testing as required. Any interference with testing or control measures is an offence.

4.3. Description and demarcation of the geographical and administrative areas in which the programme is to be implemented[8]:

For DARD Veterinary Service purposes, NI is divided into 10 administrative regions, each with a Divisional Veterinary Office. The regions are sub-divided into “patches”, each managed by a veterinary officer (VO) supported by a team of technical officers. All are subject to common direction from DARD Headquarters through staff instructions and IT development. A centralised live animal health database (“APHIS”), incorporating an animal movement and test management system, is used for all aspects of TB disease control. APHIS capability is used to administer between-herd movement of cattle, captured using a movement notification system and permissible movement matrix, facilitated by input at markets, abattoirs and

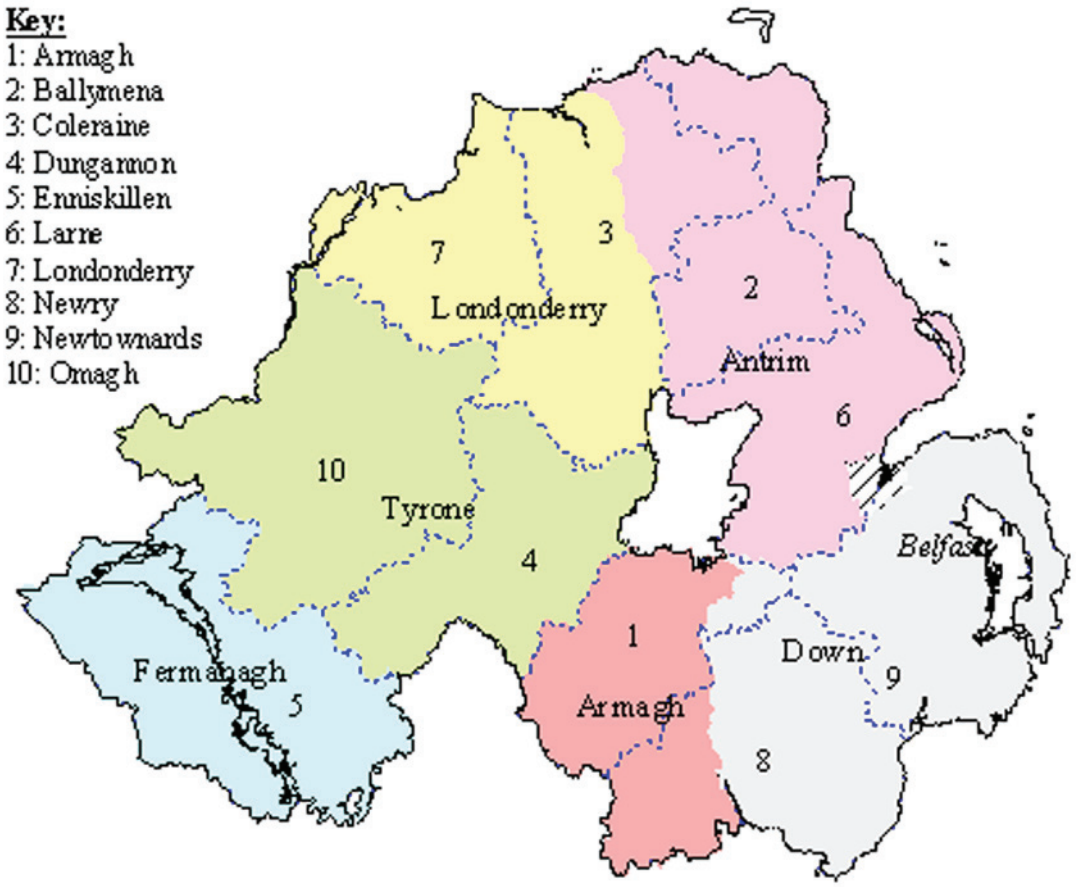
7 Describe the authorities in charge of supervising and coordinating the departments responsible for implementing the programme and the different operators involved. Describe the responsibilities of all involved

8 Describe the name and denomination, the administrative boundaries, and the surface of the administrative and geographical areas in which the programme is to be applied. Illustrate with maps.

directly via the internet to herdkeepers. It facilitates management of herd-level and animal-level tests, with results recorded at animal level.

Entry of test results is virtually exclusively by direct link with the testing veterinarian via a web based system onto APHIS. Abattoir and laboratory results are similarly reported immediately on APHIS.

Fig 11: Illustration of Divisional Veterinary Office areas and Counties in Northern Ireland



4.4. Description of the measures of the programme[9]:

4.4.1. Notification of the disease:

Notification may arise from:

- Declaration of a suspect clinical case
- Disclosure at an abattoir of a suspect TB lesion at routine slaughter
- Disclosure of a non-negative skin test result

The herd is declared OTS until the results of confirmatory tests, PME, other epidemiologically relevant information, or more than 5 skin reactors, requires the herd to be declared OTW.

4.4.2. Target animals and animal population:

The programme extends to the entire region of NI. All animals except those that are less than 6 weeks old and retained in their natal herd are required to be routinely tested for TB in NI. All animals are required to be tested in restricted herds.

9 A comprehensive description needs to be provided of all measures unless reference can be made to Union legislation. The national legislation in which the measures are laid down is also mentioned.

Current Demographics

There are currently 1.6 million cattle in NI, distributed among 20,500 farm businesses with cattle (June 2011). Dairy cows make up 18% of the national herd while beef cows account for 17%. Based on cattle TB tested in herds, the mean herd size has increased from 56 cattle in 1990 to 78 in 2011, an increase of 39%. However, the data are strongly skewed to the right and the median was 38 for all TB herd tests in 2011. Over half of herds (58%) in Northern Ireland have fewer than 50 cattle.

There are no exceptions to control measures for sporting or cultural animals.

4.4.3. Identification of animals and registration of holdings:

All cattle herds in NI are registered with the central authority and each has been allocated a unique herd number to facilitate tracing of animal movements. All registered premises are recorded on a central computer database (APHIS). Full details of the testing programme are maintained on the database.

Under Council Regulation (EC) No 1760/2000 cattle are identified by means of a unique identification number authorised by DARD. All cattle born after 1 January 1998 are identified with an ear tag in each ear bearing the same unique identification number, which will remain with the animal throughout its life. All cattle born after 1 January 2000 must be tagged using the new all numeric tags.

Each animal's test results and movement details are held and are readily accessed on a computer database (APHIS). Epidemiological investigation and full tracing procedures in compliance with Council Regulation 1760/2000 are instigated following the detection of a diseased animal.

4.4.4. Qualifications of animals and herds[10]:

All herds in NI at all times are allocated an OT herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). These statuses are as defined in CD 64/432 EEC. In addition to CD 64/432 EEC requirements, where any herd in NI discloses more than five skin reactors without regard to disease confirmation, or where considered otherwise epidemiologically prudent, the herd is made OTW. The status reason describes the specific details of why the herd has the status. The next test type describes the test that is set and best describes the test type requirement.

OTW status is applied to a herd where:

- Disease is confirmed by PME and/or laboratory procedures.
- When disease has not been confirmed, OTW status is applied where a Veterinary Officer has considered it to be epidemiologically prudent, for example recent movement out of a herd of an animal that is disclosed as a reactor in another herd. This decision is at the discretion of the patch VO and will be based on their knowledge of the breakdown, the area, and any other relevant epidemiological evidence available to them.
- In any case, where there are more than five reactors disclosed at a skin test OTW status is routinely applied.

OTW status is removed from a herd where

- Two consecutive clear herd skin tests have been completed in accordance with CD 64/32 Annex A (3B), and

10 To mention only if applicable.

- Cleansing and disinfection procedures are completed as required. All OTW herds (due to disease) in NI are subject to DARD cleansing and disinfection inspection. No such herd will regain OTF status unless cleansing and disinfection is inspected and is approved.

OTS status is applied to a herd where:

- A suspect tuberculous lesion is disclosed at abattoir.
- Disclosure of an inconclusive reactor.
- A herd test is overdue.
- 5 or less reactors are disclosed at a test, with no PME or laboratory confirmation.
- And when, in the judgment of the patch VO, there is no over riding epidemiological reasons to apply OTW status (see OTW, above).

OTS status is removed from a herd where

- The Veterinary Officer is content that there are no epidemiological factors that indicate the herd status should be retained or made OTW (see OTW above)
- Testing is completed in accordance with CD 64/432 Annex A (3A)

or, where applicable,

- The inconclusive animal is resolved by testing or slaughter with negative PME and laboratory results.
- Cleansing and disinfection procedures are completed as required. All OTS herds (due to disease) in NI are subject to DARD cleansing and disinfection inspection. No such herd will regain OTF status unless cleansing and disinfection is inspected and is approved.

4.4.5. Rules on the movement of animals:

In accordance with Council Regulation EC No 1760/2000 all calves born after 1 January 1998 must be identified with an ear tag in each ear within 20 days from the birth of the animal. All cattle identification numbers are authorised by DARD and recorded on the Animal and Public Health Information System (APHIS) computer database so that no duplication should be possible. The birth of a calf must be notified to the Department within 7 days of tagging, 27 days of birth and in any case before the animal leaves the holding of birth. All herd keepers must maintain a register of cattle born or moved into the herd. The register must show the identification number of the animal and details of replacement tags/retags. Herd keepers must also record in their register the colour, breed type, sex, date of birth and the dam's identification number (for animals born in their herd). Their register must also show the date and means of acquisition of stock, the date of movement off the holding, the address of premises to which the animal moved, or if it has died, the date and manner of disposal. These records must be retained for 10 years. From 1 January 2000 the movement permit system was replaced by movement control documents requiring a producer to notify the Department within 7 days of an animal either leaving or arriving on his/her farm. Markets are required to notify movements on and off to the Department by the end of the next working day. However, in the case of a restricted animal the producer is required to obtain a movement licence from the Department in advance of moving the animal out of his/her herd. All movements are recorded and can be traced on APHIS. All stock on farms are checked against official records at Cattle Identification Inspections, and Tuberculosis and Brucellosis herd tests which occur at least annually, and when presented at markets or slaughterhouses. Discrepancies between the description of the animal and the details recorded on APHIS are investigated. If the discrepancy is not satisfactorily resolved a status is placed against the animal on APHIS which restricts its movement. Where the identification and traceability of an animal cannot be established at point of slaughter, the carcase will be removed from the human food chain. In the field, where the disease status of an animal cannot be clearly established from the database, the animal will be isolated and tested.

Herds with either OTS and OTW status applied are both subject to movement restrictions immediately. This is controlled through APHIS.

NI does not permit movement out of OTS or OTW herds unless direct to slaughter within NI. NI does allow live movement within the MS from herds where OTS status is applied due to an unresolved inconclusive animal where no history of BTB within three years (as per derogation under CD 64/432 Annex A 3.A (d))

NI allows movement into OTS or OTW herds except where the official veterinarian considers it epidemiologically prudent to prohibit such movements and, in any case, if there is delay in testing.

A matrix of movement restrictions is applied that is relevant to the status and status reason applied to the herd.

OTW status movement

- No live animal movements out except directly to slaughter in NI.
- Note: the movement restrictions described above may, where considered epidemiologically necessary, be increased to prevent any movement off farm even to direct slaughter or cease movement onto farm.

OTS status movement

- No live movement out except directly to slaughter in NI.
- Note: OTS herds with the status reason "RI (inconclusive) but no TB confirmed within three years" are derogated under CD 64/432EEC Annex A 3.A(d) to allow local live movement within UK. However, animals from the herd or those that have originated in the herd since the last clear herd test are not allowed to be exported to another MS.
- Note: the movement restrictions described above may, where considered epidemiologically necessary, be increased to prevent any movement off farm even to direct slaughter or cease movement onto farm.

There are no herds of unknown status in NI as all herds have a testing history. New herds may only purchase from OTF herds and as a result the status of the animals added to a new herd is known.

Overdue Tests:

Where a test becomes overdue, increasingly stringent movement controls are applied routinely as below:

- Immediately overdue, no live moves to market, export, or other holdings.
- 1 month overdue, no live moves to market, export, other holdings or slaughter. No moves in are allowed except one breeding bull on exceptional licence.

4.4.6. Tests used and sampling schemes:

- The DARD programme comprises surveillance, compulsory removal and compensation for compulsorily removed animals. The surveillance is organised in two fully integrated sections, PME and live surveillance.
- All animals slaughtered for human consumption undergo PME as required by CD 64/433 EEC. All such PMEs are completed by DARD staff. Results of PME are available on APHIS immediately. Full integration allows immediate action to be taken by field staff, such as suspension of trading status, movement controls applied and further epidemiological measures to be instigated. Further laboratory investigations pursuant to PME findings are also fully integrated, ensuring continuity of information and security of actions. Such further investigations are carried out by AFBI, (a DARD sponsored non-departmental public

body) with full integration of results on APHIS. This surveillance includes both animals at routine slaughter and reactor animals removed under the programme.

Live animal surveillance is undertaken using three methods.

- Export certification uses the SIT test and interpretation as required by CD 64/432 EEC and may only be performed with the express permission of DARD. Results are recorded on APHIS.
- Herd and animal testing outside export certification uses the SCITT as described in EC 64/432 EEC. Results are recorded on APHIS. More severe interpretations of the SCITT results are used where considered epidemiologically necessary at the discretion of the patch VO, and in any case where disease is confirmed.
- Gamma interferon testing as described in CD 64/432 EEC is used where considered epidemiologically necessary. It is always used as a supplementary test to the SCITT in these situations. Results are recorded on APHIS.

Inconclusive SCITT Results:

In NI, animals are allowed one skin test with an inconclusive result without compulsory removal.

A non-negative result at a second consecutive test results in mandatory removal as a reactor animal.

Herdkeepers may be advised to slaughter the animal at any time during this period.

At a restricted herd test, where standard and/or severe interpretation may be used for disease control, any animal with an immediate previous inconclusive result is removed as a reactor if the next test result is not negative.

Pre-movement Testing

NI is fully compliant with the current requirements of pre-movement testing under CD 64/432 EEC.

All animals over 42 days are subject to the single intradermal test and interpretation within 30 days of export as required. Otherwise NI avails of the derogation available in CD 64/432EEC Annex A 1.1(c) for intra-MS movements where animals from an OTF herd are not required to be pre-movement tested.

In addition to CD 64/432 EEC requirements, in NI any animal that has not undergone a test outwith a period of 15 months must undergo a pre-movement test before live movement except directly to slaughter in NI.

Supplementary Testing

CD 64/432 EEC at Annex B Art 3 allows supplementary testing.

In NI these are

- 6 monthly test post regaining OTF status following all OTS or OTW status for disease reasons.
- Lateral check tests of contiguous herds.
- Area testing where considered epidemiologically appropriate.
- Gamma interferon testing.
- Strain typing of isolates.

Gamma Interferon Testing in NI

NI has conducted significant IFNg testing in advance of EU approval of supplementary tests. In 1990s approximately 100,000 cattle were IFNg tested in NI. Review of the results of this

extensive trialling concluded that the test was best employed as a supplementary test to the skin test.

At present IFNg testing is available to herds throughout NI where it is considered by DARD that the supplementary test will remove diseased animals more rapidly in the disease process and thereby increase the speed of resolution.

Herds currently selected are those with recent confirmed disease or confirmed lesion at slaughter following a recent negative skin test. Herd keepers with IFNg positive animals that are skin negative are offered compensation. Participation with the IFNg test programme element is voluntary.

Research continues to allow further development of the assay under field conditions and the test application is kept under review.

Strain Typing of Isolates

Since 2003 VNTR (Variable Number Tandem Repeat) has been used to strain type each breakdown episode, with all cultured reactors strain typed since mid 2009. This information is available to VOs to facilitate epidemiological decisions.

Atypical, or Possibly Fraudulent, Results

- Where DARD considers the result of a test to be atypical, or possibly fraudulent, it may conduct further investigations and may, as a result, consider the result of the test null and void.
- Such results may be suggested, inter alia, by test history, veterinary observation or epidemiological information.

4.4.7. Vaccines used and vaccination schemes:

The TB Control Order (Northern Ireland) 1999 prohibits vaccination of cattle against bovine tuberculosis in NI.

4.4.8. Information and assessment on bio-security measures management and infrastructure) in place in the holdings involved:

All herd owners in Northern Ireland have been issued with the DARD production “Biosecurity Code for Northern Ireland farmers and guidance for official visitors to farm properties and recreational users of farmland.” This book describes the reasons for having a code, legal requirements, notifiable disease and reducing risks of allowing disease on to premises.

Veterinary Service officials advise herdkeepers on movements and segregation of cattle in breakdown premises, particularly in relation to preventing spread of disease to contiguous herds. Movements of personnel and equipment that have the potential to carry disease are investigated and appropriate biosecurity advice given. Herds contiguous to breakdowns also receive biosecurity advice.

4.4.9. Measures in case of a positive result[11]:

Immediately a notification of suspect TB is made to a local DVO, the herd OTF status is removed.

11 A description is provided of the measures as regards positive animals (description of the slaughter policy, destination of carcasses, use or treatment of animal products, the destruction of all products which could transmit the disease or the treatment of such products to avoid any possible contamination, a procedure for the disinfection of infected holdings, the therapeutic or preventive treatment chosen, a procedure for the restocking with healthy animals of holdings which have been depopulated by slaughter and the creation of a surveillance zone around the infected holding,).

This notification may arise from:

- Declaration of a suspect clinical case.
- Disclosure at an abattoir of a suspect TB lesion at routine slaughter.
- Disclosure of a non-negative skin test result.

The herd is declared OTS until the results of confirmatory tests, PME, other epidemiologically relevant information, or more than 5 skin reactors, requires the herd to be declared OTW.

OTS and OTW herds are both subject to movement restrictions immediately. This is controlled through APHIS.

A matrix of movement restrictions is applied that is relevant to the status and status reason applied to the herd.

NI does not permit movement out of OTS or OTW herds except directly to slaughter in NI. However, where a herd has OTS status due to an unresolved inconclusive with no history of bTB within three years, NI avails of the derogation in CD 64/432 Annex A 3.A (d), where intra MS movements are allowed.

Relevant laboratory tests are established and reported via APHIS.

The test regime is modified on APHIS.

The test, if applicable, is interpreted by the patch VO who may remove test negative animals considered at epidemiologically increased risk. This may include full herd depopulation if considered necessary.

Removal procedures are immediately instigated, including the legal requirement to immediately isolate the diseased animal(s). Isolation advice specific to the circumstances is given by the official veterinarian and enforced by legal notice. Compliance breaches may lead to enforcement action.

All reactors are removed by DARD subcontracted hauliers for immediate slaughter to a designated slaughter house.

Where the welfare of the animals precludes live removal, it may be euthanized on farm. PME is available where confirmation of disease in the episode has not yet been established or where otherwise considered epidemiologically necessary by the patch VO.

Following a confirmed TB breakdown (OTW) adjoining at risk herdkeepers are alerted and their herds are allocated a contiguous herd test (Lateral Check Test, LCT), where considered appropriate following a veterinary risk assessment. If the test is not completed on time, these herds are downgraded to OTS and movement restricted. They are further tested at regular 4 monthly intervals until the infected herd has been cleared or until no further risk of lateral spread.

Tracing forward of animals that carry a disease risk is carried out. If it is not possible to test the traced animal then a herd level test may be set (Forward Check Test, FCT). Tracing parameters such as putative exposure windows are at VO discretion.

Note: where the traced animal has been exported live, DARD informs DEFRA (UK MS Competent Authority) of the relevant details.

Where VO discretion considers it relevant, the herds from which a TB reactor has originated or moved through are tested. These backward traced herds are downgraded to OTS or OTW until testing is completed.

A notice requiring cleansing and disinfection as the patch VO considers necessary is served and, on completion, the herdkeeper is required to notify the Divisional Veterinary Office.

Advice on cleansing and disinfection is given by the VO at a farm visit and in writing, including a list of Approved Disinfectants. Completion of cleansing and inspection is inspected by DARD staff. No such herd will regain OTF status unless cleansing and disinfection is inspected and is approved.

Specific advice on the breakdown epidemiology, public health and improvement of biosecurity is given directly by the patch VO to the herdkeeper. In addition, written advice is provided.

Case conferences may be held to avail of specialist knowledge, such as advice from the Veterinary Epidemiology Unit or AFBI, where the patch VO considers it necessary.

The option exists to depopulate either fully or partially any herd when it is considered epidemiologically necessary by the DARD field veterinarians.

In the case of total herd depopulations the following action is taken:

- No animals are allowed to move into the premises for 60 days following the depopulation.
- A full Cleansing and Disinfection is required after depopulation.
- The herdkeeper is advised of the control of risk from slurry.
- Two months after re-stocking a TB test is required. If this test occurs within a year of the breakdown it is classed as reactor (RH1) test. If the RH1 is clear the restriction is removed and then a post restriction test (CHT) is set for six months later and an Annual Herd Test set twelve months after the completion of the post–restriction test. If a farm premises is depopulated for more that 12 months then the restriction is removed at 12 months and the test following the purchase of animals is classed as an Annual Herd Test.

4.4.10. Compensation scheme for owners of slaughtered and killed animals:

Reactor animals and any relevant in contact animals are valued by DARD Valuation Unit on farm prior to slaughter.

Compensation is made at 100% of market valuation directly to the herdkeeper for all classes of animals removed.

Where a herd keeper disputes a valuation, they may seek an independent valuation by an independent valuer from a DARD approved list of valuers.

This independent valuation is not final and binding, and so the herdkeeper or DARD may appeal a valuation to an independent valuation appeal panel.

In any case the animal is removed without delay.

Salvage value is paid to the competent authority.

No consequential loss compensation is made.

4.4.11. Control on the implementation of the programme and reporting[12]:

The Bovine TB Control Scheme in Northern Ireland is run as a programme by the Veterinary Service of DARD. This is led by a Senior Principal Veterinary Officer supported by a dedicated team at HQ. This is supplemented with input from the in-house Veterinary Epidemiology Team and other sources as required. Implementation is primarily in-house at Divisional Veterinary Office level with extensive testing contracted to private veterinary practitioners (PVP).

One of the roles of the Programme team is to improve the delivery of the Programme. This includes Key Programme Performance indicators that monitors, on a monthly basis, progress

12 Describe the process and control that will be carried out in order to ensure the proper monitoring of the implementation of the programme.

against targets in the Veterinary Service Business Plan. Audit of decision making by the field staff and case audits of breakdown herds are also conducted.

A further central role is to conduct audit of work carried out by PVPs, assessing the work contracted for against required delivery targets. Some of the monitoring may be done remotely using the APHIS. For example, reactor removal times are closely monitored to ensure meeting of the in-house target that is set at less than EU requirement, and notification times for test results. Further, specialist teams of audit Veterinary Officers conduct field test audits. This includes audit of the test procedure in the field. Failure to comply fully with contractual requirements will attract sanctions as described in a formal protocol.

Detailed disease statistics are published monthly at http://www.dardni.gov.uk/index/dard-statistics/animal-disease-statistics.htm

5. Benefits of the programme[13]:

The main benefits of the TB programme are indicated below.

The overall benefit to the NI farming and processing sectors is that the TB programme has been successful in reducing TB in cattle and in supporting trade in live cattle and products. The export trade in cattle, beef, milk and by-products, which was worth £1,269.4m here in 2010, is dependent on the effective implementation of the programme.

This figure is made up as follows:

live cattle exports	- £17.0m (including to GB)
animal by-products	- £18.6m (including to GB) cannot separate cattle data from other animals
beef and sheep meat	- £696.7m (including to GB) cannot separate data
milk and milk products	- £537.1m (including to GB)

The vast majority of herds in NI are able to participate fully in export trade because of the programme. In the absence of an effective programme, access to export markets would not be possible. Maintenance of a programme continues to be essential to provide the guarantees necessary to enable NI cattle and their products to access EU and third country markets.

Trade in live animals is governed by Directive 64/432. Bovine animals for export to another MS must originate from an OTF herd and have been submitted to a pre-movement test for TB.

Trade in milk is governed by Council Directive 2004/41/EC and by Regulation 2004/853/EC which establish that milk originating from herds that do not have OTF status must be heat-treated and that milk from animals showing a positive reaction must not be used for human consumption.

Trade in animal products for human consumption is governed by Directive 2004/41/EC and Regulations 2004/853 and 2004/854. Meat from animals with generalized TB must not be declared fit for human consumption. In cases where lesions are confined to the lymph nodes or only one organ or only one part of the carcase, only the affected part need be declared unfit for human consumption.

Maintaining access to third country markets depends on NI continuing to comply with the relevant requirements of the OIE and such conditions as may be imposed bilaterally by our trading partners.

13 A description is provided of the benefits for farmers and society in general from the public and animal health and economical point of view.

Human Health

In terms of human health, control of TB was one of the great public health success stories of the twentieth century. In the late 19th century TB caused 1 in 5 of deaths in the UK and even as late as the pre and post World War II period there were 50,000 TB notifications in England and Wales. Before WWII, 2,000 children died in the UK every year due to bTB. The implementation of BCG vaccines, pasteurisation of milk, and the reduction of the incidence of the disease in the cattle population contributed to the effective elimination of the disease as a major health issue in the developed countries. There were 12 cases of bTB in humans in NI from 2000-2005 and a further 7 in the period 2006-2009.

Were there to be a return to past levels of infection, the risk to the general public would be limited because of the use of BCG and pasteurisation of milk. For farm families who might consume unpasteurised milk or contract the disease through direct transmission, the risks could be significant.

However the National Institute for Health and Clinical Excellence (NICE) concluded that the overwhelming majority of the UK population was at negligible risk of *M. bovis* infection.

Animal Welfare

If the disease were to re-emerge there could be significant animal welfare problems. It is not likely that these would be acceptable to a population increasingly seeking high welfare standards.

This analysis of programme benefits suggests that although precise estimates cannot be made there are a number of significant benefits relative to a “no control situation”.

6. Data on the epidemiological evolution during the last five years[14]

6.1. Evolution of the disease[15]

6.1.1. Data on herds(a) (one table per year)

Year: 2011

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds checked(d)	Number of positive herds(e)	Number of new positive herds(f)	Number of herds depop-ulated	% positive herds depo-pulated	Indicators		
									% herd coverage	% positive herds Period herd prevalence	% new positive herds Herd incidence
1	2	3	4	5	6	7	8	9 = (/) x100	10= (5/4) x100	11 = (6/5) x100	12 = (7/5) x100
N.Ireland	Bovine	25,677	25,677	23,917	1,655	1,386	7	0.4	90	6.92	6.01
Total		25,677	25,677	23,917	1,655	1,386	7	0.4	90	6.92	6.01

(a) Herds or flocks or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining or upgrading, the health status of the herd. In this column a herd must not be counted twice even if has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one animal tested positive in this period.

14 The data on the evolution of the disease are provided according to the tables below where appropriate.

15 No data to provide in case of rabies.

6.1.1. Data on herds(a) (one table per year)

Year: 2010

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds checked(d)	Number of positive herds(e)	Number of new positive herds(f)	Number of herds depop-ulated	% positive herds depop-ulated	Indicators		
									% herd coverage	% positive herds Period herd prevalence	% new positive herds Herd incidence
1	2	3	4	5	6	7	8	9 = (/) x100	10= (5/4) x100	11 = (6/5) x100	12 = (7/5) x100
N.Ireland	Bovine	25,933	25,933	23,595	1,484	1,150	16	1.1	91	6.55	5.07
Total		25,933	25,933	23,595	1,484	1,150	16	1.1	91	6.55	5.07

(a) Herds or flocks or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining or upgrading, the health status of the herd. In this column a herd must not be counted twice even if has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one animal tested positive in this period.

6.1.1. Data on herds(a) (one table per year)

Year: 2009

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds checked(d)	Number of positive herds(e)	Number of new positive herds(f)	Number of herds depop-ulated	% positive herds depop-ulated	INDICATORS		
									% herd coverage	% positive herds Period herd prevalence	% new positive herds Herd incidence
1	2	3	4	5	6	7	8	9 = (/) x100	10= (5/4) x100	11 = (6/5) x100	12 = (7/5) x100
N.Ireland	Bovine	26,287	26,287	24,023	1,608	1,293	12	0.7	91.4	7.0	5.61
Total		26,287	26,287	24,023	1,608	1,293	12	0.7	91.4	7.0	5.61

(a) Herds or flocks or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining or upgrading, the health status of the herd. In this column a herd must not be counted twice even if has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one animal tested positive in this period.

6.1.1. Data on herds(a) (one table per year)

Year: 2008

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds checked(d)	Number of positive herds(e)	Number of new positive herds(f)	Number of herds depop-ulated	% positive herds depop-ulated	INDICATORS		
									% herd coverage	% positive herds Period herd prevalence	% new positive herds Herd incidence
1	2	3	4	5	6	7	8	9 = (/) x100	10= (5/4) x100	11 = (6/5) x100	12 = (7/5) x100
N.Ireland	Bovine	26,780	26,780	23,922	1,598	1,273	10	0.6	89.1	7.0	5.57
Total		26,780	26,780	23,922	1,598	1,273	10	0.6	89.1	7.0	5.57

(a) Herds or flocks or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining or upgrading, the health status of the herd. In this column a herd must not be counted twice even if has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one animal tested positive in this period.

6.1.1. Data on herds(a) (one table per year)

Year: 2007

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds checked(d)	Number of positive herds(e)	Number of new positive herds(f)	Number of herds depop-ulated	% positive herds depop-ulated	Indicators		
									% herd coverage	% positive herds Period herd prevalence	% new positive herds Herd incidence
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9 = (/) x100**	**10= (5/4) x100**	**11 = (6/5) x100**	**12 = (7/5) x100**
N.Ireland	Bovine	26,915	26,915	24,280	1,633	1,264	5	0.3	89.3	6.9	5.35
Total		26,915	26,915	24,280	1,633	1,264	5	0.3	89.3	6.9	5.35

(a) Herds or flocks or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining or upgrading, the health status of the herd. In this column a herd must not be counted twice even if has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one animal tested positive in this period.

6.1.2. Data on animals (one table per year and per disease/species)

Year: 2011

Region(a)	Animal species	Total number of animals(b)	Number of animals(d) to be tested under the programme	Number of animals(c) tested	Number of animals tested individually (d)	Number of positive animals	Slaughtering		INDICATORS	
							Number of animals with positive result slaughtered or culled	Total number of animals slaugh-tered(e)	% coverage at animal level	% positive animals Animal prevalence
1	2	3	4	5	6	7	8	9	10=(5/4) x100	11=(7/5) x100
N.Ireland	Bovine	1,590,452	1,565,646	1,607,358	1,607,358	8,136	8,136	8,620	100.0	0.506
Total		1,590,452	1,565,646	1,607,358	1,607,358	8,136	8,136	8,620	100.0	0.506

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance: milk bulk tank tests).

(e) Include all positive animal slaughtered and also the negative animals slaughtered under the programme.

6.1.2. Data on animals (one table per year and per disease/species)

Year: 2010

Region(a)	Animal species	Total number of animals(b)	Number of animals(d) to be tested under the programme	Number of animals(c) tested	Number of animals tested individually (d)	Number of positive animals	Slaughtering		INDICATORS	
							Number of animals with positive result slaughtered or culled	Total number of animals slaughtered (e)	% coverage at animal level	% positive animals Animal prevalence
1	2	3	4	5	6	7	8	9	10=(5/4) x100	11=(7/5) x100
N.Ireland	Bovine	1,604,356	1,583,229	1,582,878	1,582,878	6,404	6,404	7,144	100.0	0.405
Total		1,604,356	1,583,229	1,582,878	1,582,878	6,404	6,404	7,144	100.0	0.405

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance: milk bulk tank tests).

(e) Include all positive animal slaughtered and also the negative animals slaughtered under the programme.

6.1.2. Data on animals (one table per year and per disease/species)

Year: 2009

Region(a)	Animal species	Total number of animals(b)	Number of animals(d) to be tested under the programme	Number of animals(c) tested	Number of animals tested individually (d)	Number of positive animals	Slaughtering		INDICATORS	
							Number of animals with positive result slaughtered or culled	Total number of animals slaugh-tered(e)	% coverage at animal level	% positive animals Animal prevalence
1	2	3	4	5	6	7	8	9	10=(5/4) x100	11=(7/5) x100
N.Ireland	Bovine	1,612,813	1,599,025	1,601,500	1,601,500	8,198	8,198	8,905	100.2	0.512
Total		1,612,813	1,599,025	1,601,500	1,601,500	8,198	8,198	8,905	100.2	0.512

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance: milk bulk tank tests).

(e) Include all positive animal slaughtered and also the negative animals slaughtered under the programme.

6.1.2. Data on animals (one table per year and per disease/species)

Year: 2008

Region(a)	Animal species	Total number of animals(b)	Number of animals(d) to be tested under the programme	Number of animals(c) tested	Number of animals tested individually (d)	Number of positive animals	Slaughtering		INDICATORS	
							Number of animals with positive result slaughtered or culled	Total number of animals slaugh-tered(e)	% coverage at animal level	% positive animals Animal prevalence
1	2	3	4	5	6	7	8	9	10=(5/4) x100	11=(7/5) x100
N.Ireland	Bovine	1,622,541	1,647,300	1,592,213	1,592,213	8,390	8,390	9,001	96.7	0.53
Total		1,622,541	1,647,300	1,592,213	1,592,213	8,390	8,390	9,001	96.7	0.53

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance: milk bulk tank tests).

(e) Include all positive animal slaughtered and also the negative animals slaughtered under the programme.

6.1.2. Data on animals (one table per year and per disease/species)

Year: 2007

Region(a)	Animal species	Total number of animals(b)	Number of animals(d) to be tested under the programme	Number of animals(c) tested	Number of animals tested individually (d)	Number of positive animals	Slaughtering		INDICATORS	
							Number of animals with positive result slaughtered or culled	Total number of animals slaugh-tered(e)	% coverage at animal level	% positive animals Animal prevalence
1	2	3	4	5	6	7	8	9	10=(5/4) x100	11=(7/5) x100
N.Ireland	Bovine	1,643,458	1,464,025	1,640,552	1,640,552	7,299	7,299	7,888	112.1	0.45
Total		1,643,458	1,464,025	1,640,552	1,640,552	7,299	7,299	7,888	112.1	0.45

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance: milk bulk tank tests).

(e) Include all positive animal slaughtered and also the negative animals slaughtered under the programme.

6.2. Stratified data on surveillance and laboratory tests

6.2.1. Stratified data on surveillance and laboratory tests

Year: 2011

Region(a)	Animal species/ category	Test type(b)	Description of test	Number of samples tested	Number of positive samples
N.Ireland	Bovine	Serological	Gamma interferon assay	17,123	854
	Bovine	Microbiological	Lowenstein – Jensen and Stonebrinks solid culture media and Bactec MGIT 960 liquid culture system. Molecular confirmation of culture by spoligotype	2,700	642
Total				19,823	1,496

(a) Region as defined in the programme of the Member State.

(b) Indicate whether the test is serological, virological etc.

6.2.1. Stratified data on surveillance and laboratory tests

Year: 2010

Region(a)	Animal species/ category	Test type(b)	Description of test	Number of samples tested	Number of positive samples
N.Ireland	Bovine	Serological	Gamma interferon assay	13,520	661
	Bovine	Microbiological	Lowenstein – Jensen and Stonebrinks solid culture media and Bactec MGIT 960 liquid culture system. Molecular confirmation of culture by spoligotype	3,887	751
	Bovine	Other	VNTR	781	742
Total				18,188	2,154

(a) Region as defined in the programme of the Member State.

(b) Indicate whether the test is serological, virological etc.

6.2.1. Stratified data on surveillance and laboratory tests

Year: 2009

Region(a)	Animal species/ category	Test type(b)	Description of test	Number of samples tested	Number of positive samples
N.Ireland	Bovine	Serological	Gamma interferon assay	14,657	1,279
	Bovine	Microbiological	Lowenstein – Jensen and Stonebrinks solid culture media and Bactec MGIT 960 liquid culture system. Molecular confirmation of culture by spoligotype	6,234	992
	Bovine	Other	VNTR	992	977
Total				21,883	3,248

(a) Region as defined in the programme of the Member State.

(b) Indicate whether the test is serological, virological etc.

6.2.1. Stratified data on surveillance and laboratory tests

Year: 2008

Region(a)	Animal species/ category	Test type(b)	Description of test	Number of samples tested	Number of positive samples
N.Ireland	Bovine	Serological	Gamma interferon assay	13,956	805
	Bovine	Microbiological	Lowenstein – Jensen and Stonebrinks solid culture media and Bactec MGIT 960 liquid culture system. Molecular confirmation of culture by spoligotype	3,286	928
	Bovine	Other	VNTR	2,780	2,752
	Bovine	Other	Histology	3,132	2,635
Total				23,154	7,120

(a) Region as defined in the programme of the Member State.

(b) Indicate whether the test is serological, virological etc.

6.2.1. Stratified data on surveillance and laboratory tests

Year: 2007

Region(a)	Animal species/ category	Test type(b)	Description of test	Number of samples tested	Number of positive samples
N.Ireland	Bovine	Serological	Gamma interferon assay	8,513	653
	Bovine	Microbiological	Lowenstein – Jensen and Stonebrinks solid culture media and Bactec MGIT 960 liquid culture system. Molecular confirmation of culture by spoligotype	2,953	946
	Bovine	Other	VNTR	2,624	2,598
	Bovine	Other	Histology	2,896	2,539
Total				16,986	6,736

(a) Region as defined in the programme of the Member State.

(b) Indicate whether the test is serological, virological etc.

6.3. Data on infection (one table per year)

Year: 2011

Region(a)	Animal species	Number of herds infected(b)	Number of animals infected
N.Ireland	Bovine	1,390	4,425
Total		1,390	4,425

(a) Region as defined in the programme of the Member State.

(b) Herds or flocks or holdings as appropriate.

6.3. Data on infection (one table per year)

Year: 2010

Region(a)	Animal species	Number of herds infected(b)	Number of animals infected
N.Ireland	Bovine	1,229	3,393
Total		1,229	3,393

(a) Region as defined in the programme of the Member State.

(b) Herds or flocks or holdings as appropriate.

6.3. Data on infection (one table per year)

Year: 2009

Region(a)	Animal species	Number of herds infected(b)	Number of animals infected
N.Ireland	Bovine	1,346	3,972
Total		1,346	3,972

(a) Region as defined in the programme of the Member State.

(b) Herds or flocks or holdings as appropriate.

6.3. Data on infection (one table per year)

Year: 2008

Region(a)	Animal species	Number of herds infected(b)	Number of animals infected
N.Ireland	Bovine	1,866	3,936
Total		1,866	3,936

(a) Region as defined in the programme of the Member State.

(b) Herds or flocks or holdings as appropriate.

6.3. Data on infection (one table per year)

Year: 2007

Region(a)	Animal species	Number of herds infected(b)	Number of animals infected
N.Ireland	Bovine	1,990	3,899
Total		1,990	3,899

(a) Region as defined in the programme of the Member State.

(b) Herds or flocks or holdings as appropriate.

6.4. Data on the status of herds at the end of each year[16]

Year: 2011

Region(a)	Animal species	Status of herds and animals under the programme(b)													
		Total number of herds and animals under the programme		Unknown(c)		Not free or not officially free from disease				Free or officially free from disease status suspended(f)		Free from disease(g)		Officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	25,677	1,565,646	0	0	509	88,022	838	89,656	1,573	133,706	n/a	n/a	22,757	1,254,262
Total		25,677	1,565,646	0	0	509	88,022	838	89,656	1,573	133,706	n/a	n/a	22,757	1,254,262

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined in Union or national legislation for the respective disease at the end of the reporting period.

(g) Free herd as defined in Union or national legislation for the respective disease.

(h) Officially free herd as defined in Union or national legislation for the respective disease .

(i) Include animals under the programme in the herds with the referred status (left column).

16 Only data to provide for bovine tuberculosis, bovine brucellosis, ovine and caprine brucellosis (B. melitensis).

6.4. Data on the status of herds at the end of each year[17]

Year: 2010

Region(a)	Animal species	Status of herds and animals under the programme(b)													
		Total number of herds and animals under the programme		Unknown(c)		Not free or not officially free from disease				Free or officially free from disease status suspended(f)		Free from disease(g)		Officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	25,933	1,583,229	0	0	245	59,274	741	90,811	1,872	148,740	n/a	n/a	23,075	1,284,404
Total		25,933	1,583,229	0	0	245	59,274	741	90,811	1,872	148,740	n/a	n/a	23,075	1,284,404

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined in Union or national legislation for the respective disease at the end of the reporting period.

(g) Free herd as defined in Union or national legislation for the respective disease.

(h) Officially free herd as defined in Union or national legislation for the respective disease .

(i) Include animals under the programme in the herds with the referred status (left column).

17 Only data to provide for bovine tuberculosis, bovine brucellosis, ovine and caprine brucellosis (B. melitensis)

6.4. Data on the status of herds at the end of each year[18]

Year: 2009

Region(a)	Animal species	Status of herds and animals under the programme(b)													
		Total number of herds and animals under the programme		Unknown(c)		Not free or not officially free from disease				Free or officially free from disease status suspended(f)		Free from disease(g)		Officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	26,287	1,599,025	0	0	412	78,238	673	76,759	1,985	174,685	n/a	n/a	23,201	1,269,343
Total		26,287	1,599,025	0	0	412	78,238	673	76,759	1,985	174,685	n/a	n/a	23,201	1,269,343

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined in Union or national legislation for the respective disease at the end of the reporting period.

(g) Free herd as defined in Union or national legislation for the respective disease.

(h) Officially free herd as defined in Union or national legislation for the respective disease .

(i) Include animals under the programme in the herds with the referred status (left column).

18 Only data to provide for bovine tuberculosis, bovine brucellosis, ovine and caprine brucellosis (B. melitensis).

6.4. Data on the status of herds at the end of each year[19]

Year: 2008

Region(a)	Animal species	Status of herds and animals under the programme(b)													
		Total number of herds and animals under the programme		Unknown(c)		Not free or not officially free from disease				Free or officially free from disease status suspended(f)		Free from disease(g)		Officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	26,780	1,647,300	0	0	344	60,193	771	86,570	2,087	167,387	n/a	n/a	23,578	1,333,150
Total		26,780	1,647,300	0	0	344	60,193	771	86,570	2,087	167,387	n/a	n/a	23,578	1,333,150

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined in Union or national legislation for the respective disease at the end of the reporting period.

(g) Free herd as defined in Union or national legislation for the respective disease.

(h) Officially free herd as defined in Union or national legislation for the respective disease .

(i) Include animals under the programme in the herds with the referred status (left column).

19 Only data to provide for bovine tuberculosis, bovine brucellosis, ovine and caprine brucellosis (B. melitensis).

6.4. Data on the status of herds at the end of each year20

Year: 2007

Region(a)	Animal species	Status of herds and animals under the programme(b)													
		Total number of herds and animals under the programme		Unknown(c)		Not free or not officially free from disease				Free or officially free from disease status suspended(f)		Free from disease(g)		Officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	26,915	1,464,025	0	0	356	54,722	811	87,801	1,932	158,622	n/a	n/a	23,816	1,163,580
Total		26,915	1,464,025	0	0	356	54,722	811	87,801	1,932	158,622	n/a	n/a	23,816	1,163,580

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined in Union or national legislation for the respective disease at the end of the reporting period.

(g) Free herd as defined in Union or national legislation for the respective disease.

(h) Officially free herd as defined in Union or national legislation for the respective disease .

(i) Include animals under the programme in the herds with the referred status (left column).

20 Only data to provide for bovine tuberculosis, bovine brucellosis, ovine and caprine brucellosis (B. melitensis).

6.5. Data on vaccination or treatment programmes[21] NOT APPLICABLE

Year:

Region(a)	Animal species	Total number of herds(b)	Total number of animals	Information on vaccination or treatment programme					
				Number of herds(c) in vaccination or treatment programme	Number of herds(c) vaccinated or treated	Number of animals vaccinated or treated	Number of doses of vaccine or treatment administered	Number of adults vaccinated	Number of young animals vaccinated
Total									

(a) Region as defined in the programme of the Member State

(b) Herds or flocks or holdings as appropriate

6.6. Data on wildlife[22]

6.6.1. Estimation of wildlife population

Year: 2005-2009

Regions(a)	Animal species	Method of estimation	Estimated population
N.Ireland	Badger Meles meles	Scientific field survey and analysis 07/08	33,500 (95%CI 26-41.2k)
Total			

(a) Region as defined in the programme of the Member State

21 Data to provide only if vaccination has been carried out.

22 Data only to provide in case the programme comprises measures as regards wildlife or if the data are epidemiologically relevant for the disease.

6.6.2. Disease surveillance and other tests in wildlife (one table per year)

Year: 2011

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
N. Ireland	Badger Meles meles	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	728	44
	Badger Meles meles	Other	Histology	41	11
	Badger Meles meles	Other	Post mortem	148	19
	Wild Deer	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Wild Deer	Other	Histology	0	0
	Wild Deer	Other	Spoligo typing	0	0
	Otter Lutra lutra	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Otter Lutra lutra	Other	VNTR	0	0
Total				917	74

(a) Region as defined in the programme of the Member State

(b) Indicate whether the test is serological, virological, biomarker detection etc.

6.6.2. Disease surveillance and other tests in wildlife (one table per year)

Year: 2010

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
N. Ireland	Badger Meles meles	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	501	19
	Badger Meles meles	Other	Histology	17	0

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
	Badger Meles meles	Other	Spoligo typing	35	19
	Badger Meles meles	Other	Post mortem	101	10
	Wild Deer	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	2	0
	Wild Deer	Other	Histology	0	0
	Wild Deer	Other	Spoligo typing	0	0
	Otter Lutra lutra	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	2	0
	Otter Lutra lutra	Other	VNTR	0	0
Total				658	48

(a) Region as defined in the programme of the Member State

(b) Indicate whether the test is serological, virological, biomarker detection etc.

6.6.2. Disease surveillance and other tests in wildlife (one table per year)

Year: 2009

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
N. Ireland	Badger Meles meles	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	530	13
	Badger Meles meles	Other	Histology	11	0
	Badger Meles meles	Other	Spoligo typing	13	11
	Badger Meles meles	Other	Post mortem	102	0

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
	Wild Deer	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	451	5
	Wild Deer	Other	Histology	5	3
	Wild Deer	Other	Spoligo typing	5	4
	Otter Lutra lutra	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Otter Lutra lutra	Other	VNTR	0	0
Total				1,117	36

(a) Region as defined in the programme of the Member State

(b) Indicate whether the test is serological, virological, biomarker detection etc.

6.6.2. Disease surveillance and other tests in wildlife (one table per year)

Year: 2008

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
N. Ireland	Badger Meles meles	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	540	31
	Badger Meles meles	Other	Histology	4	2
	Badger Meles meles	Other	Spoligo typing	31	31
	Badger Meles meles	Other	Post mortem	100	14
	Wild Deer	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Wild Deer	Other	Histology	0	0
	Wild Deer	Other	Spoligo typing	0	0

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
	Otter Lutra lutra	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	4	2
	Otter Lutra lutra	Other	VNTR	2	2
Total				681	82

(a) Region as defined in the programme of the Member State

(b) Indicate whether the test is serological, virological, biomarker detection etc.

6.6.2. Disease surveillance and other tests in wildlife (one table per year)

Year: 2007

Region(a)	Animal Species	Test type(b)	Test description	Number of samples tested	Number of positive samples
N. Ireland	Badger Meles meles	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	363	12
	Badger Meles meles	Other	Histology	0	0
	Badger Meles meles	Other	Spoligo typing	10	10
	Badger Meles meles	Other	Post mortem	70	10
	Wild Deer	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Wild Deer	Other	Histology	0	0
	Wild Deer	Other	Spoligo typing	0	0
	Otter Lutra lutra	Microbiological	Lowenstein – Jensen culture media and Bactec MGIT 960 system. Molecular confirmation of culture positive samples	0	0
	Otter Lutra lutra	Other	VNTR	0	0
Total				443	32

(a) Region as defined in the programme of the Member State

(b) Indicate whether the test is serological, virological, biomarker detection etc.

6.6.3. Data on vaccination or treatment of wildlife NOT APPLICABLE

Year:

Region(a)	Square km	Vaccination or treatment programme		
		Number of doses of vaccine or treatment to be administered	Number of campaigns	Total number of doses of vaccine or treatment administered
Total				

(a) Region as defined in the programme of the Member State

7. Targets

7.1. Targets related to testing (one table for each year of implementation[23])

7.1.1. Targets on diagnostic tests

Region(a)	Type of the test(b)	Target population (c)	Type of sample(d)	Objective (e)	Number of planned tests
N.Ireland	Tuberculin skin test	All bovines		Surveillance	2,365,000
	Gamma Interferon Assay	Bovines	Heparinised blood	Surveillance	18,000
	Bacteriological	Herds where disease not confirmed	Tissue	Surveillance	4,749
	Histopathology	Herds where disease not confirmed	Tissue	Surveillance	3,535
Total					2,391,284

(a) Region as defined in the programme of the Member State

(b) Description of the test (for instance SN-test, AB-Elisa, RBT,)

(c) Specification of the targeted species and the categories of targeted animals (for instance sex, age, breeding animal, slaughter animal, …).

(d) Description of the sample (for instance blood, serum, milk,)

(e) Description of the objective (for instance qualification, surveillance, confirmation of suspected cases, monitoring of campaigns, seroconversion, control on deleted vaccines, testing of vaccine, control of vaccination,)

23 For subsequent years of approved multiannual programmes only one table for the relevant year should be filled in.

7.1.2. Targets on testing herds and animals[24]

7.1.2.1 Targets on the testing of herds(a)

Region(b)	Animal species	Total number of herds(c)	Total number of herds under the programme	Number of herds expected to be checked(d)	Number of expected positive herds(e)	Number of expected new positive herds(f)	Number of herds expected to be depopulated	% positive herds expected to be depopulated	TARGET INDICATORS		
									Expected % herd coverage	% positive herds Expected period herd prevalence	% new positive herds Expected herd incidence
1	2	3	4	5	6	7	8	9 = (8/6) x100	10 = (5/4) x100	11 = (6/5) x100	12 = (7/5) x100
N.Ireland	Bovine	25,500	25,500	23,595	1903	1593	15	0.8	91	8.0	6.75
Total		25,500	25,500	23,595	1903	1593	15	0.8	91	8.0	6.75

(a) Herds or flocks, or holdings as appropriate.

(b) Region as defined in the programme of the Member State.

(c) Total number of herds existing in the region including eligible herds and non-eligible herds for the programme.

(d) Check means to perform a herd level test under the programme for the respective disease with the purpose of maintaining, upgrading, etc., the health status of the herd. In this column a herd must not be counted twice even if it has been checked more than once.

(e) Herds with at least one positive animal during the period independent of the number of times the herd has been checked.

(f) Herds which status in the previous period was Unknown, Not free-negative, Free, Officially Free or Suspended and have at least one positive animal in this period.

24 Data not to provide in case of rabies.

7.1.2.2. Targets on the testing of animals

Region(a)	Animal species	Total number of animals(b)	Number of animals(c) under the programme	Number of animals(c) expected to be tested	Number of animals to be tested individually (d)	Number of expected positive animals	Slaughtering		TARGET INDICATORS	
							Number of animals with positive result expected to be slaughtered or culled	Total number of animals expected to be slaughtered(e)	Expected % coverage at animal level	% positive animals (Expected animal prevalence)
1	2	3	4	5	6	7	8	9	10=(5/4)x100	11=(7/5)x100
N.Ireland	Bovine	1,600,000	1,585,000	1,585,000	1,585,000	9,356	9,356	9,856	100	0.59
		1,600,000	1,585,000	1,585,000	1,585,000	9,356	9,356	9,856	100	0.59

(a) Region as defined in the programme of the Member State.

(b) Total number of animals existing in the region including eligible herds and non-eligible herds for the programme.

(c) Includes animals tested individually or under bulk level scheme.

(d) Include only animals tested individually, do not include animals tested by bulk level samples (for instance milk bulk tank tests).

(e) Include all positive animals slaughtered and also the negative animals slaughtered under the programme.

7.2. Targets on qualification of herds and animals (one table for each year of implementation)

Region(a)	Animal species	Total number of herds and animals under the programme		Targets on the status of herds and animals under the programme(b)											
				Expected unknown(c)		Expected not free or not officially free from disease				Expected free or officially free from disease status suspended(f)		Expected free from disease(g)		Expected officially free from disease (h)	
						Last check positive(d)		Last check negative(e)							
		Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)	Herds	Animals(i)
N.Ireland	Bovine	25,500	1,600,000	0	0	364	22,204	936	57,096	1,300	79,300	23,400	1,441,400	23,400	1,441,400
Total		25,500	1,600,000	0	0	364	22,204	936	57,096	1,300	79,300	23,400	1,441,400	23,400	1,441,400

(a) Region as defined in the programme of the Member State

(b) At the end of the year

(c) Unknown: No previous checking results available

(d) Not free and last check positive: Herd checked with at least one positive result in the latest check

(e) Not free and last check negative: Herd checked with negative results in the latest check but not being Free or Officially Free

(f) Suspended as defined for the respective disease in Union or national legislation where appropriate or according national legislation.

(g) Free herd as defined for the respective disease where appropriate in Union or national legislation where appropriate or according national legislation

(h) Officially free herd as defined for the respective disease where appropriate in Union or national legislation where appropriate or according national legislation

(i) Include animals under the programme in the herds with the referred status (left column)

7.3. Targets on vaccination or treatment (one table for each year of implementation) NOT APPLICABLE

7.3.1. Targets on vaccination or treatment[25]

Region(a)	Animal species	Total number of herds(b) in vaccination or treatment programme	Total number of animals in vaccination or treatment programme	Targets on vaccination or treatment programme					
				Number of herds(b) in vaccination or treatment programme	Number of herds(b) expected to be vaccinated or treated	Number of animals expected to be vaccinated or treated	Number of doses of vaccine or treatment expected to be administered	Number of adults(c) expected to be vaccinated	Number of young(c) animals expected to be vaccinated
Total									

(a) Region as defined in the programme of the Member State

(b) Herds or flocks or holdings as appropriate

(c) Only for Bovine brucellosis and Ovine, Caprine brucellosis (B. melitensis) as defined in the programme

7.3.2. Targets on vaccination or treatment[26] of wildlife NOT APPLICABLE

Region(a)	Animal species	Square km	Targets on the vaccination or treatment programme		
			Number of doses of vaccine or treatments expected to be administered in the campaign	Expected number of campaigns	Total number of doses of vaccine or treatment expected to be administered
Total					

(a) Region as defined in the programme of the Member State

25 Data to provide only if appropriate .

26 Data to provide only if appropriate.

8. Detailed analysis of the cost of the programme (one table per year of implementation[27])

Costs related to	Specification/Unit	Unit[1]	Number of units	Unitary cost in €	Total amount in €	Union funding requested (yes/no)
1. Testing						
1.1. Cost of sampling						
	Domestic animals					
	Wild animals					
1.2 Cost of the analysis						
- Brucellosis and Tuberculosis programmes	Rose Bengal test					
	SAT					
	Complement fixation test					
	ELISA test					
	Tuberculin test (by Private Veterinary Practitioner)	Test	1,850,000	£3.57	£6,604,500	Yes
	Tuberculin test (by Government staff – TVO/ VOT)	Test	515,000	£2.86	£1,472,900	Yes
	Gamma-interferon test	Test	18,000	£19.37	£348,660	Yes
	Bacteriological test	Test	4,749	£144	£683,856	Yes
	Other (please specify)					
	Histopathology	Test	3,535	£20	£70,700	No
- ASF, CSF, SVD & Bluetongue programmes	ELISA test					

27 For subsequent years of approved multiannual programmes only one table for the relevant year should be filled in.

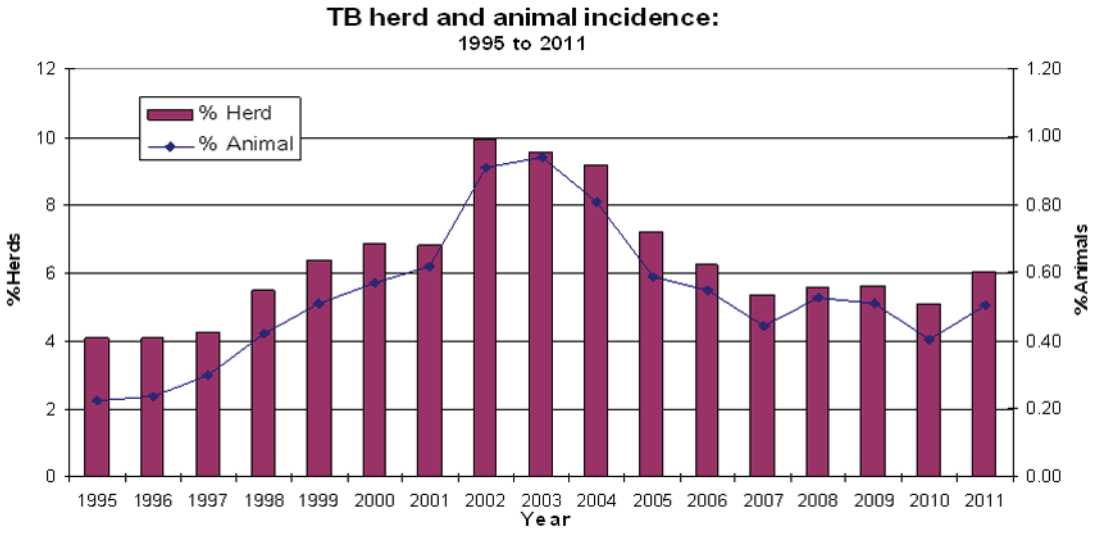
Costs related to	Specification/Unit	Unit[1]	Number of units	Unitary cost in €	Total amount in €	Union funding requested (yes/no)
	PCR test					
	Virological test					
	Seroneutralisation test (only for SVD)					
	Entomological surveillance test (only for Bluetongue)					
	Other (please specify)					
- Rabies programmes	Serological test					
	Detection of Tetracycline in bone test					
	Fluorescent antibody test					
	Other (please specify)					
1.3. Other costs						
	Purchase of traps (for Bluetongue)					
	Other (please specify)					
2. Vaccination or treatment						
2.1. Purchase of vaccine/ treatment						
- Brucellosis programmes	Domestic animal vaccinated					
- Bluetongue programmes	Domestic animal vaccinated					
- Rabies programmes	Oral vaccine dose + bait					
	Parenteral vaccine dose					
- Classical swine fever programmes	Oral vaccine dose + bait					

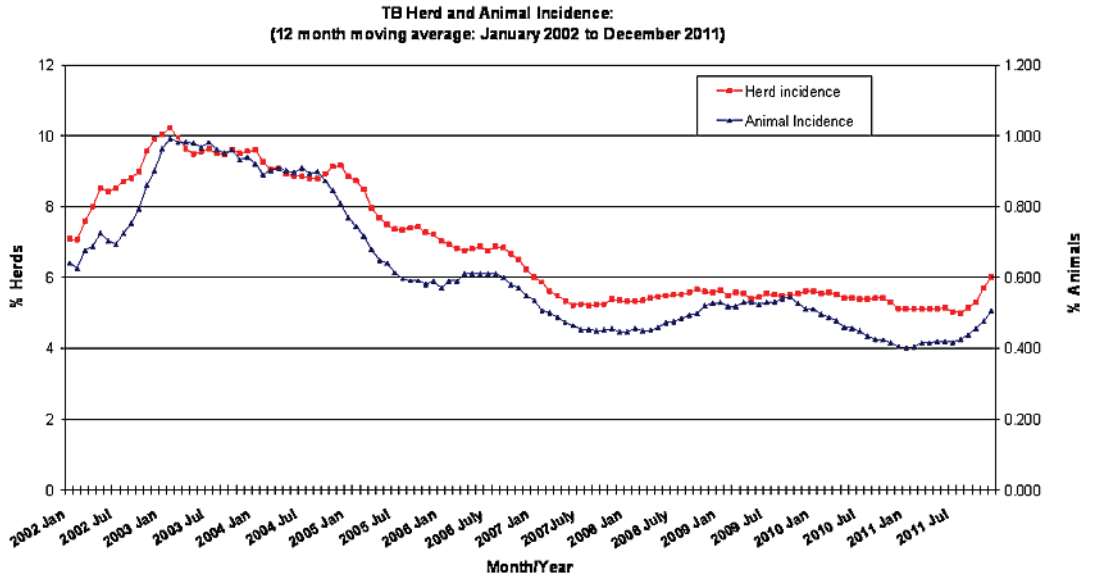
Costs related to	Specification/Unit	Unit[1]	Number of units	Unitary cost in €	Total amount in €	Union funding requested (yes/no)
2.2. Administering/Distribution costs						
Administering in domestic animals						
- Distribution for wild animals (please specify the type of distribution)						
2.3. Control costs						
2.4. Others (please specify)						
3. Slaughter and destruction						
3.1. Compensation of animals		Compensation for animals valued and slaughtered	9,856	£1,365	£13,453,440	Yes
3.2. Transport costs		Animals transported to slaughter	9,856	£8.50	£83,776	No
3.3. Destruction costs						
3.4. Loss in case of slaughtering						
3.5 Costs from treatment of products (milk, or others –please specify)						
4. Cleaning and disinfection						
5. Salaries (staff contracted for the programme only)		Staff	Not applicable	Not applicable	£4,700,000	No

Costs related to	Specification/Unit	Unit[1]	Number of units	Unitary cost in €	Total amount in €	Union funding requested (yes/no)
6. Consumables and specific equipment						
Tuberculin		Litres of tuberculin (300 litres avian + 300 litres bovine)	600	£934.57	£560,742	Yes
7. Other costs						
Salvage		Payment for animal carcases	9,856	-£142	-£1,399,552	Yes
DARD Funded Research		Research	Not applicable	Not applicable	£327,681	No
	TOTAL				£26,906,703	

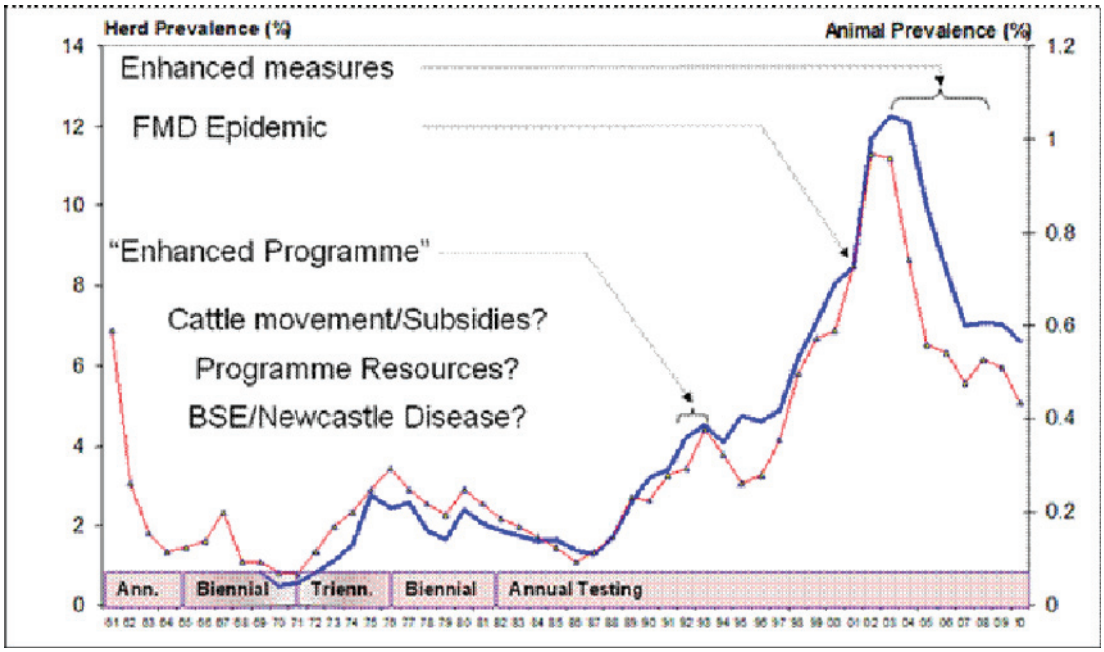
1 Specify the unit to which the data in the following two columns is referring to (e.g. sample, test, animal sampled etc). ANNEX A

Annex B


TB herd and animal incidence:
1995 to 2011
% Herd
% Animal
%Herds
%Animals
Year
0
2
4
6
8
10
12
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011


TB Herd and Animal Incidence:
(12 month moving average: January 2002 to December 2011)
Herd incidence
Animal Incidence
% Herds
% Animals
Month/Year
0
2
4
6
8
10
12
0.000
0.200
0.400
0.600
0.800
1.000
1.200
2002 Jan
2002 Jul
2003 Jan
2003 Jul
2004 Jan
2004 Jul
2005 Jan
2005 Jul
2006 Jan
2006 July
2007 Jan
2007July
2008 Jan
2008 July
2009 Jan
2009 Jul
2010 Jan
2010 Jul
2011 Jan
2011 Jul

Herd and animal prevalence from 1960 to 2010.



Annex C

Update Report for Public Accounts Committee

Department	Agriculture & Rural Development
PAC Hearing (NI Assembly)	Control of Bovine Tuberculosis in Northern Ireland
Date of Report / Hearing	29/06/2009
Date of MOR to PAC	16/09/2009
Report Criteria	Current Commitments
Date of Update Report	16/4/2012

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 1 Spending hundreds of millions of pounds on a programme that is not explicitly aimed at the eradication of bovine TB seems an extremely poor use of taxpayers' money. In the Committee's view, there needs to be a fundamental change in mindset within the Department, with a renewed focus on eradication, not merely containment. The Committee recommends that there must be a marked and sustained reduction in the prevalence of bovine TB and expects to see a much greater sense of urgency within the Department to achieve this.	DARD fully accepts the importance of having a renewed focus on eradication, and not merely the containment of this disease. DARD has been working closely with stakeholders and all those who have an interest in reducing the level of bovine TB in NI. In December 2008, the DARD Minister announced an agreed joint industry/Government strategic approach for dealing with bovine TB. The overall aim is to move towards the ultimate eradication of bovine TB through a phased approach, in a realistic timeframe and in the most cost-effective way. The aim in the first five year phase of the strategy, is to lay the foundations for the eventual eradication of the disease. In this phase, the goals are to maintain trade and to produce more effective and efficient ways of reducing transmission of bovine TB from cattle to cattle and between wildlife and cattle. Whilst the longer term objective is to reduce and eradicate the disease, in the shorter term it is expected that measures taken to improve the detection of disease will initially increase the reported disease levels, as the intended effect of enhanced measures will be the earlier detection of infected animals.	DARD remains committed to the eradication of this disease and will continue to work towards this end. DARD has been successful in securing the EU Commission's approval of NI's 2010, 2011 and 2012 TB Eradication Plans. This means we have been eligible to secure some €5 million per annum co-funding from the EU Veterinary Fund for TB. A draft 2013 TB Eradication Plan will be submitted to the Commission. The EU Commission approved NI TB Eradication Plan is a comprehensive document containing a full explanation of the historical, statutory and policy context as well as a detailed description of all the measures contained in the programme, including the regime of testing, herd and animal movement controls, and actions appropriate in the case of positive or inconclusive test results, etc. This is subject to annual review by the EU Commission and represents their acceptance that actions detailed therein are consistent with the aim of TB eradication. EU approval of the 2010 TB Eradication Plan required that from 1 January 2010 animals that give an inconclusive result to a second consecutive bovine TB test are removed as reactors (rather than after a third such test as previously).	Ongoing to 2014

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 2 The Committee recommends that the Department re-examines its bovine TB performance targets. While allowing for a possible increase in incidence in the short-term, targets should be much more challenging in the medium to longer-term than currently and must include a target date for eradication. The Committee accepts that this end date may require revision as the programme develops, but considers it vitally important that the Department has a clear sense of its ultimate objective.	Bovine TB performance targets will be reviewed and challenging targets set, based on the evidence gathered during each phase of the strategy and in line with disease trends.	EU approval of the 2010 TB Eradication Plan required that from 1 January 2010 animals that give an inconclusive result to a second consecutive bovine TB test are removed as reactors (rather than after a third such test as previously). This fundamental change meant that existing disease predictions were no longer valid. On 22 July 2010 the NI Executive therefore agreed a new PSA indicator to remove the existing measurement and create a new target for TB. This new TB target was to implement the NI section of the 2010 UK Bovine TB Eradication Plan and to maintain eligibility for the co-funding of the plan. Whilst the period of this target ended in March 2011, DARD continues to have an objective to achieve and maintain annual EU Commission approval for our TB Eradication Plan. DARD continues to closely monitor disease levels and disease incidence figures are published each month on the DARD website.	Ongoing to 2014
PAC Recommendation 3 The Committee cannot accept as reasonable that a policy review process that began in 1999 is still incomplete some 10 years later. The Committee recommends that the Department ensure that, in future, policy reviews are carried out at the appropriate time and that the recommendations arising from those reviews are considered and implemented on a timely basis.	DARD will ensure that future policy reviews are carried out in a timely manner and that any recommendations arising from these are considered and implemented as appropriate.	DARD has a procedure in place for dealing with the outcome of future policy reviews. A detailed inventory of recommendations will be compiled, and a forward action plan and progress monitoring arrangements will be drawn up for approval by the DARD Top Management Group within 6 months of the publication of the outcome of future policy reviews. This recommendation has been achieved	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 4 The Committee recommends that the Department ensures that its supervision of PVPs is more effective than it has been in the past and that lapses in standards are dealt with on a timely basis. In particular, it must ensure 100 per cent compliance with the requirement to report test results within one working day. The Committee recommends that the veterinary Associations and practice principals help bring this about, as a matter of urgency. The Department must also take steps to improve its partnership arrangements with private vets – for example, through more frequent and regular liaison meetings at a local level.	DARD is committed to the monitoring and continuous improvement of its system for the quality control of testing by PVPs and will take all appropriate steps to make its supervision more effective. This includes establishing clear delivery standards, protocols for identifying lapses from these standards, and a clear system to rectify any lapses on a timely basis. DARD will continue to work with the Veterinary Organisations and PVPs to improve partnership arrangements, performance and communications. DARD will continue to work closely with PVPs to resolve issues that arise in preventing 100 per cent compliance with the requirement to report test results within one working day.	DARD has procedures in place to ensure effective supervision of PVPs. The TB Testing Group, which comprises DARD officials and representatives of the NI veterinary profession, continues to meet to discuss TB test related issues. Work is on-going to deliver key messages to reinforce testing procedures for the PVPs. To date actions include a DVD, leaflet, displays at the 2009, 2010 and 2011 AVSPNI conferences, CVO letters, sending relevant statistics to individual practices, meetings held in DVOs across NI, CVO meetings and TB Testing Group meetings. The veterinary profession convened a well attended TB seminar on 1 February 2012. DARD has procedures in place and will continue to monitor compliance and to identify and resolve where possible any issues that prevent compliance.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 5 The Committee finds it worrying that significant differences in bovine TB detection rates, between DARD staff and PVPs, have existed over the past 20 years and yet the Department still cannot explain why. The Committee recommends that the issue be resolved and action taken to address the underlying problems as a matter of urgency. In future, test results should be monitored on an ongoing basis, with any anomalies quickly investigated and resolved.	DARD will continue to monitor and analyse the results produced by both DARD staff and those produced by PVPs in order to ensure that like for like comparisons can be made of the respective detection rates. DARD will use the information to identify the reasons for any differences and will implement solutions to this issue as a matter of urgency. DARD will also provide test statistics to monitor test results on an ongoing basis to each Veterinary Practice and to the TB Testing Group which was established in February 2009.	DARD and PVP representatives discuss the most recent detection rate comparative reports at meetings of the TB Testing Group. The detection rate statistics are provided to each practice twice a year and are now available to view at any time on the APHIS system. Detection rate reports were issued to all Practices in August 2010, January 2011, September 2011 and January 2012. Comparisons were conducted in May 2010. DARD has undertaken a number of actions to improve the efficiency of TB testing. Comparison reports will continue to be produced and monitored on an annual basis. Any issues arising will be dealt with as a matter of urgency. The most recent comparison was completed in March 2011.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 6 While it is a matter for the Department's Monitoring Panel to decide on the appropriate penalty, the Committee expects a firm line to be taken in all cases warranting suspension. It is important to make clear to the small number of vets whose performance falls below the acceptable level that the Department is serious about enforcement of standards. Penalties should include the withholding or recovery of fees, as appropriate. The Committee recommends that the Department consider introducing sanctions against veterinary practices, in addition to individual practitioners, for cases involving serious or repeated breaches of procedures.	DARD is currently undertaking a review of its long-standing contractual arrangements, which will include both the revision of sanctions including those that apply to practices and any requirement to recover testing fees. This is due to be completed in summer 2010.	The review of the existing contractual arrangements was conducted in parallel with a report considering the allocation of testing between PVPs and in-house staff. The review of the contractual arrangements was completed in August 2010 and discussions with PVPs have taken place. DARD have also during 2011 discussed extensively with colleagues in England and Wales because this has become a UK wide issue. More certainty in relation to programme funding and the outcome of the ongoing England/Wales tender process in needed. Following further discussions with AHVLA, DARD is currently seeking legal advice on the way forward.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 7 The Committee has major concerns about one particular case outlined in the C&AG's report, involving a private vet who falsely signed for tests performed by an unauthorised vet. Not only did the Department fail to terminate his contract and fail to report him to his professional body, but it allowed him to resume working for the Department a year later. The Committee was told that, in making this decision, the Department considered legal advice from the Royal College of Veterinary Surgeons and the finding of the Office of the Director of Public Prosecutions that there was insufficient evidence to prosecute. The Committee notes that this is not consistent with paragraph 2.27 of the C&AG's agreed report. The Committee requires the Department to clarify which of these versions in respect of legal advice is correct.	DARD had referred the case to the Director of Public Prosecutions who considered there was insufficient evidence to support a prosecution. DARD also considered reporting the PVP to the Royal College of Veterinary Surgeons and sought legal advice on this course of action but, on the basis of the legal advice given, did not pursue the referral. The appropriate sanctions will be imposed for any future fraudulent activity and serious breaches of the testing procedures.	This recommendation relates to a specific case. Breaches of testing procedures may lead to sanctions such as withholding of fees, the suspension or withdrawal of approval to carry out testing, and the requirement to attend further training, etc depending on the nature of the breach. Should the breach be exceptionally serious, the severity of the sanctions would extend beyond the normal range and may include referral to the Royal College of Veterinary Surgeons. If an approved tester is suspected of fraud, the case is referred for investigation to DARD's Central Investigation Service and, if a case is established, it will be referred to the Public Prosecution Service. If an approved tester is found guilty in any subsequent Court proceedings, criminal conviction normally results in suspension from the Register of Veterinary Surgeons. Hence, the tester will not be able to perform any tuberculin testing, as they are required to remain on the Register to do so.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 8 The Committee strongly recommends that any vet who is found guilty of fraudulent behaviour should have their contract terminated, be reported to their professional body and, where possible, be prosecuted. Moreover, any vet who has previously been found guilty of fraudulent behaviour should not subsequently be engaged by the Department.	DARD accepts the Committee's recommendation on action regarding a vet who is found guilty of fraudulent behaviour. In respect of any future employment of a vet who has previously been found guilty of fraudulent behaviour, DARD will seek legal advice on a case by case basis in determining the outcome.	The Department must act lawfully when applying sanctions to an individual, even if they have been found guilty of previous fraudulent activity or if they have been subject to any sanction imposed by the Courts. For this reason, the Department cannot guarantee absolutely that anyone in those circumstances could not subsequently be re-engaged. However, the Department does not actively wish to re-engage such individuals and if application is made the Department would seek legal advice.	Completed
PAC Recommendation 9 Given the high level of testing in the bovine TB programme, even a relatively small difference in the unit cost of tests can have a significant impact on overall programme expenditure. The Committee recommends that the Department closely monitors the relative costs of in-house and PVP testing on an ongoing basis, to ensure that best value for taxpayers' money is consistently achieved.	DARD will continue to monitor and to review its in-house costs in comparison to the PVP rates in order to facilitate assessments and identify action to improve value for money.	Costs have been produced for in house staff in August 2010 and the figures and methodology have been validated by an Agricultural Economist. A paper on the comparative costs of in-house and PVP rates was completed in March 2011. Monitoring will continue and annual reports produced. A follow up exercise is currently underway. The Committee's recommendation for DARD to closely monitor relevant costs, on an ongoing basis to ensure value for money has been met. Work will continue to ensure compliance with the commitment.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 10 The use of lay testers has the potential to provide a useful new resource, while achieving substantial cost savings over current arrangements. The Committee recommends that the Department reviews the outcome of the Defra trial and its discussions with the European Commission. If Defra is successful in obtaining approval to lay testing, the Committee recommends that the Department gives full consideration to adopting a similar approach in Northern Ireland.	After reviewing the outcome of the ongoing DEFRA trial on lay testers, and the discussions with the Commission, DARD will consider adopting a similar approach in NI which will be informed by an assessment of the relevant costs and benefits.	DEFRA submitted an explanation paper to the Commission in December 2010 and met with the Commission in February 2011 to further discuss the use of lay testers. This has clarified that lay testers can be used for most TB testing. DARD commenced a lay testing pilot project in June 2011. The objective of the pilot is to train and deploy a small number of lay testers and use the information gained to inform a wider consultation in 2012. The pilot ended on 31 December 2011 and is currently being evaluated. A consultation exercise will commence later this year on the future possible approach.	Ongoing. Pilot use of lay testers ended 31 December 2011
PAC Recommendation 11 The Committee recommends that the Department reconsider the current allocation of testing between PVPs and in-house staff, with a view to increasing the proportion of routine tests conducted in-house. This would also provide a better benchmark for the quality review of PVP routine testing, about which the Department has previously expressed concerns.	DARD will reconsider the current allocation of testing between PVPs and in-house staff. Consideration will also be given to the Committee's comments on increasing in-house tests and benchmarking.	A paper on in-house testing regarding staff numbers, deployment and allocation of tests was discussed and agreed at Veterinary Service Board level. A report on the allocation of testing and the review of the contractual arrangements with PVPs has now been completed and the recommendations agreed by the TB Steering Group.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 12 The Committee recommends that, as a general principle, Departments should never delay taking action on what should be urgent issues, pending completion of an Audit Office report. In this particular case, the length of time the Department is taking to put the findings of its review of testing arrangements into practice is unacceptable. It must finalise its position on each of the issues involved and begin implementation as soon as possible.	DARD will finalise its position on the findings of the review of TB testing arrangements and implement whatever action is necessary as soon as possible. As part of those actions, DARD is currently carrying out a review of its contractual arrangements with PVPs.	The review of the contractual arrangements was completed in August 2010 and preliminary discussions with PVPs have taken place. We have also discussed extensively with colleagues in England and Wales because this has become a UK wide issue. More certainty in relation to programme funding and the outcome of the England/Wales tender is needed before proceeding.	Completed
PAC Recommendation 13 It appears to the Committee that there is a strong case for introducing compulsory blood tests in problem and high risk herds. In view of the cost implications, the Committee recommends that the Department considers conducting a trial, in a high incidence area, as a basis for a cost-benefit assessment. Given the need for more research into the efficacy of the blood test, the Committee urges the Department to ensure that sufficient resources are applied to ensure that this work receives a high priority.	DARD, as part of its new TB strategic approach, intends to review the use of the supplementary blood test in the TB programme and to carry out an assessment of the costs and benefits of making the test compulsory, including the feasibility of a trial. The review will be completed as soon as possible.	Following the DARD Evidence and Innovation Call 2010/11 DARD has commissioned the Agri-Food and Biosciences Institute (AFBI) to undertake an evaluation of interferon-gamma (IFN-g) testing for bovine TB in NI. AFBI will review the considerable data that has been acquired as a result of their expertise in using the gamma-interferon test. It is anticipated that the results of this data analysis will enable DARD to determine how best to achieve maximum benefit from its deployment in disease control and cost benefit terms in relation to the TB Eradication Programme.	Approval for AFBI to proceed with the IFN-g project was formally granted on 9 May 2011. This is a major project. First outputs are expected by early 2012 with the project continuing until 2013/14 with scientific papers submitted for publication in peer reviewed journals.

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 14 Given that poor boundary fencing appears to have played a significant role in the spread of bovine TB, the Committee is disappointed that the Department does not have a firm grip on this issue. In the Committee's view, there is merit in obtaining a clear view of the real extent of the problem and the Department needs to consider how this can be tackled. As regards the enforcement of fencing requirements, the Committee recommends that the Department acts on its intention to link non-compliance with bio-security codes to the level of compensation awarded and expects this to be taken forward as a priority issue.	In October 2004, DARD introduced a statutory requirement for farmers to maintain their fences to prevent contact with animals on adjoining land. In addition, the importance of fencing that prevents contact between animals is highlighted in the voluntary Bio-security Code that was developed jointly by DARD and industry and published in 2004. DARD is also currently progressing plans for a TB Bio-security (Case Control) Study to identify the differences between herds that get TB and those that remain free of disease in the same high incidence areas and boundary fencing will be considered in the study. Findings will then be used to help develop further bio-security guidance for farmers.	DARD commissioned the Agri-Food and Biosciences Institute (AFBI) to carry out the TB Bio-security Study in a TB high prevalence area in Co Down. The Study was launched in October 2010 and the fieldwork elements of the Study including a survey of boundary fences were completed in July 2011. Some 200 farmers participated in the Study and provided valuable information. Collation and analysis of the considerable volume of data gathered as part of the Study is ongoing. It is hoped that this information will add to our knowledge of TB risk factors and inform the new biosecurity advice for farmers. It is expected that the findings will become available later in 2012.	For completion by 31 July 2012

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 15 The Committee considers that the Department should be much more proactive in encouraging farmers to attend training on early disease recognition and farm bio-security planning and would like to see the number of participants substantially increased. The Committee recommends that the Department makes attendance compulsory for farmers whose herds have suffered repeated infection. Failure to attend should result in a reduction of compensation in future outbreaks.	DARD will continue to monitor the general effectiveness of training for farmers, and will consider what further opportunities there are to enhance guidance and training on bio-security matters rather than make attendance compulsory for farmers whose herds have suffered repeated infection. DARD will continue to look for ways of highlighting to farmers the practical steps they can take to protect their herds from TB.	Research has been commissioned as part of the DARD directed Agri Food and Biosciences Institute (AFBI) Research Work Programme 2012/13 to assess NI landowners'/farmers' understanding of biosecurity measures such as closed farms, isolation, etc; the consequences of not applying biosecurity measures and their attitudes to applying biosecurity measures when dealing with diseases. DARD will continue to develop ways to encourage and enhance awareness and training on bio-security for farmers, DARD will continue to consider other training appropriate opportunities where possible	Completed
PAC Recommendation 16 The Committee recommends that the Department considers introducing pre-movement testing, for animals moving within Northern Ireland, perhaps on a trial basis within a high incidence area. As part of the Department's consideration, an updated cost-benefit analysis should be prepared. This would also provide a useful basis for opening dialogue with farmers' representatives on cost sharing.	In July 2008, a requirement was introduced to restrict the movement of any individual animals that had not had a TB test in the previous 15 months. That restriction remains until they are TB tested. This requirement applies across NI and goes beyond the EU Directive requirement for annual herd testing. DARD remains of the view that this is sufficient.	DARD remains of the view that the current measures, which go beyond the EU Directive requirement for annual herd testing, are sufficient.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 17 It is important that the wildlife factor in the transmission of bovine TB is addressed. The Committee recognises that this is an emotive issue which has not been objectively answered. When the badger prevalence survey is completed and the way forward determined, the Committee expects real progress to be made with a minimum of delay.	DARD's priority in respect of the wildlife factor is to complete planned research and build the evidence that is needed to make informed policy decisions about wildlife intervention in NI. This will be taken forward as soon as possible.	DARD commissioned the Agri-Food and Biosciences Institute (AFBI) to carry out the TB Biosecurity Study to assess what critical differences there are between TB breakdown and TB clear herds in a TB high prevalence area in Co. Down. Wildlife risk factors are being assessed as part of that Study. The fieldwork for the Study completed in July 2011 and it is expected that the findings will become available later in 2012. DARD has also commissioned AFBI to undertake an evaluation of interferon - gamma (IFN-g) testing for bovine TB in NI. DARD has conducted a review of its TB evidence needs to identify critical evidence gaps. DARD commissioned AFBI to conduct 4 Literature Reviews (LRs) on TB and wildlife factors. These LRs have been finalised and are published on the DARD website. DARD, on 25 October 2011, conducted a stakeholder workshop on possible TB and wildlife research studies to help inform the 2012/13 Evidence and Innovation research call.	Initial works achieved but work will be Ongoing to first phase review 2014

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 18 The Committee recommends that the Department examines the potential for adopting a "test-bed" approach as a means of determining the most cost-efficient combination of measures to eradicate bovine TB.	DARD will commission a report from its epidemiologists on the merits of adopting a potential test-bed approach in NI and this is expected to be completed by summer 2010.	An initial report on a "test-bed" approach has been completed by Veterinary Service epidemiologists. Its findings will inform DARD's consideration of its TB and wildlife evidence needs and help inform the TB & wildlife research and studies commissioned for 2012/13.	Completed
PAC Recommendation 19 It is important that the Department finalises its thinking on how best to address the conflict of interest inherent in PVPs carrying out testing in their clients' herds. If the conflict cannot be eliminated, the Committee recommends that the Department ensures that the risks are properly managed and that adequate safeguards are put in place. This should include an effective system of monitoring the work of PVPs, supplemented by a programme of robust supervisory checks.	DARD will carry out inspections where it believes the potential for a conflict of interest may exist.	A review of the current PVP contract has taken place and this included the management of potential conflicts of interest. The current conditions for the approval of PVPs to carry out tuberculin tests (VP1) expressly forbids PVPs to carry out tests on animals in which they have a financial interest or on animals belonging to close relatives. DARD considers that there is no inherent conflict of interest where a PVP tests his/her client's animals.	Completed
PAC Recommendation 20 The Committee welcomes the reduction in numbers of overdue herd and individual animal tests in recent years. Nevertheless, there is still room for improvement and the Committee recommends that the Department aims to achieve much closer to 100 per cent compliance with the 12-month deadline, for all animals.	DARD will continue to monitor testing of individual animals at a local level.	DARD has monitoring procedures and performance indicators in place at a local level and will continue to monitor compliance for annual testing on an ongoing basis.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 21 The Committee recommends that the Department works closely with the farmers' representative bodies to see how the problems in isolating reactor animals can best be overcome. Given the problems with isolation, the Committee recommends further reductions in reactor removal time, as well as 100 per cent compliance with the EU 30-day target.	DARD will continue to work in partnership with industry representative bodies and the Veterinary Organisations to identify ways of overcoming problems in isolating reactor animals. DARD will continue to work with the industry to identify and resolve issues that arise in preventing 100 per cent compliance with the EU target of 30 days for the removal of reactor animals from farms while endeavouring to keep any delays to a minimum.	This issue has been discussed with industry representative organisations at meetings of the TB Core Stakeholders Working Group. DARD's Veterinary Epidemiology Unit are assessing the level of the problem and quantifying the disease risks involved. Reactor removal times are being monitored by DARD and reasons for delays are investigated. This work will continue to resolve any issues and reduce delays to the minimum possible. DARD will continue to ensure that reactor removal times are in line with EU and its own more challenging targets.	Completed, with reviews ongoing.
PAC Recommendation 22 The Committee strongly recommends that the Department brings itself into line with the EU Directive, by allowing only one re-test of 'inconclusive' animals.	DARD is currently considering removing animals as reactors at the second consecutive inconclusive TB test result in compliance with the EU Directive requirements. This may be submitted as part of DARD's TB eradication plan to the EU Commission. The timing of implementation will be subject to securing the necessary additional funding. It should also be recognised that this will initially raise TB incidence levels.	This recommendation has been achieved on 1 January 2010 when DARD introduced a requirement for any animal that gives an inconclusive result to 2 consecutive TB tests to be removed as a reactor.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 23 The Committee recommends that the Department address its failure to secure what would have been millions of pounds' worth of grants from the EU Veterinary Fund. The Committee wants the Department to be in no doubt that it expects full advantage to be taken, in future, of the funding available from the EU.	DARD intends to take full advantage of any funding from the EU where it is available and is of advantage to NI in the longer term.	DARD has been successful in securing the EU Commission's approval of NI's 2010, 2011 and 2012 TB Eradication Plans. This means we have been eligible to secure some €5 million per annum co-funding from the EU Veterinary Fund for TB. DARD continues to have an objective to achieve and maintain annual EU Commission approval for our TB Eradication Plan and to optimise the funding from the EU Veterinary Fund for TB.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 24 The Committee recommends that, as an added incentive to prevent bovine TB breakdowns, the Department considers introducing a system whereby the rate of compensation would be progressively reduced in cases of multiple claims by the same herd keeper.	It is outside DARD's powers to withhold compensation solely because a farmer has repeated episodes of disease in the herd. Any herd may have recurrent episodes of disease due to many complex risk factors which cannot be identified and can often be outside the control of either the farmer or DARD. DARD will however, continue to look for ways of highlighting to farmers the practical steps they can take to protect their herds from TB.	DARD's interaction with the farming community will continue in relation to looking at practical steps that farmers can take to protect their herds from TB. DARD has conducted 2 public consultation exercises in 2011 in relation to disease compensation arrangements for bovine TB (and brucellosis). DARD has commissioned the Agri-Food and Biosciences Institute (AFBI) to carry out the TB Bio-security Study in a TB high prevalence area in Co Down. The Study was launched in October 2010 and the fieldwork elements of the Study were completed in July 2011. Some 200 farmers participated in the Study and provided valuable information. Collation and analysis of the considerable volume of data gathered as part of the Study is ongoing. It is hoped that this information will add to our knowledge of TB risk factors and inform the new biosecurity advice for farmers. DARD continues to disseminate guidance through local farming newsletters, magazines and mail shots.	Ongoing

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 25 With bovine TB continuing to be a significant problem, it is essential to enforce, and be seen to enforce, compliance with the regulations on testing and movement restrictions. Given the limited success to date of enforcement activity against breaches of the regulations, the Committee recommends that the Department reviews its investigation methods, in order to improve its standard of evidence collection.	DARD's Veterinary Service Enforcement Branch will continue to work closely with TB programme managers and DARD's Central Investigation Service to improve its investigation methods and the process of evidence collection. DARD will continue to strive to ensure effectiveness in the use of its enforcement action in order to achieve compliance with the regulations on testing and movement restrictions. DARD proposes to strengthen its existing powers by introducing a new offence of deliberate infection in the new Diseases of Animals Bill.	DARD's Veterinary Service Enforcement Branch (VSEB) continues to work closely with DARD's Central Investigation Service (CIS) and the TB Management team to improve its investigation methods. As a further deterrent, Single Farm Payment can be withheld for offences associated with breaches of the TB legislation. VSEB continues to co-operate closely with CIS where any cases of fraud are suspected. VSEB have developed good working relationships with the PSNI and with the investigation authorities in the south of Ireland as there can often be a cross-border dimension to livestock crime. VSEB Branch, in conjunction with VS TB Section, has a established a group that considers possible fraud cases and coordinates follow up action. DARD will continue to take the strongest possible enforcement action in order to achieve compliance. Introduction of DNA tags on reactor animals has been implemented from 1 December 2010. A new offence of deliberate infection has been introduced in the new Diseases of Animals Act, which came into effect on 12 March 2010.	Completed

Public Accounts Committee Recommendations	Departmental Commitment as outlined in Memorandum of Reply	Subsequent Actions and Progress to Date	Status
PAC Recommendation 26 There is a disturbing gap between the Department's rhetoric on zero tolerance to fraud and the effectiveness of its actions. The Committee recommends that, as an added deterrent against fraud, the Department should seek to introduce a system of penalties against future compensation claims, where claimants have previously been found guilty of fraud. The outcome of the Department's consideration should be provided to the Committee.	DARD has the power to withhold compensation for offences committed under the Diseases of Animals Order and has considered further the legalities of withholding compensation for subsequent claims. DARD is satisfied that to withhold any compensation which may become due to the individual because of a previous offence would contravene the European Convention on Human Rights and that individual's property rights. In addition, it is not considered legally defensible for DARD to use a previous offence to withhold future compensation which may be payable and to amend legislation to introduce such a process would open DARD to legal challenge. It would be very difficult for DARD to establish that the withholding of compensation in these circumstances was proportionate against the aim of a deterrent to commit the offence and punishment by withholding compensation. A fair balance would also have to be achieved between the greater public interest and the Individual's rights.	A new offence of deliberate infection has been introduced in the new Diseases of Animals Act which came into effect on 12 March 2010. See comments at PAC Recommendation 25.	Completed

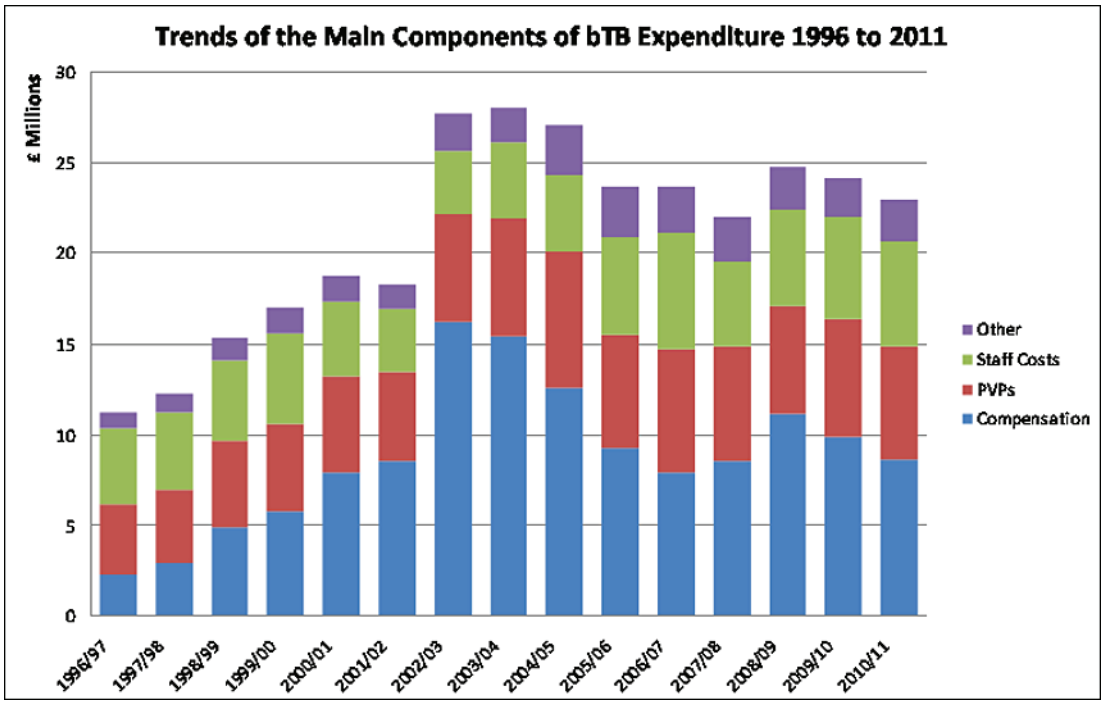
Annex D

TB Control Programme

Action	Detail
Testing	Annual testing of all herds is mandatory. TB testing is undertaken only by DARD approved Veterinary Surgeons, using the Single Intradermal Comparative Cervical Test (SICCT) for internal control. All animals slaughtered for human consumption undergo Post Mortem Examination (PME). Results are available on the Animal and Public Health Information System (APHIS) immediately. All herds in NI at all times are allocated an official tuberculosis (OT) herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). Failure to test a herd on an annual basis results in the OTF status being suspended immediately in all cases. Further delay in testing will result in automatic increased movement sanctions and downgrading the herd status to OTW. In NI, animals are allowed one skin test with an inconclusive result without compulsory removal. A non-negative result at a second consecutive test results in mandatory removal as a reactor animal. Herdkeepers may be advised to slaughter the animal at any time during this period. Contiguous tests are undertaken in herds that are in close proximity to infected herds, usually neighbouring them.
Slaughter of TB reactor animals	Confirmed TB reactors are removed by DARD subcontracted hauliers for immediate slaughter. Slaughter may occasionally include full herd depopulation if considered necessary to stop spread of the disease. In the case of total herd depopulations the following action is taken: · No animals are allowed to move into the premises for one month following the depopulation.· · A full cleansing and disinfection is required after depopulation.· · The herdkeeper is advised of the control of risk from slurry.· · Two months after re-stocking a TB test is required. If this test occurs within a year of the breakdown it is classed at a reactor (RH1) test. If the RH1 is clear the restriction is removed and then a post restriction test (CHT) is set for six months later and an Annual Herd Test set twelve months after the completion of the post-restriction test. If a farm premises is depopulated for more than 12 months then the restriction is removed at 12 months and the test following the purchase of animals is classed as an Annual Herd Test.

Action	Detail
Movement controls	All calves born after 1 January 1998 must be identified with an ear tag in each ear within 20 days from the birth of the animal. All cattle identification numbers are authorised by DARD and recorded on the Animal and Public Health Information System (APHIS) computer database so that no duplication should be possible. Movement control from all herds, at all times, is controlled by a combination of the OT herd status and status reason applicable to the herd. As all movements must be recorded on APHIS, including those to market and abattoir, immediate movement control is applied. Since the year 2000 the implementation of movement control documents require a producer to notify the Department within 7 days of an animals either leaving or arriving on his/her farm. Markets are required to notify movements on and off to the Department by the end of the next working day. However, in the case of a restricted animal the producer is required to obtain a movement licence from the Department in advance of moving the animal out of his/her herd. All movements are recorded and can be traced on APHIS. Herds with either OTS or OTW status applied are both subject to movement restrictions immediately. This is controlled through APHIS. Where a test becomes overdue, increasingly stringent movement controls are applied routinely as below: · Immediately overdue, no live moves to market, export, or other holdings. · 1 month overdue, no live moves to market, export, other holdings or slaughter. No moves in are allowed except one breeding bull on exceptional licence. All animals over 42 days are subject to the single intradermal test and interpretation within 30 days of export.
Compensation	Currently DARD pay compensation for animals testing positive for TB at 100% of the market value for the animal/animals involved. Valuations to determine market value are decided by agreement between a Department valuer and the owner of the animal, or failing agreement the owner can select and pay for an independent valuer (drawn from a DARD list) to assess the value of the animal/animals concerned. As a result of Article 11A of the Tuberculosis Control (Amendment) Order (Northern Ireland) 2005. *The Department (DARD) or the owner of the animal may submit an appeal to a tribunal of persons, appointed by the Department for the purpose, if dissatisfied with the determination of the market value of any animal –* *(a) in the case of an appeal by the Department, under Article 11(6)(b), or* *(b) in the case of an appeal by the owner, under Article 11(6)(b), (7) or (11).* DARD is currently undertaking a review of the compensation arrangements for Bovine TB and Brucellosis.

Annex E


Trends of the Main Components of bTB Expenditure 1996 to 2011
£ Millions
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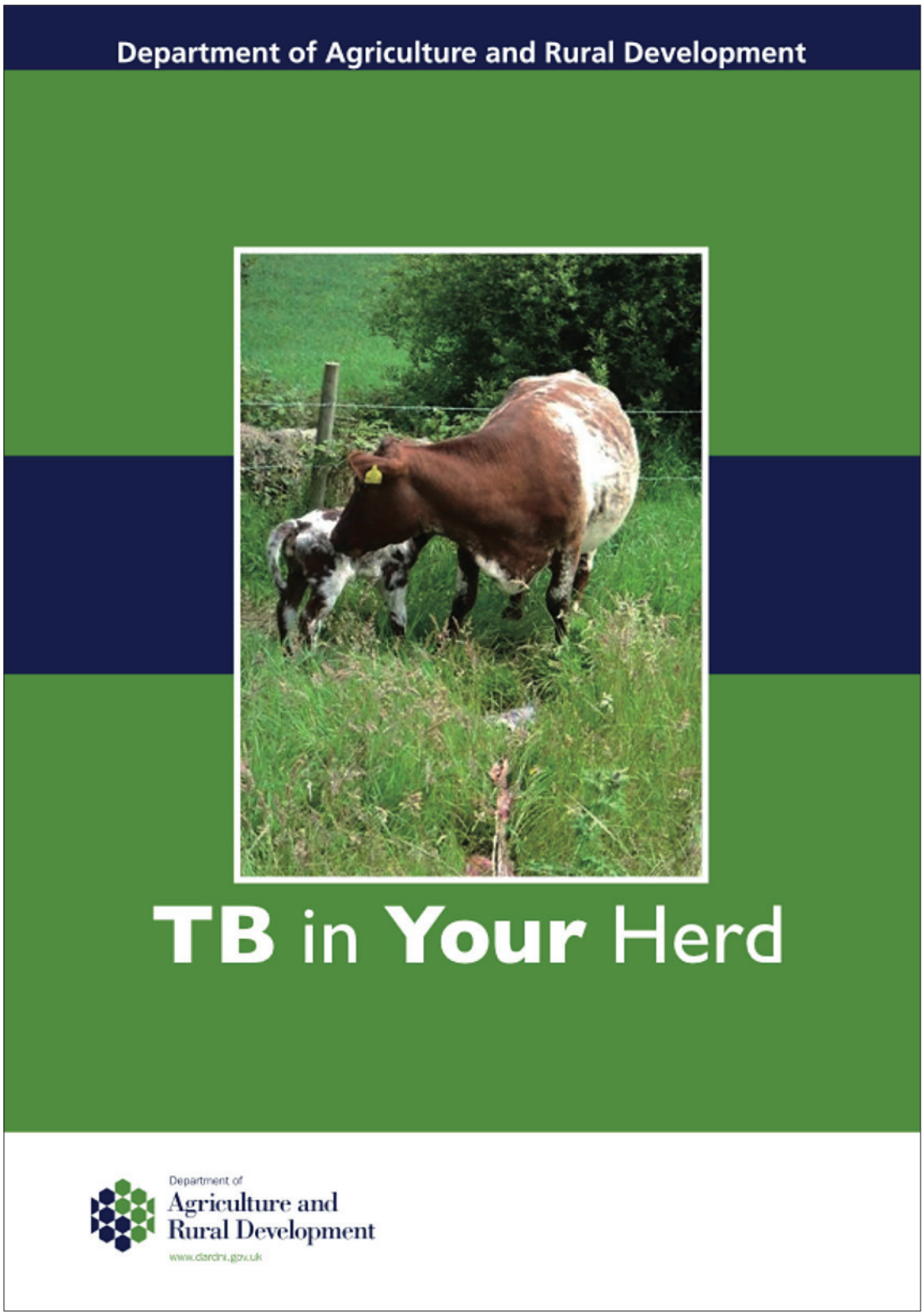
Other
Staff Costs
PVPs
Compensation

Annex F


Department of Agriculture and Rural Development
TB in Your Herd
Department of
Agriculture and
Rural Development
www.dardni.gov.uk

Index

Introduction

This booklet is for use when:

- Animals in your herd have failed the bovine TB skin test or,
- An animal from your herd was diagnosed as having bovine TB after it was slaughtered.

The information in this booklet will help answer some of your questions. Please keep it where you can find it again. However, different farms may have very different circumstances, so you should contact your local Divisional Veterinary Office (DVO) if you have any concerns or questions.

Tuberculosis

What is tuberculosis?

Bovine tuberculosis (TB) is a disease in cattle. It is caused by the bacterium Mycobacterium bovis which can also affect humans, deer, goats, pigs, dogs and cats, as well as many others mammals including badgers. It is one of a family of bacteria, which cause, amongst other diseases, Johne's disease in cattle, avian TB in birds and leprosy in humans. TB in humans can be caused by both *Mycobacterium bovis* and the human form, *Mycobacterium tuberculosis*.

How do cattle herds become infected with tuberculosis?

Cattle are known to have been infected with the bovine type of tuberculosis ever since the cause of tuberculosis was discovered. Due to TB control programmes, the level of infection in cattle has fallen overall.

Evidence of tuberculosis in cattle is most common in the throat and lungs of affected animals. This indicates that cattle mainly become infected by inhaling the bacteria which cause the disease and also means that the bacteria are passed out of the infected animal's body in its breath or in discharges from the nose or mouth.

So TB is mainly considered to be a respiratory disease. However, it may, on occasion be found elsewhere in the animal, such as the gut and the udder.

Simply put, to become infected, cattle must be exposed to a source of bacteria which cause the disease.

Cattle can be exposed in a number of ways:-

- Cattle which come into nose-to-nose contact with an infected bovine animal may breathe in the bacteria. This infected animal may, for example, have been bought into the herd, be a neighbour's animal, may be at a market or show, or may be a shared breeding bull.

  This exposure may occur:

  - at pasture or
  - where cattle are gathered together such as in winter housing. When cattle are gathered together an animal may become infected by the bacteria being carried in moisture droplets (aerosol). This moist atmosphere is commonly found in wintering sheds.
- Infected wildlife, particularly badgers and deer in this country, can also transmit the disease to cattle. However, it is not certain what proportion of herd breakdowns here are due to transmission from wildlife.

  As in the case of cattle to cattle spread, exposure is mainly thought to be by the respiratory route. This exposure may be

- at pasture or
- when wildlife has access to winter housing

- Infected cattle and wildlife can also contaminate the environment with the bacteria which cause the disease. The bacteria, whether they come from cattle or wildlife, can survive in the environment. Sometimes transmission to cattle may occur from these bacteria in the environment. This, for example, may occur when there is poor biosecurity.

  Examples of poor biosecurity are lack of cleaning and disinfection or allowing badgers access to contaminate cattle feedstuffs.

  This also means that bovine TB can be spread from farm to farm by people, animals, vehicles and farm machinery. The bacteria also survive in slurry and there is a risk of spread through this source.

If the udder is infected the milk may contain the bacteria. While TB is considered a mainly respiratory disease, it may also, on occasion, involve other body organs, such as the gut or udder. Milk from a TB infected udder may cause TB in calves fed the milk. Humans can be exposed through infected cow's milk. This was once a very significant problem but has been controlled by disease management in cattle, reducing the number of cases where udder involvement is seen, and by pasteurisation.

The Skin Test - Testing for Tuberculosis

What test is used and how accurate is it?

The tuberculin skin test is currently used throughout the world to test for tuberculosis. The tuberculin test detects the animal's defence against disease. It tells if the animal has been in contact with TB. The tuberculin test is not perfect. However, it is the best test currently available. It can be expected to detect approximately 75% of infected cattle at any one test. Herds in which reactors are found are tested a number of times in order to give the best chance of eliminating infection from the herd. It is further known that when the test is used on cattle without disease, it wrongly classifies a non-infected animal as diseased less than once in 1,000 times. Some cows may be less likely to give a positive reaction if they are close to calving.

Why was TB infection found in an animal that I sent to slaughter when my last herd test was clear?

The tuberculin test assesses the disease status of the herd on the day it is completed. Cattle in your herd may be at risk of infection and become infected after the test is completed. This may happen through cattle moving into herd, contact across fences with your neighbours' cattle, or contact with infected wildlife, e.g. badgers. Evidence of disease can then develop quickly in an animal, e.g. 3-4 weeks.

Although the tuberculin test is the best test currently available, it may occasionally miss an infected animal, which may show evidence of disease later when it is slaughtered. This is another reason why TB may be seen in an animal which was clear at its last test.

How are test results interpreted?

Interpretation of the tuberculin test has been developed over many years from experimental work in laboratories and millions of actual tests. It has been developed in many countries and here in Northern Ireland we use the results of over 10 million animal tests to allow us to set the best interpretation levels.

Using the readings obtained at the tuberculin test the veterinary surgeon performing the test classifies each animal as negative, inconclusive or as a reactor. These terms are explained later.

Where infection is confirmed in a herd, a more stringent assessment of the rest of the test results may be carried out. This is called severe interpretation. The test history of the herd and of the herds in the local area is examined. Herds from which reactors may have originated may also be checked. As a result of these investigations, the Divisional Veterinary Office may decide to classify further animals in the herd as reactors or as inconclusives.

Why are reactors not tested again to check the result?

The tuberculin test is the internationally accepted indicator of TB infection. Rules for programmes of testing are laid down in European Union directives. When reactors are found, the priority is to remove them from the herd and reduce the risk to other cattle. The tuberculin test already has an inconclusive category, which is used when it is necessary to check results.

Reactor animals – valuation and removal

What is a reactor?

A reactor animal is one that has failed the tuberculin skin test. If reactors are found in a herd, this is known as a herd TB 'breakdown'.

Do all reactors have bovine TB?

Reactions to the tuberculin test can sometimes be caused by other mycobacteria. It is impossible to find out in living animals whether the reaction is due to *Mycobacterium bovis* or another mycobacterium. We slaughter reactors and pay compensation. Although this policy may seem wasteful, it has helped us reduce the disease in cattle in this country by removing animals which might have the disease and which could spread it to other animals and to people.

Throughout the country, tuberculosis due to Mycobacterium bovis is confirmed in more than half of all herd breakdowns, as described in "*How do I find out if my animal had TB?*"

What happens when I have a reactor?

Your herd will be placed under movement restrictions and we will value and slaughter the reactors. There are more details about this process later in this booklet.

What happens to reactor animals?

Reactors will be slaughtered. You must isolate them from the rest of the herd until they are slaughtered. This will reduce the risk of them spreading bovine TB on your farm. DARD will examine the carcase to find out the extent of the infection within the animal.

What about compensation?

DARD compensates herdkeepers when the reactors are slaughtered. A DARD Valuation Officer will contact you to make an appointment to come to the farm and carry out a valuation.

The Valuation Officer will first check the identification of the reactor and may mark the animal. He will then assess the current market value of the reactor based on his knowledge and experience. You should ensure that any documentation in your possession, which is relevant to the market value of the animal, (e.g. pedigree certification or milk records or any other relevant information e.g. progeny or sibling performance) is available at time of valuation. In the case of documentation, only original, valid documents will be considered. The Valuation Officer will also ask you whether a female animal is in calf and the stage of pregnancy will be taken into consideration.

The Valuation Officer will use the information provided to arrive at the valuation amount.

The Valuation officer records his valuation figure on a Market Value of Animals form (BT29), which you must sign whether or not you accept the valuation. The valuation papers along with any pedigree certificates are forwarded to the DVO.

You may apply to the Senior Livestock Valuation Officer, Valuations Unit at Omagh DVO if you require a copy of the certificate. As compensation you will receive 100% of the agreed market value of the animal.

If you agree to the valuation made by the Valuation Officer, the DVO will contact DARD's haulier who will arrange with you for the collection of the animal as soon as possible. The reactor animal must be kept isolated, fed and watered by you until it is collected.

Do I have to accept the DARD valuation?

No. If you fail to agree a market value with DARD **within three working days** you must sign the BT29 form indicating that you have declined the DARD valuation. You then have the option to choose an Independent Valuer (IV) from an approved list, which will be provided to you by the DARD valuer. You must select and notify DARD of your choice of IV **within 2 working days** of being offered the DARD list of IVs. You must make your own arrangements for this independent valuation to be carried out. You will be responsible for any costs, fees or other expenses incurred by the IV selected by you, in carrying out this valuation. If you fail to inform DARD of your nomination within the 2 working days DARD will determine the value of the animal(s) and proceed to remove the animals for slaughter.

If you have nominated an IV within the 2 days, your chosen IV should carry out the assessment and provide both you and DARD with written confirmation of his valuation.

You must ensure that DARD receives the Independent Valuation, in writing from the IV, **within 8 working days** of your nomination.

If this does not occur, DARD will determine the value of the animal(s) and proceed to slaughter. Note that any independent valuation carried out is not final and binding, and may be appealed by either DARD or the owner of the animal(s). Should the timescales outlined in bold in this and the preceding paragraph not be complied with, it will not infringe your right to appeal the valuation. However, slaughter will proceed after Independent Valuation irrespective of whether an appeal is being made by you or DARD.

Can I appeal a valuation?

If you or DARD are dissatisfied with the determination of the market value of any animal you or DARD may submit an appeal to the TB/BR Valuation Appeals Panel, appointed by DARD for the purpose. Any appeal must be submitted in writing within 30 working days of the determination of market value to which it relates and must be accompanied by a fee of £100, full details of the grounds upon which the appeal is sought including documentary or other evidence, and the change sought to the valuation. Appeals received after the 30 days will not be accepted. The fee will be refunded if your appeal is successful. Further details on the appeals process are available in form VA2 which will be provided to all herdkeepers who do not accept a DARD valuation.

Following consideration of an appeal submitted by you or DARD, the TB/BR Valuation Appeals Panel shall determine the market value of the animal and such determination shall be final and binding on both you and DARD.

Withholding of Compensation Payment

Under Article 18(6) of the Diseases of Animals (NI) Order 1981 (as amended) the Department has discretion to withhold compensation where it is suspected that an offence may have been committed. If DARD is currently investigating irregularities noted at the time of the test on your herd, compensation may be withheld until the investigation is concluded; after which,

a decision will be taken on whether or not, or to what extent payment can be made. You will be informed by letter if compensation is to be withheld pending investigation.

Do I have to get the animal slaughtered?

DARD will arrange this for you, after the animal has been valued DARD will arrange and pay to move it to the slaughterhouse. You will receive forms requiring a declaration of any residues that may be in the animal. The completed form(s) must go with the animal to the slaughterhouse.

The haulier will obtain an MC2L – movement licence – for the reactor. Please check that the ear tag number on the BT28A/B residues declaration forms and MC2L match the number on the animal's official ear tags.

Post Mortem and Laboratory Tests

How do I find out if my animal had TB?

Animals are examined post-mortem in the abattoir for visible evidence of tuberculosis. You can find out if TBtype lesions were found to be present in the animal by contacting the Veterinary Officer dealing with your breakdown.

At the post-mortem examination we will take samples and send them to the Veterinary Sciences Division, Belfast. Staff at the laboratory will try to grow the bacteria to see if it is *Mycobacterium bovis*. The bacteria only grow very slowly and it is likely to be **at least eight weeks** before we have any results. It could take even longer. Information is available from the Veterinary Officer dealing with your breakdown.

Why do you do a post-mortem examination?

By examining the carcase we hope to find out if your animal was diseased, and if so, whether it was in the early stages of disease or whether it has reached the stage when it could pass the infection on to other animals. This helps us to give you better advice on how to reduce the risk of the disease spreading within your herd. It also helps us decide how much more testing we need to carry out in your herd and in neighbouring herds, and whether we should trace animals that you have bought or sold.

What are lesions?

The term "lesion" means the damage, injury or change in the function or structure of a part of the body caused by a disease or injury. In the case of TB, lesions are most common in the lymph nodes of the head and chest and in the lungs. They may also occur in the gut and at other sites. If lesions can be seen with the naked eye they are called "visible" lesions. Sometimes lesions may be present that are too small to be visible on the first examination.

Occasionally we find an animal that has TB lesions throughout its body and such an animal may also show signs of disease while it is still alive. Such cattle are rarely seen nowadays because of yearly testing.

Why do some reactors show no obvious signs of being diseased?

Not all TB reactors are expected to show signs of disease. This is because herds are tested at least every 12 months and disease is detected by the test before it has had time to become visible by post-mortem examination.

Commonly, the TB lesion in an animal is smaller than the size of your thumbnail and may be in a site where it can be very difficult to detect.

If no lesions are found at the post-mortem examination, does this mean that the animal was not infected with TB?

The post-mortem examination carried out at slaughterhouses is done for reasons of public health, not to confirm TB in the cattle. Inspectors examine those parts of the animal where we know that TB is most likely to occur. They have only a limited time for that examination at abattoir. More detailed examination is possible at the laboratory and TB may be confirmed if seen under the microscope or grown in the laboratory from animals where no lesions were found. We will not pay any extra money if we don't find bovine TB in your animals, as the animal has failed the skin test and is still classed as a 'reactor', by law, these animals must be slaughtered.

In Contact Animals

What about the other animals in my herd?

Usually we will only slaughter animals that have reacted to the skin test. However, if bovine TB is confirmed, we may re-examine the skin test results of the animals remaining in your herd using a more severe interpretation. This may lead to animals, which had been classified as 'inconclusive reactors' being reclassified as reactors. Also, we may feel it is necessary to slaughter other animals in the same group which have been in close contact with cattle which have had bovine tuberculosis confirmed. You will receive the full market value for these animals.

Cleansing and Disinfection

What about disinfection?

Mycobacterium bovis can survive in the environment so you will have to thoroughly clean and disinfect all places (other than fields) where you have kept reactor cattle, and all equipment and tools you have used with them. This should kill the bacterium and help prevent the disease spreading to the other cattle in your herd. You should use an approved disinfectant that has been tested for use against TB. DARD staff can provide you with a list of approved disinfectants showing the appropriate dilution rate that will kill TB.

A VO or Animal Health and Welfare Inspector will give you a notice BT33 telling you what cleansing and disinfection you should do. This will depend on your own farm's circumstances. By law, you must carry out the cleansing and disinfection set out in a BT33 notice, but you can employ contractors to do the work if you want to. You should contact the DVO as soon as possible after you have finished the cleansing and disinfection and it will be inspected.

Inconclusive Reactors

What is an inconclusive reactor?

Some animals give a reaction to the tuberculin test which is less than the reaction which would classify them as reactors but it is not a negative test result. These animals must be tested again not less than 42 days after the first test. Until the re-test is carried out, these inconclusives must be isolated from other animals in the herd to avoid any risk that infection might spread.

DARD will issue a notice (BT21) to you giving the identification number of the inconclusive reactor and requiring it to be isolated. The notice also explains that the animal may not be moved from the farm unless a licence for it to move is issued by DARD. Inconclusives will only be licensed to move directly to slaughter in a slaughterhouse in Northern Ireland.

What happens to an inconclusive reactor?

Inconclusives are re-tested and if the result is negative the restrictions on the animal are withdrawn. If the result at this first re-test is not negative, the animal will be classed as a reactor and removed from the herd. The herd is then restricted. If no signs of tuberculosis are found at post-mortem and after laboratory examination, the herd will be tested once at least 42 days after removal of the reactor and, if negative, restrictions will be withdrawn. If signs of TB are found at post-mortem, the herd may be tested immediately and will also have to wait two further tests at not less than 60 day intervals. When these negative whole herd tests have been completed and satisfactory cleansing and disinfection has been carried out, then the restrictions will be withdrawn.

Are inconclusive reactors ever slaughtered?

Occasionally, if bovine TB has been confirmed on your farm we will slaughter inconclusives where they have been in contact with infected animals. In this case, the animals will be valued and you will receive the full valuation.

Herd Movement restrictions

Why does my herd have to be restricted?

Once reactors have been found in a herd, it is necessary to minimise contact with cattle in other herds. Some of the cattle in the herd may be incubating the disease but have not yet reached the stage where they will react to the tuberculin test. Movement of any cattle from the herd is prohibited until a series of tests are carried out to ensure, as far as possible, that only disease free cattle are moved to other herds or to markets. You will be informed of a herd movement restriction on form BT25 and possibly form BT23.

You will be able to take animals direct to a slaughterhouse in Northern Ireland provided the normal cycle of risk herd tests is adhered to. Should the RHT (Restricted Herd Test) or any herd test, be delayed more than 1 month past the due by date DARD will remove the facility for any movement to and from your herd until the RHT due is completed and received at your DVO. Where an animal that is to be moved to slaughter is individually subject to restriction notices (BT21, BT23 or BT28), the animal must be accompanied by a special movement licence (MC2L), which is available from the local Divisional Veterinary Office.

Cattle in restricted herds may not be moved to other herds or to markets. In very exceptional circumstances, cattle from restricted herds may be moved to isolated premises but this will only be with the direct authority of the DVO following an investigation. If you would like clarification, you should discuss these points with your local DVO.

How long are herds restricted because of a TB breakdown?

Generally herds are restricted until 2 consecutive clear test results have been obtained. The first test of a restricted herd is carried out not less than 60 days after the removal of reactors from the herd. The next test of a restricted herd is done not less than 60 days after the first test. If both these tests are clear and cleansing and disinfection have been carried out to the satisfaction of DARD inspectors, the herd will be de-restricted.

If TB has not been confirmed in the herd, it may be possible to derestrict the herd after a single clear herd test is carried out not less than 60 days after the removal of reactors.

Animal Restrictions

Can I buy animals?

While you are under restrictions you will normally be allowed to bring animals onto the farm shown in the restriction notice (form BT25) but in certain circumstances it may be necessary to stop cattle being brought onto the farm. Should a RHT or any TB herd test be delayed more than 1 month past the due date DARD will remove the facility for any movements to and from your herd until the test due is completed and received at your DVO. We will try to reduce the economic effects of these restrictions as much as possible, provided you adhere to the testing cycle.

Can I sell animals?

You can sell animals for slaughter provided the normal schedule of risk herd tests is adhered to. Should an RHT or any herd test be delayed more than 1 month past the due by date DARD will remove the facility for any movement to or from your herd until the test due is completed and received at your DVO. If the retest cycle is being adhered to then animals must move directly from your farm to the slaughterhouse Animals that are not individually restricted may be moved to a slaughterhouse provided the herd(s) is/are complying with testing requirements and is/are accompanied by the required movement documents (MC2B and MC2C). Also, the movement must be notified to DARD by the seller on the day of movement using form MC2A.

Except in cases where herd movements are frozen individually restricted animals (e.g. inconclusives or traced animals that have been included on a BT21 notice issued to you) may be moved subject to the conditions of a licence (MC2L), which must be issued by DARD. You should contact your local DVO to obtain an MC2L licence.

Can I sell inconclusive reactors for slaughter?

If you are complying with DARD RHT testing requirements you can sell inconclusives for slaughter, but you should discuss it with your VO first. If you decide to slaughter an inconclusive you will probably need to have another herd test. Where an inconclusive is to be moved to slaughter a movement licence must be obtained from the DVO. This licence will be endorsed with instructions to the VO at the slaughterhouse indicating that a detailed post-mortem examination is required and samples are to be submitted to the laboratory.

What happens if I am unable to sell other cattle from my farm?

Movement restrictions may cause difficulties such as the need for extra housing and feed for stock that you would normally have sold, for example, stores or heifers. DARD is not empowered to pay compensation for losses which you suffer because you have to change the way you manage your farm or because your RHT or TB herd test, has gone past the due by date as described in *'Movement Restrictions'*, and the answer to *'Can I sell animals?'*. These losses may be covered under your farm insurance policy. If you believe that movement restrictions may cause animal welfare problems, you may wish to discuss with your VO.

Welfare and Emergencies

What happens in emergencies?

If an animal has to be slaughtered on your farm for welfare reasons, for example, if it is ill or has been injured, please tell us as soon as possible and always before you move the carcase in case we need to examine it. **You should never wait to contact us before arranging to have an animal slaughtered, if the delay would put the animal's welfare at risk**.

Your veterinary surgeon will need to sign a casualty slaughter form before the animal leaves your farm. If the casualty animal is a reactor the DVO will decide how to deal with it, but action must not be delayed if this would put the animal's welfare at risk.

When restrictions are removed from a herd, can animals be moved freely immediately?

Yes – as soon as restrictions have been removed **in writing**.

When a herd has undergone a series of tests and DARD considers that the infection has been eliminated, a notice is sent to the herdowner advising him that restrictions are withdrawn from the herd (form BT26).

The Testing Regime

What testing will my herd need?

Once we have confirmed that an animal from your herd has bovine TB, you must have **two clear whole-herd tests in a row**, involving every animal in the herd, before we will lift the restrictions. These herd tests must be carried out at least 60 days apart. We may apply a more severe interpretation than we apply to routine tests to make sure your herd is cleared of the infection as quickly as possible. There must always be 2 clear tests following removal of reactors when TB has been confirmed.

If bovine TB is not confirmed on post-mortem or laboratory examination, and there are only a limited number of reactors, it may be possible to remove restrictions after **only one clear herd test**.

A further test will be arranged for your herd 4 to 6 months after movement restrictions are lifted to check that no infection remains.

Should the test be delayed more than 1 month past the due by date DARD will remove the facility for any movement to and from your herd until the test due is completed and received at your DVO.

What animals need to be tested?

In general, once we have found reactors on your farm, we will need to test all your cattle, including calves less than 6 weeks old. Very occasionally we may agree not to test certain groups of animals (for example, housed barley beef bulls). If you wish us to consider this, you should discuss this with your VO before your test is carried out.

Disease Prevention and Biosecurity

What can be done to prevent another breakdown of the herd?

With TB in the country, it is impossible to guarantee that a herd will remain clear of disease. However, it is possible to reduce your risk of disease by the following:

- **Cattle Purchase**. If you must purchase cattle, try to do so directly from a known source and avoid cattle that may have been frequently moved. Take particular care about the origin of breeding cattle, as these animals may be the core of your herd for some time. If possible, isolate after purchase and ask your veterinary surgeon to carry out a tuberculin test on the animal(s). (Your veterinary surgeon will need to obtain permission from DARD to perform this test; and you will be responsible for paying his fee).
- **Bought-in beef store cattle** for finishing should be kept separately from your breeding stock.

- **Minimise contact with badgers**, fence off badger setts to prevent access by cattle. Avoid grazing fields which contain badger setts, if possible. Raise troughs and drinkers to prevent badgers getting access; prevent badger access to farm buildings, feed and feedstores (including silage pits).
- Try to **maintain good boundaries** that prevent contact between neighbouring cattle, or don't graze cattle in adjacent fields.
- **Avoid sharing equipment**, vehicles etc with other farmers.
- **Do not use slurry or manure** from other herds on your land.

Tighter Restrictions On Overdue Tuberculosis Tests.

Ensure your TB test is completed on time and your facilities allow good quality testing by your vet.

If your TB herd test is not completed by the due by date, APHIS will apply restrictions automatically, and you will be unable to move animals out of the herd except to slaughter. Animals can however still move into the herd.

If your TB herd test remains outstanding for one month past the due by date, APHIS will automatically apply full restrictions on your herd. No animals may move into your herd, except for one bull (with DARD permission). No animals may move out of the herd, except for non emergency welfare cases moving to slaughter with prior approval of DARD. Non emergency welfare cases must be accompanied by licence obtained from DARD.

If your annual TB herd test remains outstanding for 3 months beyond the original due date, the herd will require two clear tests taken at least 60 days apart (the second of which you will have to pay for) to re-establish its TB status.

If your test remains outstanding for 4 months beyond the original due date enforcement action is initiated, this may include prosecution.

Bovine TB and the risk to Human Health

What is the human health risk?

Bovine tuberculosis can affect humans but today the risks are considered to be very low due to the routine testing and slaughter of cattle and the pasteurisation of milk. Although the risk is small, we do not ignore it. Milk purchasers are informed of your restriction if you are selling milk and we tell the medical authorities if we confirm bovine TB in your herd. The medical authorities may arrange for you and your family to have a check up, but this is not always routine. If you have any worries about your or your family's health, you should explain the circumstances to your doctor.

Can I carry on selling milk?

Milk from any positive reactor may not be used for human consumption. The milk from such animals should be withheld from the bulk tank and disposed of in the farm slurry system. If you wish to spread this milk directly on the land you must apply for a waste licence exemption from the DOE. Milk from the rest of your herd, including milk from inconclusive reactors can continue to be sold

What if I sell unpasteurised milk?

You will not be allowed to continue to sell your own unpasteurised milk or unpasteurised milk products (such as cream, yoghurt, cheese and so on) for human consumption, even if bovine TB is only suspected, until your herd is shown to be free of TB.

Should we drink raw milk from the bulk tank?

DARD recommends that you should not drink unpasteurised raw milk. You will not know if you have bovine Tb in your herd unless signs are found at routine slaughter, or at a TB herd test.

Can I feed reactor milk to calves?

It is illegal, under domestic legislation in Northern Ireland to feed milk from reactor cows to calves unless it has first been sterilised.

What happens to the meat from reactors and inconclusives?

Meat inspectors will inspect the carcase at the slaughterhouse. It is rare for any problem related to bovine TB to be seen in the meat. The meat inspectors will remove any visually affected parts of the carcase and the rest of the carcase will normally pass as fit for humans to eat unless another problem is found which makes it unfit. Cattle born before 1st August 2006 do not enter the food chain and are removed by an alternative system.

Subsidies See DARD website for up to date details
http://www.dardni.gov.uk/grantsandsubsidies/gas0012.htm

Annex G

Department of Agriculture and Rural Development

Biosecurity Code
for Northern Ireland Farms

Also, guidance for official visitors to farm properties and recreational users of farmland

Department of Agriculture and Rural Development
www.dardni.gov.uk

Biosecurity Code for
Northern Ireland Farms

The following organisations participated in drawing up the Biosecurity Code:

Association of Veterinary Surgeons Practicing in Northern Ireland

Livestock and Meat Commission

Livestock Auctioneers Association (NI)

Northern Ireland Agricultural Producers Association

Northern Ireland Dairy Association

Northern Ireland Poultry Federatio

North of Ireland Veterinary Association

Ulster Farmers Union

Northern Ireland National Beef Association

Northern Ireland Meat Exporters Association

The North of Ireland Veterinary Association

Association of Veterinary Surgeons Practicing in Northern Ireland

LMC Livestock & Meat Commission

Livestock Auctioneers' Association (NI)

Northern Ireland Agricultural Producers Association

Northern Ireland Dairy Association

Northern Ireland Poultry Federation

Ulster Farmers Union

Northern Ireland National Beef Association

Northern Ireland Meat Exporters Association

Biosecurity Code for
Northern Ireland Farms

Contents

Contents

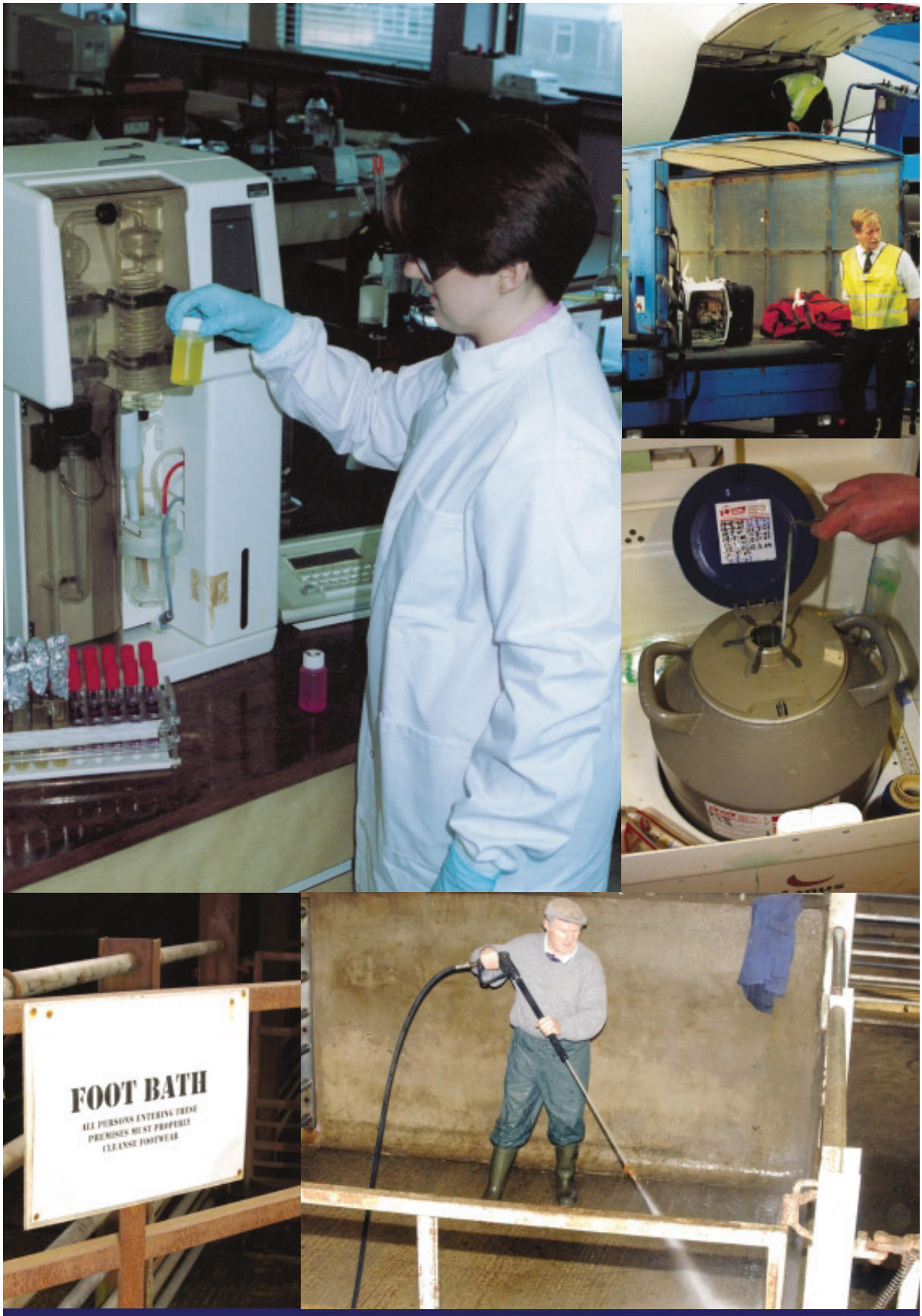
Preface

This preface is not part of the Code but is intended to explain the legal considerations upon which it is based.

The law relevant to parts of the code is the law in force on the date of publication or reprinting of the code (Please turn to back cover for this information). Any of the legal requirements quoted may be subject to change – readers should seek confirmation before assuming that these are an accurate statement of the law currently in force.

This Code covers Northern Ireland only.

Parts Three and Four are not part of the Code but are intended as guidance to official visitors to farm properties and recreational users of farmland.



Farmers and all those involved in the Agri-food industry have their part to play in Biosecurity

Part 1 Reasons for a Bioscurity Code and how disease spreads

1. *Introduction*

There is a recognised need to maintain and improve the health and welfare status of our national herds and flocks. This Biosecurity Code has been written as a means of achieving progress, with emphasis on the merits of sector-wide adoption of animal health plans.

Implementation of prudent measures suggested in this code can reduce significantly the risk of disease spreading to farms, and may also assist in reduction of existing disease.

This document is intended to provide a basic reference for the industry, but cannot address every eventuality. If in doubt always consult your Veterinary Surgeon, or your local Divisional Veterinary Office. (See Annex 2 for contact details).

2. *What is Biosecurity?*

Biosecurity is the prevention of disease causing agents entering or leaving any place where they can pose a risk to farm animals, other animals, humans, or the safety and quality of a food product. The same principles apply within the farm, preventing disease spreading between animals and groups.

The production of a healthy and wholesome product relies on every part of the agri-food industry playing its part in making sure that we receive the benefits of good biosecurity. This ranges from dealing with the threat from exotic disease by the controls at ports and airports, to the controls at feedmills, hatcheries, AI stations, dairies, abattoirs and markets, to the final barrier, "fortress farming" at the farmgate.

Part 1

Reasons for a Bioscurity Code and how disease spreads

Some of these controls are enforced by law, but many are the result of the industry's realisation of the importance of effective biosecurity to safeguard their produce.

This Biosecurity Code outlines the actions which should be taken at the farmgate and on the farm, and emphasizes how farmers and those who keep animals can minimize the risk to their stock.

Biosecurity is more than cleansing and disinfecting; it includes, for example the prudent sourcing of stock, on-farm quarantine, and testing for specific diseases, as the single most effective way of spreading animal disease is the movement of infected livestock, which may or may not be exhibiting signs of illness, onto or off the farm.

The Biosecurity requirements of pig and poultry units are similar in many respects, but because of their intensive and specialized production methods, more specific information is to be found in their Codes of Practice and Assurance Schemes. (See Annex 6 for details on how to obtain a copy).

Part 1

Reasons for a Bioscurity Code and how disease spreads

3. *What's in it for the farmer, other livestock keepers, rural dwellers, and those who enjoy the countryside?*

Benefits of a reduced animal disease incidence:

- Reduced costs of treatment/prevention of illness, including farmer's time.
- Reduced stress on animals and poultry resulting in improved animal welfare and reduced stress for animal owners.
- Reduced disruption of farming and rural businesses.
- Improved productivity and performance.
- Improved quality of marketable produce
- Reduced risk of transmission of diseases that can spread to humans, e.g. *Salmonella spp, E.coli* etc.
- Protected export markets
- Potential to improve the quality of the environment as a consequence of the reduced disposal of wastes.

The whole rural economy benefits from improved national herd and flock health, with a more efficient production system for a quality product.

Biosecurity principles should apply regardless of the size of the enterprise, from the single farm animal or horse kept as a pet, to the largest farm business.

Part 1

Reasons for a Bioscurity Code and how disease spreads

4. *Notifiable disease*

The legal classification of this group of diseases alone justifies their inclusion as a distinct group. They are classified in this way because of the potential impact on the entire industry, as seen with the recent foot and mouth outbreak, or for public health reasons.

A full list of notifiable diseases can be found in Annex 3, but at present those that are most relevant to N.I. are tuberculosis, brucellosis, BSE/Scrapie and Aujeszky's disease, and of these the incidence of tuberculosis and brucellosis remain of particular concern.

Notifiable diseases or suspicion of Notifiable diseases must be reported to the Department of Agriculture and Rural Development (see Annex 2 for contact details).

Further information on tuberculosis and brucellosis is contained in Annex 4. Leaflets dealing with tuberculosis and brucellosis can be obtained from your local Divisional Veterinary Office (listed in Annex 2).

Part 1

Reasons for a Bioscurity Code and how disease spreads

5. *How Disease is spread*

Most animal diseases are caused by infectious agents; bacteria, viruses, protozoa or parasites. These are the diseases that biosecurity measures can help to contain. Whatever the cause, the result is increased overhead costs to the industry and a reduction in animal welfare. Reduction of disease incidence, therefore, is a priority for everyone, and should not be left to chance.

Infectious animal disease can be transmitted by:

- Direct or indirect contact with infected animals, their secretions and discharges.
- Mother to offspring, including via milk and in utero infection.
- Contaminated equipment, food or water, including pasture.
- Contaminated dosing and injecting equipment.
- Breathing the same air as infected animals.
- Vermin/wildlife.
- Humans and/or their vehicles.

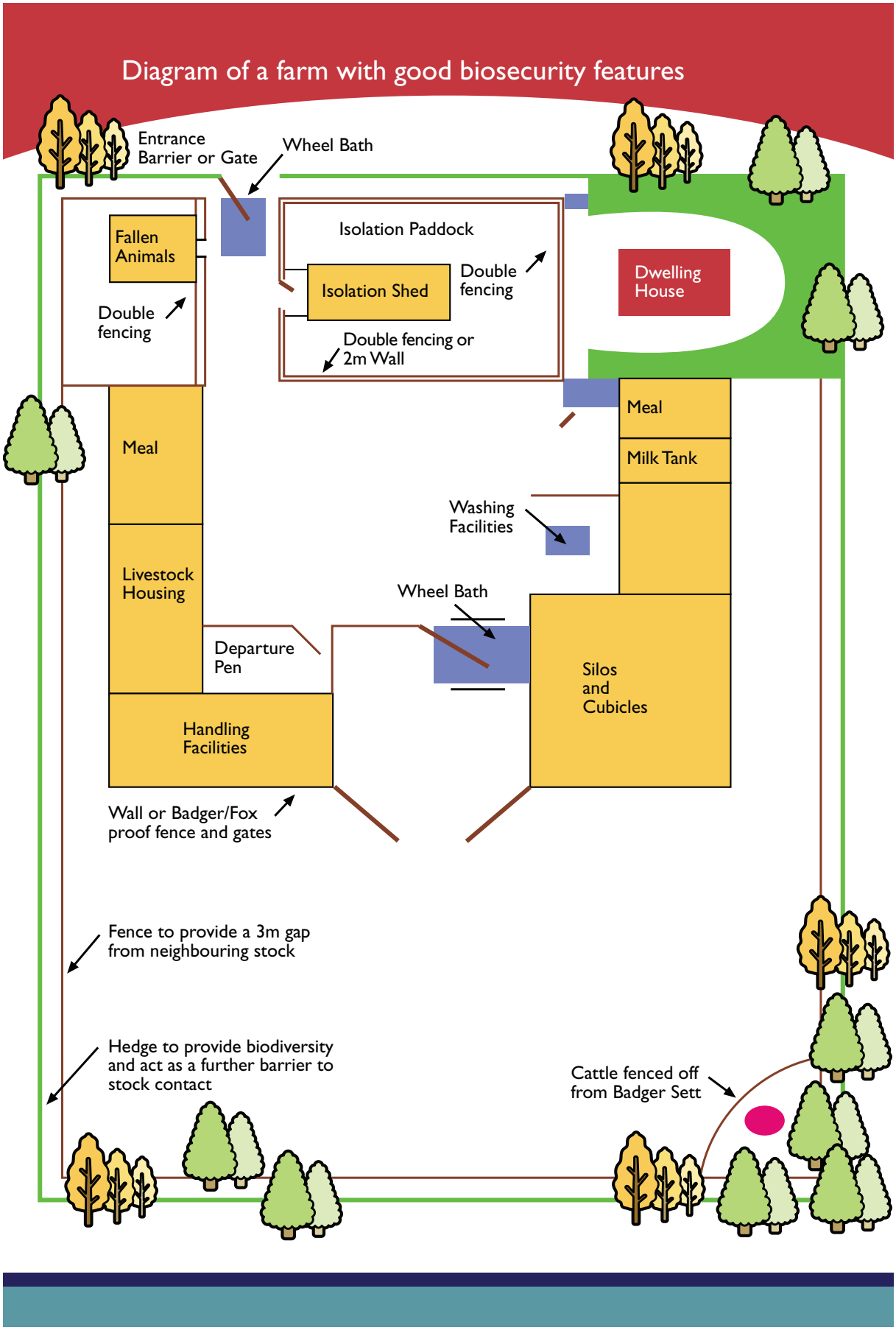


Diagram of a farm with good biosecurity features
Entrance Barrier or Gate
Wheel Bath
Fallen Animals
Double fencing
Isolation Paddock
Isolation Shed
Double fencing
Double fencing or 2m Wall
Dwelling House
Meal
Milk Tank
Meal
Washing Facilities
Livestock Housing
Wheel Bath
Departure Pen
Silos and Cubicles
Handling Facilities
Wall or Badger/Fox proof fence and gates
Fence to provide a 3m gap from neighbouring stock
Hedge to provide biodiversity and act as a further barrier to stock contact
Cattle fenced off from Badger Sett

Part 2 The part played at the farm

6. *Planning to avoid disease: the health plan*

Any disease in a herd/flock is unwelcome. Affected animals suffer welfare problems and productivity is lost. However, the existence of disease can be reduced, and the losses and suffering minimised, by careful planning. An animal health plan should be created to reduce the risk of introducing disease and to recognise, treat and control existing conditions. The prevention and control of disease should not be left to chance. Your Veterinary Surgeon will be able to advise on the biosecurity measures most appropriate for your herd/flock health plan. Such a plan should be updated annually.

Farm Assurance Schemes recognise the benefits of these health plans, and have included them in their standards.

When making changes to your farm and farm policy, and/or major changes to buildings, implement biosecurity measures to improve the health of your animals.

The provision of isolation facilities plays an important part in controlling the entry of, and spread of disease on your farm, and is part of the process in planning to avoid disease.

Hygienic farm production should be based on a process of identifying potential food safety hazards, assessing the risks of them occurring, and establishing controls at key stages to manage these risks. (Annex 1- Reference 11).

7. *Reducing risks (includes protocol for new / returning animals)*

The preventative measures outlined below should become part of your routine:

- Maintain a closed herd/flock or, if this is not feasible, only purchase from a small number of reliable sources.

Part 2 The part played at the farm

- When sourcing animals check the testing history and satisfy yourself about the disease status of the animals and the herd/flock from which they come.
- Comply carefully with the animal movement legislation. It is there to protect you. (Annex 1-Reference 1)
- Do not share bulls between herds.
- New or returning livestock should be placed in isolation for 21 days. This includes animals returning home from shows. The quarantine facility should be a house, which does not share airspace, water supply or drainage with any other animal accommodation, and is a minimum of 3 metres away from other livestock areas. A field or paddock may also satisfy these criteria. If in doubt your own Veterinary Surgeon can advise on suitability.
- Your Veterinary Surgeon can advise on the need for testing for certain specific diseases, such as infectious bovine rhinotracheitis (IBR), bovine viral diarrhoea (BVD) etc. Make sure that the Aujeszky's disease status in pigs is the same as, or better than, the status in your herd so as not to jeopardise your own herd's status. (Annex 1-Reference 1).
- Obtain information on any recent treatments or vaccinations the animals have received from the seller.
  Remember: Imported and bought-in stock may also be at risk from disease present on your farm.
- Use appropriate vaccinations, under the direction of your Veterinary Surgeon, as a tool to reduce the incidence of disease.
- Routinely treat all purchased stock for internal and external parasites. Consult your Veterinary Surgeon for the best treatment regime to avoid anthelmintic resistance in sheep.
- Maintain your stock in a good standard of health, and welfare. If any stock are not thriving ask yourself why, and seek help. Help is available from your Veterinary Surgeon, Veterinary Sciences

Part 2 The part played at the farm

Division, and locally based College of Agriculture, Food and Rural Enterprise Development Advisers, College of Agriculture, Food and Rural Enterprise (CAFRE). (See Annex 5 for contact numbers).

- Have your Veterinary Surgeon investigate disease outbreaks on your farm, and utilise the extensive resources available at Veterinary Sciences Division to help reach a diagnosis. (See Annex 5 for contact numbers).
- At the first signs of illness, isolate sick animals and burn, bury, or compost bedding after use.
- Dispose of dead animals, (which includes foetuses and afterbirth) promptly, hygienically and in accordance with the legislation (Annex 1-Reference 3). Aborted foetuses, afterbirth, and calves dying within 2 days of birth may pose special risks. For more information consult the leaflet, "Protecting you and your family from brucellosis" (See Annex 7 for details).
  Each farm should have a collection area for fallen animals, capable of being cleansed and disinfected. Site as far away from animals and as near the farm entrance as possible, so that contact with the fallen animal collection vehicle is kept to a minimum. Prevent access by animals (including vermin), children, and non-essential people. Keep fallen animals covered, or if possible, in a sealed polythene bag, or in a leak-proof covered bin or container. Cleanse and disinfect the site, equipment or containers used, after removal of the carcase.

  Remember: All abortions must be reported to your local Divisional Veterinary Office. (See Annex 2 for contact numbers).

Part 2 The part played at the farm



- Newborn animals are particularly susceptible to disease, so ensure calving/lambing/farrowing/foaling pens and incubators/hatcheries are cleaned and disinfected regularly.

  Remember: Disinfectant is ineffective if dirt is present so cleaning must first be carried out thoroughly, and disinfectant must be used at the correct strength. Always follow the manufacturer's instructions for use. A list of approved disinfectants can be obtained from your local Divisional Veterinary Office. (see Annex 2 for contact numbers).

- Avoid nose to nose contact with neighbouring stock.
- Farm boundaries should be secure, and be checked regularly. There should be at least a 3-metre gap between neighbouring livestock. (This can incorporate a thick hedge, a useful physical barrier, as well as increasing farm biodiversity).
- Where possible, and especially with young animals, (calves, pigs and poultry), an "all in, all out" policy should be adopted.

Part 2 The part played at the farm

- Overwintering cattle in accommodation shared with other herdkeepers is a high risk and should be avoided. If not possible, then make enquiries about the health status of the in-contact animals.

  Comply fully with rules on movement notifications and movement licenses, as it is vital that all in-contacts can be traced in the event of a disease outbreak. (Annex 1-Reference 1)

  Isolate these animals for 21 days, before reintroducing to your other livestock.

- Similarly where common grazing is used, livestock should be isolated for 21 days upon return.

Keep your stock separate from your neighbours' stock

Part 2 The part played at the farm

8. *Vehicles*

- Avoid unnecessary contact between vehicles and livestock.
- Thoroughly clean and disinfect all vehicles if they have had contact with livestock from other premises.
- Livestock must only be transported in vehicles that have been cleansed and disinfected. These vehicles must be cleaned and disinfected after transporting livestock. (Annex 1-Reference 4).
- Avoid sharing trailers and other machinery. If hauliers or contractors must be used, inspect for cleanliness and disinfection.

Biosecurity starts at the entrance

Part 2 The part played at the farm

9. *Buildings and Equipment*

- Clean and disinfect buildings after use by livestock. The risk of disease is greatest around calving/ lambing/farrowing/ foaling/hatching, and in young animals, so pay greatest attention to calving/ lambing/farrowing/foaling pens, hatchery and rearing accommodation.

Clean and disinfect buildings regularly

- Clean and disinfect all shared and hired equipment before and after use. There is a particular risk where equipment comes in close contact with the animals such as shearing/clipping, hoof trimming equipment, and ultrasound scanners for pregnancy diagnosis.

Part 2 The part played at the farm

10. People

- Practise good personal hygiene. Wash hands thoroughly after close contact with farm animals. Provide permanent facilities for hand washing.
- Adopt a routine of wearing clean protective clothing and footwear for use solely on your premises. Wash and disinfect regularly.
- Never wear work clothes to the market or other places where farmers and animals are present.
- Ask all business callers to make an appointment, and reduce the number of visitors to your farmyard. Display notices directing visitors to the farmhouse or office. Do not let visitors come into contact with animals, animal housing, or feedstuffs unless it is necessary.
- Provide a washing area, brush, water and disinfectant or equivalent facilities for all visitors/workers on arrival and departure.
- Staff and visitors should be made aware of the need for hygiene and disease security.

Remember: Some animal diseases can infect people. (See Annex 7 for details of the leaflets "Protecting you and your family from brucellosis" and "Common Zoonoses in Agriculture").

Clean and disinfect protective clothing regularly

Make sure boots are cleaned and disinfected

Part 2 The part played at the farm

11. Animal medicines

- Use only clean dosing equipment and sterile injection equipment, and do not share.
- Record use of veterinary medicines in accordance with the regulations. (Annex 1-Reference 5).
- Use medicines in accordance with the manufacturer's instructions. (Annex 1-Reference 5).
- Source all veterinary medicines from legitimate suppliers only. This ensures that only authorised medicines are used and helps ensure that they are used appropriately. Inappropriate usage can lead to the masking of disease problems, or reduced efficacy of the medicine, and could result in prosecution and financial loss due to rejection of the carcass or produce.
(Annex 1-Reference 5).

12. Slurry and Manure

Pathogens can survive in slurry and manure and it is sensible to exercise caution in handling and applying livestock wastes. (Annex 1-References 8,9 & 10)

Special care must be taken to ensure that all manures, slurry, and litters are free from carcases, parts of carcases, aborted foetuses and foetal afterbirths. (Annex 1-Reference 3 & Reference 9)

To minimise the risk: -

- Spread on cultivated land rather than grass for conservation, and avoid spreading on land for grazing if you can. If this becomes necessary, allow a 6 week gap between spreading and access by livestock. (For poultry litter, see below).

Part 2 The part played at the farm

- Ensure that aborted materials are not spread in slurry or manure.
- Do not spray slurry up into the air, creating aerosols, which can transmit infections, but use an inverted spreading plate, or preferably spread by injection.
- Avoid using hired/shared spreaders if possible, but if you must, thoroughly cleanse and disinfect before and after use.

Special care must be taken in relation to the disposal of poultry litter due to the risk to cattle from botulism. (Botulism in cattle has not been associated with poultry manure eg from laying hens) (See Annex 7 for details of the leaflet "Botulism in cattle").

- Poultry litter should not be spread on land for grazing or conservation and cattle should not have access until at least the following grazing season. This also applies to other materials and water contaminated with poultry litter.

Further information is contained in the *Code of Good Agricultural Practice for the Prevention of Pollution of Water*, and the *Code of Good Agricultural Practice for the Prevention of Pollution of Soil and Air.* Information and advice can be obtained from Countryside Management Branch (see Annex 5 for contact details), and copies can be obtained from the DARD Internet site www.dardni.gov.uk/core/dard0444.htm.

Avoid aerosols when spraying slurry

Part 2 The part played at the farm

The spreading of sewage sludge onto agricultural land is controlled by The Sludge (Use in Agriculture) Regulations (NI) 1990 which is enforced by the Department of the Environment (see Annex 5 for contact details). This legislation aims to protect human and animal health and to maintain soil fertility and crop yields.

13. Records and traceability

- There are legal requirements for the registration of all livestock premises, for animal identification, and for the keeping of breeding and movement records. Rapid traceability is important for effective disease control. (Annex1-Reference 1)
  Registration and record-keeping requirements will be increased under the forthcoming EU Feed and Food Hygiene Regulations. (Annex 1- Reference 11)
- Keepers of cattle, sheep, pigs, goats, poultry and farmed deer must be registered and their animals identified in accordance with the law (Annex 1-Reference 1).
- Vehicles and people can spread disease. Records of visitors and deliveries would greatly assist veterinary investigations into notifiable disease outbreaks.

14. Wildlife

Wild animals and birds can spread disease. To reduce this risk:

- Keep your farmyard and surroundings clean and tidy.
- Have an active vermin control policy.
- Discourage access to food, farm buildings and poultry litter.
- Avoid grazing fields which contain badger setts, if possible.
- Fence off badger setts to prevent access by cattle.
- Raise troughs and drinkers off the ground to minimise access by badgers.

Keep vermin under control

Part 2 The part played at the farm

15. Feed and Water

Compound feed should not be used for species other than those for which it is intended.

To reduce the risk of disease spread:

- Keep feed in a clean, dry store secure from wildlife, dogs and cats.
- Dispose of waste feed effectively and safely by incineration, burial or composting.
- Discourage vermin by disposing of waste feed, and operating vermin control.
- Clean feed and water troughs regularly.
- Use mains water (or bore hole water which satisfies similar microbiological standards) wherever possible.
- Fence off watercourses and stagnant ponds.

Raise troughs and reduce contamination

Part 2 The part played at the farm

- Raise troughs, drinkers and mineral blocks off the ground to avoid faecal contamination.
- The feeding of swill (catering waste which contains meat, meat products, or products that have been in contact with meat), is banned (Annex 1- Reference 6).

16. Dogs and Cats

Regularly treat dogs and cats for roundworms and tapeworms, particularly newly acquired animals, before they have access to pasture. Cat, particularly kitten, faeces may contain Toxoplasma oocysts, which can lead to abortion in sheep (and in women), so cats should not be allowed into feedstores. It is advisable to neuter cats to reduce the number of kittens on the farm.

Dogs and cats should not be fed household scraps as foot and mouth outbreaks have been attributed to improper disposal of waste meat products.

*Man's best friend -
be aware of the disease risks*

Be aware of the disease risks


WARNING
DISEASE RESTRICTIONS
IN OPERATION
DO NOT ENTER
LIVESTOCK UNITS
Drive slowly
Farmyard

Part 3 Advice for official visitors to farm properties

Being aware of the risk of spread of animal disease by visitors to farm premises, the farmer is justified in asking for the cooperation of anyone entering the farm. To help the industry combat the transmission of animal disease, the farmer should respectfully request the adherence to certain rules.

- Business visitors and contractors should contact the farmer first to arrange the visit. Official visits for enforcement or investigation purposes may require an unannounced visit, and where this is necessary, the visiting officers will comply with the car parking and cleansing and disinfection requirements of the Code.
- Visitors should advise the farmer if they have previously been on other livestock premises that day.
- Visitors are asked to park sensibly in an area, which avoids potential contact with farm livestock.
- All visitors should ensure that they make use of cleansing and disinfection facilities provided for footwear, that their clothing is clean, and they wear protective clothing where necessary.
- Agricultural contractors should ensure that all vehicles, machinery and equipment have been cleaned and disinfected before going onto and before leaving the farm.
- Visitors should follow biosecurity advice given by the farmer.


PLEASE
Use the stile and leave gate closed
Keep dogs on lead
Leave no litter
Thank you

Part 4 Advice for recreational users of farmland

Walkers, cyclists, horse-riders and other countryside users, are requested to follow the advice below.

- Never feed animals or leave food lying around.
- Take all litter with you. Keep the countryside tidy.
- Ensure gates are left as they are found.
- Avoid contact with farm animals.
- Particular risks to people such as *E.coli.* can arise when people picnic or camp in fields that are being, or have recently been, used for grazing.
- Keep dogs under control.
- Respect any official signposting in the event of a disease outbreak.
- Use disinfectant footpads or baths where provided, particularly in the event of a disease outbreak.
- Follow biosecurity advice given by the farmer.

Biosecurity is for everyone who keeps animals or poultry

Annex 1 Legislation

The following statutes relate to reference numbers appearing in the code.

Reference 1: The identification, registration and movement of animals, and the registration of herds and flocks is covered by:

Cattle

Cattle Identification (No.2) Regulations (Northern Ireland) 1998 S.R.1998 No.279 (amended by S.R.1999 No.324)

Cattle Identification (Notification of Births, Deaths and Movements) Regulations (NI) 1999 S.R. 1999 No. 265

Cattle Identification (Enforcement) Regulations (NI) 1998 S.R. 1998 No.27

Cattle Passport Regulations (NI) 1999 S.R 1999 No.324

Pigs

Aujeszky's Disease Order (Northern Ireland) 1994 S.R. 1994 No. 198

Aujeszky's Disease (Scheme) Order (Northern Ireland) 1994 S.R. 1994 No. 199

Sheep / Goats

Identification and Movement of Sheep and Goats Order (NI) 1997 S.R.1997 No. 173 (as amended by S.R. 1998 No. 393.)

Poultry

Poultry Breeding Flocks and Hatcheries Scheme Order (Northern Ireland) 1994 S.R 1994 No. 118 (as amended by S.R.2000 No. 110).

Diseases of Poultry Order (NI) 1995 S.R. 1995 No. 465 (as amended by S.R.2003 No. 401)

Diseases of Poultry Scheme Order (NI) 1995 S.R. 1995 No. 464

Annex 1 Legislation

Reference 2: The keeping of records is covered by the:

Animal Records Order (Northern Ireland) 1997 S.R.1997 No. 172 (as amended by S.R. 1998 No. 27 and S.R. 2000 No. 344)

Reference 3: The disposal of fallen animals, foetuses and afterbirths, and animal by-products is covered by:

The EU Animal By-Products Regulation (EC) No 1774/2002 and the Animal By-Products Regulations (NI) 2003. S.R. 2003 No.495

Reference 4: The transport of animals and disinfection of vehicles used in animal transport is covered by:

The Welfare of Animals (Transport) Order (Northern Ireland) 1998

Transport of Animals and Poultry (Cleansing and Disinfection) No. 2 Order (Northern Ireland) 1997 S.R. 1997 No 466

Reference 5: The use of, and record keeping relating to, animal medicines is covered by:

The Medicines (Restrictions on the Administration of Veterinary Medicinal Products) Regulations 1994 S.I. 1994 No. 2987 (as amended by S. I. 1997 No.2884).

The Animals and Animal Products (Examination for Residues and Maximum Residue Limits) Regulations (Northern Ireland) 1998 S.R. 1998 No. 237 (currently under review).

Reference 6: The swill feeding ban is covered by the:

The Animal By-Products Regulations (NI) 2003. S.R. 2003 No.495

Annex 1 Legislation

Reference 7: The welfare of animals is covered by the:

The Welfare of Animals Act (Northern Ireland) 1972.

The Welfare of Farmed Animals Regulations (Northern Ireland) 2000 S.R. 2000 No. 270 (as amended by S.R. 2002 No. 259).

Reference 8: The legislation for the control of tuberculosis is:

The Tuberculosis Control Order (NI) 1999 No. 263

The Tuberculosis (Examination and Testing) Scheme Order 1999 No.264.

Reference 9: The legislation for the control of brucellosis is:

The Brucellosis Control Order (NI) 1972 No. 94. This Order is under review and new legislation is due to be introduced in June 2004.

For more information on any of the above, please contact your local Divisional Veterinary Office. (See Annex 2 for contact details).

Reference 10: The legislation dealing with the prevention of pollution caused by the spreading of slurry and manure is enforced by these organisations and listed below:

1. **These regulations are enforced by District Councils.**
   The Public Health (Ireland) Act 1878
   The Clean Air (Northern Ireland) Order 1981
   Pollution Prevention and Control Regulation (NI) 2003 -

Annex 1 Legislation

2. These regulations are enforced by the DOE.

The Sludge (use in Agriculture) Regulations (NI) 1990

The Water (Northern Ireland) Order 1999

The Groundwater Regulations (Northern Ireland) 1998

Council Directive 91/676/EEC concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources

Action Programme for Nitrate Vulnerable Zones (Northern Ireland) 1999

The Waste Collection and Disposal Regulations (Northern Ireland) 1992 as amended by the Waste Collection and Disposal (Amendment) Regulations (Northern Ireland) 1997

The Water Framework Directive (2000/60/EC)

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (Northern Ireland) 2003

3. This regulation is enforced by the Health and Safety Executive

The Food and Environmental Protection Act 1985 Chapter 48,Part III

Reference 11: The proposed EU legislation on Feed and Food Hygiene has a provisional implementation date of 01/01/2006. Consultations on these are ongoing with the industry.

For more information please contact the Food Standards Agency (NI). (See Annex 5 for contact details).

Copies of the legislation may be obtained from The Stationery Office. (See Annex 5 for contact details).

Annex 2 Veterinary Service contact numbers

Divisional Veterinary Offices (DVOs)

ARMAGH	LARNE
Mall West ARMAGH BT61 7JN **TEL**: 028 3752 9900 **FAX**: 028 3752 9911	Crown Buildings Pound Street LARNE, BT40 1SH **TEL**: 028 2826 3222 **FAX**: 028 2826 3220
BALLYMENA	**LONDONDERRY**
Kilpatrick House 38-54 High Street BALLYMENA BT43 6DP **TEL**: 028 2566 2862 **FAX**: 028 2566 2853	Crown Buildings Asylum Road LONDONDERRY BT48 7EB **TEL**: 028 7131 9592 **FAX**: 028 7137 2489
COLERAINE	**NEWRY**
Crown Buildings Artillery Road COLERAINE BT52 2AJ **TEL**: 028 7034 1111 **FAX**: 028 7034 1135	Glenree House Unit 2 Springhill Road Carnbane Industrial Estate NEWRY, BT35 6EF **TEL**: 028 3025 3200 **FAX**: 028 3025 3222
DUNGANNON	**NEWTOWNARDS**
Crown Buildings Thomas Street DUNGANNON BT70 1HR **TEL**: 028 8775 4777 **FAX**: 028 8775 4888	9 Robert Street NEWTOWNARDS BT23 4DN **TEL**: 028 9182 5825 **FAX**: 028 9181 3870
ENNISKILLEN	**OMAGH**
Inishkeen House Killyhevlin ENNISKILLEN BT74 4EJ **TEL**: 028 6632 5004 **FAX**: 028 6634 3043	Sperrin House Sedan Avenue OMAGH BT79 7AQ **TEL**: 028 8225 1020 **FAX**: 028 8225 3400

Annex 2 Veterinary Service contact numbers

2. *REPORTING NOTIFIABLE DISEASE AND WELFARE PROBLEMS:*

Notifiable diseases or suspicion of a notifiable disease must be reported to the Divisional Veterinary Office.

During working hours, Monday to Friday 9-5, please contact the local Divisional Veterinary Office

For Out of Hours contact to report suspect epizootic disease (e.g. Swine Fever, Foot and Mouth Disease, Newcastle disease), please contact the Hotline.

Hotline: (028) 9052 5596

To report common Notifiable Disease suspects (e.g. Anthrax, BSE) and Welfare problems during weekends and public holidays, please contact the duty VO for the Divisional Veterinary office area.

Armagh	Tel: 0776 4204 400
Ballymena	Tel: 0776 4204 403
Coleraine	Tel: 0776 4204 413
Dungannon	Tel: 0776 4204 421
Enniskillen	Tel: 0776 4204 422
Larne	Tel: 0776 4204 423
Londonderry	Tel: 0776 4204 425
Newry	Tel: 0776 4204 426
Newtownards	Tel: 0776 4204 427
Omagh	Tel: 0776 4204 429

Advice and assistance is also available from the Veterinary Service Headquarters: Tel: (028) 9052 4556
Fax: (028) 9052 5012

Annex 3 Notifiable Disease

At the first sign or suspicion of a notifiable disease, the local Divisional Veterinary Office must be notified. (See Annex 2 for contact number) Some of the notifiable diseases are **exotic** and occur rarely in NI. These include the major epizootic diseases such as foot and mouth disease, swine fever, and Newcastle Disease, and whose presence or suspicion must be notified immediately to the Divisional Veterinary Office or to the "out of hours" hotline (see Annex 2 for the contact number).
Some notifiable diseases are **present** in N.I. and these include TB, BR, Aujeszky's disease, and BSE. These must also be notified to the Divisional Veterinary Office.

Annex 3 Notifiable Disease

2. *LIST OF NOTIFIABLE DISEASES AND THE YEAR OF LAST OCCURRENCE IN NORTHERN IRELAND*

Notifiable Diseases	Species	Last Occurrence
African horse sickness	Horses	Never
African Swine Fever	Pigs	Never
Anthrax	Cattle and other mammals	1990
Aujeszky's disease	Pigs & other mammals	Present
Blue tongue	Sheep & goats	Never
Bovine spongiform encephalopathy	Cattle	Present
Bovine tuberculosis	Cattle, sheep and deer	Present
Brucellosis (Brucella abortus)	Cattle	Present
Brucellosis (Brucella melitensis)	Sheep & goats	Never
Caseous lymphadenitis	Sheep	Present
Classical Swine fever	Pigs	1958
Contagious agalactia	Sheep & goats	Never
Contagious equine metritis	Horses	1984
Contagious pleuro-pneumonia (otherwise known as Pleuro -pneumonia)	Cattle	1893
Dourine	Horses	Never
Enzootic Bovine leucosis	Cattle	Never
Epizootic haemorrhagic disease	Deer	Never
Epizootic lymphangitis	Horses	Never

Annex 3 Notifiable Disease

Notifiable Diseases	Species	Last Occurrence
Equine encephalomyelitis	Horses	Never
Equine viral arteritis	Horses	1995
Foot and Mouth disease	Cattle, sheep, pigs and other cloven hoofed animals	2001
Glanders	Horses	1910
Goat pox	Goats	1850
Infectious bovine rhinotracheitis	Cattle	Present
Infectious equine anaemia	Horses	Never
Influenza A infection	Horses	1998
Jaagsiekte complex	Sheep & goats	Present
Johne's Disease	Cattle, sheep & goats	Present
Lumpy skin disease	Cattle	Never
Peste des petits ruminants	Sheep & goats	Never
Porcine reproductive and respiratory syndrome (PRRS) (Blue-eared pig disease)	Pigs	Present
Porcine respiratory corona virus	Pigs	Never
Rabies	Dogs & other mammals	1923
Rift valley fever	Cattle, sheep & goats	Never
Rinderpest (otherwise known as cattle plague)	Cattle	1900
Scrapie	Sheep & goats	Present

Annex 3 Notifiable Disease

Notifiable Diseases	Species Occurrence	Last
Sheep pox	Sheep	1850
Sheep scab	Sheep	Present
Spongiform encephalopathy	Species other than cattle, sheep & goats. Only lab findings are notifiable	
Swine vesicular disease	Pigs	Never
Teschen disease	Pigs	Never
Transmissible gastro-enteritis	Pigs	Never
Trichinosis	Pigs	1979
Vesicular exanthema	Pigs	Never
Vesicular stomatitis	Cattle, pigs & horses	Never
Visna-Maedi complex	Sheep	1984
Warble fly infestation	Cattle, Deer & Horses	1996
DISEASES OF POULTRY		
Arizona disease	Poultry	Never
Avian Infectious laryngo-tracheitis	Poultry	Present
Avian influenza	Poultry	Never
Duck plague (herpes virus infection)	Poultry	Never
Duck septicaemia (anatipestifer infection)	Poultry	Never
Duck viral hepatitis	Poultry	Never
Fowl pox	Poultry	1964
Goose hepatitis	Geese	Never

Annex 3 Notifiable Disease

Notifiable Diseases	**Species Occurrence**	**Last**
Newcastle disease	Poultry	1997
Ornithosis (including psittacosis)	Poultry	Present
Paramyxovirus 1 infection in pigeons	Pigeons	Present
Spongiform encephalopathy (lab findings only)	Only lab findings are notifiable	Never

Annex 4 Further Information on TB and BR

(Annex 1- References 1, 3, 7, & 8)

TB and BR are two notifiable diseases of cattle that are present in Northern Ireland, which have a major impact on cattle farming, and which can also infect humans.

All herdkeepers **MUST**:

- treat all cattle abortions and retained placentas (retained for more than 24 hours) as possible BR infection, and report them to the local Divisional Veterinary Office.
- immediately isolate the animal until it has been tested and the Department of Agriculture and Rural Development has confirmed the result as negative for BR.
- dispose of foetus, and afterbirth hygienically and in accordance with the legislation. (Annex 1- Reference 3).
- ensure the welfare of the animal.
- **AT ALL TIMES,** obey animal movement regulations. They are there to protect you. Obey any restrictions on animal movements that are in place. Ensure all animals are identified in accordance with legal requirements, and records of breeding and movement are up to date at all times. Rapid traceability is important for effective disease control for both TB and BR, and also for other diseases.
- co-operate with scheduling of all TB and BR tests, as an aid to early detection and elimination of reactor animals so reducing the potential for spread within the herd. Failure to present animals for testing when required is an offence.

Annex 4 Further Information on TB and BR

(Annex 1- References 1, 3, 7, & 8)

- isolate reactor(s) and inconclusive animal(s) and animals reported to you as high risk, as required to do so by notice.
- not use milk from animals infected with BR for animal feeding unless it has been treated in accordance with a notice issued by the Department.
- not use milk from an animal, including non-bovines, which is infected or suspected of being infected (includes an inconclusive) with TB, for animal feeding unless it has been sterilized.
- maintain the fences dividing your premises from adjoining land in such condition as to prevent contact of your herd with neighbouring cattle and to prevent your herd from straying from your premises. This should be achieved with at least a 3-metre gap between neighbouring livestock.
- carry out pre-movement testing for BR (when the new BR Order is made). Until then, herdkeepers are strongly advised to carry out pre-movement testing.

Preventative measures should become part of your routine.

In addition all cattle owners **SHOULD**:

- maintain a closed herd, or where not possible, only purchase from a small number of reliable sources. Ask, WHEN WAS THE HERD LAST TESTED CLEAR FOR TB AND BR?

Annex 4 Further Information on TB and BR

(Annex 1- References 1, 3, 7, & 8)

- use pre-movement testing for TB (requires the Divisional Veterinary Officer's permission. See Annex 2 for contact numbers).
- isolate any purchased breeding cattle, arrange a BR blood test (with your Veterinary Surgeon) and do not release the cattle from isolation until the test is clear. Bear in mind, however, that the reproductive status of the animal may affect the results of the test.
- fence off badger setts to prevent access by cattle. Avoid grazing fields which contain badger setts, if possible. Raise troughs and drinkers to prevent badgers getting access; prevent badger access to farm buildings, feed and feedstores (including silage pits).
- provide pasteurised milk for their own and their families' consumption, as both TB and BR can cause human disease, and have been transmitted via unpasteurised milk.

For more information on any of the above, please contact your local Divisional Veterinary Office, (See Annex 2 for contact numbers).

Annex 5 Useful Contact Numbers

Veterinary Sciences Division
Veterinary Laboratories — Belfast Tel: (028) 9052 5621
Omagh Tel: (028) 8224 3337

Animal Disease Control Division,
Dundonald House, Belfast BT4 3SB — Tel: 028 9052 4650

Countryside Management Branch
Annex D, Dundonald House, Belfast BT4 3SB — Tel: (028) 9052 0922, Fax: (028) 9052 0924

Department Of the Environment
Environment and Heritage Service, Calvert House, Belfast BT1 1FY — Tel: (028) 9025 4754, Fax: (028) 9025 4700

HSENI
The Health and Safety Executive For NI, 83 Ladas Drive, Belfast BT6 9FR — Tel: (028) 9024 3249, Fax: (028) 9023 5383

HSE Books
PO Box 1999, Sudbury, Suffolk CO10 2WA — Tel: 01787 881165, Fax: 01787 313995

The Stationery Office
16 Arthur St., Belfast BT1 4GD — Tel: (028) 9023 8451
E-mail: Customer.services@tso.co.uk
Internet: www.tso.co.uk

Food Standards Agency (NI)
10C Clarendon Rd, Belfast BT1 3BG — Tel: (028) 9041 7700, Fax: (028) 9041 7726
Internet: www.foodstandards.gov.uk

Food Standards Agency Publications — Tel: 0845 6060 667, Fax: 020 8867 3225

Annex 5 Useful Contact Numbers

Service Delivery Group
College of Agriculture, Food and Rural Enterprise (CAFRE)
Greenmount Campus
Antrim BT41 4PU
Tel: (028) 9442 6772
Fax: (028) 9442 6777

Agriculture Development Centre Phone / Fax Number	Agriculture Development Centre Phone / Fax Number
Omagh ADC Sperrin House, Sedan Avenue Omagh, BT79 7AQ Tel: 8225 1020 Fax: 8225 3500	Downpatrick ADC Rathkeltair House Market Street, BT30 6LZ Tel: 4461 2211 Fax: 4461 8226
Magherafelt ADC 31 Station Road Magherafelt, BT44 5DN Tel: 7930 2112 Fax: 7930 2067	Ballymoney ADC Crown Buildings, John Street Ballymoney, BT53 6DS Tel: 2766 0160 Fax: 2766 0103
Newtownards ADC 2b Portaferry Road Newtownards, BT23 3NT Tel: 9181 3570 Fax: 9182 2106	Ballymena ADC Kilpatrick House, 38-54 High Street Ballymena, BT43 6DT Tel: 2566 2800 Fax: 2566 2838
Greenmount Campus 22 Greenmount Road Antrim, BT42 4PU Tel: 9442 6666 Fax: 9442 6606	Limavady ADC 4-6 Killane Road Limavady, BT49 0DS Tel: 7776 2521 Fax: 7776 8075

Annex 5 Useful Contact Numbers

Agriculture Development Centre Phone / Fax Number	Agriculture Development Centre Phone / Fax Number
Enniskillen ADC Inishkeen House Killyhevlin, BT74 4EJ Tel: 6632 5004 Fax: 6634 3000 Fax: 6632 4753	Dungannon ADC Crown Buildings, Thomas Street Dungannon, BT70 1HR Tel: 8775 4777 Fax: 8775 4888
Loughry Campus Cookstown, BT80 9AA Tel: 8676 8100 Fax: 8676 1043	Enniskillen Campus Levaghy Enniskillen, BT74 4GF Tel: 6634 4800 Fax: 6634 4888
Newry ADC 1 Cecil Street Newry, BT35 6AH Tel: 30253310 Fax: 30253311	Ballyclare ADC 18 The Square Ballyclare, BT39 9BB Tel: 9332 2399 Fax: 9335 4218
Armagh ADC 2 Newry Road Armagh, BT60 1EN Tel: 3751 5659 Fax: 3751 5611	

Annex 6

Biosecurity in the Pig and Poultry Industry

1. *General points:*

(a) The presence of any large group of animals such as pigs or poultry, in intensive conditions, provides a large pool of susceptible animals. It is critical that diligence is exercised when such a unit is present on a farm, especially when the unit is part of a wider mixed farming operation. Pigs and poultry are susceptible to several important infections that can be transferred to humans. These include *Salmonella spp.* and in the case of poultry, *Campylobacter spp.*

(b) The codes and assurance schemes provide specific advice which covers the importance of:

i. Careful cleansing and disinfection of units before stocking and re-stocking.

ii. Separation of the unit from other farm activity.

iii. Rigorous hygiene measures when entering and leaving the unit (eg. separate clothing and footwear).

iv. The need to ensure that all inputs such as feed, water and bedding are safe.

2. *Codes of Practice and Assurance Schemes in the Poultry Industry*

i. **Code of Practice** for the control of Salmonella in commercial egg laying flocks*.

ii. **Draft Code of Practice** for the control of Salmonellae in commercial broilers*.

iii. Northern Ireland Poultry Health Assurance Scheme*.

iv. Assured Chicken Production Quality assurance scheme#

Annex 6

Biosecurity in the Pig and Poultry Industry

3. Codes of Practice and Assurance Schemes in the Pig Industry:

i. **Code of Practice** for the Prevention and Control of Salmonella in Pig Farms*.

ii. Assured British Pigs Quality Assurance Scheme¥.

* Available from Animal Health Division
(See Annex 5 for contact details)

\# Available from:
Assured Chicken Production c/o CMi
Long Harborough Tel: 0199 3885 648
Oxford OX29 8LH Fax: 0199 3885 611

¥ Available from:
Assured British Pigs Tel: 0870 2416 787
EFSIS Agricultural Division
44 Winterhill Hse, Snowdon Drive,
Milton Keynes MK6 1AX

Annex 7 Useful Leaflets

1. ***Botulism in cattle.***
   Copies are available from Animal Health Division (See Annex 5 for contact details)

2. ***Protecting you and your family from Brucellosis.***
   Copies are available from HSENI (see Annex 5 for contact details)

3. ***Common Zoonoses in Agriculture***
   Copies are available from HSE Books (see Annex 5 for contact details)

4. ***Cleaner farms, Better flocks***
   Copies are available from the Food Standards Agency Publications (See Annex 5 for details)

5. ***Dealing with Tuberculosis in your herd***
   Copies are available from Divisional Veterinary Offices (See Annex 2 for contact details

6. ***Brucellosis: Stop it…***
   Copies are available from Divisional Veterinary Offices (See Annex 2 for details)

Annex H

TB and Wildlife Research and Studies – Projects Currently Underway	Estimated Project length
TB Biosecurity Study The key aim of the TB Biosecurity Study is to compare farm characteristics in herds that have recently had a TB breakdown and those that have had no recent history of a breakdown in a TB high incidence area in County Down. Consideration of selected cattle and wildlife factors are key elements of the research. The fieldwork element of the Study completed in July 2011. A survey of on-farm buildings and a farm boundary survey were carried out and some badger sett survey work was also undertaken on and around participating farms. Collation and analysis of the data gathered is underway. The Study findings should add to our knowledge of TB risk factors. The Study should also contribute to the development of best practice and biosecurity advice that can be rolled out to all herdkeepers to help reduce the level of bovine TB here. It is expected that the findings will be available later in 2012.	**2 years** (Survey took place 2010/11)
Gamma Interferon (IFN-g) Project The key aim of the gamma interferon project is to undertake an evaluation of the IFN-g test as currently implemented in Northern Ireland in order to quantify the usefulness of the test to detect additional bTB infected animals. This will include an evaluation of factors that influence test results. The criteria for defining an animal as positive using the IFN-g test will be re-assessed to identify if this could be further optimised and the implications of doing so in terms of test performance. An assessment will also be made on how other factors influence the IFN-g test. The overall outcomes of the project will be recommendations on the optimisation and best use of the IFN-g test to aid control and eradication of bTB in Northern Ireland.	**3 years** (Project started 2011)
Badger-Cattle Proximity Study The principal objective of the Badger-Cattle Proximity Study is to examine and describe the extent of badger-cattle and cattle-cattle interactions, through the use of proximity loggers and GPS devices, at pasture and within cattle houses in the Downpatrick / Lecale area of County Down. The Study should also examine and develop strategies to mitigate the extent of badger-cattle contact in both a housed and a grazing environment. The Study will provide information on the extent of interactions within and between badger and cattle populations and the ecology of badgers at farm and local level in an intensively farmed area that has a high incidence of TB and relatively high badger density. This may add to the current TB eradication strategy in the region.	**3 years** (Study started 2011)

TB and Wildlife Research and Studies – Projects Currently Underway	Estimated Project length
Badger Road Traffic Accident Survey Badgers are a protected species in Northern Ireland and culling for TB control purposes is not permitted. Ad hoc surveys, using badgers killed by cars, have been undertaken in the past but a province-wide survey has been ongoing since the mid 1990's. An interim report has been published which noted the following: · The prevalence of *M. bovis* in badgers was 17%. · TB infection is geographically widespread in badgers with no evidence of clustering and no apparent association, *at regional level*, with the distribution of infection in cattle. · Herds immediately adjacent to infected badger carcases did not have a higher risk of infection compared to those adjacent to TB-negative animals. However, a higher proportion of herds within 3km of a positive carcase had TB compared to those within 3 km of a negative carcase and the difference was statistically significant. The provisional conclusions arising from the survey was that there did appear to be a link between the distribution of infection in both species, although this did not indicate causality, i.e. direction of spread. Two RTA papers have been published so far: (1) Survey for Mycobacterium bovis in Road-Traffic-Accident Badgers in Northern Ireland - presented at ISVEE in 2003, and (2) Mycobacterium bovis surveillance in European badgers (Meles meles) killed by vehicles in Northern Ireland: an epidemiological evaluation. - presented at the 2011 International Conference on Animal Health Surveillance (ICAHS), Anses France, 17 - 20 May 2011	On-going
Literature Review on cattle-cattle transmission, risk factors and susceptibility: The key objective of the Literature Review is a comprehensive review of transmission, within and between herds, of bovine TB with particular reference to cattle to cattle spread (a) in cattle housing, (b) at pasture, and (c) any other significant circumstance or location such as during transport or at markets. This review should also seek from published work or work nearing completion to identify, summarise and rank those factors that influence susceptibility to bovine TB. The review should similarly seek to identify, summarise and rank those practical management actions that could best mitigate the risk of transmission in housing and at pasture and identify any other factors likely to commend further beneficial study. http://www.dardni.gov.uk/afbi-literature-review-tb-review-cattle-to-cattle-transmission.pdf	**1 year** (Posted on the DARD website January 2012)

TB and Wildlife Research and Studies – Projects Currently Underway	Estimated Project length
Literature Review on badger-cattle transmission The key objective of the Literature Review is a comprehensive review of transmission of bovine TB with particular reference to badger to cattle spread (a) in cattle housing, and (b) at pasture. This review should also seek from published work or work nearing completion to identify, summarise and rank those badger/cattle interfaces most likely to lead to bovine TB transmission. The review should similarly seek to identify, summarise and rank those practical management actions that could best mitigate the risk of transmission in housing and at pasture and identify any other factors likely to commend further beneficial study. http://www.dardni.gov.uk/afbi-literature-review-tb-review-badger-to-cattle-transmission.pdf	**1 year** (Posted on the DARD website January 2012)
Literature Review on cattle bTB tests and effective deployment: The key objective of the Literature Review is a comprehensive review of the published work or work nearing completion to inform an understanding of which tests for use in cattle provide the greatest sensitivity and specificity, and in which circumstances, and how this can be applied in order to improve TB control in Northern Ireland per se and, also, to best inform the most practical and cost-effective deployment of test resources in what may become a more constrained economic environment. http://www.dardni.gov.uk/afbi-literature-review-tb-review-diagnostic-tests-cattle.pdf	**1 year** (Posted on the DARD website January 2012)

TB and Wildlife Research and Studies – Projects Recently Completed	Project length
Literature Review on bTB tests in badgers The key objective of the Literature Review is a comprehensive review of the published work or work nearing completion on what tests could be conducted on blood or other samples collected from (a) live badgers trapped and released, (b) live badgers trapped, anesthetised and released, and (c) badgers trapped, euthanized and post-mortemed, to provide a better understanding of bovine TB infection in the local badger population, the efficacy of specific tests or combinations of tests, the practicality of a test and release (test -ve)/cull (test +ve) approach, and to provide a comparative assessment of the likely results of such testing between a lethal and non lethal intervention. http://www.dardni.gov.uk/afbi-literature-review-tb-review-diagnostic-tests-badgers.pdf	1 year (Posted on the DARD website January 2012)
Literature Review on the BCG vaccination against tuberculosis in European badgers The key objective of the Literature Review is a comprehensive review of the published work or work nearing completion on the potential efficacy of injectable and oral badger vaccine; on the current understanding how best to administer vaccine (means, frequency, dosage, etc) to achieve the most beneficial cattle TB outcomes and with reference to cost effectiveness. The review should seek to establish whether there are any aspects likely to commend further study or have particular applicability to NI conditions. http://www.sciencedirect.com/science/article/pii/S0147957112000100	**1 year** (Completed and published February 2012 on-line in Compartive Immunology Microbiology and Infectious Diseases Journal)

TB and Wildlife Research and Studies – Projects Completed
Badger Population To date, two country-wide surveys have been completed to allow a fuller understanding of the number and distribution of the undisturbed badger population in NI. The first survey was in 1994. The badger population in Northern Ireland was estimated in 1994 at 38,000 with a mean sett density of 3.51/km2. It was found that a high preponderance of setts occurs in hedgerows and it was postulated that this increases the proximity of badgers to cattle, and therefore, the potential for inter-species transmission[1]. The second survey was in 2007/2008. The badger population in NI during 2007/2008 is estimated at 33,500 animals in 7,500 social groups giving a mean estimated density of such groups as 0.56 per square kilometre. It was observed that there was a positive association between areas of improved grassland and arable agriculture, and cover. Density was correlated with land class, the highest densities found in drumlin farmland areas and marginal uplands. Due to the prevalence of favourable landscape features, Counties Down and Armagh had the highest density of badger social groups. http://www.dardni.gov.uk/badger-survey-of-ni-2007-08.pdf
Deer Surveys There are 3 species of wild or feral deer in Northern Ireland: Dama dama (fallow deer), Cervus nippon (sika deer) and Cervus elaphus (red deer). A proportion of the red deer are enclosed. A survey carried out in 1995, in which deer of the three species were sampled, demonstrated a prevalence of 5.8% (397 deer sampled). A small surveillance exercise carried out in 2009, in which fallow and sika deer were sampled, revealed a prevalence of 2% (146 deer sampled). The low number of deer (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role in the epidemiology of bovine TB is likely to be limited if not entirely insignificant. http://www.dardni.gov.uk/wild_deer_tb_surveillance_2008_2009

TB and Wildlife Research and Studies being considered for 2012/13	Estimated Project length
Literature Review on the role of slurry in spreading TB The key objective of the Literature Review is a comprehensive review of the published work or work nearing completion on the role of slurry in spreading TB and whether it should be treated or disinfected prior to spreading.	1 year
Analysis of Molecular Strain Typing Data The key objectives of this project are to analyse existing data, including geographical clustering of strains, associations between cattle and badger isolates, effect of cattle movement, extent of latent infection, genetic factors, etc. to determine how this tool can be best applied practically in the Northern Ireland TB eradication programme and to provide a better understanding of bovine TB transmission in Northern Ireland.	1 year
Risk factors associated with multiple reactor and chronic herds The key objective of this project is to investigate the risk factors for herds with persistent and/or chronic infection in order to further reduce disease in those herds.	3 years

1 Feore S.M. (1994) The distribution and abundance of the Badger Meles meles in Northern Ireland. PhD thesis. Queens University of Belfast.

Annex I

Research and Library Service
Research Paper

10th November 2011

Mark Allen

Bovine TB – comparative models for compensation and eradication/control

This paper provides a comparison of the Bovine Tuberculosis compensation, eradication and control systems currently in operation within Northern Ireland, Ireland, England, Scotland, Wales, Australia, Canada, New Zealand and the United States of America.

Paper 000/00 NIAR 459-11

Key Points

- Bovine Tuberculosis is caused by the bacterium *Mycobacterium bovis* which can also affect humans, deer, goats, pigs, dogs and cats, as well as many others mammals including badgers;
- The symptoms of Bovine TB can take months to exhibit in cattle but in the late stages of the disease common symptoms include emaciation, a low–grade fluctuating fever, weakness and lack of appetite. Bovine TB affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability;
- Bovine TB free status is internationally defined and agreed as being in effect when the incidence of TB in herds is below 0.2% for 3 consecutive years;
- It has been DARD's (and its predecessor departments) policy to eradicate the disease within Northern Ireland since 1964;
- There are currently 1.58 million cattle within Northern Ireland spread across 25,930 active herds, with dairy cows/heifers accounting for 21% of the national herd while beef cows/heifers account for 18%;
- Bovine TB herd incidence within Northern Ireland peaked in 2002 when the annual herd incidence was calculated at 10.2%. Individual animal incidence peaked in 2003 when just under1% of animals tested proved positive;
- The 2010 herd incidence rate was 5.12% and the individual animal incidence rate was 0.405% (based on August 2011 figures);
- DARD currently pays compensation for TB reactor cattle at 100% of market value of the animal/animals involved;
- DARD recently undertook a second public consultation on the issue of compensation arrangements for Bovine TB and Brucellosis. The consultation documentation included proposed options for the introduction of a compensation cap;
- On an annual basis DARD submits a Bovine TB monitoring, eradication and control programme to the European Commission as a pre-requisite for EU co-financing. This programme outlines mechanisms dealing with animal testing, slaughter of TB reactors, movement controls, biosecurity, risks from wildlife, vaccination and areas for further research;
- Many EU countries are Bovine TB free (incidence of less than 0.20%) and in those countries where this is not the case such as Spain it was extremely difficult to access recent data in English relating to incidence rates, compensation levels and eradication/ control measures;
- Compensation mechanisms and rates of payment for Bovine TB differ across the countries referred to in this report (Australia, Canada, England, Ireland, New Zealand, Scotland, the USA and Wales);
- Eradication and control provisions for Bovine TB are also varied.

Executive Summary

The eradication of Bovine TB has been a priority for DARD (and its predecessor departments) since 1964. The disease, which is caused by the *Mycobacterium bovis* affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

Under internationally defined standards, for a country to be defined as Bovine TB free there must be a herd incidence rate of less than 0.2% for 3 consecutive years. Whilst the incidence of Bovine TB within Northern Ireland does appear to be declining the most recently available data points to a herd incidence rate of 5.12%.

At present DARD is currently conducting a second public consultation on the issue of compensation schemes for Bovine TB and Brucellosis. The current compensation scheme operates on a basis that farmers receive 100% of the market value of any TB reactor cattle. The public consultation document contains different proposals for the introduction of a cap in compensation.

With regard to the monitoring, eradication and control of Bovine TB, as part of the requirement for accessing EU co-financing, DARD develops and submits an annual programme setting out a series of specific measures and actions. The most recent plan submitted in April 2011 contains details covering animal testing, slaughter of TB reactors, movement controls, biosecurity, risks from wildlife, vaccination and areas for further research.

Looking at the incidence of Bovine TB within a wider context it is apparent that Northern Ireland has a higher herd incidence rate than many nations, both local and further afield. It is also worth noting that many EU nations have achieved Bovine TB free status.

Compensation rates and payment mechanisms across the UK and wider world are varied. Whilst some schemes (mainly within the UK) are close to that operated within Northern Ireland, it is evident that some other countries operate schemes which utilise different compensation calculation methods and also in some instances require inputs from the industry. Some systems also contain additional features designed to supplement the income of affected farms in the months following herd depopulation.

On the issue of eradication and control it is evident that the approaches taken within different countries also varies widely but also appears to be multi faceted. Whilst there would appear to be some commonality in relation to the issue of testing, there is much greater variation in relation to the approaches taken to movement control for example. Biosecurity measures would also appear to vary in both their scale and focus as do approaches to the reduction of wildlife vector risk from animals such as deer, possums and badgers.

A common thread across many nations appears to be on the need to develop vaccines for either cattle or wildlife vectors as a cost effective means of reducing or eradicating the incidence of Bovine TB, but it is evident that much of this work is at an early stage and as such will require further research and investment.

Contents

1 Context and background

This research paper provides an overview of the scale of Bovine TB within Northern Ireland as well as outlining some of the differing approaches to compensation and eradication/control in other selected countries.

Bovine Tuberculosis is caused by the bacterium Mycobacterium bovis which can also affect humans, deer, goats, pigs, dogs and cats, as well as many others mammals including badgers.

The symptoms of Bovine TB can take months to exhibit in cattle but in the late stages of the disease common symptoms include emaciation, a low–grade fluctuating fever, weakness and lack of appetite. Bovine TB affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

Bovine TB free status is internationally defined and agreed as being in effect when the incidence of TB in herds is below 0.2% for 3 consecutive years[1].

1 Chapter 11.6, Bovine Tuberculosis, Terrestrial Animal Health Code, World Organisation for Animal Health (OIE)

2 Bovine TB within Northern Ireland

2.1 Incidence

It has been DARD's (and its predecessor departments) policy to eradicate the disease within Northern Ireland since 1964.

There are currently 1.58 million cattle within Northern Ireland spread across 25,930 active herds, with dairy cows/heifers accounting for 21% of the national herd while beef cows/ heifers account for 18%[2].

Bovine TB is recognised as a scheduled and notifiable disease under the Diseases of Animals (Northern Ireland) Order 1981, and as such farmers are required to inform DARD of any suspected or confirmed cases within their livestock.

As well as a mandatory annual skin test for TB as set out in EU Directive 64/432[3] farmers are encouraged to regularly check their cattle for TB symptoms such as lesions as well as subjecting all herds to an annual test.

As shown in figure 1 below, Bovine TB herd incidence peaked in 2002 when the annual herd incidence was calculated at 10.2%. Individual animal incidence peaked in 2003 when just under1% of animals tested proved positive.

The recent trend for both herd and individual animal incidence appears to be downward but it should be recognised that the figures recorded in 2010 are still higher than those recorded from 1995-1997. **As things currently stand the 2010 herd incidence rate was 5.12% and the individual animal incidence rate was 0.405%.**[4]

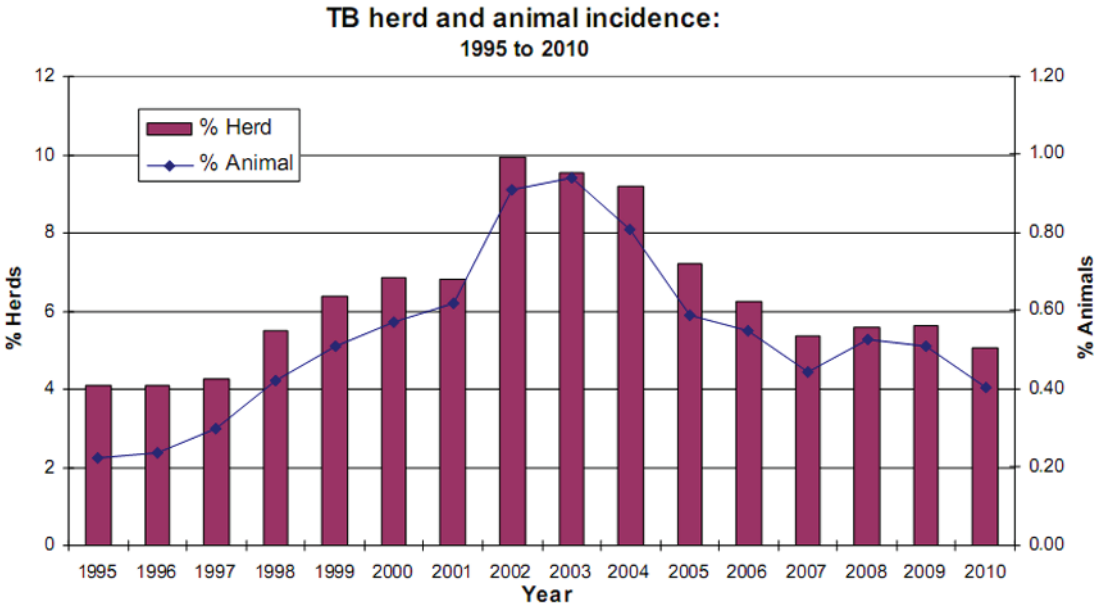


Figure 1: Bovine TB and animal incidence within Northern Ireland, 1995 - 2010[5].

2 TB monitoring, eradication and control programme 2012, DARD, submitted to EC 15th April 2011

3 Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine.

4 Full year data for 2010 derived from Tuberculosis - internet monthly statistics - August 2011, DARD

5 Bovine brucellosis (BR), bovine tuberculosis (TB) and bovine spongiform encephalopathy (BSE), Quarterly Update: April - June 2011, DARD Quarterly Disease Report

As shown in figure 2 the most recent quarter for which data is available also witnessed a 2% increase in the number of TB reactors (1,395 TB reactors cf. 1,365 during the same period in 2010[6]) compared to the same quarter in 2010. The number of reactors did peak in 2003 but the fact remains that the current number of reactors is still higher than the figures recorded between 1995 and 1997.

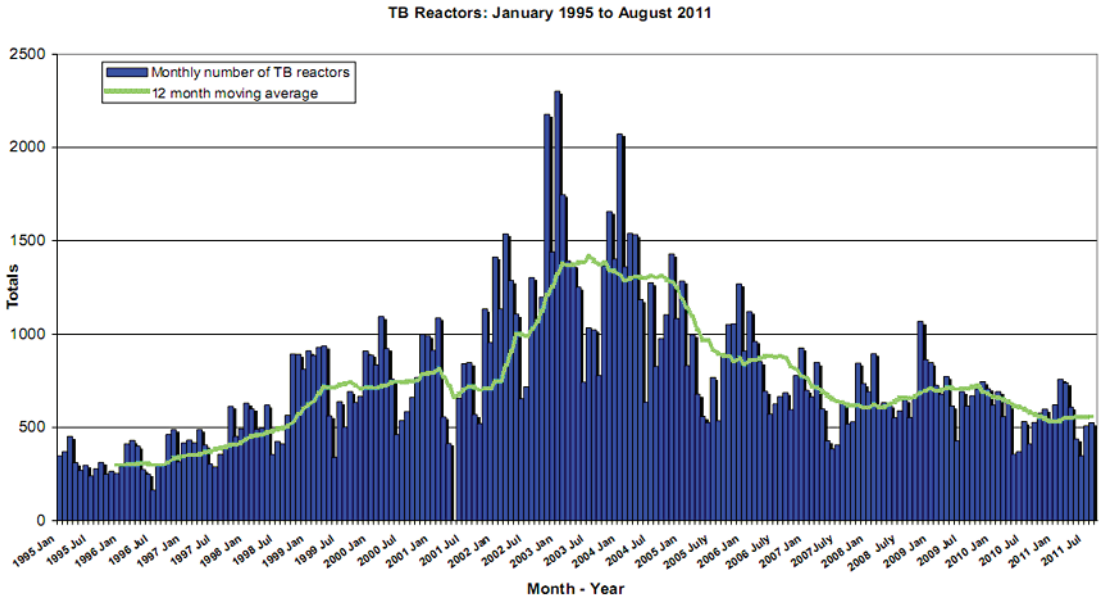


Figure 2: Bovine TB reactors within Northern Ireland, January 1995-August 2011[7]

2.2 Compensation provisions

As things currently stand and under the auspices of the Tuberculosis Control Order (Northern Ireland) 1999[8], DARD will pay compensation for animals testing positive for TB at 100% of market value of the animal/animals involved.

According to the Order the market value of an animal means—

(a) in the case of an animal over 30 months old either—.

(i) the price which might reasonably have been obtained for it at the time of valuation from a purchaser in the market if it had been free from disease; or.

(ii) the value of that animal to the owner had it been slaughtered under and in accordance with Commission Regulation (EC) No. 716/96[9] adopting exceptional support measures for the beef market in the United Kingdom(5),.

whichever is the higher; or

(b) in the case of an animal 30 months old or under, the price which might reasonably have been obtained for it at the time of valuation from a purchaser in the market if it had been free from disease.

Valuations to determine market value are decided by agreement between an inspector of the Department and the owner of the animal, or failing that are decided by an independent valuer

6 ibid

7 Tuberculosis - internet monthly statistics - August 2011, DARD

8 Tuberculosis Control Order (Northern Ireland) 1999

9 adopting European Commission Regulation (EC) 716/96 exceptional support measures for the beef market in the United Kingdom

paid by the Department and selected by the owner from a list of at least three such valuers submitted by the Department to the owner.

As a result of Article 11A the Tuberculosis Control (Amendment) Order (Northern Ireland) 2005[10]:

The Department (DARD) or the owner of the animal may submit an appeal to a tribunal of persons, appointed by the Department for the purpose, if dissatisfied with the determination of the market value of any animal –

(a) in the case of an appeal by the Department, under Article 11(6)(b), or

(b) in the case of an appeal by the owner, under Article 11(6)(b), (7) or (11)."

DARD is currently undertaking a second public consultation on the issue of compensation arrangements for Bovine TB and Brucellosis. This consultation period will close on the 2nd December 2011 and contains a number of options for changes to Bovine TB and Brucellosis compensation as follows:

- Introduce separate compensation caps for commercial and pedigree animals based on the NI average market value data (commercial animals) and an uplift of £800 (for pedigree animals);
- Introduce a cap similar to that used in the South of Ireland; and
- Introduce separate caps for commercial and pedigree animals based on the NI average market value data (dairy commercial animals) and an uplift of £300 (for pedigree animals). This is an extension of the existing approach used for brucellosis reactors.

2.3 Eradication/Control provisions

As stated previously DARD policy since 1964 has been the eradication of Bovine TB. On an annual basis DARD submits a Bovine TB monitoring, eradication and control programme to the European Commission as a pre-requisite for EU co-financing.

The most recently submitted document for the year 2012 reveals that DARD takes a strategic approach to both the eradication of Bovine TB and the design of the programmes to achieve this objective.

A new management structure is now in place within the department based in 3 key components as follows:

- TB Steering Group – to oversee strategic direction.
- TB Policy Development Group – to develop proposals / manage specific projects.
- TB Programme Delivery Group – to ensure effective delivery of this programme and monitor key performance indicators.

Since 2008, and in line with the views of the then Minister, Michelle Gildernew MLA[11], DARD has continued to pursue a policy focused on the eradication of bovine TB. The approach that continues to this day is essentially 3 stranded:

- control cattle to cattle spread;
- address any wildlife component; and
- create a partnership with the agricultural industry in the delivery of the strategy.

10 Tuberculosis Control (Amendment) Order (Northern Ireland) 2005

11 Gildernew sets course for way ahead in TB fight, DARD press release, 9th December 2008.

Table 1 below sets out the current Bovine TB monitoring, control and eradication methods employed within Northern Ireland.

Measure	Specific details
Testing	Annual testing of all herds is mandatory TB testing is undertaken only by DARD approved Veterinary Surgeons, using the Single Intradermal Comparative Cervical Test (SICCT) for internal control All animals slaughtered for human consumption undergo Post Mortem Examination (PME). Results are available on the Animal and Public Health Information System (APHIS) immediately All herds in NI at all times are allocated an OT herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). Failure to test a herd on an annual basis results in the OTF status being suspended immediately in all cases. Further delay in testing will result in automatic increased movement sanctions and downgrading the herd status to OTW In NI, animals are allowed one skin test with an inconclusive result without compulsory removal. A non-negative result at a second consecutive test results in mandatory removal as a reactor animal. Herdkeepers may be advised to slaughter the animal at any time during this period. Contiguous tests are undertaken in herds that are in close proximity to infected herds, usually neighbouring them
Slaughter of TB reactor animals	Confirmed TB reactors are removed by DARD subcontracted hauliers for immediate slaughter. Slaughter may include full herd depopulation if considered necessary to stop spread of the disease. In the case of total herd depopulations the following action is taken: • No animals are allowed to move into the premises for one month following the depopulation. • A full Cleansing and Disinfection is required after depopulation. • The herdkeeper is advised of the control of risk from slurry. • Two months after re-stocking a TB test is required. If this test occurs within a year of the breakdown it is classed as reactor (RH1) test. If the RH1 is clear the restriction is removed and then a post restriction test (CHT) is set for six months later and an Annual Herd Test set twelve months after the completion of the post–restriction test. If a farm premises is depopulated for more than 12 months then the restriction is removed at 12 months and the test following the purchase of animals is classed as an Annual Herd Test.

Measure	Specific details
Movement controls	All calves born after 1 January 1998 must be identified with an ear tag in each ear within 20 days from the birth of the animal. All cattle identification numbers are authorised by DARD and recorded on the Animal and Public Health Information System (APHIS) computer database so that no duplication should be possible. Movement control from all herds, at all times, is controlled by a combination of the OT herd status and status reason applicable to the herd. As all movements must be recorded on APHIS, including those to market and abattoir, immediate movement control is applied. Since the year 2000 the implementation of movement control documents require a producer to notify the Department within 7 days of an animal either leaving or arriving on his/her farm. Markets are required to notify movements on and off to the Department by the end of the next working day. However, in the case of a restricted animal the producer is required to obtain a movement licence from the Department in advance of moving the animal out of his/her herd. All movements are recorded and can be traced on APHIS Herds with either OTS and OTW status applied are both subject to movement restrictions immediately. This is controlled through APHIS Where a test becomes overdue, increasingly stringent movement controls are applied routinely as below: · Immediately overdue, no live moves to market, export, or other holdings. · 1 month overdue, no live moves to market, export, other holdings or slaughter. No moves in are allowed except one breeding bull on exceptional licence. All animals over 42 days are subject to the single intradermal test and interpretation within 30 days of export
Biosecurity	A TB Biosecurity Study is currently underway in a TB high incidence area in Co. Down. The Study is designed to compare farm characteristics in both herds that have recently had a TB breakdown and those that have had no recent history of a breakdown in this TB high incidence area. Consideration of selected cattle and wildlife risk factors are key elements of this research. As well as establishing relevant farm business information, a survey of on-farm buildings and a farm boundary survey are being carried out. Radial badger sett survey work on and around the main farm buildings of participating farms is also being undertaken. The findings of the Study should be available by the middle of 2012. The conclusions will inform evidence-based biosecurity advice to be provided to livestock farmers and will inform policy decisions. All herdkeepers are currently sent an advisory booklet on biosecurity measures http://www.dardni.gov.uk/biosecurity_code_booklet_for_northern_ireland_farms.pdf

Measure	Specific details
Wildlife	TB been isolated from deer and badgers in Northern Ireland. A survey carried out in 1995, in which deer of the three species found here were sampled, demonstrated a prevalence of 5.8% (397 deer sampled). A small surveillance exercise carried out in 2009, in which fallow and sika deer were sampled, revealed a prevalence of 2% (146 deer sampled). The low number of deer (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role in the epidemiology of bovine TB is likely to be limited if not entirely insignificant With regard to badgers A Badger Stakeholder Group was formed in 2004 in NI, which was tasked with assessing the available information and considering the potential need for a badger management strategy within NI. Following consideration by the Badger Stakeholder Group of the evidence available from the completion of various extensive trials elsewhere (most notably the Randomised Badger Culling Trial in GB) and the adoption of lethal intervention as a policy to control bovine TB in cattle in another Member State (the Republic of Ireland (ROI)), it was concluded in their report, published February 2008, that no recommendation could be made on the way forward for Northern Ireland without first undertaking work to gather information specific to the Northern Ireland situation. The Badger Stakeholder Group agreed that this should include:- • a survey of the badger population in Northern Ireland to determine the number and distribution of badgers (completed in 2008), • developing a proposal for a study of the prevalence of bTB infection in badgers (ongoing), • assessing the available evidence in relation to the role of badgers in bovine TB to inform an appropriate course of action in NI, including whether it is appropriate to run a badger culling pilot (ongoing), • considering participation in a vaccination trial, and • undertaking a cost benefit assessment of the future options for any proposed badger management strategy in NI, once the information arising from the above actions is available.
Vaccination	DARD continues to develop collaborative links with work ongoing in England and ROI regarding the development and trialling of vaccines for bovine TB in badgers. Vaccines developed for badgers may be the most feasible solution in the long term administered by either injection or orally. DARD also maintains an interest in ongoing work by Defra on the development of a so called DIVA (Differentiating Infected from Vaccinated Animals) test which would enable the vaccination of cattle, although this would also require a change in EU law (current EU Directive 78/52/EEC- article 13ii prohibits vaccination[12]) to make vaccination with BCG and the use of a DIVA test legal. This development is however some way off at this time.

Measure	Specific details
Research	DARD continues to work in partnership with the NI Agri-Food and Biosciences Institute (AFBI) to establish critical knowledge gaps in relation to TB and to identify and explore further research and development options that would complement and assist current research. DARD has commissioned AFBI and DARD's Veterinary Epidemiology Unit (VEU) to conduct a number of literature reviews which will help identify and fill critical knowledge gaps in relation to bovine TB generally and also to wildlife in particular. The TB literature reviews being carried out by AFBI are: (i) cattle to cattle transmission; (ii) badger to cattle transmission; (iii) cattle bTB tests and effective deployment; and (iv) bTB tests in badgers. In addition, DARD's VEU is currently conducting a literature review on badger vaccines. It is anticipated that these reviews will better inform DARD in relation to future TB R&D projects.

Table 1: Current Bovine TB monitoring, control and eradication measures employed in Northern Ireland[13]

3 Bovine TB Incidence and Approaches to compensation and eradication/control within other selected jurisdictions.

The initial thinking behind this paper had been to compare the Bovine TB situation in Northern Ireland with Ireland, the rest of the UK and other EU nations. An initial scan of the data however revealed that many EU countries are Bovine TB free (incidence of less than 0.20%) and in those countries where this is not the case such as Spain it was extremely difficult to access recent data in English relating to incidence rates, compensation levels and eradication/control measures.

With this caveat in mind the focus for the remainder of this paper is on those nations for which data on incidence rates, compensation levels and eradication/control measures was both up to date and accessible.

3.1 Incidence

Country	**Herd incidence %**
Australia	Officially Bovine TB free since 2002
Canada	Officially Bovine TB free (State of Manitoba has split status due to some incidence)
England	8.72%[14]
Ireland	4.65% (31/12/2010)[15]
New Zealand	0.13% (30/6/2010)[16]
Scotland	Officially Bovine TB free since 2009 (herd incidence rate of 0.18% in 201[17])
USA	Officially Bovine TB free with exception of states of California (1 positive herd in 2011 so far[18]), Michigan(4 positive herds in 2010[19]), Montana and New Mexico which are working towards TB free status.
Wales	6.57%20
Northern Ireland	**5.12%**

Table 2: Bovine TB herd incidence rates - selected countries

In compiling the data outlined in table 2 it needs to be recognised that the comparison of herd incidence rates across different jurisdictions needs to be treated with extreme caution, if not avoided all together, given the differing approaches to testing employed (see footnotes relating to England and Wales by way of example) and the impact this can have on incidence rates.

In light of these limitations with herd incidence data DARD epidemiologists are currently finalising work with colleagues from GB and Ireland that should enable a comparative analysis of Bovine TB disease trends over time, and a paper outlining this work is due to be published shortly.

3.2 Compensation provisions

Country	Compensation scheme details
Australia	Despite Bovine TB free status, **compensation is payable at 'farm gate value'** for positive reactors under the auspices of the Emergency Animal Response Disease Agreement which is an agreement between government and industry on how to manage cost and responsibility for an emergency response to an animal disease outbreak. Under this Agreement Bovine TB is defined as a category 4 disease and as such any **compensation paid is split between the government 20% and the industry 80%**.[21]
Canada	Under the Compensation for Destroyed Animals Regulations[22] which are part of the Health of Animals Act[23] **compensation is payable at market value that the animal would have had at the time of its evaluation if it had not been required to be destroyed**. Payments are up to a **maximum of $CN 8000 for registered animals and $CN 2,500 for non-registered animals**.
England	Compensation for animals slaughtered because of bovine TB **is determined primarily through table valuations, based on average market prices for 47 pre-determined cattle categories**. Table value rates are updated monthly and published, as compensation information bulletins[24], at the start of each calendar month, on the Defra website. On rare occasions it may be necessary to use individual on-farm valuations to determine compensation. Individual **animals are only recognised as "pedigree" when a pedigree certificate has been issued by a recognised breed society** by the day of the assessment of the category into which the animal falls

Country	Compensation scheme details
Ireland	On Farm Market Evaluation Scheme main measure employed – removed animals are **compensated at market value** (equivalent price which might reasonably have been obtained for the animal at the time of determination of compensation) determined by **independent valuer** to a **ceiling of €2,800 per individual animal (inclusive of factory salvage price)**, except in respect **of one pedigree stock bull per breakdown episode with a ceiling of €3,500 (inclusive of factory salvage price)**[25]. Currently herdkeepers in the south of Ireland contribute through a production levy (currently €1.27 per animal and €0.0006 per litre of milk) towards the cost of the TB and brucellosis eradication schemes with the remainder being from public funds and the EU Veterinary Fund. The revenue from the producer levies was approximately €5m in 2010. Other measures which could be classified as compensatory are provided in support of herd keepers with infected cattle as follows: · **Depopulation grant** - An owner/keeper whose herd is depopulated (totally or partially) in the interest of disease control may qualify for a Depopulation Grant, which is **designed to compensate farmers for income lost during the rest period up to a maximum of €228.52 per animal**; · **Income Supplement** - payable in cases where **disease breakdown results in the removal of more than 10% of animals in a herd and where depopulation is not deemed appropriate**. Payment is in respect of each animal removed as a reactor from a herd, subject to a maximum of 100 animals qualifying for **payment up to a max of €38.09 per animal**; · **Hardship Grant** - The Hardship Grant eligibility period runs from 1 November to 30 April. This Scheme is **designed to alleviate the costs difficulty of some owner/keepers whose holdings are restricted on foot of a herd re test and where animals are retained and fed during periods of restriction**. Potentially eligible owner/keepers must meet certain conditions including requirements that they (i) must not have any income from milk sales and (ii) must not have any off farm income. The Grant may provide eligible owner/keepers with a **payment of up €250.00 per month for a period not exceeding 4 months** within the period 1 November to 30 April of the following year.
New Zealand	Payable at a rate of **65% of the fair market value** of each reactor animal, up to the maximum allowable as defined in the Biosecurity (National Bovine Tuberculosis Pest Management Strategy) Order 1998.[26] Owners of Tb Reactor cattle which are eligible for compensation, are not liable for the cost of transporting these animal(s) to slaughter or for slaughter fees.
Scotland	In line with provisions of The Tuberculosis (Scotland) Order 2007[27] **compensation is payable at 100% of market value of animals**. Valuations of market value can either be agreed between the owner and government, be made by 1 valuer agreed by the owner and government, made by 2 valuers, 1 appointed by government and other by owner, or failing agreement 1 valuer can be appointed by the Institute of Auctioneers and Appraisers in Scotland.

Country	Compensation scheme details
USA	**Fair market value (based upon prices achieved at markets) up to $3000 per animal testing positive for Bovine TB, minus any amount received for slaughter**, if sent to slaughter. Transportation costs to slaughter are also often paid either in full or partially. Valuations are completed by either APHIS staff, private valuers or by the use of a valuation calculator using a few key parameters.[28] Questions remain over whether the Federal Government has the budget to continue to pay this compensation for all animals testing positive.
Wales	Under Tuberculosis (Wales) Order 201017 new system in place to encourage better practice by cattle keepers. Compensation is now calculated using the following formula: **Market value of animal** (provided by independent assessor) X **multiplier based on compliance with TB testing times, adherence to legislation and best practice guidance** = **level of compensation paid**.

Table 3: Bovine TB compensation arrangements - selected countries

3.3 Eradication/Control provisions

Country	Eradication/Control programme details
Australia	Australia's national eradication campaign (Brucellosis and Tuberculosis Eradication Campaign or BTEC) ran for 27 years from 1970 to 1997, achieving freedom from bovine TB by OIE standards on 31 December 1997. BTEC included the following measures: • TB detection through meat inspection and systematic field testing; • quarantining and repeated testing of infected herds; • movement controls to prevent TB spreading between herds; and • slaughter of animals with high risk of infection and those returning positive tests, with compensation paid to the owners. Starting in 1973, the cattle industry made major contributions to the funding of BTEC through levies. Following eradication of the disease Tuberculosis Freedom Assurance Programmes (TFAP) ran from 1998-2002 (Part1) and from 2003-2006 (Part 2) in order to 'mop up' any residual disease. These programmes included measures such as: • maintenance of a TB case register; • Effective surveillance was achieved via the National Granuloma Submission Program; • providing policy advice, legislation and all infrastructure to support diagnostic and eradication activities; • reviewing and revising surveillance schemes for TB; • using herd surveillance programs where required; • using tail or ear tags to identify cattle to their property of origin; • eradicating infection from infected herds, providing compensation and additional assistance measures for affected producers.

Country	Eradication/Control programme details
Australia *(continued)*	At present Australia has its Emergency Animal Disease Response Agreement18 ('EADRA) which a contractual arrangement that brings together the Commonwealth, state and territory governments and livestock industry groups to collectively and significantly increase Australia's capacity to prepare for, and respond to, emergency animal disease (EAD) incursions. Bovine TB is recognised as a category 4 disease and as such there are surveillance, control, removal and compensation measures contained within this mechanism.

Canada	Bovine TB is a reportable disease under the Health of Animals Act and Regulations and Canada follows a strict surveillance and eradication program for this disease.
	
	In terms of surveillance routine slaughter granulomas are supplemented by on-farm testing where:
	
	• Sector has insufficient slaughter numbers (farmed cervids (elk and deer))
	
	• Risk of disease from wildlife exists (Riding Mountain – Manitoba – risk from elk and deer)
	
	Under the National Bovine TB Eradication Program, whenever the infection is confirmed in a herd of cattle, farmed bison, or farmed cervids (elk and deer), the CFIA(Canadian Food Inspection Agency) institutes disease eradication measures that include[31]:
	
	• Aggressive stamping out policy applied:
	
	  • Automatic depopulation of all exposed susceptible animals required since 1983 for all infected herds required;
	
	• Province/zone accreditation based on disease findings:
	
	  • All provinces, including split-status province of Manitoba, are classified as TB-free (equivalent to accredited-free under US programme)
	
	• Control movement out of province/zone that loses TB-free status:
	
	• Triggers regulations requiring permit from CFIA – all imported animals from outside Canada must originate from an officially TB free country/zone/herd; and be tested for TB prior to import with negative results; and be accompanied by an official veterinary health certificate. Animal imports from Mexico are also banned.
	
	In areas of wildlife risk such as Manitoba, Canada also implements bio security measures to reduce the risk to wildlife infecting domestic cattle that include the following measures:
	
	• Ban on any baiting or feeding of elk & deer;
	
	• Require hay to be removed from fields to be eligible for crop insurance;
	
	• Prescribed burns to improve elk habitat; and
	
	• Barrier fencing of hay storage & feeding yards on 95% of farms in proximity to deer and elk habitat.

Country	Eradication/Control programme details
England	Within England the Department for Environment, Food and Rural Affairs has the lead responsibility for the eradication and control of Bovine TB. Recent years have seen a considerable growth in Bovine TB infections in high risk areas such as the South West of England and as a result Defra has publicly stated that it will *'..take decades to eradicate the disease'* within England. The approach adopted in The Bovine TB Eradication Programme for England[32] published in 2011 has a number of key principles as follows: • Partnership working - recognising the progress and continuing to develop working between government, the industry and veterinary science; • Responsibility and cost-sharing - giving farmers more control and choice, empowering the industry to take greater responsibility for tackling TB; • Working effectively in the EU: ensuring compliance EU legislation, while pushing for a more flexible, risk-based EU legal framework; • Supporting farmers - reducing unnecessary burdens and restrictions on farmers where possible and without compromising disease controls. Also, working with the industry and veterinary profession to provide targeted advice and support to farmers. In terms of practical actions to eradicate Bovine TB within England these could be characterised as being either surveillance or control measures and those that have been in use for a number of years include the following: • A significant expansion of the areas on annual and two-yearly routine testing - routine testing is risk based in England – herds in higher risk areas are testing on an annual basis, whereas herds in lower risk areas are tested every second, third or fourth year. • Enhanced controls on some high risk herds; • Clarifying TB breakdown terminology so farmers better understand disease risk; • Enhanced surveillance for TB at abattoirs; • Extended the use of gamma interferon blood testing to infected herds in two-year routine testing areas; • Reviewed and confirmed the effectiveness of the pre-movement testing policy; and • DNA tagging of TB positive cattle from April 2011 – to prevent fraud.

Country	Eradication/Control programme details
England *(continued)*	The 2011 Eradication Plan also contains the following new proposals: • Revising some of the existing pre-movement testing exemptions; • Reducing compensation payments for reactor animals from herds where TB tests are significantly overdue; • Reviewing options for an enhanced risk-based approach to routine TB surveillance; • Reviewing the procedures for TB infected herds regaining OTF status; • Assessing the feasibility of options for a risk-based trading system; • Developing a more rigorous, risk-based TB compliance and enforcement strategy; and • Continuing to invest in the development of a cattle vaccine and seek to persuade the EU to lift the current ban on TB vaccination of cattle. Defra strategy also recognises the need for steps to reduce the threat of TB infection posed by the badger population and with this in mind work continues in the following ways: • 2010 public consultation on a proposal to enable the issuing of licences under the Protection of Badgers Act 1992 and the Wildlife and Countryside Act 1981 to farmers and/or landowners to cull and/or vaccinate badgers for the purpose of preventing the spread of bovine TB in cattle – government recently completed a second round of consultation before deciding whether or not to proceed with a cull; • invested over £11 million on research into badger vaccines -as a result an injectable BCG badger vaccine is now available for use on prescription, subject to a licence from Natural England; • badger vaccine deployment project - During the first trapping year more than 500 badgers were vaccinated in the 100km2 pilot project area in Gloucestershire; • developing an oral badger vaccine, which, if it can be done, has the potential to make an important contribution to reducing infection levels in badgers, and as a result, badger to cattle transmission.

Country	Eradication/Control programme details
Ireland	A scheme for the eradication of bovine tuberculosis in cattle commenced in Ireland in 1954 with a voluntary scheme for the eradication of bovine tuberculosis in cattle commenced initially in counties Sligo and Clare. The scheme was gradually extended to other areas and intensified from 1958 onwards, and was given a statutory basis Diseases of Animals (Bovine Tuberculosis) Act, 1957 and included measures for the • provision for the identification and declaration of areas in which bovine tuberculosis is to be eradicated; • testing in those areas; • removal and slaughter of reactors; and • provision of compensation to farmers. In April 1988, a new initiative, ERAD, the Eradication of Animal Disease Board, was established by the Irish Government as a specialised agency to implement a vigorous four-year TB eradication programme and implemented the following measures: • pre-movement testing; • a comprehensive testing programme using a more potent tuberculin (30,000 I.U./ml); and • a more severe interpretation than that required by Directive 64/432/EEC, both at individual herd, including full herd depopulation, and at area based level. The period of 1988-1992 also saw the first connections between badgers and Bovine TB and this led to the development of an interim wildlife control strategy where badger capturing and removal took place in areas associated with bovine herd TB breakdowns. From 1992 to the present measures that have been employed to eradicate Bovine TB have included[33]: • an annual round screening test of all herds (farmers pay for routine surveillance tests themselves – government pays in instances of outbreak); • controls on movement of animals; • restriction of holdings; • removal and slaughter of reactors and specific targeted testing including the use of blood tests, with appropriate follow-up testing; • compensation for farmers whose herds are affected by disease; • a focused badger population control where they have been implicated as a probable cause of TB; and • continued work towards the development and introduction of a vaccine to prevent TB in badgers.

Country	Eradication/Control programme details
New Zealand	The TB control programme in New Zealand is guided by the National Pest Management Strategy for Bovine TB[34] (NPMS). It is managed by the Animal Health Board under the programme name "TB free New Zealand. Between 2009 and 2010 the programme has witnessed a 25% decrease in Bovine TB incidence. Contact with infected wildlife remains the main source of the disease for domestic cattle and deer herds. While possums are the main carrier of the disease in the wild, ferrets are also a common infection source in some areas. These infected wild animals are known as TB vectors and the areas they inhabit are classified as vector risk areas (VRAs). Control and eradication methods employed to deal with Bovine TB are as follows: • **disease control** - aiming to control and contain the spread of the disease within cattle and deer herds – primarily achieved through a regular testing programme and associated classification/register of herd status; • **movement control** - controlling the spread of the disease between herds -AHB has developed Movement Control Areas (MCAs) in which certain movement restrictions apply. Cattle or deer over 90 days old and inside an MCA must have a pre-movement test within 60 days prior to being moved. Stock going direct to slaughter do not need a pre-movement test ; • **vector control** - aiming to control and contain the wild animal species mostly responsible for spreading the disease to cattle and deer – include surveys of wild animal populations are undertaken to determine the presence and/or extent of infected wildlife, ground and aerial baiting with poison and trapping to remove infected wildlife; New Zealand is also proactively involved in the development of a BCG vaccination for cattle which would afford immunity but not result in a positive skin test for TB in vaccinated cattle[35].

Country	Eradication/Control programme details

Scotland	As such no TB eradication plan exists due to TB free status. Control measures are however set out in the Implementation Plan for Officially Tuberculosis Free Status in Scotland[36].
	
	These include legal requirement for cattle over 42 days old that move from 1 or 2 yearly testing parishes into a Scottish herd to have Pre & Post movement tests. The Pre-movement test must occur within 60 days prior to entering a Scottish herd, and the post-movement test between 60-120 days of their arrival. All pre and post movement tests must be arranged and paid for by the herd owner. Other measures are as follows:
	
	• With effect from 28 February 2010, a clear TB test prior to movement to Scotland is also required for cattle from all low incidence areas of England and Wales (3 and 4 yearly tested parishes) no more than 60 days before movement and no less than 60 days after any previous test with the following exceptions:
	  • Cattle which can be shown to have spent their whole lives in low incidence areas;
	  • Cattle being sent direct to Scotland for slaughter;
	  • Calves less than 42 days of age.
	• bTB Isolation units in Scotland which permit Irish imports to be exempt from post import testing will be phased out by the end of December 2010, and importers will be required to meet the cost of post import testing (as for movements from high incidence areas in GB);
	• The current requirement for pre- and post-movement testing of cattle from 1 and 2 yearly tested parishes in England and Wales to Scotland.
	• Pre-export tuberculin testing of cattle over 42 days of age. (To be reviewed annually)
	• Enforcement of compliance through cross checks using existing and new cattle movement reports from BCMS and routine checks by animal health staff.
	• Abattoir surveillance through meat inspection.
	• TB is a notifiable disease and suspect cases should be reported
	• Source and spread tracings of breakdowns.
	• Gamma interferon testing for all new confirmed breakdowns in Scotland
	• Routine tuberculin testing will continue during the transitional period with a four yearly default testing frequency period - The proposed future approach is :
	  • Risk analysis to establish criteria for at-risk herds;
	  • Consideration of whole herd tests vs. selected animal tests;
	  • Consideration of ceasing routine testing on islands with low disease risk.

Country	Eradication/Control programme details
USA	In 2000, a comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis was announced in conjunction with an emergency declaration by the Secretary of Agriculture. A goal of final eradication was set for the end of 2003 but has not been achieved, although 46 states have reached this status.[37] Under the most recent programme States, zones, or regions are classified into five categories based on prevalence of TB in cattle and bison as follows[38]: • Accredited-free - herd prevalence of zero for bovine tuberculosis in cattle and bison; • Modified Accredited Advanced - must have had a bovine tuberculosis prevalence of less than 0.01% of the total number of cattle and bison herds in the State or zone for each of the most recent 2 years; • Modified Accredited - must have had a tuberculosis prevalence of less than 0.1% of the total number of cattle and bison herds in the State or zone for the most recent year ; • Accreditation Preparatory - have a tuberculosis prevalence of less than 0.5% of the total number of cattle and bison herds in the State or zone ; and • Non-Accredited - have an unknown tuberculosis-affected herd prevalence or a tuberculosis herd prevalence of 0.5% or greater. The state status determines the interstate and intrastate TB testing requirements for cattle. The classification system ensures that the state meets the requirements necessary for obtaining national eradication of bovine TB. In terms of eradication and control measures the approach adopted within the USA is characterised as being based upon detection and removal. Detection of the disease is achieved by: • Live Animal Surveillance - herds are subjected to skin tests; and • Routine Slaughter Surveillance - cattle slaughtered at state and federally inspected slaughter plants are inspected for granuloma lesions. Suspect lesions undergo laboratory diagnostics to confirm presence of M. bovis.

Country	Eradication/Control programme details
USA *(continued)*	In instances of detection the following steps are followed[39]: • a herd is confirmed as infected by laboratory testing, • the herd is classified as an affected herd and placed under quarantine and TB tested to determine the presence or absence of other infected animals. • epidemiological tracing of cattle movement into and from the affected herd is performed and additional contact herd testing is conducted. • owners of affected herds may either depopulate the affected herd or engage in a test and removal plan. • In a test and removal plan cattle are repeatedly tested. Infected and suspect cattle at each test are removed to slaughter until the remaining herd tests negative for the disease. This process will take 4-7 years to attain a required series of negative herd tests. Following on from an October 2009 APHIS published entitled "A New Approach for Managing Bovine Tuberculosis" the following moves were instigated in 2010[40]: • **New Policy for Management of TB-Affected Herds** - Historically, Federal funding was used to depopulate entire TB-affected herds and indemnify herd owners as the primary management option. Rather than recommending whole-herd depopulation, APHIS now tailors its approach to a particular herd. In simple terms this means that a test and remove approach can now be employed in circumstances where data supports it; • **Joint TB and Brucellosis Regulatory Working Group** - In September 2010 APHIS formed a working group of Federal, State, and tribal subject matter experts to discuss new directions for the bovine tuberculosis (TB) and brucellosis eradication programs. Development of the proposed TB and brucellosis regulation was expected to take approximately 2 years and work is ongoing on this front; • **TB Serum Bank** - he serum bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results for samples from infected animals. The serum bank samples will be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the United States Animal Health Association; • **Collaborations with Mexico** – APHIS continues to work with Mexico animal health authorities to help advance the country's TB eradication program and to significantly reduce the risk of importing TB-infected and -exposed animals into the United States.

Country	Eradication/Control programme details
Wales	The Welsh Assembly Government developed a TB Eradication Programme for Wales in 2008 which was overseen by the TB Eradication Programme Board, a Technical Advisory Group and the Welfare Strategy Steering Committee. The Programme had the following objectives: • keeping infection out of clean farms and clean areas by raising standards of biosecurity; • rapid, early identification of infection; • containment of infection through immediate imposition of movement restrictions once disease is suspected and actively tracing potentially infected cattle; • elimination and eradication of infection from infected herds and • infected areas Key elements of this programme included: • TB Health Check Wales – every cattle herd in Wales tested to establish a baseline for the disease; • Biosecurity measures – including improved animal husbandry; • Pre movement testing and new testing measures; • Compensation scheme; • Culling of badgers within an Intensive Action Pilot Area (IAA); • Development of badger and cattle vaccines. 2008 also saw the creation of 3 Regional Eradication Delivery Boards in Wales, covering North Wales, Carmarthen and Cardiff. These Regional Boards are tasked with controlling and eradicating Bovine TB taking account of what works best within their region29. Since 2010 the eradication of TB in Wales has been an integral part of the UK TB Eradication Plan as set out previously in this table relating to England. It is also worth noting that since January 2010 all herds of cattle in Wales are annually tested for TB. The Badger (Control Area) (Wales) Order 201130 provided the legislative means for a badger cull within Wales as well as establishing a control area (IAA) mainly covering Pembrokeshire and small parts of Carmarthenshire and Ceredigion. As of today however no badger cull has been instigated within this control area.
	On 21 June 2011, Welsh Minister for Environment and Sustainable Development John Griffiths announced that there will be a review of the scientific evidence base regarding the eradication of bovine TB in Wales. These experts will peer review the scientific evidence base for the comprehensive programme for the eradication of bovine TB in Wales. The panel will be chaired by an independent expert with the other members being relevant recognised experts. It is expected that the report will be delivered in November 2011.

Table 4:Bovine TB eradication and control measures - selected countries

(Footnotes)

12 Derived from DARD Bovine TB programme for monitoring, eradication and control of Bovine TB, submitted to the European Commission, 15th April 2011.

13 Council Directive 78/52/EEC of 13 December 1977 establishing the Community criteria for national plans for the accelerated eradication of brucellosis, tuberculosis and enzootic leukosis in cattle

14 Defra do not provide Bovine TB herd incidence statistics and this figure is derived from Detailed TB statistics 1Jan to 31 Dec 2010 by taking the number of Total New TB incidents as a proportion of the Total number of herd tests conducted. One of the problems with this form of incidence calculation, is that it doesn't take into account risk based testing. Herds in higher risk areas are tested on an annual basis, whereas herds in lower risk areas are tested every second, third or fourth year. The problem with this from the incidence point of view, is that as you change the testing policy, you influence the incidence rate. Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra

15 Bovine TB statistics, Department of Agriculture, Fisheries and Food, DAFF website, 19th September 2011

16 Annual Report for the year ending 30th June 2010, Animal Health Board of New Zealand

17 Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra

18 Information about Bovine TB, State of California Department of Food and Agriculture, website, 20th September 2011

19 Bovine TB positive testing herd statistics, State of Michigan Department of Agriculture website

20 Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra. The Welsh figures may well be lower than the English figures as a result of The Welsh Government currently having an annual testing policy for all herds, including the lower risk herds in the north of Wales, which will partially explain why the incidence rate in Wales is lower than in England – in effect the impact of high risk areas is diluted by the tests from low risk areas.

21 Frequently Asked Questions, Emergency Animal Response Disease Agreement, Animal Health Australia website.

22 Compensation for Destroyed Animals Regulations 2000

23 Health of Animals Act 1999

24 Table showing compensation for Bovine TB, BSE, Brucellosis and Enzootic Bovine Leukosis, September 2011, DEFRA website, 31 August 2011

25 Compensation Arrangements for TB and Brucellosis - Important Information for Farmers Booklet (Revised June 2009), Department of Agriculture, Fisheries and Food website

26 National Operational Plan: 1 July 2005-30 June 2013, National Bovine Tuberculosis Pest Management Strategy, Animal Health Board, New Zealand.

27 Tuberculosis (Scotland) Order 2007

28 Email from Dr Stephen Ott,, Appraisal-Indemnity-Compensation Specialist, APHIS, USDA.

29 Tuberculosis (Wales) Order 2010

30 EAD Response Agreement, Animal Health Australia website.

31 Canada's Bovine Tuberculosis Eradication Program, Powerpoint presentation by Dr.Connie Arguue and Dr.Maria Koller–Jones, Canadian Food Inspection Agency, July 2009

32 Bovine TB Eradication Programme for England , Defra, July 2011

33 2011 TB Control Programme, Department of Agriculture, Fisheries and Food, DAFF website

34 National Operational Plan: 1 July 2005-30 June 2013, National Bovine Tuberculosis Pest Management Strategy, Animal Health Board, New Zealand.

35 Annual Report for the year ending 30th June 2010, Animal Health Board of New Zealand

36 the Implementation Plan for Officially Tuberculosis Free Status in Scotland, Scottish Government Website, 22nd September 2011

37 http://www.aphis.usda.gov/publications/animal_health/content/printable_version/AHR_Web_PDF/E_chapter_3.pdf

38 Bovine Tuberculosis Eradication, Uniform Methods and Rules, Effective January 1, 2005, United States Department of Agriculture

39 Bovine Tuberculosis, Information for Livestock Producers, Animal Health and Food Safety Services, Animal Health Branch, California Department of Food and Agriculture, 2011

40 Chapter 3 – Animal Disease Surveillance and Management, 2010 United States Animal Health Report , United States Department of Agriculture

41 Regional Eradication Delivery Boards page, Welsh Government Website, 14th October 2011

42 The Badger (Control Area) (Wales) Order 2011

Annex J

Update on Bovine Tuberculosis Eradication/Control Provisions in England and Wales

[This supplements the narrative contained within the Assembly Research Paper (pages 18 & 23) produced by Mark Allen on 10 November 2011 – Annex J]

England

- The Coalition Government have given a commitment to introduce, as part of a package of measures, a carefully-managed and science-led policy of badger control in areas with high incidence of TB in cattle. Following consultation on 14 December 2011 Defra announced their intention to proceed with two TB badger trial cull pilots in England as part of a package of measures to address bovine TB.
- Natural England would issue licences under the Protection of Badgers Act 1992. Defra will invite the farming industry to come forward with a shortlist of areas. Natural England will assess the applications against the licence criteria. It is proposed that the two trial pilot culls will begin after the Olympics in 2012.
- Defra anticipate that groups of farmers who receive the appropriate licences will employ contractors to carry out the culling operation. All those involved in badger culling will be required to undertake specific training and demonstrate their competence. The policy is based on a cost-sharing approach with the farming industry.
- There will be strict criteria that applicants for a licence to cull badgers would have to meet. Operators would need a Deer Stalking Certificate or equivalent qualification, and will need to attend a Government-approved course and assessment.
- On 9 February 2012, the Badger Trust wrote to Defra giving them notice of the grounds of legal challenge they intend to pursue if Defra proceed with their policy, i.e. seeking a Judicial Review of the Defra proposals.

Wales

- On 21 June 2011, Mr John Griffiths AM, the Minister for Environment and Sustainable Development announced that he had commissioned a review of the scientific evidence base regarding the eradication of bovine TB in Wales. Plans made under the previous administration for a badger cull in the Intensive Action Area of West Wales were put on hold pending the outcome of that review.
- On 20 March 2012 John Griffiths AM, WAG Minister for Environment and Sustainable Development announced a programme of badger vaccination (rather than culling) following that review.
- Mr Griffiths advised that any decision to cull would need to be justified on the basis that it would be necessary to eliminate or substantially reduce the incidence of bovine TB in cattle. He stated that after considering the evidence provided to him, including scientific and legal advice, that he was not at present satisfied that a cull of badgers would be necessary to bring about a substantial reduction in the incidence of bovine TB in cattle in which case he could not authorise a cull under the Animal Health Act 1981.

Annex K

Title: **Measures to address bovine TB in badgers**	**Impact Assessment (IA)**
	Date: 30/11/2011
IA No:	**Stage:** Final
	Source of intervention: Domestic
Lead department or agency: DEFRA	**Type of measure:** Other
Other departments or agencies:	**Contact for enquiries: TB Programme** tbbc@defra.gsi.gov.uk
Summary: Intervention and Options	**RPC:** RPC Opinion Status

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB in 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
-£0.88m	-£0.29m	£0.03m	No	N/A

What is the problem under consideration? Why is government intervention necessary?

Bovine TB (bTB) is a serious infectious disease of cattle. Disease freedom is a "public good" affecting the whole cattle industry. Private actions to control or eradicate disease are likely to be non-optimal because of externalities and information asymmetry. Badgers are known to harbour bTB and without addressing TB in badgers, it will not be possible to eliminate the disease in cattle. However, badgers are an important native species, and the general public value their existence and freedom from cruel treatment. There is no practical market mechanism that could adequately internalise the trade-off between the existence and welfare of badgers and the control of bTB, so there is a need for Government policy to address this explicitly.

What are the policy objectives and the intended effects?

The objectives of a badger control policy, as part of a package of measures to tackle bTB in cattle, are to address the reservoir of the disease in the badger population; reverse the rising trend of incidence of bTB in cattle in areas with high and persistent levels of the disease; and to empower farmers and landowners to use all appropriate measures to take control of the disease in their local areas in order to minimise the risk to their cattle herds. The intended effect is to reduce the incidence of bTB in cattle in the areas where badger control measures are being applied, also reducing the cost to farmers and Government of dealing with the disease.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Six options have been considered:

- Option 1 - continuing with the current policy with no additional badger control measures;
- Option 2 - a Government-led operation to cull badgers under the Animal Health Act 1981;
- Option 3 - a Government-led operation to vaccinate badgers under the Animal Health Act 1981;
- Option 4 - issuing licences to farmers/landowners under the Protection of Badgers Act 1992 (PoBA) to cull badgers;
- Option 5 - issuing licences to farmers/landowners under PoBA to vaccinate badgers;
- Option 6 - a combination of options 4 and 5 to issue licences under PoBA to cull and/or vaccinate badgers.

The preferred option is Option 6 which would enable farmers/landowners to take control of the wildlife reservoir of the disease at a local level. As illustrated in the IA which accompanied the 2010 public consultation, option 6 does not present the best net present value (NPV) (this was for option 4, for industry to carry out only culling) but does give greatest flexibility for farmers/landowners to formulate the most suitable local solution. Options 2 and 3 are not considered affordable in the current public spending climate.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 09 / 2015					
Does implementation go beyond minimum EU requirements?			**N/A**		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro Yes/No**	**< 20 Yes/No**	**Small Yes/No**	**Medium Yes/No**	**Large Yes/No**
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:**	**Non-traded:**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: ..... Date: .....

Summary: Analysis & Evidence — Policy Option 6

Description:

Issuing licences to use a combination of culling and vaccination in one area of 350m^2.

FULL ECONOMIC ASSESSMENT

Price Base Year 2010	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -£4.43m	**High:** +£1.59m	**Best Estimate: -£0.88m**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**£3.74m**
High	Optional		Optional	**£6.38m**
Best Estimate			£0.5m	**£4.56m**

Description and scale of key monetised costs by 'main affected groups'

Farmers in cull area: surveying, culling and limited vaccination operations, administration and coordination £1.40m
Farmers in neighbouring area: financial cost of initial increase in cattle TB incidents £0.05m
Government: licensing, monitoring, policing, financial cost of initial increase in cattle TB incidents £3.11m

Other key non-monetised costs by 'main affected groups'

General public: strong aversion to a badger cull among many members of the public (no reliable estimate of valuation).
Government: policing costs depend on the extent of illegal activity to disrupt culling (see Evidence Base).

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**£1.95m**
High	Optional		Optional	**£5.34m**
Best Estimate			£0.4m	**£3.68m**

Description and scale of key monetised benefits by 'main affected groups'

Farmers in cull area: financial benefit of avoiding cattle TB incidents £1.13m
Farmers in vaccination area: financial benefit of avoiding cattle TB incidents £0.03m
Government: financial benefit of avoiding cattle TB incidents £2.52m

Other key non-monetised benefits by 'main affected groups'

Farmers in cull and vaccination areas: non-financial benefit of avoiding cattle TB incidents (includes stress of operating business under restrictions, emotional impact of loss of prized cattle), and of seeing action taken to reduce risk of TB transmission from a known wildlife reservoir.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

This option is not prescriptive about how badger culling and vaccination are combined. For illustration, the figures are based on culling within the area of 350km^2 plus limited vaccination in the neighbouring area. Effect of culling on bTB in cattle: assumed as in RBCT, with post-cull effects persisting for as long as has been so far observed in the RBCT areas but no further (i.e. up to 6 years after culling stopped). Cost of culling operation: assumes mainly controlled shooting, with some use of cage trapping. In line with licensing conditions and guidance, barriers or buffers reduce impact in the neighbouring area. For farmers in the cull area, monetised costs exceed expected monetised benefits; any potential risk to sustained implementation would be mitigated by licensing conditions. There are considerable uncertainties around the central estimates shown here.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 0.2	**Benefits: 0.1**	**Net: 0.0**	No	Zero Net Cost

1. Introduction

1.1. Bovine TB (bTB) is a serious infectious disease of cattle, caused by the bacterium *Mycobacterium bovis (M. Bovis).* It can be transmitted to humans and other warm-blooded animals.

1.2. Bovine TB is a pressing animal health problem and is one of the biggest challenges facing the cattle farming industry today. In England, in 2010, bTB cost the taxpayer £90m and nearly 25,000[1] cattle were slaughtered for TB control.

1.3. The Government is committed to putting in place a package of measures to tackle bTB which adds up to a balanced programme. There is no single solution, so we need to use every control tool in the toolbox to reduce the disease in cattle, in a proportional and cost-effective way. We envisage that a balanced programme should include the following key elements, many of which are already in place:

- surveillance for the disease in cattle and control measures in those herds where infection is identified;
- controlling the disease in badgers;
- enhanced bio-security and husbandry practices by cattle owners;
- advice and support to farmers;
- dealing with bTB in non-bovine kept species (including camelids (llamas, alpaca) and goats); and
- focused research and development (including development of a cattle vaccine and an oral badger vaccine).

1.4. Of these key elements, the one which is not currently being deployed is badger control. Scientific evidence indicates that in areas with high incidence of bTB in cattle, it will not be possible to eliminate the disease in cattle without addressing the transmission of disease from badgers[2]. No other country in the world has successfully tackled bTB in cattle without addressing any wildlife reservoir involved in maintaining and transmitting infection to cattle. We therefore regard this as the most pressing issue if we are to make progress on tackling the disease in cattle.

1.5. However, badger control is only one part of the programme. We are committed to a balanced package of measures which includes all the key elements above and which will be reviewed regularly as we progress towards the long term goal of eradication. Cattle measures will continue to be central to our bTB control programme.

1.6. The TB Eradication Programme for England, published in July 2011, includes the following key measures:

- cattle surveillance and control measures to address cattle to cattle transmission;
- promoting good biosecurity, to address transmission between cattle, and between badgers and cattle;
- control of TB in badgers, to reduce transmission from badgers to cattle in TB endemic areas;

[1] 2009 figure
[2] See Risks and Assumptions, Box 1.

- measures to tackle TB in non-bovine farmed species (including pigs, goats, deer, sheep, alpacas and llamas);
- advice and support for farmers;
- a targeted research and development programme; and
- robust governance, monitoring and reporting arrangements.

1.7. This Impact Assessment assesses the costs and benefits of several scenarios under the preferred option for badger control (Option 6 in the 2010 public consultation).

2. Rationale for Government intervention

2.1. The original rationale for Government's involvement in the effort to tackle the disease was to protect public health. In the 1930s, most milk was consumed untreated. Milk-borne human *M. bovis* infection was a major public health risk and a significant source of TB in humans.

2.2. A test and slaughter policy introduced in the 1950s alongside routine pasteurisation of cows' milk and inspection of cattle carcases at slaughterhouses gradually removed the risk to human health.

2.3. Today, alongside maintaining vigilance over risks to public health, the main rationale for Government intervention is to meet EU requirements and to mitigate the economic impact of the disease on the cattle farming industry. The benefits of Government controls of bTB in cattle – in terms of reduced disease spread and losses – outweigh the costs of those controls. By continuing with the current approach, costs are expected to increase further as the disease situation worsens and the cost of control measures increases.

2.4. The total costs of bTB are about 3% of gross output of GB cattle enterprises, rising to 7% in South West England. The total cost of a cattle herd breakdown is equivalent to about 25% of the output of an average cattle farm. This is the average of a very wide range including many small breakdowns to a few very large, costly and long-lasting incidents. Most of the cost currently falls to Government.

3. Policy objective

3.1. The objectives of a badger control policy, as part of a package of measures to tackle TB in cattle, are to

- address the reservoir of the disease in wildlife;
- reverse the rising trend of incidence of bTB in cattle within areas where badger control is being applied; and
- give farmers and landowners the opportunity to take all measures available to them to minimise the risk to their cattle herds.

3.2. The intended effect of the policy is to reduce the incidence of bTB in cattle in the areas where badger control measures are being applied, also reducing the cost to farmers and Government of dealing with the disease.

4. Application and scope

4.1. TB control is a devolved matter. This policy will apply to England only.

5. Analysis of Options

5.1. We considered six policy options in the 2010 consultation Impact Assessment:

Option 1: continue with the current policy (i.e. no additional control measures);

Two possible options for a Government-led policy of badger control under the Animal Health Act 1981, comprising:

Option 2: Government-led culling (using cage-trapping and shooting);

Option 3: Government-led cage-trap and vaccination;

A partnership approach between the farming industry and government, based on any, or all, of the following three options:

Option 4: issuing licences under the Protection of Badgers Act 1992 (PoBA) to cull badgers;

Option 5: promoting greater use of licences under the PoBA to trap and vaccinate badgers;

Option 6: issuing licences under the PoBA to cull, vaccinate or use a combination of culling and vaccination.

5.2. **Our preferred approach is option 6**: to issue licences under the PoBA for industry to cull badgers, subject to a specific set of licence criteria. Under existing arrangements farmers and landowners will also be able to apply for licences to vaccinate badgers either on its own or for use in combination with culling. This approach will allow farmers to manage their own situations and use all the control measures available. It also means that taxpayers will not be paying for significant additional disease control measures. We consulted further on the implementation of this option, as articulated in draft Guidance to Natural England from July-September 2011.

5.3. In the Impact Assessment which accompanied the 2010 public consultation, Option 6 illustrated a scenario in which badgers are culled in 75% of a 150 km^2 area and vaccinated in 75% of the neighbouring 2km ring (100km^2). From discussions with industry, a more realistic scenario is that badgers are culled in 70% of a 350km^2 area. Each control area will use a different mix of barriers of buffers to protect the neighbouring ring against the perturbation effect and there are a range of possible impacts that could result from different combinations of measures. For the purposes of this IA we have assumed that:

- 50% of the control area is surrounded by a hard boundary (e.g. sea coast, lakes and reservoirs, motorways);
- on 40% of the boundary, farmers with vulnerable livestock have agreed to accept any TB risks associated with culling related perturbation;
- vaccination occurs on land comprising 10% of the surrounding area.

(In practice it may be unlikely that 50% of a control area will be surrounded by a hard boundary, but this combination of assumptions is intended to reflect the effect that might

be achieved by having some barriers, buffers or other measures in place around the whole boundary.) The costs and benefits described in the next section are based on this scenario.

6. Costs and benefits

6.1. The analysis below sets out the costs and benefits of the scenario outlined above.

Costs

Table 1: Summary of costs

	Rate	Time period
Licensing	**£377,000 per area for two pilot areas**	**Total over four years (highest in the first year)**
Co-ordination	**£20,000 / area/ year**	**4 years**
Culling using cage trapping	**£2,500 / km^2 / year**	**4 years**
Culling using controlled shooting	**£300 / km^2 / year**	**4 years**
Culling using a combination of methods	**£1,000 / km^2 / year**	**4 years**
Vaccination	**£2,250 / km^2 / year**	**4 years**
Monitoring	**£737,000 per area for two pilot areas**	**4 years**
Policing	**£500,000 per area per year**	**4 years**

Licensing

6.1. Natural England will be required to exercise its powers as licensing authority under Section 10(2)(a) of the Protection of Badgers Act (1992) to issue licences for the purpose of preventing the spread of disease.

6.2. The licensing operation would consist of processing and assessing applications against fixed criteria (including site visits) and judgement will be used to arrive at a decision on such applications. This process involves mapping and analysing the proposed control area, assessing the biosecurity arrangements in place on farms and monitoring compliance (including site visits).

6.3. The licensing costs (which include the ongoing costs to Natural England of monitoring compliance with the licence conditions) have been based on Natural England's staffing costs (and travel and subsistence costs associated with visits in the control area), with costs for future years apportioned between the first two pilot areas and the additional areas which may have been granted licences if the policy is rolled out more widely.

6.4. Costs associated with legal challenges are unknown at present.

6.5. Farmers will incur costs in the licensing and monitoring process but these are taken to be included in the costs of co-ordination (see below).

Survey

6.6. Applications will need to be supported by a map which demonstrates that the area is at least 150 km^2 in size; is located within 12-month test areas; has at least 70% of the area accessible for culling; and that reasonable measures (e.g. barriers or buffers) are in place to mitigate the risk to non-participating farmers and landowners of a potential increase in confirmed new incidents of TB in vulnerable livestock within the control area and in the surrounding 2km ring. Protected areas, such as SSSIs, will also need to be identified for assessment by NE.

6.7. To produce and analyse one map has been estimated to take 12-15 hours of one FTE, plus 3.5-7.5 hours to digitise the area. Costs to produce these maps have been estimated as £3,000 for 6 applications (£500 per 150 km^2 area). These costs are included in the cost of licensing above.

Co-ordination of culling

6.8. Participants in a culling operation will be required to comply with strict conditions to ensure that culling is delivered effectively and co-ordinated across the control area over six weeks. To achieve this co-ordinated approach, costs will be incurred for communication, planning, support, management, and administration estimated at about £20,000 a year per area. Significant savings per farmer would be expected in areas above 150 km^2. These costs would be borne by participating farmers.

6.9. A co-ordinated approach would require a co-ordinated licence application. The costs above include costs for recruiting a group leader / project officer to co-ordinate the application including farm visits, collating maps, collecting data to satisfy all of the licence criteria and information required to support the Badger Control Plan, including information on bio-security awareness campaigns and the measures already in place. The group leader / project officer would liaise with the licensing authority during the application process and monitor participation and compliance throughout the cull period, including the submission of licence returns and any necessary enforcement action.

Culling Delivery

6.10. Participants will be permitted to use two culling methods (which can be used in combination, or as single control methods):

- cage-trapping followed by shooting; and
- controlled shooting.

6.11. The costs of cage-trapping and shooting are based on the estimates in Defra's 2005 cost-benefit analysis adjusted for inflation and rounded. Removing the costs of surveys and monitoring (shown separately here), these are estimated at £2,500 / km^2 of participating land / year.

6.12. The main operations, and therefore the main costs, of cage-trapping and shooting are the same as those for cage-trapping and vaccination. The major additions for shooting

are the cost of ammunition (if using frangible bullets containing bismuth, these cost about £4 each plus approximately £45 per order for carriage to a firearms dealer) and the cost of badger carcase disposal (see below).

6.13. While the estimated cost of cage-trapping and shooting is solidly based in RBCT experience (adjusted to exclude activity specific to its trial status), there is less evidence of the costs of controlled shooting. It seems likely that in some situations farmers could carry out controlled shooting at a substantially lower cost, perhaps around £300 / km^2 of participating land / year. For the "best estimates" in the assessment of industry-led culling, we assume that a combination of cage trapping and controlled shooting would be used, costing £1,000 / km^2 of participating land / year.

6.14. As part of the licence criteria, operators will require relevant training and competence to carry out culling. Industry will be responsible for running the courses, according to a syllabus approved by Government. The training will be independently audited. The costs are likely to be between £50-£250 per person, depending on the number of people attending and their previous experience and qualification.

6.15. In addition to required training, controlled shooting will be piloted in two areas in the first year to ensure that it is effective and humane. The costs of monitoring in the pilot areas are included below.

Carcase Disposal

6.16. The carcases of badgers suspected of harbouring TB (a zoonotic disease) fall within the definition of Category 1 materials under the Animal By-Products Regulation 1774/2002 (and Regulation 1069/2009 due to replace the previous Regulation on 4 March 2011). The carcases therefore must be collected, transported and identified without undue delay, and either incinerated in an approved incineration plant or processed in an approved rendering plant with the processed products being finally disposed of as waste by incineration or burial in an approved landfill. Burial without first processing is not a permitted disposal route for Category 1 material.

6.17. The cost of collecting a suitably bagged and labelled carcase is estimated at £10-20 per carcase. This is included in the culling delivery costs above.

Vaccination Delivery

6.18. Vaccination by injection of caged badgers would involve similar operations to those for cage-trapping to shoot. Unit cost of vaccine is £12 per dose and vaccination programmes are assumed to be repeated for five years. The total cost assumed for vaccination operation is £2,250 / km^2 of participating land / year.

6.19. Any necessary training of contractor staff for vaccination or for shooting is assumed to be included in the rates used.

Monitoring

6.20. The monitoring costs are divided into two elements:

- monitoring in the two pilot areas during 2012/13 to confirm our assumptions about the effectiveness and humaneness of controlled shooting; and

- the general, ongoing monitoring that will occur in all licensed areas.

Pilots

6.21. The Secretary of State has announced that the Government would take a precautionary approach through a pilot of the policy; initially licensing two areas in the first year, which will be closely monitored to ensure that controlled shooting is both effective and humane. The results of monitoring in these areas will be examined by an independent panel of experts. In the pilot areas, additional monitoring will be required during 2012/13. This is expected to cost £1.041m for three studies and the expert scientific panel.

General monitoring

6.22. In addition to Natural England's monitoring of compliance with licence conditions (the costs of which are included above in NE's licensing costs), there will be three other components to the monitoring programme which in total is estimated to cost £2.804m for the period 2011/12 to 2014/15:

i. Humaneness of culling methods
ii. Epidemiology of TB in cattle
iii. Badger activity

Monitoring humaneness

6.23. Ministers have committed to monitoring the humaneness of culling throughout the culling period to ensure that standards are maintained. We propose to take a risk based approach, decreasing the number of observations and post-mortems in later years if the results in a specific control area are satisfactory. At present, we estimate the cost to be £0.7m from 2013/14-2014/15. This estimate is based on the cost of field observations and post-mortem examinations.

Epidemiological monitoring

6.24. The incidence of bTB in cattle is already monitored. Exploratory analyses of data gathered from licensed areas and suitable comparative control areas could look for any changes in trends that might be attributable to badger control. It is estimated that this analysis will cost £394,000 over 4 years. A large proportion of these costs are fixed irrespective of the numbers of licensed areas.

Independent monitoring to confirm presence of badgers in licensed areas

6.25. The badger control policy will be an exception under Article 8 of the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) (which aims to conserve wild flora and fauna and their natural habitats and to promote European co-operation in that field), in conformity with Article 9, and will be reported in the biennial report to the Standing Committee. The Bern Convention prohibits 'causing local disappearance of or serious disturbance to... populations' (Article 8) and that '[any] exception will not be detrimental to the survival of the population' (Article 9).

6.26. We will monitor the presence of the surviving badger population in an area of 20km^2 in each licensed area annually over the culling period, at an estimated cost of £40,000 - 60,000 per control area over four years (£10,000 – 15,000 per area per year).

Policing

6.27. The need for additional policing arose in the RBCT. It is possible that any future culling operation will also generate policing costs depending on the extent of any illegal activity.

6.28. While we recognise the right of those opposed to badger control to undertake peaceful protest, those operators undertaking culling activities under licence have the right to do so without fear or intimidation. The police have been closely involved in the development of the policy and will liaise closely with the industry to discuss appropriate security arrangements and will monitor the situation on the ground to ensure public safety.

6.29. An estimate of police costs has been developed through discussion with the Association of Chief Police Officers (ACPO) and the Home Office. This estimate is based on certain assumptions about the likelihood of disruption to culling activities and has been a key factor considered by Ministers in reaching their decision on the policy.

6.30. The nature of the policing response will depend on specific intelligence available at the time. However, ACPO has suggested an initial estimate of the cost in the region of £0.5m/year/area for the four years when culling would take place (ie £2m per area) based on the 'basic' levels of policing required in relation to maintaining public order and safety. There is the potential for this estimate to increase to cover any unexpected increases in disorder from protests. However, the very high level of uncertainty around the likelihood and level of these costs mean that they have not been quantitatively estimated.

6.31. The police will also be required to amend firearms licences to enable the shooting of badgers with rifles. Amendments to firearm licences are free by law but costs will fall to the police for checking names with the NE licence, amending, reprinting and posting amended certificates. Many certificate holders are limited to specific land or areas first inspected by police. If this needs amending, additional costs will be incurred if the police need to inspect new areas as to its suitability for shooting over.

Badger welfare

6.32. The well-being of wildlife populations is of concern to many members of the general public. Previously, Defra commissioned economic research to investigate the possibility of valuing this concern in relation to badger control. The work used a "choice experiment" to estimate the trade-offs that people might be willing to make between changes in badger populations and the incidence of bTB in cattle. The results were that the general public's valuation of reduced cattle bTB shows they would be willing to accept the lower badger population following a control programme. Responses to the choice experiment also showed that the choice of management strategy towards badgers (e.g. whether to cull) was much more important than either badger population or number of cattle slaughtered because of bTB. The researchers did not consider their valuation estimates of management policy to be reliable enough to use in cost-benefit

analysis. Their work considered a general culling policy everywhere throughout the bTB high-risk areas and was not designed to assess a licensed cull within a limited area.

6.33. Overall, therefore, it is not possible to suggest a reliable estimate of the value the general public would place on avoiding a licensed area cull of badgers. However this is an important non-monetised cost of a culling policy that is noted in this assessment and is a relevant consideration for decision-making. Based on RBCT experience, the number of badgers culled in an area of 350 km^2 over four years might be around 2,450. Badger welfare has been essential to the choice of culling methods that could be used or licensed in any cull, and would be a subject of the monitoring activity costed into all culling options in the assessment.

Cost of increased bovine TB in cattle in neighbouring areas due to culling

6.34. Scientific analysis of the RBCT suggested that the phenomenon of badger perturbation could lead to adverse impacts of badger culling on bTB in cattle, i.e. additional confirmed new incidents (CNIs) in neighbouring areas. The scenario described in paragraph 5.3 assumes the area will take measures to mitigate the risk of perturbation. For the purposes of this modelling, we have assumed that both hard boundaries and vaccination is 100% effective at mitigating the detrimental effects of perturbation.

Benefits

Table 2: Summary of benefits

	Option 6: Industry-led cull & vaccination
CNIs prevented gross/net	141/136
Gross benefits £ present value	£3.68m
As % of CNIs baseline cost	21%

Saving the cost of cattle TB incidents prevented

6.35. Under "business as usual" (i.e. with no badger control), CNIs of bTB occur and require a series of control actions that are costly to farmers and to Government. The main control actions involve restricting movements of cattle from the herd, whole herd testing of the cattle, slaughter of any cattle that react to the test, and repeated testing and slaughter until the herd is cleared. This assessment considers only CNIs and excludes unconfirmed incidents, because analysis of data from the RBCT did not identify any significant effect of badger culling on unconfirmed incidents. Routine testing costs are also excluded, so the business as usual costs are less than the full costs of bTB surveillance and control in the area.

6.36. A programme of badger control within an area, whether culling or vaccination, is intended to reduce these control costs by reducing the number of CNIs in cattle in the area. The monetised benefits of the programme are the savings in bTB control costs compared to "business as usual".

6.37. The costs of CNIs under "business as usual" can be calculated by multiplying the number of CNIs in an area by the unit cost of a typical CNI. These two elements are considered in turn.

Number of CNIs under "business as usual"

6.38. This assessment does not relate to any one identified area, so we do not know the current incidence of bTB in cattle in the area where any badger control might be applied. However, it is reasonable to suppose that a control area would be one with a relatively high incidence. This is likely in the case of licensed farmer action because of the higher incentive for participation and the licensing conditions envisaged.

6.39. A fair indication of the bTB incidence in cattle is therefore the incidence in the areas identified as candidates for Defra's Badger Vaccine Deployment Project (BVDP). The average incidence in ten areas of 100 km^2 over five years 2003 to 2007 was 0.186 CNI per year per km^2, and in ten areas of 300 km^2 was 0.121 CNI per year per km^2. This implies an incidence of 0.089 CNI per year per km^2 in the outer area (the part of the 300 km^2 outside the 100 km^2). For comparison, the "historic incidence" (for three year periods before 2001) in the ten RBCT proactive cull areas plus ten survey-only areas each of 100 km^2 was 0.085 and in the neighbouring areas 0.046 CNI per year per km^2. For this assessment, initial incidence within an area of 350 km^2 is assumed to be 0.15 CNI per year per km^2, and 0.10 CNI per year per km^2 in the neighbouring area up to 2 km away.

6.40. Bovine TB incidence in cattle under current policies has generally risen in recent years. In the BVDP candidate areas, incidence rose at over 10% a year in the period 2003 to 2007. AHVLA modelling projects a national increase in incidence of around 3% a year. This assessment assumes a baseline increase in CNIs of 3% a year. Combining this trend with the initial incidence rates gives a baseline total of 685 CNIs in the 350 km^2 cull area plus the vaccinated area over ten years.

Unit cost of CNIs

6.41. We estimate the average cost of a CNI using a standard approach described previously in Defra (2005) *"Cost benefit analysis of badger management as a component of bovine TB control in England"*. The method relies heavily on a previous independent study by the University of Reading but we have updated the financial values (e.g. the loss to the farm business from having a reactor slaughtered) in line with appropriate price indices and the physical values (e.g. number of cattle slaughtered per CNI, number of extra herd tests per CNI) with averages from recent VLA analysis of actual CNIs.

6.42. The largest item of CNI costs is the impact of slaughtered reactor cattle and dangerous contacts. Reading University developed a method to estimate the true economic cost of these slaughters to take account of all relevant costs, e.g. disruption of the milk output of a dairy herd, so this is not simply the same as the value of the cattle taken. The average number of slaughters per CNI is 12.8. The average cost (net of the salvage value of the animals) is estimated to be £1205, carried partly by Government (through the compensation arrangements) but leaving a residual cost to the farmer of £320 per animal. The total cost of slaughter per CNI is about £15,000.

6.43. The second largest cost item is the cost of extra tests on the restricted herd. Cattle testing is costly both to the farmer, who has to collect cattle for testing and may lose output as a result, and to Government, which pays for the vet, administrative support and tuberculin. This item also includes the cost of official veterinary input extending

beyond the tests themselves. Assuming an average herd of 200 tested cattle, with 5.3 extra whole herd tests needed as a result of the CNI, and unit costs of £3.20 to the farmer and £7.50 to Government, the total extra testing cost of the restricted herd per CNI is about £11,000.

6.44. Other costs of a CNI are the costs to the farmer of movement restrictions and isolation of animals, and the costs of consequent testing in other herds (contiguous herds and traced animals). These are estimated to total around £4,000 per CNI.

6.45. Table 3 shows the estimated total costs of a CNI. The average cost is about £30,000, split roughly one third to the farmer and two thirds to Government. Analysis of data from the Farm Business Survey for farms experiencing major TB incidents tends to confirm that this estimate of total financial cost of an average CNI is realistic. Our impact assessment calculations use the rounded figure of £30,000 cost per CNI.

Table 3: Average cost of a confirmed new incident of bovine TB in cattle

		Cost to		
		Farmer	**Government**	**Total**
Slaughter	12.8 animals	£4,096	£11,328	£15,424
Restriction	200 in herd for 250 days	£1,000	£0	£1,000
Isolation	12.8 animals 16 days	£410	£0	£410
Testing	200 in herd for 5.3 herd tests	£3,392	£7,950	£11,342
Other tests	210 contiguous/traced animal tests	£672	£1,575	£2,247
Total		**£9,570**	**£20,853**	**£30,423**

6.46. In practice, there is a wide variation in the scale and duration of CNIs. Many are minor but a small proportion are major, costly to farmer and Government, and extremely disruptive to the farm business. In this Impact Assessment, we assume that the average cost of an avoided CNI is the same as the national average but we recognise the range that exists.

Unquantified costs of CNIs

6.47. Qualitative evidence suggests that bTB can cause significant stress and ill health among the farming population. However, the impact of such stress is difficult to quantify or value. Studies looking at the social impacts of bTB have found self-reported stress among farmers. For example, from a sample of 50 farmers interviewed in the south-west, 30 said their farm's bTB breakdown had affected their own daily life, 20 that of their family or household, 10 their employees. Evidence suggests that a long period of time under movement restrictions is a significant contributor to stress across all farming groups. A standard questionnaire designed to identify psychiatric ill health found that farmers that have been under bTB movement restrictions for a long period of time showed significantly higher levels of stress than farmers who had not experienced a bTB herd breakdown.

6.48. Bovine TB incidents are also likely to have consequences for other businesses. The available evidence in this area suggests that these effects are minor compared to those for farmers themselves and that they are a mixture of positive and negative impacts. They are not considered further in this assessment.

Baseline cost of CNIs

6.49. Multiplying the "business as usual" number of CNIs by the average cost gives the baseline cost of CNIs in the 495km^2 area (350 km^2 where badger culling might take place, plus the neighbouring area up to 2 km around the boundary). The total baseline cost of CNIs over the 11 years of the assessment period is £20.55 million in cash terms or £17.54 million in present value terms.

Effect of badger culling on the number of CNIs

6.50. The RBCT has generated data on the effect on CNIs of a five year (on average) proactive badger culling operation using cage-trapping and shooting. The estimated impacts are shown in table 4. This assessment assumes that the estimated impacts of culling in the RBCT would be achieved by a culling operation satisfying the envisaged licensing conditions and carried out for four years over an area of 350 km^2 with 70% coverage, whether by cage-trapping and shooting, shooting free-ranging badgers or a combination of both. The assessment also assumes that the post-cull effects after four years' culling would be identical in size to those seen after five (the average duration of culling in the RBCT), in terms of size and duration. The 95% confidence intervals for the RBCT estimates (in parentheses in table 4) are used to calculate high and low estimates of culling impacts.

Table 4: Estimated effect of RBCT badger culling on CNIs in cattle

	within culling areas	≤2 km^2 outside
During trial	-23.2% (-32.7% to -12.4%)	+24.5% (-0.6% to +56.0%)
Post trial (from one year after culling stopped)	-28.0% (-15.0% to -39.1%)	-4.1% (-25.7% to +23.7%)

(Sources: Jenkins, Woodroffe & Donnelly (February 2010) "The Duration of the Effects of Repeated Widespread Badger Culling on Cattle Tuberculosis Following the Cessation of Culling" www.plosone.org 5(2); Donnelly, Jenkins & Woodroffe (September 2011) "Analysis of further data (to 28 August 2011) on the impacts on cattle TB incidence of repeated badger culling".)

6.51. The most recent estimates of RBCT culling impacts cover the period up to 60 months of the post-culling period (i.e. up to 5 years after culling stopped, counted from one year after the last cull). There had previously been some indication that the impacts were tapering off. This assessment assumes that effects would persist up to 60 months post-cull and then cease.

Effect of badger vaccination on the number of CNIs

6.52. There is far more uncertainty about the impact of badger vaccination on CNIs, compared to that of badger culling, since the latter is informed by comprehensive data produced by the RBCT and other culling operations, while we have no data on the impact of vaccination. Laboratory studies on captive badgers have shown that vaccination reduces the progression, severity and excretion of *M. bovis* in badgers but there is currently only limited information on the effect of vaccination of wild badgers in a naturally infected population and none on the expected impact on CNIs.

6.53. For the options in this Impact Assessment, it is assumed that vaccination is carried out for four years. The effect of badger vaccination on bTB in cattle is assumed to be proportionate to estimated impacts of badger culling in the RBCT. The impact of

vaccination on CNIs during the vaccination period is assumed to be 38% that of culling (in the control area), and during the post-vaccination period, assumed to be 68% that of culling (in the control area), in line with modelling by FERA[3].

6.54. Low and high estimates use the 95% confidence limits reported for the estimated RBCT impacts, again scaled. As for culling, it is assumed that vaccination impacts on bTB in cattle persist for as long as has been so far observed in the RBCT areas but no longer (i.e. up to 6 years after culling stopped).

6.55. The policy on badger control involves licensing a combination of culling and vaccination but is not prescriptive about the strategy adopted. For illustration, this assessment is based on a scenario using the assumptions set out in paragraph 5.3. The impact of this strategy is assumed to be to reduce CNIs within the culled area by the same percentage as found in the RBCT results, but to eliminate the increase in CNIs seen in the neighbouring area, replacing it with the percentage reduction in CNIs as scaled for vaccination.

Net impact of the policy options

6.56. Table 5 summarises the net impact of the preferred policy option shown as a change from the baseline of "business as usual".

Table 5: Net impact of the preferred policy option

	Option 6: Industry-led cull & vaccination
PV(Costs)	+£4.56m
PV(Benefits)	+£3.68m
NPV	-£0.88m
BCR	0.81
PV(Baseline)	£17.54m
% change	+5.0%

6.57. **Option 6** is a combined strategy involving culling and vaccination. As illustrated (culling 70% of 350 km^2 circle; vaccination 10% of 2km surrounding ring, this option presents a net cost of £0.88 million. This is the preferred option as it would enable farmers/landowners to take control of the wildlife reservoir of the disease at a local level.

[3] Food and Environment Research Agency (Fera) Report to Defra, 'Comparing badger (*Meles meles*) control strategies for reducing bovine bTB in cattle in England' (November 2010) available at: http://archive.defra.gov.uk/food-farm/animals/diseases/tb/documents/8control-strat-report.pdf.
Computer modelling can be used to try and assess the contribution badger vaccination can make to tackling TB in cattle. While such models do provide an important contribution to our understanding of the benefits vaccination could provide, the results cannot be considered conclusive and can vary significantly depending on the assumptions used. The authors of the Fera model assumed high vaccine efficiency (70%), that all vaccinated badgers were completely protected and therefore could not transmit disease, high vaccination compliance (100%) and a prevalence of TB in badgers of 17% (which may be lower than is typical for endemic areas). At the time of compiling this advice, the sensitivity of their results to these assumptions is being analysed in further detail and the results are not yet available.

It is the policy approach which offers greatest flexibility for farmers/landowners to formulate the most suitable local solution.

7. Risks and assumptions

Perturbation effect and boundaries of a cull area

7.1. The RBCT suggested that badger culling could lead to additional CNIs in areas neighbouring the culled area. The criteria proposed for licensing specify that the area will have boundaries or buffers to mitigate the negative effects in neighbouring areas caused by perturbation of badgers' social groups.

7.2. The main calculations throughout the Impact Assessment assume that boundaries, buffers and vaccination in the neighbouring ring will eliminate any increase in CNIs there. Table 6 shows how the main results (first column of figures) would change without vaccination, first if perturbation impacts occur, and second if choice of boundaries succeeds in eliminating the impact on cattle bTB in the neighbouring area.

Table 6: Summary impacts of preferred option with/without neighbouring area

	With boundaries, buffers and vaccination	With perturbation impact in whole neighbouring area	With no impact in neighbouring area
CNIs prevented: gross/net	141/136	139/127	139/139
PV(Costs)	£4.56m	£4.67m	£4.25m
PV(Benefits)	£3.68m	£3.68m	£3.59m
NPV	-£0.88m	-£1.00m	-£0.66m
BCR	0.81	0.79	0.85
PV(Baseline)	£17.54m	£19.67m	£19.67m
% change	+5.0%	+5.1%	+3.3%

7.3. Option 6 shows net benefits in total, but the estimated net impact on farmers actually carrying out culling and vaccination under licence is negative (a net cost). In light of this, licence applications are most likely to come only from areas where the cattle bTB problem was worse than assumed here (in terms of herd incidence, or duration and scale of CNIs), or the value of the impact of CNIs on cattle businesses was worse than assumed (perhaps because of higher than average cattle values), or the unquantified effects such as stress were a major concern for farmers. In those situations, the benefits of badger control to farmers could be higher than estimated here.

7.4. Assumptions included in these calculations are as follows:

- One 350 km^2 area plus the neighbouring area of up to 2 km.
- From the RBCT, land access for culling was on average 70% of the total land area in the treatment areas. To achieve at least the same net benefits of culling as seen in the RBCT we have assumed that there must be land access of at least 70% in a licence application. For this Impact Assessment we have assumed a 70% participation rate for all badger control measures for illustration purposes.

- Culling will take place for four years, vaccination also for four years. Impacts of culling are shown for a four year period, but are based on the effects seen in the RBCT (where culling was conducted for an average of five years).
- Benefits are calculated over 10 years.
- Culling requires that 70% of the badger population resident across the entire licensed area be removed.
- Initial cattle bTB incidence is assumed to be 0.15 CNIs / km^2 within the 350 km^2 area and 0.10 CNIs / km^2 in the neighbouring area.
- The baseline for cattle bTB incidence assumes a 3% per year increase in CNIs.
- Effect of culling on TB in cattle assumed as in RBCT. Low and high estimates use the 95% confidence limits reported for the estimated RBCT impacts. All assume impacts on cattle bTB persist for as long as has been so far observed in the RBCT areas (i.e. up to 6 years after culling stopped) but no longer.
- Effect of badger vaccination on bTB in cattle assumed proportionate to estimated impacts of badger culling in the RBCT. Impact during the vaccination period assumed at 38% that of culling. Impact achieved in the post vaccination period at 68% of the RBCT culling impact in line with modelling by Fera.[4] Low and high estimates use the 95% confidence limits reported for the estimated RBCT impacts, again scaled. All assume impacts on cattle bTB persist for as long as has been so far observed in the RBCT areas (i.e. up to 6 years after culling stopped) but no longer. Vaccination is assumed to over-ride the effect of badger perturbation on cattle bTB in the neighbouring area.[5]
- The best estimate of the cost of the culling operation assumes a mix of cage-trapping and much cheaper controlled shooting, or a controlled shooting approach involving greater effort, (and that this can achieve RBCT effects). Low cost assumes all controlled shooting, high cost assumes all cage-trapping.

7.5. Annex 1 gives a table (Table 7) of the main assumptions made in estimating the impacts of the policy options. The table summarises the source of the assumptions and the degree of certainty attached to them. It also shows how far the results of the assessment would be altered by changing each assumption to an extreme, but still plausible, value.

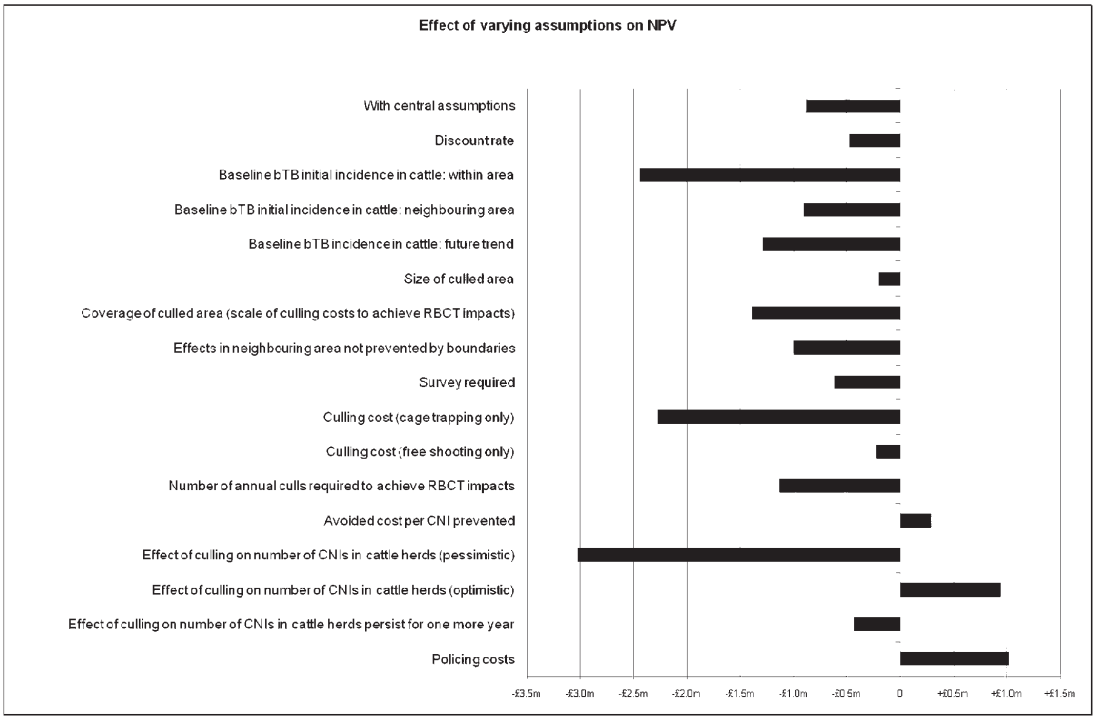
7.6. The main assumptions fall into two groups. The first group includes assumptions about the characteristics of the area where culling might take place, such as the size of the area and the incidence and trend of cattle bTB there, and whether the area has hard boundaries. These assumptions would largely be known once a specific area is being considered, and the choice of area can be based partly on whether the important characteristics of the area tend to improve the economic outcome. Proposed licensing

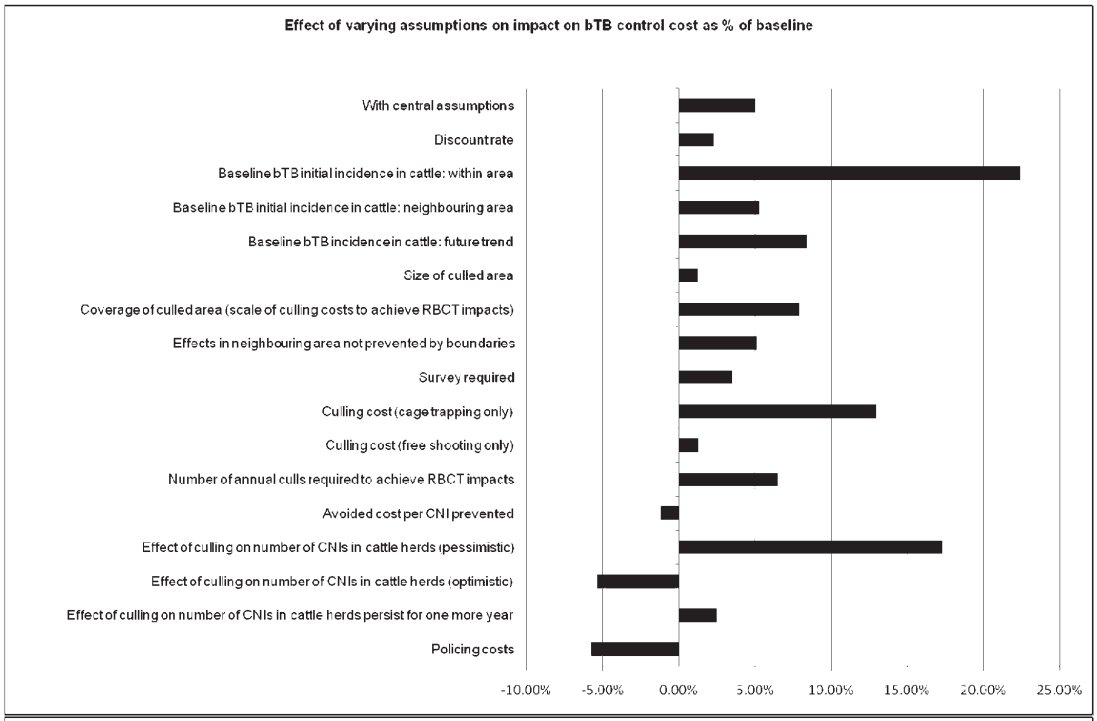
[4] Food and Environment Research Agency (Fera) Report to Defra, 'Comparing badger (*Meles meles*) control strategies for reducing bovine bTB in cattle in England' (November 2010) available at: http://archive.defra.gov.uk/food-farm/animals/diseases/tb/documents/8control-strat-report.pdf.

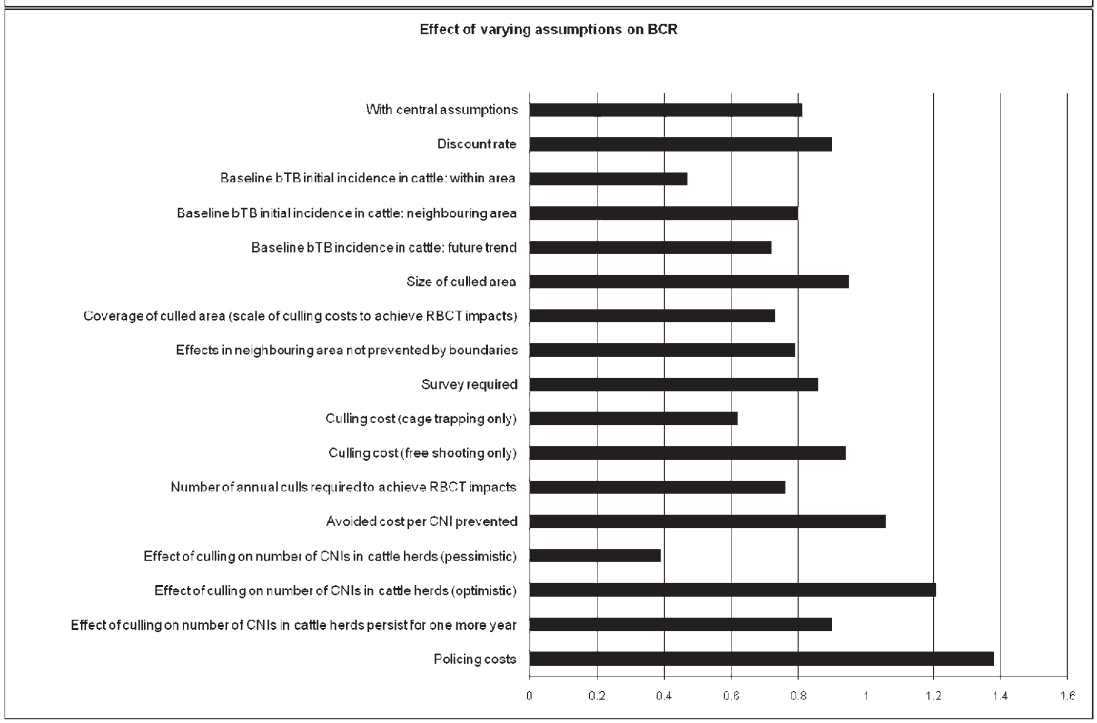
[5] For consistency, this version of the IA represents the effects of vaccination in 10% of the ring around a culling area as it was represented in the consultation stage IA. More recently, Fera specifically modelled ring vaccination around a culling area and found that the modelled disease incidence in cattle was unchanged (i.e. vaccination prevented the perturbation effect) during the control period and reduced by 30% in the following 5 years. This is slightly more beneficial than the effects assumed in this IA, but because vaccination is only applied in 10% of the ring, the difference is very small: only 0.4 net CNIs, and less than £0.01m improvement in NPV.

criteria are designed to do this. The second group are assumptions about the culling process, which are genuinely unknown or highly uncertain, are less subject to policy control, and would not become known until after any culling had taken place. The two most important ones are the impact of culling on cattle bTB, and the cost of culling needed to achieve that result.

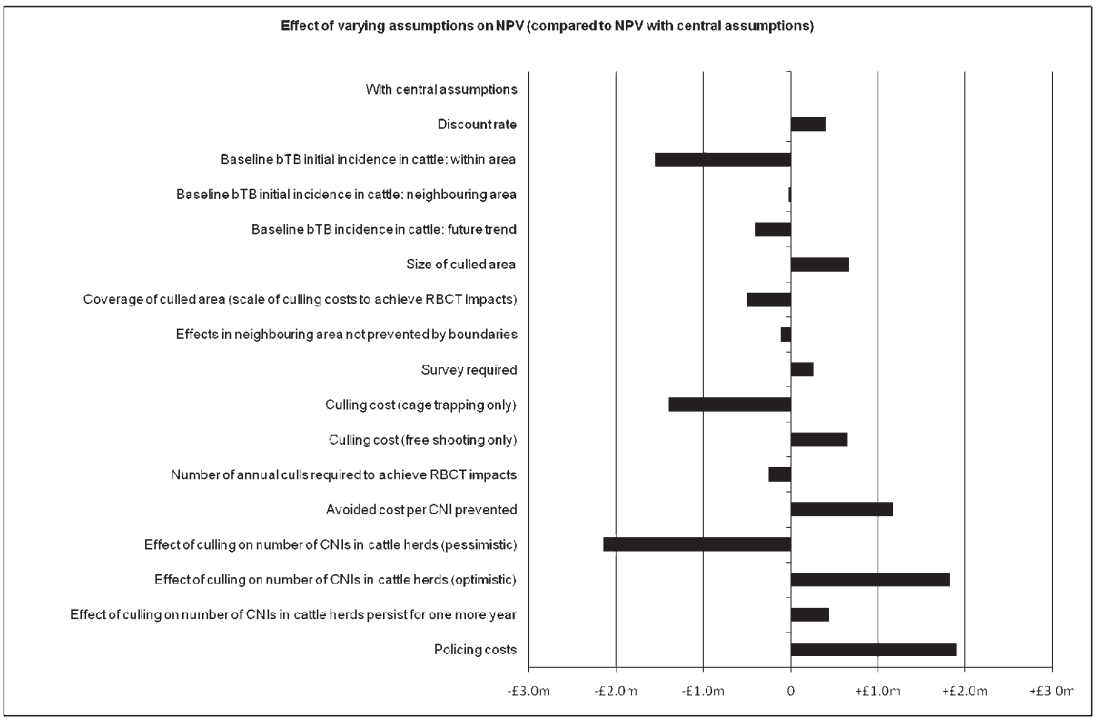
7.7. The NPV graph shows that all the assumptions affect the result, and that the NPV could be positive or negative depending on the assumptions. Changes in any one assumption mostly leave a negative NPV. The exceptions are when the cost of bTB incidents in cattle is high, when the effect of culling is at the highest end of the RBCT confidence interval, and when policing costs are excluded from the assessment.







7.8. The fourth graph below shows the same NPV results as before, but shown as changes from the NPV under the central assumptions. This means that positive values show a better result than under the central assumptions and negative values show a worse result.



Box 1: Evidence Assumptions

Efficacy of controlled shooting badgers (compared to the RBCT results)

The controlled shooting of wildlife is a technique already widely used by the rural and pest-control communities. It is commonly used to kill foxes (at night) and deer (day time), but it has not been used in any trial or field test on badgers. A report by the Game Conservancy Trust in 2006[6] concluded that, "sighting frequency [of badgers] was sufficient to be an efficient form of badger control." Controlled shooting will be piloted in two areas initially in the first year, and the culling operation will be closely monitored to ensure this method is both effective and humane. The results of the monitoring in these areas will be examined by a panel of independent scientific experts.

Relative efficacy of vaccination to culling

Based on veterinary advice and the available scientific evidence our assessment is that vaccination will not be as effective as culling in quickly lowering the weight of infection in the badger population, and therefore reducing the incidence of bTB in cattle in high incidence areas. This is because, as far as we know, vaccination only protects uninfected animals; infected animals need to die off naturally; vaccination does not affect the population density; and enough badgers in a population need to be vaccinated to develop herd immunity (which takes time to deliver).

Applicability of RBCT research

[6] The Game Conservancy Trust. 2006. *Shooting as a potential tool in badger population control. Report to Defra*. http://www.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/badger-gct0806.pdf. Accessed 24.06.10.

The results of the RBCT, representing nearly 10 years of work (1998-2007) and nearly £50 million of taxpayer investment, are fully published and peer-reviewed and represent the most substantial and coherent evidence base for the evaluation of badger culling. The large number of biases inherent in any field trial makes interpretation of the results generated from them difficult. Any conclusions are only informed by one particular, spatially and temporally limited culling operation, therefore, extrapolation of the results to other circumstances, or the viability of culling as part of a strategy involving other measures (e.g. vaccination) is highly speculative. This said, the RBCT was a large randomised control trial with proactive culling carried out over 10 x 100 km^2 areas and based on its results we are able to make predictions about the effect of proactive culling in differing circumstances e.g. area size, starting cattle herd incidence and density, and identify conditions that a proactive culling strategy must meet in order to maximise its chance of having a beneficial effect. These predictions and minimum culling criteria are based on those first discussed by the ISG in their Final Report, and subsequently by Sir David King's review of the scientific evidence behind badgers and bTB, and have been shared and discussed with numerous independent experts, including members of Defra's Bovine TB Science Advisory Body, ex-members of the ISG and scientists at the Veterinary Laboratories Agency and Food & Environment Research Agency.

Scientific evidence on controlling TB in a wildlife reservoir

TB in cattle cannot be successfully controlled / eradicated where there is a reservoir of disease in wildlife that is left unaddressed. Countries outside Great Britain with a known wildlife reservoir include Northern Ireland (Abernethy et al., 2006), the Republic of Ireland (Good, 2006; More, 2009), Spain (Naranjo et al., 2008), and New Zealand. These countries have not been able to eradicate TB, although New Zealand has made substantial progress towards this (Ryan et al., 2006). The implicit conclusion from any study that demonstrates that a particular wildlife species causes a baseline percentage of cattle cases is that the risk has to be dealt with in one way or another otherwise transmission between the species will continue (e.g. demonstrated for badgers by Donnelly et al., 2006, 2007; Griffin et al., 2005). This was recently emphasised by Donnelly and Hone (2010), who concluded that, "The[ir] results indicate that TB in cattle herds could be substantially reduced, possibly even eliminated, in the absence of transmission from badgers to cattle."

In other countries, including in the USA and Canada, a significant wildlife reservoir became evident when bovine TB was nearing eradication, making it necessary to introduce further control measures in certain regions. Australia achieved bovine TB eradication through stringent cattle controls, combined with a control programme targeting the feral cattle and buffalo reservoir in the Northern Territory. France succeeded in becoming officially TB free in 2000, but localised wildlife reservoirs of the disease have since emerged.

8. Administrative burden and policy savings calculations

8.1. We are conscious of the need to minimise red-tape burdens. In designing the final policy, we have ensured that the administration of the policy, for farmers and for Government, is fit for purpose and proportionate.

8.2. The preferred approach would open up the option to farmers of using badger control as part of a package of measures to control bTB in cattle. Government would not require farmers to cull or vaccinate badgers. For this IA therefore, the annual cost per organisation has been left at zero.

9. Wider impacts

Economic impacts

Competition Assessment

9.1. The policy would utilise an existing licensing mechanism and will not impose any new regulation. The policy is not expected to have any impact on competition. A competition assessment has been completed with the following conclusions:

- The policy will not directly limit the number or range of suppliers as there will be no fixed quota or exclusive rights to any single tender. The policy would involve applying strict criteria for suppliers to adhere to which would apply to all suppliers alike, therefore not limiting suppliers' ability to compete.
- The policy will not indirectly limit the number or range of suppliers.
- Suppliers will be able to compete openly to take up new opportunities under the changes to the existing licensing mechanism. Suppliers will have to meet legal standards already in place. The geographic area of operation will be limited by relevance.
- The policy will not reduce suppliers' incentives to compete vigorously.

Small Firms Impact Test

9.2. The policy will not impose or reduce costs on business. The policy would not be expected to have any adverse effects on small firms, as licensing criteria will not discriminate between large and small firms. The policy has been developed with regard to farming businesses who are most impacted by bTB.

Environmental impacts

Greenhouse Gas

9.3. The proposed policy is not expected to impact greenhouse gas emissions as the number of cattle kept by farmers (and hence methane emissions) is assumed to remain steady.

Wider Environmental Impact Test

9.4. The policy will change the amount of living species. The wider environmental impacts of the policy will be monitored, including animal welfare, sustainability of the local badger population, and the effect of the control measure on disease incidence in cattle.

Protected sites will also be monitored. A full ecological impact assessment has been carried out to identify areas that may require protection and monitoring. Such requirements will be included in the conditions of the licence.

Social impacts

Health impact assessment

9.5. No significant impact on health is expected. A health impact screening test has been completed with the following conclusions:

- Human health: No significant effect on human health is expected although security concerns may have an indirect impact on crime.
- Lifestyle: No significant effect on lifestyle related variables is expected. Any effect is likely to be positive by reducing the stress associated with bTB cattle breakdowns.
- Impact on health and social care services: No effect is expected as the policy would not have any direct impact on demand.

Race/Gender/Disability Equality

9.6. The policy is not expected to have any effect on race, gender or disability equality. An equality screening test has been completed.

Human Rights

9.7. The policy is not expected to have any effect on human rights.

Justice Impact Test

9.8. The proposed policy would not be expected to increase normal court business. A Justice Impact Test has been completed and agreed with the Ministry of Justice.

Rural Proofing

9.9. The policy applies principally to rural areas as it concerns the control of wildlife delivered through services that are already available in rural communities.

Sustainable Development

9.10. The policy is in line with the shared UK principles of sustainable development. A Sustainable Development test has been completed with the following conclusion:

- The benefits outweigh the costs in the economic impact assessment. The sustainability impact in terms of the impact on the wider environment of reducing the badger population will be carefully monitored. To comply with the Bern Convention, the local badger population will not be eliminated.

10. Summary

10.1. The Government's long term goal is to eradicate bTB in cattle but this is likely to take several decades. We need a progressive approach which first aims to stop the disease getting worse and then to reduce the spread and prevalence of the disease to a point where eradication becomes an achievable goal. We will not succeed in eliminating the disease in cattle unless we also tackle the disease in badgers. The scale of badger control under these policy options is expected to be small in relation to the bTB problem as a whole.

10.2. The Impact Assessment demonstrates that there is an economic case for badger control when carried out in partnership between industry and Government, excluding the costs of policing as it is envisaged in the pilot areas. However, the preferred option does not result in a large cost saving and, because the Government bears much of the cost of dealing with TB breakdowns, most of the benefits accrue to the taxpayer. The success of the preferred option depends on a commitment and willingness from the industry to accept the costs of operating the policy for the marginal financial benefits that badger control offers and the non-financial benefits of freedom from TB in cattle. The consideration for Government is whether the net reduction in bTB, in areas where the disease is serious and growing, is sufficient to justify the cost to members of the public who may value badger populations and badger welfare.

10.3. The case for licensed culling in terms of the quantified benefits and costs depends partly on whether a badger cull employing a mix of methods (a significant element of the less expensive controlled shooting with some more expensive cage-trapping and shooting) is capable of achieving the desired impact on cattle bTB. The case also depends on the extent to which the risk of perturbation can be minimised through the use of barriers and buffers, with vaccination used in combination with other, physical, barriers and buffers.

10.4. The preferred policy option would enable farmers/landowners to take control of the wildlife reservoir of the disease at a local level. For some farmers and landowners, using vaccination may be the preferred option for tackling TB in badgers. But for most farmers, culling is likely to be the preferred option, leading to higher uptake – this is an important consideration in the context of any policy options which would require the industry to bear the direct costs of badger control. The success of the preferred option is dependent on applicants fulfilling the licensing criteria with a commitment and ability to deliver over a large enough area, with a high enough efficacy and for at least 4 years.

Annex 1

Table 7: Main assumptions showing the effect that varying them would have on the results for "Option 6 Issuing licences to use a combination of culling and vaccination in one area of 150km^2 and 2km around" (impact on results shown for: estimated NPV, % change in baseline control cost over the whole 10 year period, and Benefit Cost Ratio (BCR).

Assumption	Source	Reliability (quality of evidence) H=high M=medium L=low	Central assumption [Extreme value]	NPV with extreme value	Impact on bTB control cost as % of baseline	BCR with extreme value
				With central assumptions: -£0.88m	+5.0%	0.81
Discount rate	HMT	H	3.5% [0]	-£0.48m	+2.3%	0.90
Baseline bTB initial incidence in cattle: within area	Defra indicative based on VLA analysis of VetNet data for BVDP candidate areas	H but depends on area chosen	15 CNIs / 100km^2 / year [8.5]	-£2.44m	+22.4%	0.47
Baseline bTB initial incidence in cattle: neighbouring area	Defra indicative based on VLA analysis of VetNet data for BVDP candidate areas	H but depends on area chosen	10 CNIs / 100km^2 / year [4.6]	-£0.91m	+5.3%	0.80
Baseline bTB incidence in cattle: future trend	VLA model projection of GB trend	M	+3% [0]	-£1.29m	+8.4%	0.72
Size of culled area	Depends on area chosen and licensing conditions		350 km^2 [150]	-£0.21m	+1.2%	0.95
Coverage of culled area (scale of culling costs to achieve RBCT impacts)	Depends on area chosen and licensing conditions		70% [100%]	-£1.39m	+7.9%	0.73
Effects in neighbouring area not prevented by boundaries	Depends on area chosen and licensing conditions		boundaries & buffers [no boundary]	-£1.00m	+5.1%	0.79
Survey required	RBCT approach		£1,000/km^2 [none]	-£0.62m	+3.5%	0.86

Culling cost (mix of cage trapping and controlled shooting)	Defra & University of Reading based on analysis of RBCT costs	H (cage trapping) L (free shooting)	£1,000/km^2 [£300 - £2,500]	-£2.28m -£0.23m	+13.0% +1.3%	0.62 0.94
Number of annual culls required to achieve RBCT impacts	RBCT	H/M	4 [5]	-£1.14m	+6.5%	0.76
Avoided cost per CNI prevented	Defra based on University of Reading, updated	H but may depend on area chosen and non-quantified impacts on farmer	£30,000 [£40,000]	+£0.29m	-1.2%	1.06
Effect of culling on number of CNIs in cattle herds within area and in neighbouring area, during culling and post culling (4 combinations)	Jenkins et al from RBCT	H/M	Best estimates [pessimistic extreme of 95% CI for all 4 pairs] [optimistic extreme of 95% CI for all 4 pairs]	-£3.03m +£0.94m	+17.3% -5.4%	0.39 1.21
Effect of culling on number of CNIs in cattle herds persist for one more year		M	Effects to month 60 [month 72]	-£0.44m	+2.5%	0.90
Policing costs			Basic [Excluded]	+£1.02m	-5.8%	1.38
Ranges shown in the summary sheets reflect the most important uncertainties, namely those in the impacts of culling and/or vaccination and the cost of culling. Impacts will also depend on characteristics of the areas chosen for badger control.						

DARD Letter re Lay TB Testing

Corporate and European Services Division
Central Management Branch

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Our Ref:
Your Ref:
Date: 3 October 2012

Dear Stella

DARD Submission – Lay Tb Testing Pilot Post-Project Evaluation Report

The Lay Tuberculosis Testing Pilot Project started in June 2011 and was completed on 31 December 2011. Written briefings were submitted to the Committee in June 2011 and in January 2012. The Committee asked for a further update once the post project evaluation was completed.

The Pilot has been evaluated by DARD's Business Development Branch with input on the training element of the project provided by DARD's Training and Development Unit. The evaluation report has now been signed off and a copy is attached at Annex A.

The background and outcome of the Pilot has been covered in the previous updates and the Post-Project Evaluation Report is generally positive. The project satisfied the Proof of Principle objective. Although a number of recommendations have been made in the PPE, these are largely of a project management nature or procedural and no obstacle has emerged which would prevent the development of Approved Lay Tuberculosis Testers in the North, working as DARD employees. Specifically, the pilot showed that technically, Veterinary Service could train, register and deploy lay testers.

Veterinary Service will consider the report's recommendations and will endeavour to take these forward in the development of any future Lay Tb Testing training.

While the project investigated the practicalities of training and deployment of lay tuberculosis testers it did not investigate the economics of training and deployment. The economics of training and deploying lay tuberculosis testers will be addressed in a business case which will be prepared in the coming months.

I would be grateful if you would bring this to the attention of the Committee.

Should you require any further information or clarification please do let us know.

Yours sincerely

pp

Joe Cassells
Departmental Assembly Liaison Officer

Annex A

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

Lay TB Testing Pilot Project
Post-Project Evaluation

Glossary

Acronyms used in this report

AHWI	Animal Health and Welfare Inspector
BDB	Business Development Branch
DARD	Department of Agriculture and Rural Development
DEFRA	Department for Environment, Food and Rural Affairs
OCN	Open College Network
PADT	Procurement of Animal Disease Testing (Programme)
PID	Project Initiation Document
PVP	Private Veterinary Practitioners
RCVS	Royal College of Veterinary Surgeons
REB	Resource Economics Branch
ROI	Republic of Ireland
SAHWI	Senior Animal Health and Welfare Inspector
SMART	Smart, Measurable, Attainable, Realistic and Timebound
TB	Tuberculosis
TDO	Training and Development Officer
TVO	Temporary Veterinary Officer
VOT	Veterinary Officer Testing
VS	Veterinary Service

Index

1. Scope of Post Project Evaluation

1.1 This is a Post Project Evaluation (PPE) report which was commissioned by Veterinary Service (VS) Tuberculosis (TB) Section management which required Business Development Branch to deliver an independent assessment and analysis of the Lay TB Testing Pilot Project. This report will consider issues around project costs, the delivery of objectives identified in the business case, project benefits and their management, the delivery and governance of the project, any emerging lessons learned and recommendations for future work.

1.2 In order to complete this evaluation report BDB consulted with colleagues mainly from within VS including management and staff with key roles within the Project (administrative, veterinary and field staff).

1.3 Our approach was to consolidate available management information to build as complete a picture as possible. Where detailed information was not available, this is highlighted in the report.

2. Background

2.1 Veterinary Service, TB Section, HQ Branch is located in Dundonald House. It has two broad functions:

1. Management of TB Programme Delivery
2. Provision of advice to Policy Colleagues

2.2 This is achieved through

- Maximising the quality and effectiveness of the Programme delivery through good planning, training, application of challenging standards, audit and management;
- Meeting DARD's target to achieve and maintain annual EU approval for the NI TB Eradication Programme (to ensure optimum funding is received from EU); and
- Provision of quality advice to Policy colleagues.

It is the long-term objective of the Department of Agriculture for Rural Development (DARD) to eradicate bovine tuberculosis from the cattle population of Northern Ireland. In 2009/10 the TB Eradication Programme cost £23m. The main component of the cost relates to animal testing. For instance, TB testing is mainly carried out by Private Veterinary Practitioners (PVPs), who conducted approximately[1] 1,907k bovine tests in 2011/2012, at a cost of approximately £6.5m[2] per year. In addition to the PVPs, DARD's Veterinary Surgeons test approx. 524k bovine tests per year, and these staff cost DARD in the region of £1.36m million for 2011/12, including full employment costs and travel and subsistence. The testing equates to around 1,273k animals[3] tested in 2011/12 by PVPs and 350k animals tested by DARD Veterinary Surgeons. DARD's current approach is to use its veterinary staff resource mainly for surveillance of herds where disease is present. These herds are restricted i.e. cattle movements from these herds are only allowed direct to slaughterhouses under licence by DARD.

2.3 The Veterinary Surgery (Testing for Tuberculosis in Bovines) Order 2005 came into force on 15th August 2005 and operates in Northern Ireland (NI). This Order specifies tuberculosis testing of bovine animals as a test to which the prohibition of the practice of veterinary surgery by persons other than veterinary surgeons in section 19(1) of the Veterinary Surgeons Act 1966 does not apply. Effectively, this means that the physical conducting of the bovine TB test (i.e. the administering of the tuberculin into the animal, the observing and palpating of lumps, and their measurement) does not have to be carried out by a Veterinary Surgeon. However, the legislation (as it currently stands) means that a DARD Veterinary Surgeon must interpret the test results and issue the appropriate notification, if necessary, to the herd-keeper, e.g. notice for the compulsory slaughter of animals testing positive for presence of the disease, and other herd restrictions as deemed necessary.

2.4 In Great Britain, the Department for Environment, Food and Rural Affairs (DEFRA) piloted Lay TB Testing in England from May 2005 to June 2006. Unlike Northern Ireland, one of the main drivers for the DEFRA pilot was that there were insufficient numbers of qualified vets in some areas to carry out TB testing.

2.5 The findings of the DEFRA pilot were interesting for DARD. The design of the pilot training had to be similar to the DEFRA model to ensure that DEFRA and RCVS would be satisfied and would endorse it. The training also had to meet the needs of the NI TB Eradication Plan, for example, with it different testing intervals and in the way herds are confirmed with

1 Based on DARD data between 14/11 and 31/3/12.

2 Annual costs vary based on the number of bovine tests carried out by PvPs.

3 The number of animals tested is smaller than the number of bovine tests carried out as an animal may be tested more than once.

TB (incorporating different laboratory and abattoir data). The driver for DEFRA introducing lay testing was insufficient numbers of qualified vets whereas the drivers for DARD are efficiencies, including for example, exploring the potential for a more efficient utilization of the Animal Health and Welfare Inspector (AHWI) resource. There were a number of useful points in the evaluation of the DEFRA Pilot Project and the overall findings of the DEFRA pilot were positive.

2.6 The Lay TB Testing pilot in GB ran from 20th May 2005 until 30th June 2006. Lay testers have been deployed in GB since that date although DEFRA are having ongoing discussions with the Commission on their use. The European Commission has accepted DEFRA's approach on training, veterinary supervision, quality assurance and audit. The Commission also accept the principle that properly trained and supervised technicians could do a good job and are acceptable for all TB herd tests. The pilot yielded 100+ dedicated lay testers trained and deployed in England and Wales.

3. Description of the Project and Appraisal History

3.1 The Lay TB Testing pilot project was a proof of principle project which also tested the detail through implementation. Specifically this pilot project investigated whether a very small number (3) of AHWIs from within Veterinary Service could be trained to carry out TB Testing and after registration as approved Lay Testers, be deployed in the field. It was considered that such a project would be useful in feeding valuable data/insights into any future consideration of whether TB lay-testing should be, or could be, rolled out in NI.

3.2 Current arrangements for TB testing in NI rely mainly on the use of PVPs at a cost of approximately £6.5 million per annum. Departmental Vets (VOTs and TVOs) carry out the remainder of testing, their focus being mainly on restricted herds.

3.3 The Lay TB Tester role, on deployment, would replace only the 'on-farm' element of carrying out the TB test. Legal requirements mean that a veterinarian's input is still required to interpret test results and take decisions relating to follow-up work with regard to the herd, as necessary.

3.4 The pilot involved the development of an externally approved training course for Lay TB Testers. The course was based on the DEFRA course and as with the DEFRA, it was developed in close consultation with the Royal College of Veterinary Surgeons (RCVS). Open College Network (OCN) Skills accreditation was also sought. The rationale for this stems from 'Professional skills in Government' a top down approach in the UK Government's approach to skills development and is mirrored under the NICS training and development strategy[4]. The approach aims to create a more systematic and consistent approach to skills and career development and building capacity in operational skills. Accreditation also rewards individuals by providing credit for skills and training.

- There are some differences between the DEFRA course and the DARD course, which are outlined in **APPENDIX A** to this PPE.

3.5 The pilot project involved the recruitment, training, approval and registration of three trainees. All three trainees successfully completed the classroom and field training elements before approval and registration. Within the 6 month period set aside for the Pilot Project, there was some time left for two of the three trainees to be deployed in the field post-completion of their training (i.e. post-registration with OCN which is achieved after completion of both the classroom and field experience elements). The third did not have sufficient time after registration to be deployed before the end of the project.

3.6 Although not an objective, the pilot project also afforded the opportunity to introduce and test a new mobile technology product i.e. a Personal Digital Assistant (PDA) known as the Trimble (see Para. 7.3.2).

3.7 There were a number of Strategic Objectives and drivers which contributed to the decision to undertake the Pilot Project at this time. They are detailed in the Business Case and include:

i. Draft DARD Budget 2011-15;

ii. DARD PSA Delivery Arrangements 2008-2011;

iii. DARD Strategic Plan 2006-2011; and

iv. Recommendation 10 of 2009 PAC Report on TB.

4 Skills Strategy for Northern Ireland: November 2004 and Northern Ireland Civil Service Training and Development Strategy 2006-2009

3.8 The outcomes of this Pilot Project will be used to inform the process of wider consultation on the use of TB lay testing and the decision making process regarding the potential for use of lay testing in the future.

Original Business Case

3.9 A Project Initiation Document (PID) was prepared initially (version 0.1 was dated 21/4/11 and a final version agreed on 9/9/11). A business case was then developed (although some elements of the pilot had commenced by that stage). **Lesson learned**: VS should factor in sufficient time for proportionate appraisal to be completed, in addition to a PID document, in advance of any project commencing. The two options considered in the business case were:

3.10 **Option 1:** Base case - Continue as before, i.e. continue to use veterinarians to test bovines for TB.

Option 2: Carry out a pilot of DARD's ability to develop and deliver a quality assured, accredited training programme, resolve any legal issues, select and train Lay TB Testers, and deploy them in the field (for the limited period of the pilot) when they have completed their training and have been approved and registered.

3.11 The pilot project was delivered over approximately seven months, generally following the timeline detailed in the Project Initiation Document (PID) in the Key Milestones section. Some slippage did occur at certain stages, but the pilot did conclude on 31/12/11 as originally planned.

4. Project Cost and Project Completion Date

4.1 The project was a pilot to develop and deliver an accredited TB test training course for non-veterinarians, and to test if approved Lay TB Testers could successfully undertake TB testing in the field. TABLE 1 provides a summary of the key projected target dates, and the actual outturns.

Table 1 Projected and Actual Dates of the Lay TB Testing Pilot Project

Target	Projection in EA	Actual	Variance (working days)	Comment on variance
Pilot start date	01/06/2011	02/06/2011	1	No evidence on file as to the start date variance
Pilot end date	31/12/2011	31/12/2011	0	
PPE to be completed	29/02/2012	06/04/2012	27	PPE was completed with an agreed delay between VS and BDB due to other DARD work priorities

4.2 The actual cost information provided in **TABLE 2** on the following pages reflects expenditure for the short pilot project. Variance in the actual costs when compared to the projected cost information mainly reflects additional expenditure associated with equipment and extra travel and subsistence expenses for trainees.

4.3 The costs detailed in the original business case for the pilot project are shown in **APPENDIX B**.

Table 2 Table Detailing Actual Costs vs Projected Costs as Per Original Business Case

		Additional cash cost, or opportunity cost?	Projections in EA	Projections in EA	Actual outturn	Variance	Reason(s) for variance and lessons learned	Additional notes
	Assumption in EA		3 trainees	10 trainees	3 trainees			
Cost of developing training course	3 Vet. Officers taking 5 days each, assuming annual full staff cost of £73,251 divided by 211 to get daily charge of £347	Opportunity cost	5,207	5,207	see total in row 5		Costs per student would however decrease in a rolled out implementation phase - also in a roll out phase there would be minimal development costs	Full staff costs - column three of ready reckoner - VS ready reckoner used TRIM REF DA1/11/406513 Costs of VO involved met expectations
Cost of tutors to undertake the classroom training	3470 for two tutors for 5 days... 8675 for 5 tutors for 5 days	Opportunity cost	3,470	8,675	see total in row 5		Original thinking for pilot was informed by experience of DEFRA - more tutors were required to bring in a wider range of subject areas and the different style of training in our pilot . We have learned that the training course required 5 tutors. The orginal tutor estimate therefore was unrealistic.	Full staff costs - column three of ready reckoner - VS ready reckoner used TRIM REF DA1/11/406513
Subtotal			**8,677**	**13,882**	**7,563**	**-1,114**		

Actual staff time costs are based on feedback from VOs as not all record their time on TARDIS. Also there was an assumption made that the veterinarians who supervise the trainees during their field training will not be an additional cost because they will be carrying out the same number of tests they would have been doing as part of their normal work activities.

5. Project Objectives

5.1 The original economic appraisal said that the overall aim of the pilot Lay TB testing Project was to recruit, train, register and deploy 3-10 AHWIs as Approved Lay TB Testers before the end of December 2011. TABLE 3 on the following pages summarises the targets, aim, objectives, outcomes and lessons learned:

Targets	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
Pilot start date	01/06/2011	02/06/2011	1	No evidence on file as to the start date variance	
Pilot end date	31/12/2011	31/12/2011	0		
PPE to be completed	29/02/2012	06/04/2012	27	PPE was completed with an agreed delay between VS and BDB due to other DARD work priorities	

AIM	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
To recruit, train, register, and deploy 3-10 AHWIs as Approved Lay TB Testers before the end of December 2011	3-10 AWHIs trained by 31/12/11	3 AWHIs trained	Achieved	All AHWIs were given the opportunity. 30+ applied and 3 were approved for entry into pilot	The positive take up of this opportunity should be built on in any roll out and into feedback to stakeholders esp. TUS (Positive communication has already taken place in DARD Bizz)

AIM	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
	3-10 AWHIs deployed by 31/12/11	2 AWHIs deployed	Out of range of target	The 2 staff that were deployed finished their training on 11/11/2011 and 09/12/2011 - leaving 32 and 12 working days for deployment (effectively less as Wednesdays are not normally used for testing and 29 and 30 December were effectively unusable - one took longer to view the required number of reactors of the required types, and did not finish his training until 29/12/2011 leaving insufficient time for deployment before the pilot ended. AWHIS were not expected to carry out any Gp 1 duties on a non test day eg Wednesday. Some TVOs carry out testing on a Wednesday and therefore on occasion the trainees did go out testing on a Wednesday - these tests were followed up on a Saturday. Examples of duties typically carried out on a Wednesday would include paperwork associated with the tests.	Deployment timescales need to be properly factored into the implementation phase Wednesday is not normally used as a test day due to the nature of the TB test process

Objectives	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
To develop an externally approved training course on Tb testing for non-vets, and achieve external validation of the course by the Royal College of Veterinary Surgeons and Open College Network (OCN) by May 2011	by end of May 2011	Fully met	none	N/A	This highly positive aspect of the project has been communicated to TUS and has been communicated to all staff through DARD Bizz
Recruitment of 3-10 trainee Lay Tb testers from among AHWIs within Vet. Service by July 2011	3 - 10	3	Achieved	See explanation above.	Twenty seven candidates applied for the Lay Testing pilot opportunity. The competition was run using normal NICS procedures with selected based on merit. Three candidates were accepted for entry to the pilot. The specific number of pilot trainees was based on DARD pressures on Group 1 resource - at the time of selection there were additional pressures on Group 1 resource from the DARD LPIS project.

Objectives	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
Successful completion of the approved training course by the trainees by Oct 2011 - the approved training course includes the classroom element and the field experience.	Registration by Oct	Dates of registration were 11/11, 9/12, 29/12	Outside projected date	Timescale overrun - Timescales for candidates completing the training (classroom and field work) were unrealistic in the Economic Appraisal.	We have learned that it takes longer than originally anticipated to see the required amount of different types of reactors and this will be taken into account in the design of any subsequent roll out.
Any deployment is to be completed by 31/12/2011 (deployment is defined as testing without supervision following registration)	3	2	-1	While deployment was not originally a fully defined target - one was not deployed as no time to deploy him.	

Outcomes	Projection in EA	Actual	Variance	Comment on variance	Lessons learned
Better understanding of the costs that could be involved in rolling out Lay Testing		Only partly achieved	Part of this work lies in a further implementation phase	The reference to costs here was in regard to the type of costs involved not the detailed costs down to the level of comparing costs of lay testers to costs of PvPs for example	This was not fully possible given the nature of the pilot . The pilot was not compare PvP costs with for example lay testing costs per test at this stage - the pilot a technical proof of principle that Gp staff could be trained. We now have a better understanding of the type of costs of training but we do not at this stage know more about the difference in cost between using lay testers and vets. We will be addressing this issue in a full EA which will now follow.
More informed consultation with industry, farmers and vets.		Only partly achieved	Part of this work lies in a further implementation phase	VS consulted at all times with the internal stakeholders - eg Policy and TUS. External consultation was not a formal part of the pilot - however all aspects of the pilot will inform any such future consultation	The outcomes through the PPE and quality assurance exercise will be available for any consultation exercise subject to Ministerial agreement.

Outcomes	Projection in EA	Actual	Variance	Comment on variance	Lessons learned
The grading of the lay testing post will be undertaken by Business Development Branch as part of the evaluation process	During PPE process	Achieved	Outcome was after pilot finished	Grading for pilot was assumed to be Group 2 and this was confirmed after pilot has finished	A job description for official grading has been progressed with BDB - agreed with Trade Union Side. Grading advice has been provided by BDB
					An additional lesson learned lies in and around the area of striving to have a more definitive and measurable outcome for a pilot - there could have been better clarity about what could have been realistically achieved in a pilot and what could only be achieved in a roll out or scaling up phase.

6. Financial Projections (Profitability, Main Assumptions – Revenues, Costs etc)

6.1 This pilot project involved a total capital expenditure of £8,685 compared to a projected cost of £3,490. The recurrent/revenue costs were £30,169 compared with £33,579, The recurrent costs are attributable in the main to staff costs and travel and subsistence costs for trainers and trainees.

6.2 As this was a pilot/'proof of principle' project, there were no ongoing recurrent/ revenue costs.

7. Benefits (Including Comment on any Unforeseen Benefits)

7.1. Benefits Identified in the Business Case

As this is a pilot project, the associated expenditure is not a benefit in itself but has enabled the 'Proof of Principle and the detail of implementation' to be tested over a short period of time.

7.1.1 The business case detailed seven key benefits for the pilot project to realise. These were:

1. **Consultation benefits**: Discussions and negotiations with key stakeholders, such as TUS and industry will have been opened and some of the initial concerns and fears will have been allayed.

2. **Better informed future consultation, including information presented in any consultation documentation (if it is decided to roll out a lay testing approach)**: The consultation document for a full scale consultation process will be much better informed and therefore stakeholders in the wider industry will be able to give better informed feedback.

3. **Better informed decision making**: Senior management will have better information available when making key decisions, formulating recommendations, briefing the Minister and seeking Committee approval.

4. **Identification and resolving of implementation problems**: Many of the problems and issues of full scale roll-out will have been identified and resolved.

5. **Training course development**: An accredited training course and training materials will have been developed and be available.

6. **Logistical solutions developed**: A system will have been established for allocating tests to trainees, supervision and evaluation will have been developed.

7. **Improved understanding of costs**: There will be a much better understanding of the costs of training and roll out.

7.1.2 The benefits detailed in 7.1.1 were not developed into a Benefits Realisation Plan. Measurement of whether benefits were achieved was not always straightforward particularly as the benefits were not SMART. As a consequence qualitative analysis was possible for some, but not for all of the benefits, and where quantitative analysis has not been possible, qualitative/anecdotal evidence is provided. That said, consensus of staff involved at various points in the project indicate that the benefits have generally been achieved.

7.1.3 Although there was no empirical data available in relation to many of these benefits, the delivery and evidence of them will form a valuable foundation should the decision be taken to 'roll-out' Lay TB Testing. The success of the benefits detailed in the Business Case could be evidenced as such:

1. **Consultation benefits**: BDB have been informed that regular meetings were held with TUS and other relevant stakeholders throughout the course of the pilot. This helped ensure understanding and buy-in to the pilot and the minutes of these meetings show support for the pilot. The Project Team also kept in regular contact with the RCVS and the OCN throughout, developing and maintaining a good working relationship with both of these institutions. This aided the development of the training course to meet the requirements for accreditation.

2. **Better informed future consultation information**: The information gathered and the lessons learned during the pilot will be used to inform the drafting of a consultation document on the introduction and use of Lay Testers in N Ireland. This consultation is expected to proceed later this year.

3. **Better informed decision making**: As above. The pilot has enabled VS management to explore the principle of Lay TB Testing in Northern Ireland i.e. the development of a training programme, training and deployment and the associated logistics and policy issues. Should the pilot proceed to full roll-out, significant information is now available which can be further refined to implement lessons learned, therefore providing an opportunity to optimise the resource to meet business need.

4. **Identification and resolving of implementation problems**: Any issues that became apparent during the course of the pilot were dealt with and lessons learned from this can be applied to any future roll out. This was a useful outcome of the Pilot.

5. **Training course development**: A very comprehensive training programme was developed involving both classroom and field elements (the full post course training evaluation is shown in **APPENDIX C**) . The training was accredited by the OCN and formally agreed by RCVS on 8 June 2011 and 8 November 2011 respectively. This can be used to train future Lay Testers, although some further refinement may be necessary particularly with regard to the field training element (see para 9.4).

6. **Logistical solutions developed**: A system was developed to allocate tests to Lay TB Testers which did prove to be problematic in some cases particularly in the area of targeting of tests and timing issues. It was recognised that tests to be completed by Lay Testers should not be allocated until the trainee is 'approved'. This is discussed further in the 'Considerations for Future Work' section, para 9.5.

7. **Improved understanding of costs**: The pilot has provided very useful baseline information relating to human and monetary resource required to run this small pilot. The actual costs can now be further analysed by VS and extrapolated to develop full 'roll-out' estimates if and when the time arises. The staff resource involved in the development of the training programme was significant, involving two of the Department's veterinary staff. The development of the training programme was a 'one-off' and it will not be necessary to repeat this element of resourcing unless additional veterinary tests, other than Lay TB Testing, are explored for 'roll-out' to Lay Testers and consideration given to the mechanism for refresher training. However, trainers will need to spend some time amending the training material in light of experience in delivering the training programme and in the light of comments from trainees. Consideration should also be giving to resource implications if legislative change or a change in operating procedures necessitates a revision of the training programme. In the event of full 'roll-out' of Lay TB Testing, a significant resource would be required to deliver training and mentor the numerous trainees. Costs associated with field training could be revisited in parallel with better targeting of field training to areas with a higher incidence of TB reactors.

7.2 Monetary Benefits

This project in itself does not deliver monetary benefits, but instead forms a future basis for better informed decision making, most notably as to whether there should be a further roll-out of Lay Testing in N. Ireland.

7.3 Additional, Unforeseen Benefits

A number of benefits emerged throughout the lifetime of the short pilot project that were not anticipated at the time the original business case was developed. These are outlined below.

7.3.1 Resourcing

7.3.1.1 Career Development

The project provided a development opportunity for the three AHWIs involved. During the project the Trainee Lay Testers were temporarily promoted to the Senior Animal Health and Welfare Inspector (SAHWI) grade (Inspector Group 2). They were afforded the opportunity to develop and implement a range of new skills and knowledge following completion of the accredited training programme. This opportunity was welcomed as indicated by evidence provided through interview.

7.3.1.2 Training Resource

Veterinary Service employed internal resource to develop and deliver the accredited training course. Existing Departmental resources were also used to mentor and coach the Trainees as required and to undertake the field training element. Because existing Departmental veterinary resources were employed this provided an opportunity to make maximum use of skilled staff while removing the necessity to procure expensive training services from outside the Department.

7.3.2 Technology

7.3.2.1 Equipment

As part of the pilot a new mobile Personal Digital Assistant (PDA) device was used to capture results in the field and upload DARD systems. The costs identified in the business case were based on the purchase of the Huskey device, but a new Trimble device already available through the TB programme was used instead. The Trimble device is considered to be future-proofed and has the potential to be used more widely than for solely TB in the field. The Huskey, however, is tried and tested, is robust in field conditions, is smaller and more compact.

Lesson learned: in any roll out phase a TRIMBLE will be used as this is now the accepted hand held device in use within the TB programme and is viewed as meeting the needs of TB testing.

7.4 Disbenefits

7.4.1 Relationships

The pilot has identified the possibility of resistance to change within the Veterinary Service regarding the introduction of the Lay TB Testers. It is common within any organisation undergoing a period of change, to experience an impact upon the morale of staff. By way of illustration, Mullins (Management and Organisational Behavior) writes: ‘the forces against change in works organisations include: ignoring the needs and expectations of members; when members have insufficient information about the nature of the change; or if they do not perceive the need for change. Fears may be expressed over such matters as employment levels and job security, deskilling of work, loss of job satisfaction, wage rate differentials, changes to social structures and working conditions, loss of individual control over work, and greater management control.’

Lesson learned: Strategies to manage such resistance to change should be considered as part of any change management process. The outworking of this pilot project has negatively impacted on VOT morale. In addition the pilot has impacted on the external DARD-PVP relationship. The Department relies on PVPs to deliver a number of services, one of which is TB testing. Anecdotal evidence suggests that PVPs are apprehensive that a decision will be taken to ‘roll-out’ Lay TB testing or to increase further the scope of tests to be delivered by Lay Testers. If the Lay TB Testers Project is to be further rolled out in the future, consideration will need to be given as to how best manage the expectations of current staff and relevant stakeholders through the change process.

7.3.2 Work Scheduling for Lay TB Tester

The requirements of the delivery of the TB test are such that the two intra-dermal injections take place on day one and results are read on day four. On the ground this generally translates to visiting herd keepers on Monday and Tuesday to carry out part 1 of the test i.e. perform injections, and re-visiting these herd keepers on Thursday and Friday to read the respective results. The consequence of this work pattern is that on a Wednesday, a Lay TB Tester is not involved in testing or reading results 'on-farm' and so in effect there is a 'down day' from TB testing. During the pilot, these days were used by the lay testers to gain more knowledge about TB breakdowns and investigations. There was also some opportunity to observe DARD Veterinary Surgeons testing.

Lesson learned: This issue would have to be explored further in the consideration of any further roll-out. Already, the identification of other job activities and rescheduling of work is being further explored in a parallel but separate exercise through Job Evaluation and Grading of the Lay TB Tester role.

7.3.3 Time required to complete testing workload during field training

Anecdotal evidence provided through interview indicated that in some cases during the field training aspect of the pilot, the time taken to carry out the tests 'on-farm' involving the trainee was extended and took longer than usual. This was to be expected and takes account of necessary, additional time to interact with the Trainee when administering the test on day one and reading and interpreting the results on day 4. Survey data, including comments provided in a survey conducted with customers by VS (APPENDICES D & E) corroborates the anecdotal evidence provided by staff. The time increase impacted the farmer and the testing veterinarian, potentially impacting on the payment of the TVO/VOT (paid on a headage basis rather than a daily rate) i.e. more time required to complete the tests to receive the same level of payment.

Lesson learned: Unfortunately, quantifiable time data relating to this was not collected as part of the pilot, however, when considering any further roll-out DARD will take cognizance of this issue, and will endeavour to seek further feedback from supervising veterinarians, and pilot trainees to get an approximation for the additional time taken.

That said, anecdotally, DARD did acknowledge that one advantage of using internal Group 1 staff for the Pilot was that they were accustomed to dealing with cattle in their normal duties, and were very comfortable with the cattle handling issues, so the additional time taken for the TB testing probably was not what it might have been if staff had not had previous cattle handling experience, and this will be factored in to the consideration of any roll-out.

7.3.4 BR tests Backlog

During the project, a backlog of BR tests developed. The backlog of BR tests was in the DVO areas of those staff participating in the pilot project. Anecdotal evidence would suggest that the BR tests were not reallocated to other AHWIs effectively, therefore resulting in the development of backlogs to be cleared by the Lay Testers on return to their 'normal' AHWI role.

Lesson learned: in any future roll-out, the knock-on effect of possible recruitment of staff into a lay testing role on other DARD work areas would have to be assessed, and mitigation strategies developed.

7.3.5 Technology Failure

The project provided the opportunity to pilot the new PDA – the Trimble device. On at least one occasion, there was technological failure and the Lay Tester was unable to upload results. There was no data lost in this incident and following insertion of a new 'chip' the data was fully recovered. The other PDAs were retro-fitted with new chips.

Lesson learned: The chosen technology was fit for purpose and meets DARDs needs - therefore TRIMBLES will feature in any roll out of lay testing.

8. Main Lessons Learned

8.1 Project Implementation

8.1.1 Scoping of the Project

The Lay TB Testing pilot project had a clearly defined objective but a short timescale in which to deliver. During the interviews undertaken with staff involved in the project, it was suggested that the scale of the project had been underestimated. As the objectives and tasks within the project were defined, it became apparent that further resources in numbers of staff involved and staff time would be required to ensure the successful completion of this project within the timescale.

The project would have benefitted from a scoping exercise to establish the scale and complexity of requirements. This would have helped set the direction of the project and help shape the roles, responsibilities and governance arrangements for the project at an early stage.

Lesson learned – Carry out a scoping exercise at the project initiation stage to fully establish all aspects of the project required to successfully fulfill the project objectives.

8.1.2 Governance arrangements

At the outset of the project a Project Team and Project Board were established. The Project Board was encompassed in the function of the Procurement of Animal Disease Testing (PADT) Programme Board. The Project Team met regularly, generally on a monthly basis and their work was supported and supplemented by the establishment of several separate working groups e.g. TUS and the Communications Sub- Group. A detailed Project Initiation Document was prepared. However, not all project management governance documentation was in place. Indeed the project was well commenced before a business case was prepared. A formal risk register was not maintained throughout the project although risk monitoring was reported as part of the regular update provided to the monthly Project Board meeting. Evidence provided by staff involved in the project indicated that, although a project team was established, the project roles were not clearly defined, but became clearer as the project progressed. There were regular project team meetings throughout the lifecycle of the project at which feedback and progress updates were reported. The project team meetings were used to highlight and address risks but no formal risk register was developed or maintained during the project.

Lesson learned – Clarity in the definition and understanding of project roles is an essential requirement for all projects.

Lesson learned - Develop all relevant project governance documentation, including the business case before the commencement of the project.

8.2 Training

A separate evaluation of the development and delivery of the training was carried out by DARD Training and Development Officer (TDO). There are some areas of overlap between those covered in the training evaluation report and those detailed and discussed in this section of the report.

8.2.1 Trainees

The sample size of three trainees, participating in the project, was very low from a statistical analysis viewpoint. Unfortunately this was necessitated by coincidental and competing high Departmental priorities for the staff resource. The pilot would have benefitted from a larger number of trainees to enable wider development and consideration of factors and procedures to be investigated e.g. actions to be taken in the event of failure to complete the training programme or the inability to satisfactorily carry out the full range of responsibilities

or poor performance etc. That said, evidence gathered through interview suggested that internal systems could not have provided the necessary support to any additional trainees, in particular the field-training element in the pilot project timescale. In conclusion, VS management were content with the sample size of trainees in the project.

Lesson learned – Statistical guidance on sample sizes should be sought before commencement of any project.

8.2.2 Practical Experience

An opportunity to improve the practical element of the training exists to develop competence and confidence in basic practical skills of the trainees before deployment. Through interview, it was noted that an opportunity to improve the practical skills of trainees in e.g. clipping and a method/facility to practice the intra-dermal injection procedure would be very advantageous prior to deployment. The former could be quite easily implemented e.g. using the Greenmount herd, although the latter may prove much more difficult. This observation concurs with the recommendations identified in the Lay TB Testing Pilot Post Course Evaluation Report.

Lesson learned – Review of practical training to include some pre-deployment training to develop basic practical skills including animal clipping would be advantageous.

The course requires trainees to observe a specific number and type of reactors, as agreed through consultation with the RCVS. This proved more challenging than expected for two of the three trainees. Generally the field training element should be better targeted taking account of seasonal variation and known high incidence areas in NI. Also consideration should be given, if possible, to include the observations made involving infected animals during a visit to ROI (visit was part of the classroom training element). This potential resource would be, particularly useful to observe for the less common reactions.

Lesson learned – Improved and better targeted field training for trainees on a peak seasonal basis and to areas where known incidence of TB is higher would be preferable.

Lesson learned – Now that Veterinary Service are fully aware of the facilities available at the ROI TB Research facility, this can now be integrated into future Lay TB Testers training courses.

The limited survey data provided by customers, relating to the Lay TB Testers (accredited and deployed), expressed satisfaction in the delivery of the test by the Lay Tester. There were no references made to the speed and throughput of the cattle during testing unlike feedback received relating to field-training (see para 7.4.3).

8.2.3 Field Training – Internal Feedback

In agreement with the recommendation of the Lay TB Testing Pilot Post Course Evaluation Report, it was apparent that no formal feedback mechanism was in place for the veterinary staff overseeing the field-training of the Lay TB Testers. Feedback was unstructured and often provided informally if at all.

Lesson learned – The need for improved communication through development of a feedback mechanism, for veterinary staff overseeing field-training, should be revisited and implemented if roll-out of Lay TB Testing proceeds.

8.3 Other

8.3.1 Staff

This project involved a number of people in key roles who were involved to some extent as a result of personal choice. A favourable outcome was more likely as a result of this factor. Specifically the trainee Lay Testers were recruited following an application process which resulted in a period of temporary promotion to the higher SAHWI grade whereas other

individuals involved generally volunteered. A number of staff involved in the training aspect of the pilot project did so voluntarily. During interview with some of those involved it was indicated that this project had been viewed as a development opportunity and therefore they may not volunteer again. Consideration should be given to factoring the training of Lay TB Testers into regular work activities of relevant staff. If the same level of co-operation and "good will" is not forthcoming in any further roll out of the Lay TB Testing project, Veterinary Service may encounter issues with staff motivation and capability. This will have to be managed through proper performance management procedures.

Lesson learned – DARD staff are a key resource and their 'good will' impacts positively on the delivery of a project.

8.3.2 Test Allocation

A system to allocate tests to accredited Lay Testers was developed and implemented in the project. There were a number of difficulties with the system, most notably that all of the trainees did not complete the field-training element of the training as quickly as expected. As a direct consequence tests were allocated to the trainees before they had completed field-training.

Lesson learned – Test allocation to Lay Tester should coincide with the successful completion of training programme and therefore accreditation.

9. Considerations for Future Work

9.1 A number of recommendations for future work to further inform the pre and post decision making process whether to implement Lay Testing in N Ireland are outlined below. The decision as to whether to implement Lay Testing in Northern Ireland would be taken following a public consultation exercise.

9.2 The benefits associated with this and future projects should be easily measured. Baseline information/data must be gathered so that meaningful comparison data can be gathered and analysed in the lifetime of the project. This pilot has provided a starting point for establishing such a baseline. This approach will ensure that reliable, quantitative data is available to management to monitor project progress against targets at key milestones. Examples of the type of data to be measured can be found within the DEFRA Lay TB Testing Pilot, Pilot Report and Review. In this DEFRA have collected quantitative information regarding:

- Total number of TB tests undertaken by Lay TB Testers
- How many herds tested by Lay TB Testers
- How many reactors and inconclusive reactors were viewed and measured by Lay TB Testers
- How many solo tests were carried out by Lay TB testers: and
- Time spend, in hours, of those staff administering the project, delivering the training etc.

During the course of this pilot project, Veterinary Service collected information in relation to the Total number of TB tests undertaken by Lay TB Testers, how many herds tested by Lay TB Testers, how many reactors and inconclusive reactors were viewed and measured by Lay TB Testers and how many solo tests were carried out by Lay TB testers. The pilot group size was very small (3) and the data collected is somewhat limited but by recording and analysing this information, Veterinary Service should be able to more accurately measure the success of the Lay TB Testing pilot project and gain an insight into the incidences of TB reactors over the period of the pilot.

Each trainee tested, under supervision, a minimum of 500 animals in 10 different herds. Each trainee saw, measured and palpated swellings on a minimum of 30 reactors and 30 inconclusive reactors. Each trainee saw, measured and palpated 30 circumscribed swellings and 10 slightly oedematous swellings. They each tested a range of breeds and both male and female animals. Solo test data (without a supervisor present) is shown in **APPENDIX F**. It is not possible to readily draw inferences about testing from reactor rate. However all the data will be taken forward in any further lay testing considerations.

9.3 If similar arrangements are employed to those in the pilot with regard to the development of training and its delivery using internal DARD staff resource (to include classroom and field training elements), a review of current systems should be undertaken. Specifically such a review should consider how VS could facilitate and repeat the training, mentoring and field-training elements for a larger number of trainees while maintaining the same high standards delivered during the pilot.

9.4 Further refinement of the training course as detailed in the Lay TB Testing Pilot Post Course Evaluation Report and detailed in sections 8.2 and 8.3 will enhance the learning experience for all involved. In addition the arrangements for and the policy for the provision of refresher training and the reaccreditation process for the Lay Testers should be considered. With regard to the field-training element of the training, improvements in trainee coordination as detailed in para 8.2.2 should be investigated further.

9.5 Further work will need to be carried out to ensure that a robust system for allocating tests to newly certified Lay TB Testers is in place for any future roll out. This system will be such that

all newly certified Lay TB Testers are allocated a sufficient number of tests to ensure they are fully loaded. The system should also be able to ensure that all tests are completed within the timescales outlined in Departmental policy and that a contingency is in place to ensure all tests are carried out if some of the Lay TB Testers fail to attain certified status.

9.6 As part of this pilot feedback was sought from the stakeholders directly involved, i.e. the herd owners who had cattle tested by the Lay TB Testers. In the main the feedback from herd owners was positive, however, some negative feedback was provided with regards to the carrying out of the training tests for the Lay TB testers. This was focused on the lack of communication with herd owners regarding the purpose of the training and the time it took to carry out the training tests. Although Veterinary Service expected that the training tests would take longer than normal TB tests, it appears that this was not successfully communicated to all of the herd owners involved. This information should be used to inform stakeholder communication and consultation if any further roll out of the Lay TB Testing project is undertaken. Stakeholders should be made fully aware of the purpose of training visits and the impact that they will have on the time needed to carry out the tests. However, it should be noted that none of these issues were raised in the feedback provided in relation to the test carried out by the Lay TB testers once accredited and deployed. This can be viewed as indicating that the training of the Lay TB Testers was successful.

APPENDIX A
Comparison of the Defra Training Requirement for TB Lay Testing, and the DARD Training Requirement

	DEFRA Training Requirement	DARD Training Requirement	Difference	Comment	Lesson learned
RCVS experience outlined the following elements of the training course (NB: the approval of the DARD course was pro actively sought from RCVS):					
Royal College of Veterinary Surgeons (RCVS) approved the course?	Yes	Yes	None		
Open College Network approved course?	No	Yes	Yes	Appropriate external recognition is endorsed by Veterinary Service and DARD as part of its T&D policies. OCN registration was also negotiated and agreed with TUS. This would be a recommended feature of any roll out project.	

	DEFRA Training Requirement	DARD Training Requirement	Difference	Comment	Lesson learned
No. of days spent on classroom based training	2 days	5 days	+3 days	DARD VS could possibly cut it down by 1 day. However, as there is a requirement for 1 to 1 tutoring, training a larger number of trainees will be time consuming. The rollout course will be nearer 5 days than 2 days.	DARD's VS ran a course which met all the RCVS and OCN requirements. Defra training was focussed only on meeting RCVS requirements and the courses were not directly comparable. The DEFRA course was a simple presentation on the TB testing mechanics, rather than a interactive hands on approach which was deemed to be a more effective training mechanism. The feedback from the trainees trained in the pilot supported this.
Written exam to be sat and passed?	Yes	Yes	None	Reasonable way to proceed.	
No. of animals to be tested by trainee	500	500	None	Target was derived from consultation with RCVS.	
No. of herds to be tested by trainee	10	10	None	Target was derived from consultation with RCVS.	
No. of reactors to be examined (i.e. Observed, palpated and measured) by trainee	30	30	None	Target was derived from consultation with RCVS.	
No. of inconclusive reactors to be examined by trainee	30	30	None	Target was derived from consultation with RCVS.	
No. of slight oedemas swellings which must be observed	30	10	-20	The Pilot showed that a "slight" oedema is a rare finding in NI. RCVS accepted our data and agreed to a reduction in DARD VS's target below that required by DEFRA.	DARD, in a roll out scenario, may change the target to oedema rather than slight oedema.

	DEFRA Training Requirement	DARD Training Requirement	Difference	Comment	Lesson learned
No. of circumscribed swellings which must be observed	30	30	None	Target was derived from consultation with RCVS.	
Range of breeds/ ages/sexes	range	range	None	Target was derived from consultation with RCVS.	

APPENDIX B
From Draft Business Case

Category	Item	Option 2 costs
		Based on 3 trainees and 2 trainers
Staff time	Course development	£5,207
	Course delivery: trainers	£3,470
	Classroom training: trainees	£2,640
	Liaise with and co-ordinate the trainees during the field training	£8,982
	Temporary promotion	£3,000
Travel costs	Trainees	£6,000
	Trainee supervision	£540
Equipment:	Trimble, scissors, calipers, holsters	£3,490
OCN accreditation		£250
Total		**£33,579.00**

Assumptions:

- The assumption is made that the veterinarians who supervise the trainees during the field training will not be an additional cost because they will be carrying out the same number of tests they would have been doing anyway.
- Greenmount will be used for the classroom training at no additional cost.
- The field training will take place at Greenmount at no additional cost and the trainees will shadow field vets on their routine TB tests at no additional cost.
- The assumption is made that trainee time is not an additional cost because there is sufficient capacity to release AHWIs to take part in the pilot without recruitment. However, they will be paid temporary promotion and therefore that extra cost is included above.

Appendix C

Department of Agriculture & Rural Development

Lay Tuberculosis Testing Pilot

Post Course
Training Evaluation Report

23 February 2012

DARD Training & Development Unit

Contents

Preface

The Lay Tuberculosis (TB) Tester Pilot Project is a project with the aim of investigating if 3-10 Animal Health and Welfare Inspectors (AHWIs) within Veterinary Service (VS) can be trained to carry out TB testing and can, after registration as Approved Lay TB Testers, be deployed for a limited period. The training is to be of such a standard that DARD can issue a Certificate of Competence to the trainees and the trainees can then be registered by DARD as Approved Lay TB Testers. Insight gained through the running of the pilot project will inform the broad consultation process which will take place before any further training, registration and deployment of Lay TB Testers.

Purpose

The purpose of this post training evaluation report is to establish and confirm that the training delivered by VS as part of the Lay TB Testing project was robust in terms of transferring effective knowledge and skills to ensure staff could adequately perform these duties.

Terms of Reference - Scope of the Post Training Evaluation

Background

The Lay TB Tester Pilot Project is a project with the aim of examining if three (3) Animal Health and Welfare Inspectors (AHWIs) within DARD's VS can be trained to competently carry out TB testing and can, after registration as Approved Lay TB Testers, be deployed for a limited period. The training delivered is to be of a standard that will ensure that DARD can issue a Certificate of Competence to the trainees allowing them to be registered by DARD as Approved Lay TB Testers.

Insight gained through the evaluation of training delivered on this pilot project will inform any future roll-out of this project.

DARD Training and Development Unit (TDU) which is part of Business Support Branch (BSB) have undertaken an independent post training evaluation on behalf of VS as part of the Lay TB Testing Project.

This post training evaluation will:

- Assess the standard of the classroom based and on-the-job training delivered by Departmental staff and accredited by the Open College Network (OCN);
- Make recommendations for future training delivery pending the complete review of the project.

Report Findings and Conclusions

This Evaluation Report findings and recommendations come from three main sources of information as follows:

- An on-line questionnaire to the Lay TB Testers completed using the Survey Monkey tool;
- Separate focus group meetings with both the Lay TB Testers and the Principal Tutors who developed, designed and delivered the training product;
- The background information and data provided by VS through their TRIM containers.

The report findings centre on the classroom based training, the field training and the accreditation through assignments process. The findings of this report are extremely positive and they endorse the training design and delivery methods used. The only shortcoming is that the data collected and reported could be seen as potentially biased because of the low number of Lay TB Testers (three) used in this pilot.

Key findings

The key findings are as follows:

- This pilot was successful in terms of skills, knowledge and learning transferred. The Lay TB Testers have proven that they are competent to perform tests to an agreed level and have passed the OCN Accreditation standard. However, in order to validate the entire training process VS need to also assess the feedback received from the customers whose animals were tested under this pilot. This assessment will corroborate the entire training process.
- In terms of the post classroom course evaluation the training, support and coaching provided was more than adequate to ensure that the trainees passed the OCN Accreditation standard;
- Overall the training delivered was a good product however, there are some issues surrounding the timing of this training and the use of a TVO/VOT to ensure the field training was adequate;
- There are a number of areas that could be improved, these are highlighted in the 7 recommendations of this report;

The small number of trainees selected to attend this training coupled with no pre-training baseline data, means that the statistical reporting is potentially biased.

Lay TB Testing Evaluation Results

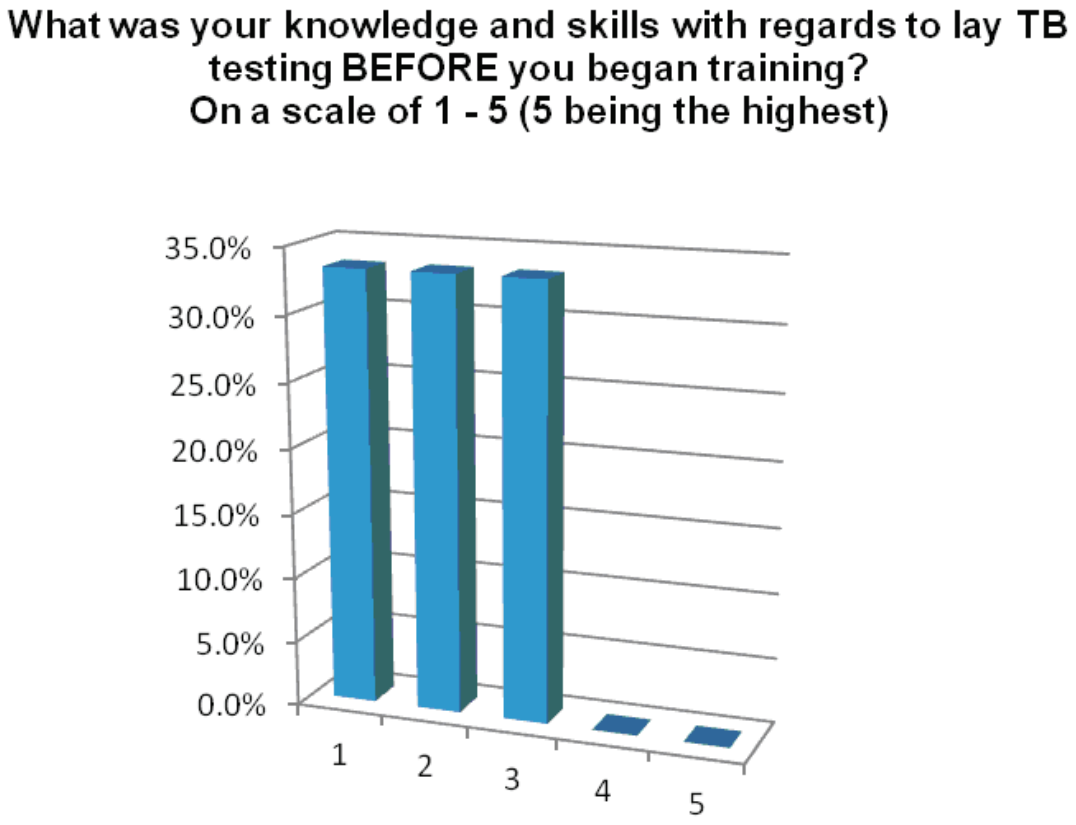
1. Evaluation Response Rate

There was a 100% response return rate (3) for this survey

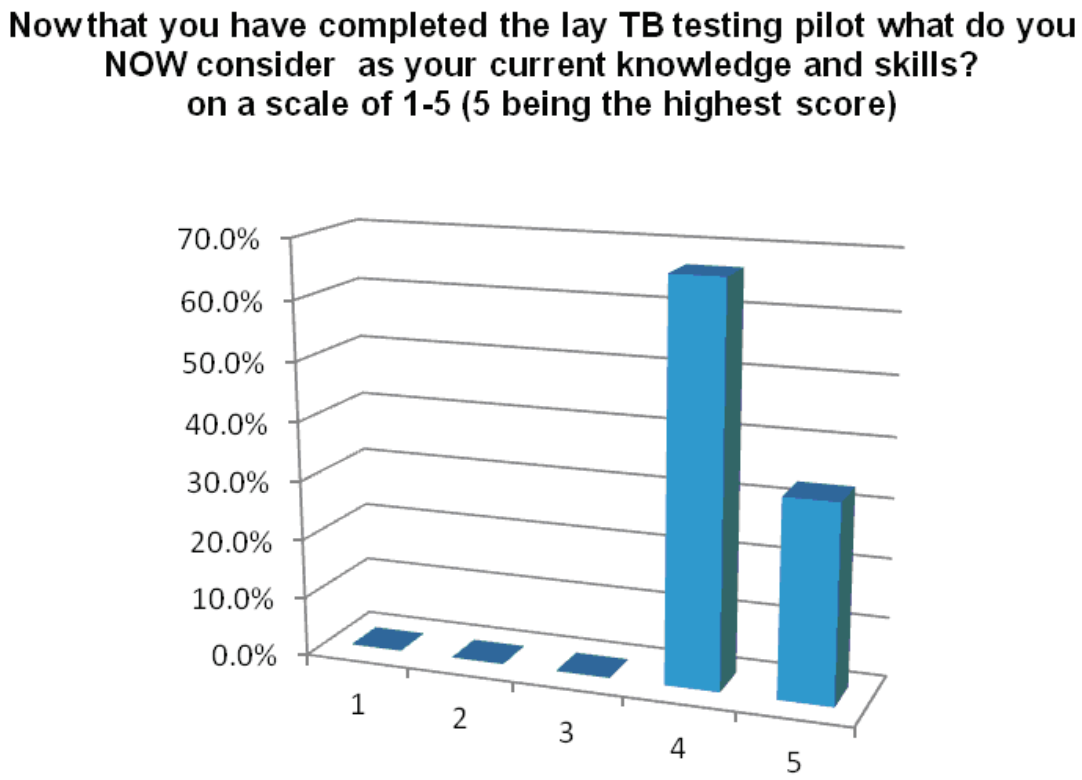
2. Relevance & Benefits of Classroom Based Training

2.1 When asked about their length of service working in Veterinary Service all respondants revealed they had worked for between 3 – 5 years.

2.2 When asked to rate their knowledge and skills with regards to Lay TB Testing, on a scale of 1-5 (where 1 is low and 5 is high) before attending the training 2 staff rated their knowledge as 2 or less. The remaining member of staff rated themselves as a 3. See the bar chart below for the full ratings:



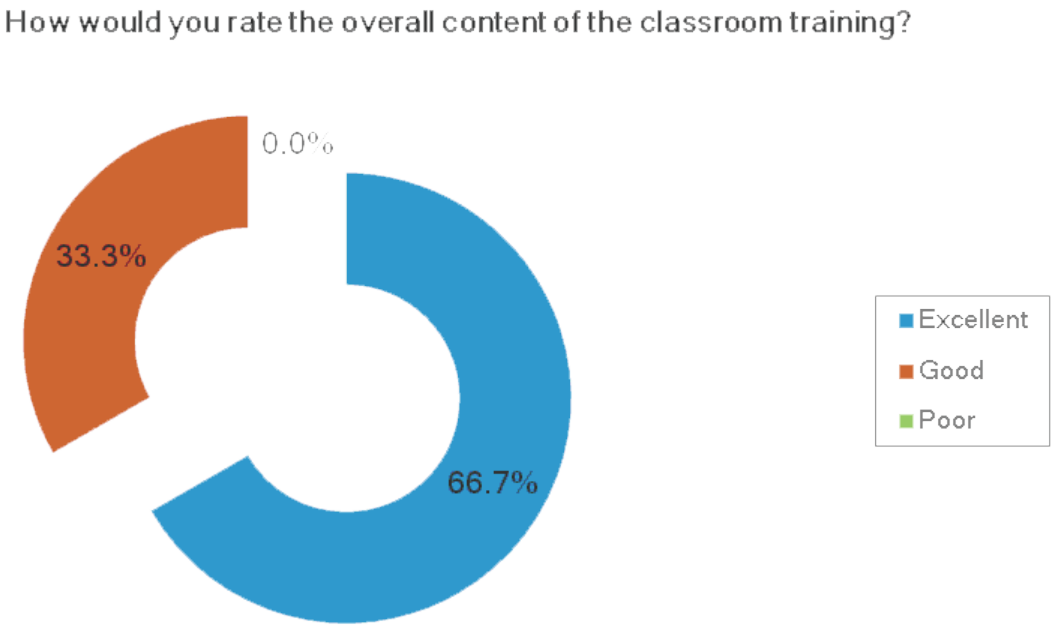
2.3 When asked to rate their knowledge and skill after completing the Lay TB testing training programme, on a scale of 1-5 (where 1 is low and 5 is high), All of the trainees had improved their score rating to either a 4 or 5. This is illustrated in the bar chart below:



2.4 When asked if the 5 day classroom based training was sufficient all three respondents indicated that it was. At the focus group session they articulated that the 5 days was time well spent, with the tutors using lulls between speakers to recap theories and to reiterate the learning.

2.5 All respondents agreed that having 5 consecutive days training was not intense and they felt that the training flowed well over the period.

2.6 When asked to rate the overall content of the classroom training, all of the respondents rated the training either excellent or good, as illustrated in the chart below:



2.7 When asked to rate the standard of the classroom training delivered by the principal tutors the results revealed that all trainees rated them as excellent. This rating was reinforced during the focus group were the comments received were as follows:

- "The tutors were very approachable and took lots of time to coach me"
- "They fielded difficult questions and were very patient"
- "Spent a lot of time and effort in training us, they were easy to talk to and patient. The coaching I received was very good"

2.8 When asked did they think having the training delivered by in-house DARD staff helped them understand TB testing, all attendees agreed that it was essential to have VS staff deliver the training.

2.9 The attendees were asked to rate on a scale of 1 – 5 (5 being the highest) each of the training sessions, what follows are the results:

Training Session Titles	**1**	**2**	**3**	**4**	**5**
Overview of what the training entailed and the Accreditation process	0	1	0	1	1
Staff Roles and Responsibilities	0	0	1	1	1
Understanding Bovine Tuberculosis	0	0	0	0	3
Understanding the theory behind Single Intradermal Comparative Cervical Tuberculin (SICCT) testing	0	0	0	0	3
Understanding SICCT testing in practice	0	0	0	0	3
Abattoir Procedures	0	1	1	0	1
Laboratory Procedures	0	0	2	0	1
Immune system and how it relates to the test	0	0	0	1	2
the Husky PDA	0	0	1	1	1
Health and Safety	0	0	1	1	1
Clinical signs of bovine TB and things that happen at tests	0	0	1	0	2
Mycobacterium Bovis	0	0	1	1	1
Bovine TB: Worldwide	0	0	2	0	1
Bovine TB: GB and the South	0	0	2	1	0
Bovine TB: Northern Ireland	0	0	1	1	1
Legislation	0	0	2	1	0
The immune system of cattle	0	0	0	1	2
TB testing equipment and consumables	0	0	0	2	1
Interpretation of test results	0	0	0	1	2
Isolation of positive reactors and inconclusive reactors	0	0	1	0	2
Communicating with herd keepers and dealing with confrontation	0	0	0	2	1

The majority of the training sessions were rated from a score of 3 – 5, with the exception of the Overview of what the training entailed and the Accreditation Process and the Abattoir Procedures.

2.10 The attendees were asked what training session as outlined in question 9 could have been expanded on in the classroom scenario. Apart from using the Husky and downloading the data to Aphis there was nothing more that they thought could be lengthened. This was reiterated during the focus group discussion and it was generally agreed that the Husky equipment failure was unavoidable and that the new Trimble equipment was more reliable.

2.11 When asked to comment on what classroom training could have been improved, the respondents stated the following:

- "Handouts could have had more information"
- "Maintenance and Use of Equipment"
- "More practical work incorporated"

Discussion at the focus group expanded on these replies as follows:

- **Handouts could have had more information** – some of the handouts contained abbreviations, some areas there could have been elaborated on – "but nothing major"
- **Maintenance and Use of Equipment** – the fact that the Husky equipment failed at one point drew attention that this could be an issue. However as new version of this equipment is now in use this should not impact in the future;
- **More practical work incorporated** – it was felt that there could have been more practical work such as the use of equipment and in particular scissors and guns. This would have made the field training easier.

2.12 When asked to state what was the most useful part of the classroom training, the following:

- "Immune system of cattle"
- "Theory behind Sicct"
- "Understanding Sicct testing"

2.13 When asked to state what was the least useful part of the classroom training, the following:

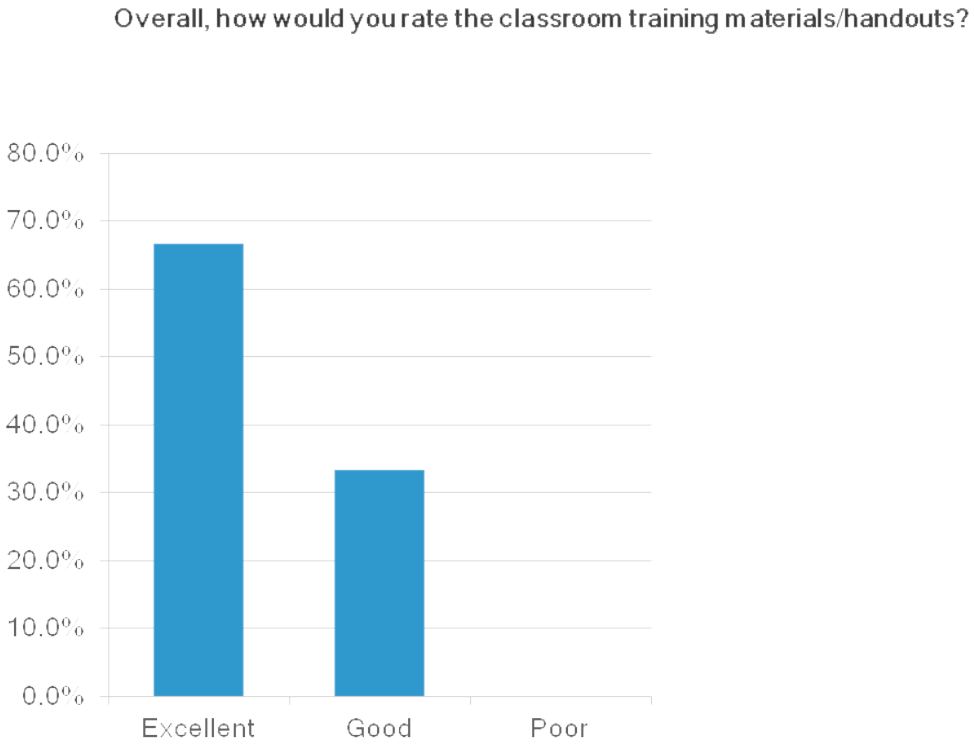
- "Abattoir + laboratory training"

The focus group expanded on this response by explaining that they thought it was more relevant to know the theory but not what happens.

2.14 The group felt that there was nothing else that should or could have been included in the classroom training.

2.15 The group also revealed that the support, guidance and in particular the coaching they received was excellent; in their opinion the principal tutors really stepped up to the mark.

2.16 The chart below outlines how the attendees rated the training materials and handouts. This should be qualified by comments made at the focus group i.e. some of the handouts contained abbreviations, some areas could have been elaborated on.



2.17 All staff stated they were content that they had received sufficient information prior to attending the classroom training.

2.18 The following additional comments were received through the survey and at the focus group:

- "The training was very comprehensive"
- "I felt that the classroom training was very good but could have had a bit more of a practical side to it perhaps using the CAFRE herd"
- "I thought the training was excellent, much better than I expected"

3 Relevance & Benefits of the Field Training

3.1 All respondents agreed that the field training was delivered in a way that was easily understood and that they received sufficient support and guidance from both the VO's and Group 4 Supervisor.

3.2 The survey also confirmed that the training was delivered to a reasonably high standard to ensure that the trainees were content to carry out testing on their own. It also confirmed that the training manual they received was easily understood and was a good resource for support and aid memoire.

3.3 When asked to list the most useful part of the field training the following comment were received:

- Testing under VO supervision;
- Making sure the guns worked properly;
- Learning to do the testing.

3.4 When asked to list the least useful part of the field training the following comment was received:

- "Working with the large herds, especially those not in a crush, I was unable to test very many cattle because of time constraint to get job finished"

The focus group expanded on this response by explaining:

- They thought they should have been focusing on smaller herds to begin with and then progressing to middle and large sized herd;
- They felt that they were constantly under pressure from the TVO/VOT to get the test done quickly so that they could move on to the herd. They got the impression that by supervising them the TVO/VOT was losing money;
- They always had an audience i.e. the customer(s), VO, TVO/VOT and anyone else who was around – at the beginning this put them under extreme pressure to complete the test quickly and accurately.

3.5 When asked to comment on whether there was anything else that should have been included in the Field training, the following comment was made:

- "We should have tested at least 10 animals before going out with the VO.

This comment was reinforced at the discussion with the focus group suggesting that the CAFRE herd could be used as a testing ground"

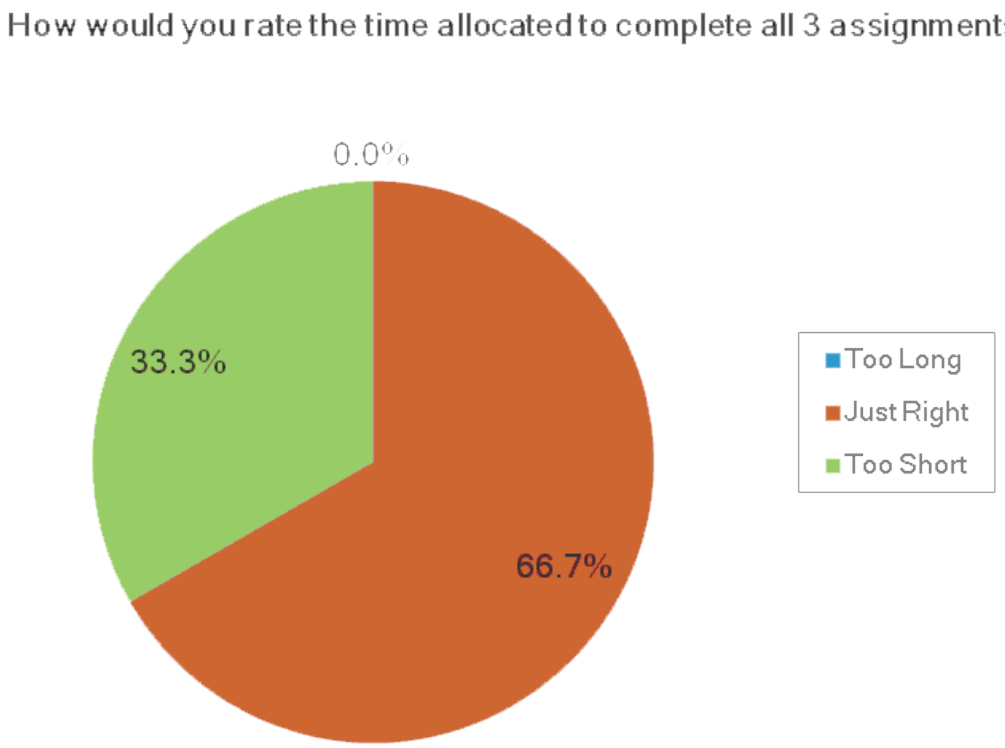
3.6 The following additional comments regarding the field testing were received both through the survey and discussion at the focus group:

- "Sourcing of reactors could be more co-ordinated so that relevant numbers can be seen quicker. Vets should be selected on basis of areas where there is likely to be reactors and tests small enough so that trainees can test more cattle each day"
- There should be more contact/communication between the Lay Testers and the VO's when reactors and inconclusive's were discovered, this would have made the training more effective and cut down on the immense travel time;
- It may be worth considering the field training being targeted to one area in Northern Ireland where incidences of TB in cattle are known. This would again cut down the training and travel costs;

4 Relevance & Benefits of Written Assignments

4.1 All respondents agreed that the training they received was sufficient to enable them to fully complete all 3 written assignments.

4.2 When asked if the time allocated to complete the assignments was adequate 2 staff said it was just right, with the remaining staff member stating it was too short. This is illustrated in the pie chart below:



4.3 All respondents found that the assignments were easy to follow and that they did not have difficulty in completing them. The focus group session revealed that the Lay Testers could not have completed the assignments without the assistance of the tutors both in the terms of explaining what they needed to do and extensive coaching. All three staff were very complementary and appreciative of both tutors in terms of the support and guidance they received not only in completing the assignments but throughout the entire process.

4.4 When asked their opinion on having the Lay TB Tester accredited, all agreed that it was a good to have this Certificate of Competence and that having gone through the training process it has given them not only the competencies but also the confidence to fully complete TB tests. They also see that having a Certificate of Competence gives them more authority with the customers and stakeholders alike when deployed.

5 Feedback from the Principal Tutors

Having completed an on-line survey and focus group with the Lay TB testers a subsequent meeting was held with the two principle tutors to ascertain their feedback on the training.

5.1 The tutors in general terms felt the training delivered was good. But they did have a number of concerns as follows:

1. The preparation time given to develop, design and deliver the pilot was not adequate; however in stating this they both acknowledged the fact that they completed the task. Nonetheless it was extremely pressurised to have everything in place for the classroom based training. In addition, this was completed during the peak annual leave period.

2. It was essential that both principle tutors were qualified and experienced trainers. Their training styles complemented each other and the fact that they both were heavily involved in developing and designing the training product was important to the success of this training. However the concern is that this is not an off-the-shelf training package that anyone can deliver, therefore if this training is to be rolled out there would need to be consistency in how it is delivered.

3. The timing of the classes could have been better – it would be more effective to begin classes in the Autumn;

4. They felt that the classroom training was good and the feedback after each training session reinforced the learning and skills transfer. This worked reasonably well with three trainees; however Veterinary Service need to consider if this would be as straightforward if the class size was much larger.

5. The 5 oral assessments proved difficult and there was a lot more coaching needed than was expected. It was helpful that one of the tutors had previous experience of this type of assessment and was able to structure the questions to a level that the trainees could easily understand and respond to. It would therefore be important that any future tutors should be competent in the delivery of oral assessments.

5.2 When asked about lessons learned from the entire training programme the following points were discussed:

5.2.1 The Health and Safety session of the classroom training was an oral presentation and the feedback was that whilst this session was very valuable and was delivered professionally, the learning should have been reinforced by a PowerPoint presentation. This was an issue documented through the audit process which recommended that for scrutiny purposes an account of what was delivered should be recorded.

5.2.2 It is acknowledged that a vast amount of time and effort went into the development and design of this pilot training package. If this training is to roll-out then pre-training time would need to be factored into any subsequent delivery to ensure that any new and/or best practice methods and lessons learned are considered. All training lesson plans, presentations, materials, methods used and evaluation/feedback should be fully recorded and pulled together for use as the generic Trainers Brief. This Trainers Brief would be used as the core resource for all future training.

5.2.3 More practical training sessions in relation to clipping and measuring, perhaps using the CAFRE herd and the use of equipment should also be considered. This would give added confidence to the trainees before they start their field training sessions.

5.2.4 The tutors have considered introducing a method of evaluation after each test. This would leave them better placed to gauge the training delivery against each lesson plan; if the level of communication is right and to access the knowledge and skills transfer process.

5.2.5 The timing of the training should also be considered and if possible it should be geared to coincide with the main TB testing period.

5.3 Other comments received from the principle tutors are as follows:

5.3.1 VS should think about having a VO dedicated for 3-4 month period to supervise the trainees in the field. This VO would be able to target hot spots for testing, have the initial interface and communication with the customers, and there would be a skills and knowledge transfer by passing on practical tips and know-how to the trainees. It would be a professional way to introduce Lay TB testing to the customer and it would show commitment to the trainees. This would be more effective for field training and would ultimately reduce travel time and cost.

Report Recommendations

In all there are 7 main recommendations emerging from this report, they are as follows:

(i) Given that there were only three staff selected to complete this project any further roll-out should include a greater number of trainees (up to 10). Any future training should be fully evaluated i.e. a pre-course training evaluation in order to gather baseline data and a post training evaluation to measure for improvement, application and performance;

(ii) The OCN Accreditation process should be endorsed as a measure of demonstrating that Lay TB Testers have been fully trained, certified and are competent to carry out tests. If this pilot is to be rolled out then VS should investigate what measures they need to take to ensure that these and any future certified Lay TB Testers maintain their certification i.e. refresher training and/or reaccreditation;

(iii) VS should ensure that staff selected as principle tutors should be fully qualified to develop, design and deliver training and in particular are competent to complete oral assessments to the satisfaction of the examining body, VS should consider the minimum qualification for the principle tutors is set at least at City & Guilds Level 3 Preparing to Teach in the Lifelong Learning Sector (PTLLS);

(iv) VS should consider appointing a dedicated VO for 3-4 month period to fully supervise all trainees in the field. This VO would liaise fully with the principle classroom tutors and play a part in the accreditation process;

(v) The timing of any further training roll-out should coincide with the peak test period for TB. This will ensure that the Lay TB Testers' field training is more targeted thus ensuring a more cost effective process;

(vi) There should be a full review of the training provided in this pilot and the feedback provided in this report should be used as a basis for any amendments. To complete this review adequate time must be allowed to ensure positive improvements are made. A greater emphasis should be put on the practical side of the training provided.

(vii) The principle tutors should consider as best practice to complete wash-up/ evaluation sessions as follows:

- With the Lay TB Testers after each stage of the training process;
- With themselves;
- With their peer group.

All lesson plans, training objectives exercises and procedures should be documented and updated during the process. VS should consider introducing an independent quality assurance to ensure this training is validated. A Trainers Brief described at paragraph 5.2.2 should be developed and used as the core resource for all future training.

APPENDIX D
Customer Survey Data

Section A: Test at which a trainee Lay Tuberculosis Tester was being trained	
What did you think of the following:	Number of Returns:42

Before the test	Good	Average	Poor
The way initial contact was made with you by DARD?	48%	31%	21%
Information supplied to you about the lay testing project?	43%	29%	29%
Availability of further advice or information?	36%	38%	26%
If you have given a poor rating please explain/comment.			
A) No further advice available			
b) No info at all was given			
c) Was not aware of project - not explained			
d) No further info provided			
e) Did not know about test until staff arrived.			
f) DARD staff just turned up on farm			
g) no knowledge of AHWI coming			
h) No further info given			
i) Wasn't aware of testing taking place			
j) No info provided re trainee arrival			
k) Herdkeeper unaware of trainee coming. No further info offered			
l) No contact was made before test. It was just a matter of fact it was going to happen unless I was very unhappy about it			

How satisfied were you that:			
During the test	**Good**	**Average**	**Poor**
Staff made it clear who they were?	86%	10%	5%
Staff made it clear what they were doing?	88%	7%	5%
The visits were well organised?	76%	14%	10%
The staff understood your business?	79%	17%	5%

If you have given a poor rating please explain/comment.
a) Think it was the first time the man had seen a cow
b) Staff didn't explain who they were
c) Too slow. Full hour to do test

How would you rate:			
Overall	**Good**	**Average**	**Poor**
The quality of work done?	62%	21%	17%
The knowledge of the people doing the work?	79%	17%	5%
The politeness of the people doing the work?	83%	17%	0%

How would you rate:			
Overall	**Good**	**Average**	**Poor**
The helpfulness of the people doing the work?	81%	17%	2%
The capability of the people doing the work?	74%	17%	10%

If you have given a poor rating please explain/comment.
a) Two different testers 1 average 1 poor
b) Did not have a clue. Don't even think about sending another trainee tester ever again !!!
c) On completion of the test, I remarked to the senior person how willing & capable the trainee was (he will go far). Interested in what was taking place.
d) Work was a bit slow. Would not have suited someone with a bigger herd
e) Very slow
f) Test too slow - maybe because of training
g) Work a little slow
h) Trainee was not a stock man at all. Needed Glasses. Training kept herdkeeper back
i) Maybe they could do future testing elsewhere eg Greenmount
j) Testing very slow because of training
k) Staff arrived totally unannounced. Herdkeeper had to approach staff and ask them who they were and what they were doing
l) This herdkeeper asked for the test himself. Trainee was just an observer so he saw the questionnaire as largely irrelevant
m) Herdkeeper thinks a blood test would be better for TB. Tests should always be done in one day.
n) No actuad testing carried out on this herd. The herdkeeper thinks the VO just gave instructions to the AHWI
o) very slow and futtery. Vet could have done 10 animals in time AHWI done 1

Section B: Test carried out by a registered Lay Tuberculosis Tester working alone

What did you think of the following:	Number of Returns:10

Before the test	**Good**	**Average**	**Poor**
The way initial contact was made with you by DARD?	90%	10%	0%
Information supplied to you about the lay testing project?	70%	30%	0%
Availability of further advice or information?	50%	50%	0%

How satisfied were you that:			
During the test	**Good**	**Average**	**Poor**
Staff made it clear who they were?	90%	0%	10%

How satisfied were you that:			
During the test	**Good**	**Average**	**Poor**
Staff made it clear what they were doing?	100%	0%	0%
The visits were well organised?	90%	0%	10%
The staff understood your business?	100%	0%	0%

If you have given a poor rating please explain/comment.
a) Came 1 hour late & with only 1 set of print outs for 2 herds

How would you rate:			
Overall	**Good**	**Average**	**Poor**
The quality of work done?	80%	20%	0%
The knowledge of the people doing the work?	90%	10%	0%
The politeness of the people doing the work?	100%	0%	0%
The helpfulness of the people doing the work?	100%	0%	0%
The capability of the people doing the work?	90%	10%	0%

APPENDIX E
Project Staff Survey Data

Northern Ireland Lay TB Testing Pilot Project DARD Staff Feedback

Number of Returns: 19

1 = strongly disagree

3 = neither agree nor disagree

5 = strongly agree

N/A = not applicable, I did not experience this aspect of the project

Recruitment and selection of lay tester trainees	1	2	3	4	5	N/A
The expression of interest circular was effective in getting AHWIs to apply for training	0%	11%	32%	16%	0%	42%
The selection process was effective in selecting suitable candidates for training	0%	11%	26%	11%	0%	53%
The number of trainees was adequate	5%	32%	11%	0%	11%	42%

Explanation/comment
a) No AHWIs in Ballymena interested as I am aware

Explanation/comment
b) For pilot purposes 2 would be sufficient as the end game was surely to establish the official certification of these group of workers under the guidelines of the RCVS and within European regulations. 1 would be ok, but I realise the merit in having a second as back-up.
c) I didn't read the interest circular. In my view, a more suitable candidate than one of those chosen was rejected.
d) I would have liked more to have been trained.
e) I was not involved in AHWI recruitment for this project. I think three lay testers, one of who did not progress to testing, and the short period available for the testing phase renders this exercise in-valid.
f) If lay testing is to be rolled out, then AHWIs will need to be directly informed as to the reasoning behind it as an interest circular may not yield a high enough number of volunteers.
g) not enough thought given to in depth discussion with AHWIs to alleviate fears by explaining purpose and need for pilot
h) I had no input in above.

Classroom based training of lay testers	1	2	3	4	5	
The training delivered by me was relevant to the trainees	0%	0%	5%	11%	11%	74%
The trainees were able to understand the training I delivered	0%	0%	5%	11%	11%	74%
The programme covered all the theoretical knowledge required by the trainees	0%	5%	5%	0%	5%	84%
I received training which was relevant to my needs	0%	0%	0%	0%	11%	89%
The trainers treated me with respect	0%	0%	0%	11%	11%	79%
I was provided with enough printed material for future reference	0%	0%	0%	5%	5%	89%
The trainers were knowledgeable in their topic	0%	0%	0%	5%	5%	89%
The length of the course was appropriate to the amount of training	0%	0%	5%	5%	5%	84%
The involvement of the Open College Network improved the training	0%	0%	11%	0%	5%	84%

Explanation/comment
a) none of my AHWIs were involved
b) I oppose the fact that these group of workers can receive only 1 week of classroom training and are now eligible to carry out on-farm TB diagnostic testing. I gained a professional 3rd level veterinary degree with honours, having spent 5 intensive years study. i was examined with supreme scrutiny in order to achieve the prestigious qualification of veterinary medicine. Only then, was I eligible to partake in TB testing. TB testing has always been in my opinion 'an act of veterinary medicine'. I would caution the deployment of AHWIs in such a role given the unfolding 'sharp rise' of 18.5% in TB reactors since Nov 2010. Vets have proven themselves in the past, that in 2003 when TB herd incident had soared to 10% then, with the recruitment of 29 VOTs herd incident fell year on year. A professional approach is whats needed currently to stem the rise in TB infection

Explanation/comment
c) I only delivered practical training and it was not satisfactory as testers were not allowed to inject animals.
d) I had no involvement in these aspects of the trial.
e) I was not involved in classroom based training
f) I have trained many young vets in my career. James Buchanan was the best I have trained.
g) I was not part of training

Field training of lay testers	1	2	3	4	5	
DVOs and SVOs understood their role as Authorised Veterinary Surgeons during field training	5%	5%	16%	16%	0%	58%
Selected VOs understood their role as Authorised Veterinary Surgeons during field training	11%	5%	11%	32%	5%	37%
TVOs and VOTs involved in training understood their role as Authorised Veterinary Surgeons	0%	11%	16%	11%	16%	47%
The targets for field work training, in particular seeing various reaction types, were achievable within 11 weeks	16%	16%	21%	11%	11%	26%
The trainers treated me with respect	0%	0%	0%	5%	11%	84%
The herdkeepers treated me with respect when I was being trained	0%	0%	5%	5%	0%	89%
The trainers were knowledgeable	0%	0%	0%	5%	11%	84%
The field training prepared me for deployment	0%	0%	0%	5%	5%	89%
The programme covered all the theoretical knowledge required by the trainees	5%	5%	0%	11%	11%	68%

Explanation/comment
a) as a trainer I observed that my trainee was treated with respect
b) Field work training was carried out at the quietest time of the year for TB testing. As a result the targets were unlikely to be achieved within 11 weeks
c) No First hand experience of training
d) theory was not part of the field training given by VOTs. I didn't receive any instruction to involve theory with the physical act of TB testing. The trainees were not given any formal training in fraud awareness. This will mitigate against effectiveness of the ERAD programme given the likelihood for such incidents to occur, in light of the fact of high livestock values presently.
e) I had no involvement in these aspects of the trial.
f) I can only comment on what I saw on farm.

Deployment of lay testers	1	2	3	4	5	N/A
Instructions were clear for allocation of tests to lay testers	16%	21%	0%	26%	5%	32%

Deployment of lay testers	1	2	3	4	5	N/A
A sufficient number of tests were made available for lay testers	16%	11%	11%	26%	11%	26%
The number of tests available to TVO's and VOT's was reduced	5%	11%	42%	0%	5%	37%
The Staff Instructions for lay testers were fit for purpose	0%	16%	5%	21%	0%	58%
DVOs and SVOs understood their role as Authorised Veterinary Surgeons during the Deployment Phase	5%	11%	21%	16%	0%	47%
Selected VOs understood their role as Authorised Veterinary Surgeons during the Deployment Phase	5%	5%	21%	16%	11%	42%
Herdkeepers treated me with respect when I operated as an Approved Lay Tester	0%	0%	0%	5%	11%	84%
The length of the deployment phase was adequate for the lay tester to develop confidence in his role	16%	11%	5%	5%	11%	47%
I was supplied with the equipment necessary for carrying out my work	0%	0%	0%	5%	5%	89%
Amended forms (BT15, BT23 and BT28) were fit for purpose	5%	11%	11%	11%	11%	53%

Explanation/comment
a) a lot of time spent trying to see the required number of reactors and its this could have been better co-ordinated to reduce time and have time testing by trainee on his own would have increased
b) Ballymena could only find two tests of relevance and only one by trainee
c) From my understanding the pilot, having trained the AHWIs was that when all the targets had been met regarding numbers of reactors, inconclusives and reaction types, the pilot would come to a natural end. I had assurances that the lay testers would be effectively 'parked' until DARD undertook a public consultation in early 2012. Pending the outcome of such a consultation the decision would be made whether or not to 'deploy' lay testers. it seems to me that DARD have not honoured this commitment. Should AWHI's be currently TB testing?
d) I wasn't personally involved but there was general confusion over allocation of tests and DVO role expressed at DVO forum - initally at least. I think the role of AVS should have stayed within TB policy section.
e) I had no involvement in these aspects of the trial.
f) Number of tests available was borderline and may have been low if all 3 AHWIs would have started to do field work at same time.
g) more time should have been spent creating a workable, efficient and practical procedure for the field, once LT were deployed. Too much uncertainty re date of deployment, not enough communication with field offices and HQs
h) so little input that I could only answer a few of the questions

Please indicate your role in the project:	
Trainee	2
DVO/SVO in Divisional Veterinary Office which is headquarters to a trainee	3

Please indicate your role in the project:	
DVO/SVO in Divisional Veterinary Office which is not headquarters to a trainee	5
TVO/VOT involved in training trainees	3*
TVO/VOT not involved in training trainees	
VO selected to allocate tests and provide direction on behalf of DVO/SVO to lay testers	6
Trainer for practical class in Greenmount	1

* 1 VO involved in training

APPENDIX F
Tests Carried Out By Approved Lay Testers[5]

In the period 01/11/2011 – 31/12/2011

RESULTS FOR LAY TESTER 1 - date of Registration: 11 November 2011

Herd	Test Type	Date completed	Number of Animals	Number of field Reactors	Number of field Inconclusives
1	RH1	17/11/2011	74	1	2 severe
2	RH1	18/11/2011	126	1	1 standard
3	RH1	25/11/2011	130	0	0
4	RH1	01/12/2011	24	0	0
5	RH1	15/12/2011	29	0	0
6	RH1	09/12/2011	172	1	0
7	RH1	08/12/2011	142	0	0
8	RH1	16/12/2011	42	0	0
9	RH1	16/12/2011	108	0	0
10	RH1	15/12/2011	58	0	0
11	RH1	23/12/2011	49	1	1 standard
12	RHT	22/12/2011	86	0	0
13	RH1	22/12/2011	26	0	0
14	RH1	23/12/2011	27	0	0
15	RH1	22/12/2011	3	0	0
Total			**1096**	**4**	**4**

Outcome for reactors

Herd	No. of reactors identified by Lay Tester	PM	Comment
1	1	Not lesioned	

5 Data for testers and Herds has been anonymised

Herd	No. of reactors identified by Lay Tester	PM	Comment
2	1	Lesioned	TB generalised – carcase condemned
3	1	Lesioned	
4	1	Lesioned	TB generalised

Outcome for inconclusives

Herd	No. of inconclusives identified by Lay Tester	RI1 test results
1	1	No result as of 09/01/2012
2	1	No result as of 09/01/2012
3	1	No result as of 09/01/2012

RESULTS FOR LAY TESTER 2 - date of Registration: 09 December 2011

Herd	Test Type	Date completed	Number of Animals	Number of field Reactors	Number of field Inconclusives
1	RH1	23/12/2011	136	0	0
2	RH1	15/12/2011	65	1	0
3	RH1	13/12/2011	30	1	0
4	RH1	22/12/2011	30	1	0
5	RH1	30/12/2011	93	0	1
Total			**354**	**3**	**1**

Outcome for reactors

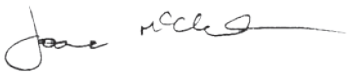
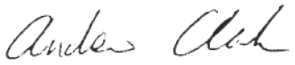
Herd	No. of reactors identified by Lay Tester	PM	Comment
1	1	Lesioned	TB generalised
2	1	Lesioned	
3	1	Lesioned	

Outcome for inconclusives

Herd	No. of inconclusives identified by Lay Tester	RI1 test results
1	1	No result as of 09/01/2012

RESULTS FOR LAY TESTER 3 - date of Registration: 29 December 2011

No tests carried out after registration.

	Name(s)	Signed	Date
Prepared by:	Joanne McClements		3/4/12
	Andrew Clark		3/4/12
Verified by:	Michael McLernon		3/4/12
Approved by:	Roly Harwood		

Dr E.F. Logan Submission

Dr E F Logan PhD, BVM&S, FRCVS, F.R.Ag.S
39 Holestone Road
Doagh
Ballyclare
BT39 OTJ

16th April 2012

Ref: Farming Life Article "Sharp increase in TB reactor cases"

1. May I ask a question – Why is so much emphasis on cattle at pasture and so little research on housed cattle?

2. I have been a veterinary surgeon for over 50 years (graduated 1959). The first 9 years I spent in large animal practice where daily I carried out TB testing, the rest I spent in veterinary research in Edinburgh and Northern Ireland. Whilst at the Veterinary Research Laboratories DANI where I was head of the Immunology Department I never carried out TB research but for several years I was on the periphery of such research because of my knowledge of bovine immunity.

3. As a student, I was taught TB was a disease of housed cattle and not of grazing cattle. On the other hand Brucillosis was considered to be a disease of grazing cattle because bacteria in the aborted foetus and afterbirth contaminated the grazing in which the germ could survive over winter.

4. When I entered practice in Northern Ireland in 1959 the TB scheme was voluntary but if farmers entered the scheme they received a headage payment – quite minimal by today's standards.

5. Prior to this I was brought up on a dairy farm at Blackcave, Larne. We were one of the earliest herds to be TB attested (Herd No 1034) because we sold Grade A unpasteurised milk directly to the housekeepers in the area. This must have been around 1949 and from that time until the herd moved to Straid, Ballyclare in 1974, 25 years later we never had a reactor despite the fact we were the only TB free herd in the vicinity and cattle not uncommonly broke into our cattle fields because we had much better grass.

6. When I started TB testing I found reactors in dairy herds which were housed in winter but rarely in beef herds which at that time were grazed extensively and were not housed except in some cases for very short periods in very severe weather. So it was with people, consumption as TB was called in humans was due to people living in cramped cottages with low ceilings and small windows and several children sleeping in the same room and in the same bed. Most of the Bronte family died of consumption. Rural graveyards are full of children who died in early life.

7. In the early years of TB testing cattle both old and young were housed and tied by the neck throughout the winter. Cows each had a stand and in the summer at milking time returned to that particular stand. Thus within the byre the cattle did not mix. When testing one could find a reactor in a stand and perhaps the 2 neighbouring cows doubtful. Further down the byre one might find another example. If these animals were removed often at the next test the herd was "clear". These byres were very well ventilated and there was strict legislation enforced by the DANI veterinary surgeons. The air was clear and manure removed twice daily.

8. When forage changed from hay to silage and cattle manure became quite fluid, not easily collected in wheelbarrows and so the nature of cattle housing changed completely. Dairy cows were packed into cramped conditions with much less space available per cow. Cubicles were installed and cows moved freely around the house and regularly changed cubicles. Double rows of cubicles were built and cows lay down directly head to head. Because of the

large volumes of urine and liquid manure the atmosphere was moist and warm and farmers replicated the conditions of the cramped cottages. The atmosphere was so humid and full of urine ammonia that the corrugated iron roofs rusted within a few years and had to be replaced. Coliform mastitis previously unknown – a very acute form of mastitis which often caused death became common because of the conditions. To be fair, newly built cattle sheds now have much better ventilation.

9. Because of climate changes dairy cows are frequently housed for 7 months from October to the beginning of May.

10. Is poor housing the true cause of the increase in TB?

11. At meetings of the Northern Ireland Veterinary Association I have asked this question but it appears no research is being carried out. The emphasis of the spread of TB has now turned to the badger and spread from cow to cow at grass.

12. Unfortunately due to the large numbers of reactors to the best of my knowledge only superficial examinations PM are carried out at the abattoirs. These are examinations sufficient for meat inspections but not detailed enough to investigate the epidemiology of TB.

13. In grazing animals in quite a high percentage of outbreaks the cause cannot be found. "Nosing" between individual animals is often quoted as a cause of spread. There is very little evidence that "nosing" is common and more importantly it is minimal. One thesis quotes the time of "nosing" in seconds and it only occurs when cattle are first acquainted.

14. What of the role of the badger? Clearly cattle and badgers carry the same strains of TB. This is not surprising since they both share common grazing. DARD suggest the cattle should be isolated from badgers. How can this be done when badgers are burrrowing animals and travel hundreds of yards from their setts.

15. I have at a NIVA meeting asked is it not possible to differentiate badger infection from cow to cow infection. In theory, and I emphasise in theory, it could be possible to separate the two infections.

16. In cattle to cattle infection, the route of infection is inhalation. Thus the TB lesions should be in the lungs and adjacent lymph modes. It might be possible to isolate the bacillus from the nasal passages.

17. In badgers to bovine infection, the route of infection is oral. Badgers excrete the TB bacillus in bodily fluids which contaminate the grazing: Thus the distribution of lesions could be different and might be in the intestine and mesenteric lymph modes. If lesions in both infections could be shown to be different it would strengthen the case for badger culls.

18. Sadly because of the lack of success everybody is tired of TB and the enthusiasm to eradicate this disease has faded. Many other countries have eradicated TB – why can't we?

19. I believe that an independent committee of experienced veterinary research workers should be set up to analyse the data already available. These vets would not necessarily have carried out research into TB but would have the knowledge and experience to examine and objectively study the data, draw conclusions and put forward proposals.

20. Unfortunately little research into the epidemiology of TB is carried out by the state veterinary staff.

Annex

Dr E. F. Logan

Dr E. F. Logan is an experienced large animal veterinary surgeon. He graduated in BVMSS in 1959. He spent the next 9 years in practice in Co. Antrim where he was involved in the TB eradication scheme.

In 1958 he went to the Royal (Dick) Veterinary College to carry out research. He was awarded a PhD in 1972 and a Fellowship of the Royal College of Veterinary Surgeons in 1974. He then spent the next 16 years at the Veterinary Research Laboratory DANI and in 1990 joined the MMBNI where he worked for a further 9 years.

He is the author of over 100 scientific papers, 77 of which were peer reviewed. In 1990 he was awarded the Belfast Telegraph cup by the UFU and the Livesey Medal by the RCVS in 1998.

FERA Submission

Effectiveness of Biosecurity Measures in preventing badger visits to farm buildings

The Wildlife and Emerging Diseases Programme at the Food and Environment Research Agency provides research, advisory and operational services in relation to diseases of wildlife, livestock and zoonotic infections of humans. It contributes to disease control by developing effective wildlife management options and by helping implement these. Research into badger ecology, the role of badgers in the transmission and maintenance of bovine TB and methods to manage the disease in badgers has been carried out by Fera (formerly the Central Science Laboratory) at Woodchester Park in Gloucestershire since the mid 1970s. The team based at Woodchester Park includes the leading scientific experts in the field of badger and bovine TB research.

1. Bovine tuberculosis caused by *Mycobacterium bovis* is a serious and economically important disease of cattle in the UK, and a potential source of zoonotic infection. Badgers have been implicated in the transmission and maintenance of the disease since the 1970s and until recently it was thought that spread from badgers to cattle was most likely to occur at pasture. However, recent studies have provided substantial evidence of widespread and frequent visits by badgers to farm buildings during which there is the potential for close direct contact between badgers and cattle and contamination of cattle feed with infected badger faeces, urine or sputum.

2. This study evaluated the effectiveness of simple practical measures in preventing badger visits to farm buildings. In the first phase of the study, 40 farms were surveyed using motion-triggered infrared cameras on potential entrances to farm buildings to determine the background level of badger visits experienced by each farm. Thirty-two farms progressed to the second phase, where they were divided into four treatment groups; Control = no exclusion measures were installed, Feed Storage = exclusion measures were installed on the feed storage areas only, Cattle Housing = exclusion measures were installed on the cattle housing areas only and Both = exclusion measures were installed on both the feed storage areas and the cattle housing. Badger exclusion measures included solid metal gates, gates with adjustable solid metal panels, solid metal fencing, feed bins and electric fencing. Cameras were deployed for at least 365 nights in each phase on each farm.

3. In Phase 1, badger visits were recorded on 19 farms (48%), and on between 0.3% and 71% of the total number of surveillance nights on each farm. Of the ten farms where badger visits were recorded on more than ten nights, feed storage areas were visited on all farms, and cattle housing on eight. In general, badgers visited feed storage areas more often than cattle housing. The frequency of badger visits to farms varied throughout the year. The highest numbers of nights with recorded badger visits were in April, May and June and the lowest in December and January. Badger visits were negatively correlated with the amount of rainfall in the preceding 24 hours.

4. When badger exclusion measures were applied, the number of visits to those farm buildings was significantly reduced ($p < 0.001$). Badgers were only able to access buildings if the exclusion measures were either not used or improperly maintained. Where exclusion measures were consistently employed and adequately maintained they were 100% effective in preventing badger access to buildings. However, they did not prevent visits to the wider farmyard.

5. For farms that had exclusion measures installed during the second phase of the study, the level of badger visits diminished ($p < 0.001$), despite an overall significant increase in the level of badger visits between the first and second phases ($p < 0.001$). Installing measures on cattle housing did not reduce visits to feed storage areas or vice versa.

6. Our estimates of levels of farmer compliance in the use and maintenance of exclusion measures varied widely amongst farms (range = 12 - 98% of nights, mean = 60%). Measures that were installed in place of existing gates were used most often by farmers, whereas those that required deployment or maintenance (e.g. retractable or permanent electric fences) were the least likely to be used. When a farmer failed to maintain the building structure itself (e.g. damage to walls resulting in new potential entrance points) this could have negated the effectiveness of any exclusion measures.

7. Badger exclusion measures were individually tailored to fit each potential entrance point on each farm. The number and type of measures also varied widely between farms depending on their size and construction. Costs per farm ranged from £604 to £12,482, with an average cost of £4045. The average cost of applying exclusion measures to both cattle housing and feed store areas was £3840 per farm, although this is derived from a relatively small sample size (8 farms). For comparison, the average cost of a cattle herd breakdown has been estimated at £27000.

8. Properly installed and maintained badger exclusion measures can be a highly effective means of reducing direct and indirect contact between badgers and cattle in farmyards. This may, in turn, have the potential to reduce disease transmission risks.

FERA Submission Annex

OPEN ACCESS Freely available online

PLoS one

Effectiveness of Biosecurity Measures in Preventing Badger Visits to Farm Buildings

Johanna Judge[1]*, Robbie A. McDonald[1,2], Neil Walker[1], Richard J. Delahay[1]

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Abstract

Background: Bovine tuberculosis caused by *Mycobacterium bovis* is a serious and economically important disease of cattle. Badgers have been implicated in the transmission and maintenance of the disease in the UK since the 1970s. Recent studies have provided substantial evidence of widespread and frequent visits by badgers to farm buildings during which there is the potential for close direct contact with cattle and contamination of cattle feed.

Methodology: Here we evaluated the effectiveness of simple exclusion measures in improving farm biosecurity and preventing badger visits to farm buildings. In the first phase of the study, 32 farms were surveyed using motion-triggered infrared cameras on potential entrances to farm buildings to determine the background level of badger visits experienced by each farm. In the second phase, they were divided into four treatment groups; ''Control'', ''Feed Storage'', ''Cattle Housing'' and ''Both'', whereby no exclusion measures were installed, exclusion measures were installed on feed storage areas only, cattle housing only or both feed storage and cattle housing, respectively. Badger exclusion measures included sheet metal gates, adjustable metal panels for gates, sheet metal fencing, feed bins and electric fencing. Cameras were deployed for at least 365 nights in each phase on each farm.

Results: Badger visits to farm buildings occurred on 19 of the 32 farms in phase one. In phase two, the simple exclusion measures were 100% effective in preventing badger entry into farm buildings, as long as they were appropriately deployed. Furthermore, the installation of exclusion measures also reduced the level of badger visits to the rest of the farmyard. The findings of the present study clearly demonstrate how relatively simple practical measures can substantially reduce the likelihood of badger visits to buildings and reduce some of the potential for contact and disease transmission between badgers and cattle.

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Introduction

Agricultural buildings may be attractive to wildlife for a variety of reasons. They can provide shelter, particularly during the winter to escape harsh temperatures [1]. Foraging opportunities arise from the availability of stored livestock feed and harvested crops, particularly for rodents which in turn may attract predators [2,3]. In addition to the potential for costly losses of stored feed and crops, wildlife activity may also increase the risk of spreading pathogens of agricultural and zoonotic importance such as *Brucella*, *Trichinella* [4], *Mycobacterium avium paratuberculosis* [5] and *Cryptosporidium* [6]. Disease risks may arise as a result of direct contact between wildlife and livestock or contamination by wildlife of buildings, equipment and feed. For example, it has been estimated that individual cattle or sheep could come into contact with 1626 and 814 rodent or bird droppings respectively in stored feed over one winter [7]. Developing simple methods of excluding wildlife from farm buildings may therefore be a useful tool in the mitigation of disease transmission risk between livestock and wild hosts.

The Eurasian badger (*Meles meles*) is the principal wildlife reservoir of *Mycobacterium bovis* (the causative agent of bovine tuberculosis infection) in the UK and Ireland [8,9]. The failure to eradicate bovine tuberculosis (TB) from cattle in these countries is hampered by the transmission of infection between badgers and cattle. Infectious badgers can excrete *M. bovis* bacilli in faeces, urine, sputum and exudate from wounds and abscesses [10]. Contact with badgers or their excretions may therefore present opportunities for the infection of cattle [11,12].

The principal route by which infection is transmitted from badgers to cattle is not clear. From the few studies that have been conducted, direct contact between badgers and grazing cattle appears relatively infrequent [13,14]. In contrast, several studies have demonstrated contamination of pasture with badger faeces and urine [12,13,15–17], and subsequent calculations suggest potentially significant risks of exposure to cattle [18]. More recent research suggests that the potential for disease transmission to cattle as a result of badger activity in farm buildings may also be substantial. Several studies have now demonstrated that badger visits to farm buildings are frequent and widespread in the southwest

of England [19-23]. During these visits badgers have been observed foraging on stored feed, invertebrates and vertebrate prey, collecting bedding, and coming to within 2m of housed cattle [19,21,24]. Observations of badgers defecating, urinating and grooming in buildings, sometimes in direct contact with cattle feed, provide evidence of the potential for indirect transmission of *M. bovis* via contamination of this environment [19,21,24].

Numerous studies have been conducted to investigate methods of reducing contact between wildlife and livestock on pasture, with varying degrees of success. For example fitting electric shock collars to wolves, which were activated when the wolves came within a certain distance of the protected area [25] and using acoustic frightening devices to deter coyotes [26] in order to reduce predation on sheep, ultrasonic devices and water jets to deter badgers [27], lasers to disperse deer [28,29] and electric fencing to keep deer [30] and badgers [31] out of crop fields. However, to date, little research has been aimed specifically at keeping wildlife out of farm buildings, although a notable exception was the localised evaluation of the use of electric fencing to reduce badger visits [32].

Here we describe the results of an experimental study to investigate the effectiveness of a range of simple exclusion measures on the level and frequency of badger visits to farm yards and buildings. The aims were to determine (i) if simple exclusion measures deter badger visits to farmyards and buildings and (ii) if exclusion measures cause displacement of badger activity to unprotected buildings.

Methods

Study farm selection

The study was undertaken in Gloucestershire, a county of southwest England with a high incidence of bovine TB in cattle. Potential study farms that had not been the subject of badger culling during the Randomised Badger Culling Trial (RBCT) from 1998 to 2005 inclusive (Bourne et al. 2007), and which were under annual TB testing of their cattle herds, were randomly selected from VETNET (The UK Department for the Environment, Food and Rural Affairs (Defra) bovine TB control and surveillance database). From this sample, we selected 32 farms with a herd size of at least 30 animals, which were kept indoors for at least part of the year, and where concentrates or cereal feed (e.g. cake, grain, barley, sugar beet) were stored on site but separately from housed cattle.

Experimental design

The experiment consisted of two phases, both lasting at least 365 days on each farm. During an initial surveillance phase (between 1st February 2007 and 31st August 2008) we established the background frequency of badger visits to all farms. During the second phase (between 1st February 2008 and 31st August 2009) we investigated the effect on badger visits of installing exclusion measures on farm buildings. For logistical reasons surveillance was initiated on different dates on individual farms, and consequently the periods of surveillance on each farm were not simultaneous.

Clearly we could only measure the effects of exclusion measures on farms where badgers were found to visit. Hence, while all 32 farms were monitored in both the first and second phases of the experiment, only those which experienced badger visits during the first background surveillance phase are included in the statistical analyses described below.

Surveillance

Infra-red, motion-triggered, digital still cameras (Leaf River IR3-BU, Vibrashine Inc., Taylorsville MS, USA; Stealth Cam 1430IR, Stealth Cam LLC, Grand Prairie TX, USA and Game Spy I40, Moultrie Feeders, Alabaster AL, USA) were deployed at potential badger access points to cattle sheds, feed stores, and silage clamps on all study farms. The positioning of cameras was constrained by the need to avoid them being damaged by livestock or machinery during normal farm working practices. Between four and thirteen cameras were deployed on each farm, depending on the size and the number of buildings and potential entrance points for badgers. The cameras were operational nightly throughout both phases of the experiment.

Memory cards, with at least 1Gb of storage capacity and batteries were replaced every two weeks. Images were downloaded from retrieved memory cards and all observations of badgers and other wildlife were catalogued using Extensis Portfolio 8 software (Extensis, Portland OR, USA). The date, time, farm ID, individual camera identity, type of building (feed store, silage clamp or cattle housing), and species observed was recorded for each observation. During phase 2, if an image clearly showed the exclusion measure was not in use, or otherwise allowed badger access (e.g. was damaged), on particular nights, this was also recorded. Images documenting badger visits were also allocated to one of two categories. Where a badger was clearly evident either entering or already inside a building, the observation was classified as a 'building visit', but where it was neither inside nor entering a building this was deemed a 'farmyard visit'.

Badger exclusion measures

In order to investigate the effects of installing badger exclusion measures on farm buildings, the study employed a factorial design (Table 1). Each farm was allocated to one of four experimental treatments where farms had: no exclusion measures, measures to reduce visits to cattle housing and associated feed troughs only, measures to reduce visits to feed stores (including silage clamps) only or measures to reduce visits to cattle housing (including feed troughs), and feed stores (including silage clamps). These treatments were each replicated eight times (n = 32 farms). Treatment was allocated to each farm towards the end of the initial surveillance phase, using a randomised complete block design to ensure an even distribution of farms with respect to the frequency of badger visits in phase 1 across the four treatment groups.

The badger exclusion measures were individually tailored to fit the requirements of each farm and sought to secure every potential entrance point on each selected facility. The five main exclusion measures used were galvanised aluminium sheeted metal gates, adjustable galvanised aluminium sheeted panels (which could be moved up or down) on gates, galvanised aluminium sheeted fencing, aluminium feed bins and electric fencing (Figure 1). A full list of measures employed on each farm is given in Table S1. Other measures installed on some farms included sheeted gates

Table 1. The factorial design of the study, showing the exclusion measure combinations by treatment.

	Treatment			
	Control	Cattle Housing	Feed Stores	Both
Measures on:				
Cattle Housing	No	Yes	No	Yes
Feed Stores	No	No	Yes	Yes

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with hinged flaps, roller doors, metal sheets attached to angled feed troughs and sheeted wheeled barriers. Gates and fences were constructed and fitted so that the gap between the bottom and the ground was less than approximately 7.5cm as this was considered to be sufficiently low to prevent badger access. Gates with two or three adjustable solid panels that could be raised or lowered were employed on uneven ground and deep litter.

Electric fencing (either fixed or retractable) was installed on farms where permanent gates or panels were not suitable, such as on very uneven ground or in areas where farm machinery access would have been compromised. The area beneath fixed-position electric fences over rough ground was sprayed with herbicide to retard vegetation growth which could otherwise cause the fence to short-circuit. Retractable electric fences were installed on silage clamps and across farmyards that were too wide for conventional gates and required frequent farm machinery access. The electric fence strands were held on self-tensioning reel systems, fixed to an insulated rod, which could be pulled across gaps of up to 20 metres. The height of the bottom three strands of fencing were 10, 15 and 20 cm above the ground as specified in designs that have been demonstrated to effectively exclude badgers [31,32]. A fourth non-electrified strand was placed at a height of approximately 122cm to increase the visibility of the fence as a safety measure to prevent farm workers accidentally driving through, or tripping over, the lower strands.

During the fortnightly building surveys, any observed damage to badger exclusion measures was recorded. In addition, details of whether the measures were maintained *in situ* by farmers were also recorded from the images taken during camera trapping where possible. Although this study was not designed to quantify the extent to which exclusion measures were employed and maintained by farmers, we attempted to gain some insights by calculating the number of nights that any measure was observed (from digital images) to be in use as a percentage of the total number of nights when the camera was activated. A conservative approach was employed, whereby all digital images from nights when multiple images suggested that measures were only adequately employed for part of the night were excluded. In addition, as we would expect more wildlife visits to take place (and therefore to be recorded in digital images) when exclusion measures were not adequately employed, we also excluded all images which contained wildlife. Hence, all remaining images were likely to have been triggered by non-wildlife events (e.g. wind-blown leaves) which are likely to have taken place independently of whether exclusion measures were correctly employed. This approach yielded a minimum estimate of the number of nights when exclusion measures were not adequately employed because we were unable to determine if the measures had been in use on those nights when cameras were not triggered.

Statistical Analyses

Camera level analyses. In order to assess the effect of fitting exclusion measures on buildings, images from each camera were examined for evidence of badger visits. Each observation in this analysis represented whether or not a badger visit was observed by a given camera on a given night (a camera-night). If a camera was known not to have been working on specific nights, those nights for that camera were omitted from the analyses.

Variations in the binary variable "building visit" (1 = 1 or more visits observed on a given camera night and 0 = no visits observed on a given camera night) were related to potential explanatory variables using a Generalised Linear Mixed Model (GLMM; GenStat for Windows, Version 13, VSN International, Hemel Hempstead, UK). Factors affecting the probability of a building visit were modelled with a binomial distribution using a logit-link transformation [33]. Fixed effect explanatory variables were season (spring = March to May, summer = June to August, autumn = September to November and winter = December to February inclusive), experimental phase (1 = pre-treatment phase, 2 = treatment phase) and building type (cattle housing or feed store). The model included all observations from phase 1 and phase 2 in order to allow for within-farm and year-to-year variation to be accounted for. A further explanatory variable was treatment status, which described whether any exclusion measures were in place on the entire farm (i.e. either no exclusion measures were present, measures were in place on the building covered by that camera, or they were in place somewhere else on the farm). For the purposes of these analyses, all exclusion measures were considered to be in place on the relevant buildings on all nights in phase 2 of the experiment. However, in reality there were nights

Figure 1. Examples of badger exclusion measures: solid aluminium sheeted gate (top left), aluminium sheeting installed on rail fence (bottom left), retractable electric fencing (middle), front and top opening aluminium feed bin (top right) and rail gate with adjustable galvanised aluminium panels (bottom right).
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where the installed measures had not been used or were not properly maintained which may, therefore, have allowed badger access. Categorical variables representing individual farms and cameras were incorporated as random effects in the model to account for potential correlation between observations recorded from the same source. Wald tests (using chi-squared statistics) were used to make inference on the main variables and Z-tests were used to make inference on comparisons between different levels of a given variable. Statistical significance was inferred when the associated p-value was less than 5%.

Farm level analyses. In order to investigate sources of variation in the likelihood of treatments affecting badger visits to any part of a single farmyard (whether to a specific building or elsewhere), data were aggregated across all cameras for each farm-night. Hence each binary observation in this analysis comprised of a record indicating whether there was photographic evidence of any badgers visiting a given farm on a given night (1) or not (0).

A similar GLMM approach was used to relate variation in the likelihood of a badger visit on any given farm-night to the series of explanatory variables as described above. In order to examine whether there was any displacement of badger activity from protected to unprotected buildings in the farmyard, the effect of treatment status on badger visits was examined at two levels, which were tested independently. First, we tested the effect on badger visits of whether the farm had any exclusion measures in place (regardless of location), compared to where no exclusion measures were in place. Second, the difference in badger visits between the three levels of exclusion treatment (i.e. on feed stores, cattle sheds or both) was investigated. The $\log_e$ of the number of active cameras was included as a fixed effect covariate as this was analogous to sampling effort and might influence the chance of a positive observation. A term for the individual farm was included as a random effect. All significance-testing was carried out as described above except for post-hoc tests between the different treatments, which were based on chi-squared statistics.

Results

In phase one (i.e. with no exclusion measures in place on any farms) badger visits occurred on 19 of the 32 farms and on between 0.3% and 71% of the total number of surveillance nights on each farm (Figure 2). Overall, feed storage areas received more than double the number of visits to cattle housing (Table S2). Badger visits to farms occurred throughout the year, but frequency varied significantly with month (GLMM, d.f. = 11, $\chi^2 = 142.8$, $p<0.001$). The highest numbers of nights with recorded badger visits were in April, May and June and the lowest in December and January.

The installation of simple exclusion measures on farm buildings significantly reduced levels of badger visits compared to buildings with no protection installed (GLMM, Z = -8.3, $p<0.001$). Over the two phases, the percentage of nights with incursions into feed stores reduced from 11.2% when no exclusion measures were installed to 0.5% when exclusion measures were installed; for cattle housing the percentage of incursions reduced from 3.5% to 1.2% (Figure S1). With exclusion measures installed there was a highly significant reduction in the frequency of visits to all types of facility, though the reduction in entry to feed stores was greater than in cattle housing (Table 2).

During phase two of the experiment there were only 58 recorded entries into buildings which had exclusion measures installed. All of these incursions could be attributed either to the measure not being adequately employed (7 occasions) or maintained (51 occasions). This latter category also included occasions when badger access was possible through damage to other areas of the buildings which had not been repaired. Badger incursions into farm buildings were completely eliminated when exclusion measures were in place and were adequately maintained.

The frequency of badger visits to farms as a whole (both incursions into buildings and observations anywhere in the farmyard) declined significantly when exclusion measures were installed anywhere on a farm (Table 3). Furthermore, the presence of exclusion measures on both feed stores and cattle housing resulted in a significantly greater protective effect, compared to where they were present on only one type of building (Table 3).

The installation of exclusion measures on some buildings also resulted in a significant reduction in recorded incursions into unprotected buildings on the same farm (GLMM, Z = −6.1, $p<0.001$). Incursions into buildings on farms with no measures installed occurred on 2.6% of all nights surveyed whereas incursions into unprotected buildings on farms with measures installed elsewhere on the farm occurred on 2.1% of nights. (Figure S1). While the number of visits to unprotected buildings was significantly reduced by installing measures on either feed stores or cattle housing, the reduction in visits to cattle housing when measures were only installed on feed stores was greater than *vice versa*.

The percentage of nights when exclusion measures were adequately employed and maintained varied considerably among farms (from 12% to 98%). However, over half the farms with measures installed (13/24) employed them on over 60% of nights (Figure 3). The results of a simple linear regression indicated that there was no relationship between the frequency of badger visits to a farm in the first phase of the study and the level of farmer compliance during the second ($F_{1,22} = 2.2$, $p = 0.2$).

Discussion

This study provides the clearest evidence to date that, in this region, badger visits to farm buildings are a common occurrence. Intensive surveillance over a full year demonstrated that badgers visited buildings at least occasionally on 19 of 32 (59%) farms in our sample. On 3 of the 32 farms (approximately 1 in 10), visits were very frequent, occurring on more than 60% of nights. Badgers visited feed stores and cattle housing, with visits to feed stores being more frequent. While badger visits to farmyards occurred all year round, they peaked in late spring/early summer.

Badgers were successfully excluded from farm buildings with the use of relatively simple, practical exclusion measures. These measures were 100% effective in preventing badger entry into farm buildings when properly used and maintained, such that the only recorded incursions occurred when measures were not employed adequately. Furthermore, the installation of exclusion measures not only stopped entry into buildings but also reduced the level of badger visits to the farmyard as a whole.

The reduction in visits to the farmyard which accompanied protection of one building type (i.e. just feed stores or just cattle housing) was most evident when feed stores were protected. This apparent 'deterrent effect', was also observed by Tolhurst et al.[32], who found that the use of electric fencing around feed stores resulted in a reduction in visits to unfenced facilities on the same farms. Tolhurst et al. also radio-tracked the badgers using these farms and demonstrated that excluded badgers simply exploited other food sources within their pre-existing territories, suggesting that farm-derived food may not be vital for the local badger population, at least not in the short term. This hypothesis may be further supported by our finding that installation of

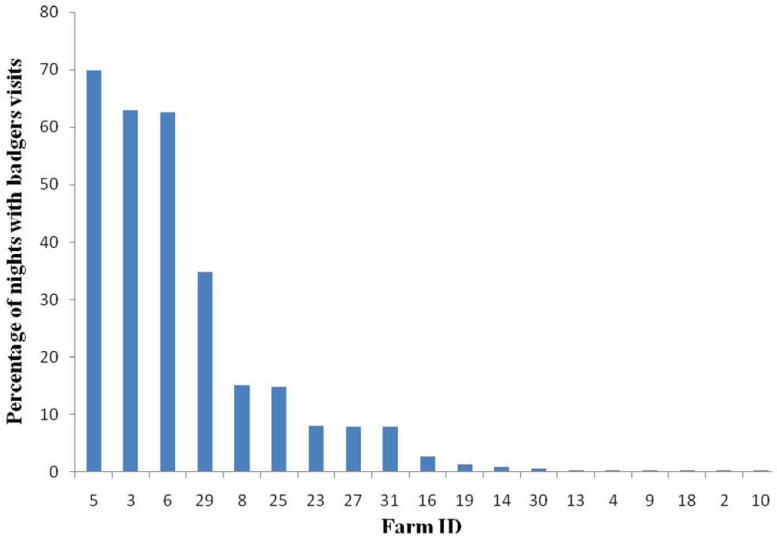

Figure 2. Percentage of nights on which badger visits to farmyards and farm buildings were observed during surveillance phase 1. Observations were made prior to any exclusion measures being installed on study farms.
doi:10.1371/journal.pone.0028941.g002

Table 2. Results of a GLMM to identify factors associated with variations in the number of nights with badger entry into buildings.

			factors		levels	
Variable	**Level**	**Number of nights with badger visits/Number of nights surveyed (%)**	**beta**	**Chi-square (df)**	**Z-statistic (1 df)**	**p-value**
Season				156.4 (3)		<0.001
	spring	546/4048 (13.5%)	0			
	summer	346/4075 (8.5%)	−0.74		−8.6	<0.001
	autumn	240/3458 (6.9%)	−0.96		−10.1	<0.001
	winter	213/3425 (6.2%)	−0.95		−9.8	<0.001
Phase	1	738/7111 (10.4%)	0			
	2	607/7895 (7.7%)	+0.51		4.5	<0.001
Treatment status on night of observation						
	Treatment vs. No Treatment		−2.02		−8.3	<0.001
	Difference between three treatments			39.8 (2)		<0.001
	Individual treatment effects					
	No treatment	1066/9238 (11.54%)	0			
	CH	175/1699 (10.30%)	−1.34		−7.7	<0.001
	FS	70/2421 (2.89%)	−2.62		−13.3	<0.001
	B	34/1648 (2.06%)	−2.02		−8.3	<0.001
	post-hoc comparisons					
	FS vs. CH		−1.28	32.4 (1)		<0.001
	FS vs. B		−0.60	7.6 (1)		0.01
	CH vs. B		+0.68	10.5 (1)		0.001

CH = Cattle Housing, FS = Feed Store, B = Both building types, C = Control.
doi:10.1371/journal.pone.0028941.t002

Table 3. Results of a GLMM to identify factors associated with variations in the number of nights with any badger visits, including both incursions into buildings and observations of badgers within the farmyard (but not entering buildings).

			factors		levels	
variable	**level**	**Number of nights with badger visits/ Number of nights surveyed (%)**	**beta**	**Chi-square (df)**	**Z-statistic (1 df)**	**p-value**
Season				184.7 (3)		<0.001
	Spring	759/4048 (18.75%)	0			
	Summer	583/4075 (14.31%)	−0.51		−7.0	<0.001
	Autumn	414/3458 (11.97%)	−0.73		−9.1	<0.001
	Winter	299/3425 (8.73%)	−1.09		−12.8	<0.001
Phase						
	1	1095/7111 (15.4%)	0			
	2	960/7895 (12.2%)	+0.54		4.9	<0.001
Treatment status on night of observation						
	Treatment vs. No Treatment		−2.28		−12.4	<0.001
	Difference between three treatments			31.6 (2)		<0.001
	Individual treatment effects					
	No treatment	1465/9238 (15.9%)	0			
	CH	239/1699 (14.17%)	−1.60		−10.0	<0.001
	FS	240/2421 (9.9%)	−1.25		−8.0	<0.001
	B	111/1648 (6.7%)	−2.28		−12.4	<0.001
	post-hoc comparisons					
	FS vs. CH		+0.35	3.1 (1)		0.1
	FS vs. B		+1.02	27.6 (1)		<0.001
	CH vs. B		+0.68	12.2 (1)		<0.001

CH = Cattle Housing, FS = Feed Store, B = Both building types, C = Control.
doi:10.1371/journal.pone.0028941.t003

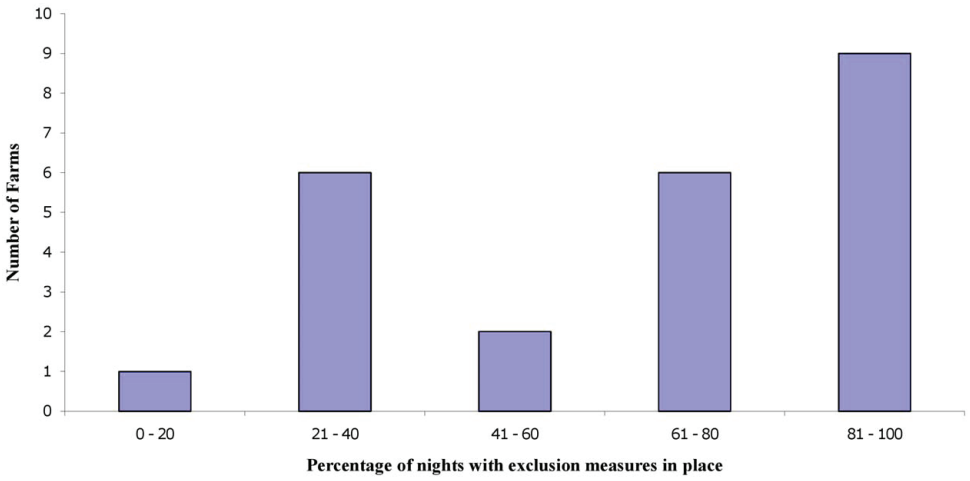

Figure 3. Frequency distribution showing the percentage of surveillance nights on which exclusion measures were observed to be adequately employed. This includes permanent, non-moveable measures, which will always be observed to be in use unless damaged.
doi:10.1371/journal.pone.0028941.g003

exclusion measures reduced the overall level of visits to the farmyard, indicating that when cattle feed is not readily accessible badgers may spend more time in other areas of their territories rather than persistently attempting to gain access to farm-derived feed. If farms were an essential source of food it would be expected that badgers would increase their attempts to gain access to stored feed or, alternatively, that their attentions would turn from protected to unprotected buildings, but neither phenomenon was observed here.

From the camera trap images it was possible to determine that badgers were only able to enter buildings that had exclusion measures installed when the measures were not adequately employed. For example, when gates were left open, when adjustable panels/flaps were not lowered sufficiently or when a new potential entrance point appeared in the building and was not repaired. On average, farmers only used badger exclusion measures that were installed on their farms on approximately 59% of nights, while electric fencing was only used on 48% of nights. On one farm, the retractable electric fencing was only used on 7% of nights. One farmer completely removed some gates that had been installed and on two other farms, walls were almost completely destroyed by cattle or machinery but were not rebuilt, thus negating the exclusion measures that had been installed.

Previous studies have found that farmers rarely employ measures to reduce direct and indirect contact opportunities between badgers and livestock [23,34]. In the present study exclusion measures were purchased and installed at no cost to the farmer, and yet the extent to which they were adequately employed varied widely, with some farmers diligently using measures almost every night, and others deploying them only rarely. This variation was not related to the background level of badger activity observed during the first phase of our study, even though farmers had been made aware that badgers were visiting their buildings. Measures that required adjustments to existing working practices (e.g. pulling retractable electric fences across, closing feed bin lids, dropping flaps on gates or shutting a gate that was previously not operational) were less likely to be used consistently, as were those that required maintenance (e.g. retractable or fixed electric fencing). Solid metal gates that were installed where gates had previously been situated were used most consistently.

The size and design of farmyards and buildings varies widely, so whilst a suite of badger exclusion measures are available, the number, distribution and nature of their deployment will differ among farms. The uniqueness of each farm also makes it impossible to quote a standard cost for the implementation of badger exclusion measures. For the farms in our study in 2008 the costs of installing exclusion measures ranged from approximately £600 to £12500, with an average cost for their purchase and installation on both cattle housing and feed stores of £3840 per farm. However, this figure should be used with caution as it is derived from a small sample size (n = 8) and costs will vary widely amongst farms depending on their individual characteristics. By comparison, the average cost of a cattle herd breakdown (CHB) in 2010/11 was estimated at £30,000 [35]. Unfortunately, it is not currently possible to conduct a cost-benefit analysis for the installation of badger biosecurity measures as we have no data on the contribution of such measures towards reducing risk of TB in cattle. Due to the relatively small sample size and short duration of the study described here, even if all breakdowns were prevented solely by the use of exclusion measures, there would be insufficient statistical power to detect any significant effect on cattle disease incidence. Nevertheless, intuitively, reducing the potential for direct or indirect contact between badgers and cattle should reduce the risk of disease transmission between the two species.

Conclusions

Wildlife populations can be a source of infectious diseases of importance to livestock. Where opportunities for transmission arise because of direct or indirect contact in well-defined areas then management of disease risks by using physical barriers may be a practical option. This study clearly demonstrates how relatively simple practical measures can substantially reduce the likelihood of badger visits to buildings. Given the opportunities that visits to farm facilities may present for the transmission of *M. bovis* between badgers and cattle, these measures could potentially have an important role to play in reducing the incidence of TB in cattle. However, we observed wide variation in the extent to which exclusion measures were employed by farmers. In addition, the frequency of badger visits amongst farms varied independently of the presence of exclusion measures, suggesting that badgers are more attracted to some farms than to others and hence that the potential benefits of exclusion measures will also vary. Consequently, the identification of factors that might determine the likelihood of badger visits to farm premises would be a useful aid to individual farmers in making decisions about whether to spend their time and money on installing and maintaining badger exclusion measures.

Supporting Information

Figure S1 The percentage of total surveillance nights over both phases when badger incursions into buildings were recorded with (■) and without (■) exclusion measures in place.
(TIF)

Table S1 Description of exclusion measures installed on each farm.
(DOCX)

Table S2 The number of nights when badgers visited the farm (but not necessarily entering farm buildings), entered cattle housing or entered feed stores in both phases. Values in brackets are percentage of nights surveyed with badger visits.
(DOC)

Acknowledgments

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Author Contributions

Conceived and designed the experiments: JJ RJD NW. Performed the experiments: JJ. Analyzed the data: NW. Wrote the paper: JJ RJD RM.

References

1. Glueck TF, Clark WR, Andrews RD (1988) Racoon movement and habitat use during the fur harvest season. Wildlife Society Bulletin 16(1): 6–11.

2. Birks JDS (1998) Secondary rodenticide poisoning risk arising from winter farmyard use by the European polecat *Mustela putorius*. Biological conservation 85: 233–240.

3. Tolhurst BA, Ward AI, Delahay RJ. A study of fox (*Vulpes vulpes*) visits to farm buildings and the implications for disease management. European Journal of Wildlife Research, (in press).
4. Gortázar C, Ferroglio E, Höfle U, Frölich K, Vicente J (2007) Diseases shared between wildlife and livestock: a European perspective. European Journal of Wildlife Research 5: 241–256.
5. Greig A, Stevenson K, Perez V, Pirie AA, Grant JM, et al. (1997) Paratuberculosis in wild rabbits (*Oryctolagus cuniculus*). Veterinary Record 140: 141–143.
6. Webster JP, Macdonald DW (1995) Parasites of wild brown rats (*Rattus norvegicus*) on UK farms. Parasitology 111: 247–255.
7. Daniels MJ, Hutchings MR, Grieg A (2003) the risk of disease transmission to livestock posed by contamination of farm stored feed by wildlife excreta. Epidemiology and Infection 130: 561–568.
8. Bourne FJ, Donnelly C, Cox D, Gettinby G, McInerney J, et al. (2007) Bovine TB: The Scientific Evidence, A Science Base for a Sustainable Policy to Control TB in Cattle, An Epidemiological Investigation into Bovine Tuberculosis. Final Report of the Independent Scientific Group on Cattle TB. London: Department for Environment, Food and Rural Affairs.
9. Griffin JM, Williams DH, Kelly GE, Clegg TA, O'Boyle IO, et al. (2005) The impact of badger removal on the control of tuberculosis in cattle herds in Ireland. Preventive Veterinary Medicine 67: 237–266.
10. Clifton-Hadley RS, Wilesmith JW, Stuart FA (1993) *Mycobacterium bovis* in the European badger (*Meles meles*): epidemiological findings in tuberculous badgers from a naturally infected population. Epidemiology and Infection 111: 9–19.
11. Muirhead RH, Gallagher J, Burn KJ (1974) Tuberculosis in wild badgers in Gloucestershire: Epidemiology. Veterinary Record 95: 552–555.
12. MAFF (1979) Bovine tuberculosis in badgers. Third report by the Ministry of Agriculture, Fisheries and Food. London: MAFF.
13. Benham PFJ, Broom DM (1989) Interactions between cattle and badgers at pasture with reference to bovine tuberculosis transmission. British Veterinary Journal 145: 226–241.
14. Böhm M, Hutchings MR, White PCL (2009) Contact networks in a wildlife-livestock host community: identifying high-risk individuals in the transmission of bovine TB among badgers and cattle. PLoS ONE 4(4): e5016. doi:10.1371/journal.pone.0005016.
15. Benham PFJ (1985) a study of cattle and badger behaviour and farm husbandry practices relevant to the transmission of bovine tuberculosis (Mycobacterium bovis). Report to MAFF Chief Scientist's Group (1982-1985).
16. Cheeseman CL, Mallinson PJ (1981) Behaviour of badgers (*Meles meles*) infected with bovine tuberculosis. Journal of Zoology 194: 284–289.
17. Hutchings MR, Harris S (1997) Effects of farm management practices on cattle behaviour and the potential for transmission of bovine tuberculosis from badgers to cattle. The Veterinary Journal 153: 149–162.
18. Hutchings MR, Harris S (1999) Quantifying the risks of TB infection to cattle posed by badger excreta. Epidemiology and Infection 122: 167–174.
19. Garnett BT, Delahay RJ, Roper TJ (2002) Use of cattle farm resources by badgers (*Meles meles*) and risk of bovine tuberculosis (*Mycobacterium bovis*) transmission to cattle. Proceedings of the Royal Society 269B: 1487–1491.
20. Garnett BT, Roper TJ, Delahay RJ (2003) Use of cattle troughs by badgers (*Meles meles*) a potential route for the transmission of bovine tuberculosis (*Mycobacterium bovis*) to cattle. Applied Animal Behaviour Science 80: 1–8.
21. Tolhurst BA (2006) Behaviour of badgers (*Meles meles*) in farm buildings, in relation to the transmission of bovine tuberculosis (*Mycobacterium bovis*) between badgers and cattle. Unpublished PhD Thesis. University of Sussex.
22. Tolhurst BA, Delahay RJ, Walker NJ, Ward AI, Roper TJ (2009) Behaviour of badgers (*Meles meles*) in farm buildings: Opportunities for transmission of *Mycobacterium bovis* to cattle. Applied Animals Behavioural Science 117: 103–113.
23. Ward AI, Tolhurst BA, Walker NJ, Roper TJ, Delahay RJ (2008) Survey of badger access to farm buildings and facilities in relation to contact with cattle. Veterinary Record 163: 107–111.
24. Roper TJ, Garnett BT, Delahay RJ (2003) Visits to farm buildings and cattle troughs by badgers (*Meles meles*): a potential route for transmission of bovine tuberculosis (*Mycobacterium bovis*) between badgers and cattle. Cattle Practice 11: 9–12.
25. Gehring TM, Hawley JE, Davidson SJ, Rossler ST, Cellar AC, et al. (2006) Are viable non-lethal management tools available for reducing wolf–human conflict? Preliminary results from field experiments. In: Timm RM, O'Brien JM, eds. Proceedings of the 22nd Vertebrate Pest Conference. California: University of California: Davis. pp 2–6.
26. VerCauteren KC, Lavelle MJ, Moyles S (2003) Coyote-activated frightening devices for reducing sheep predation on open range. Proceedings of Wildlife Damage Management 10: 146–151.
27. Ward AI, Pietravalle S, Cowan DP, Delahay RJ (2008) Deterrent or dinner bell? Alteration of badger activity and feeding at baited plots using ultrasonic and water jet devices. Applied Animal Behaviour Science 115: 221–232.
28. VerCauteren KC, Gilsdorf JM, Hygnstrom SE, Fioranelli PB, Wilson JA, et al. (2003) Green and Blue Lasers are Ineffective for Dispersing Deer at Night. Wildlife Society Bulletin 34(2): 371–374.
29. VerCauteren KC, Hygnstrom SE, Pipas MJ, Fioranelli PB, Werner SJ, et al. (2006) Red Lasers Are Ineffective for Dispersing Deer at Night. Wildlife Society Bulletin 34(2): 371–374.
30. Seamans TW, VerCauteren KC (2006) Evaluation of ElectroBraid™ Fencing as a White-Tailed Deer Barrier. Wildlife Society Bulletin 34(1): 8–15.
31. Poole DW, McKillop IG, Western G, Hancocks PJ, Packer JJ (2002) Effectiveness of an electric fence to reduce badger (*Meles meles*) damage to field crops. Crop Protection 21: 409–417.
32. Tolhurst BA, Ward AI, Delahay RJ, MacMaster AM, Roper TJ (2008) The behavioural responses of badgers (*Meles meles*) to exclusion from farm buildings using an electric fence. Applied Animal Behavioural Science 113(1-3): 224–235.
33. Collett D (2002) Modelling Binary Data (2nd Edition). London: Chapman & Hall.
34. Bennett R, Cooke R (2005) Control of bovine TB: preferences of farmers who have suffered a TB breakdown. Veterinary Record 156: 143–145.
35. Defra (2011) Bovine TB eradication programme for England. Available: http://www.defra.gov.uk/publications/files/pb13601-bovinetb-eradication-programme-110719.pdf..

Farmers for Action Submission

Farmers For Action

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FAO Committee for Agriculture and Rural Development, NI Assembly

Submission on the Review of Bovine TB in Northern Ireland

To Whom it May Concern;

Farmers For Action will make the case in this submission that bovine TB in Northern Ireland is now a political problem and has been for recent decades and not a veterinary problem without a solution.

1. The facts about bovine TB in the UK:-

   a) The Isle of Man has no badgers and no TB!

   b) Scotland has no TB other than check incidents of imported animals and does have badgers free of TB. This situation extends into the Northern Counties of England.

   c) The South West of England and Wales is the worst infected area of the UK, followed by the rest of England in a reducing county basis as you go north towards Scotland and then the Northern Ireland situation.

   d) Bovine TB was drastically reduced and almost eliminated in many infected areas decades back when infected badger culling was carried out in England, Wales and Northern Ireland.

   e) Recent trial culls of infected badgers in hot spot areas of Southern Ireland have proved successful.

   f) The consequences of decades of inaction on TB infected badger culling where required across GB and NI have manifested themselves worst in the South West of England and Wales as follows; in these areas bovine TB is now endemic in deer, is being found in pigs, sheep, goats, lamas, alpacas and with at least *35 recorded human incidents of bovine TB in the UK in 2009, one of the most recent* incidents being a young child near Bristol. NOTE – DEFRA figures for the above TB infections in other species are not accurate and do not fully reflect the true number of infected animals as there is a quirk in their collection of data - FFA can provide a witness to this effect.

   g) Brussels enforces an irradiation policy on bovine TB EU member state wide, successive UK governments have white-washed the EU as to their compliance, however, this is now coming to an end in the form of reduced compensation from Brussels resulting in DARD now trying to reduce compensation at the farmers expense. A totally unacceptable situation!

2. The Political History of TB –

   a) This stems from Westminster during the 70's, with the UK emerging as a much more affluent place to live, as a result, out of the wealthier masses has come organisations such as the so called badger protection organisations, which in turn represent huge voting power which no political party in Westminster dare lose. This situation has since the 70's stopped successive governments taking decisive commonsense veterinary advised action to cull infected badgers in infected areas to halt bovine TB.

This situation has rolled over into Northern Ireland until now, where Northern Ireland politicians collectively could change this politically unforgivable waste of taxpayers money over votes.

b) Inaction on a TB infected badger cull by the devolved Government of Northern Ireland is now responsible for bovine TB following the Westminster inaction route. The Northern Ireland Assembly has now allowed bovine TB to move into the deer species with one farm cull already having been carried out leaving the now wild deer a huge problem.

c) The Northern Ireland Veterinary Service, Dundonald House, Belfast, finds itself in the awkward position of having to bend to political will, as well as veterinary surgeons on the ground; i) knowing that an infected badger cull would head Northern Ireland on course to eradicating TB and ii) those same vets on the ground financially would have trouble maintaining their rural large animal practices without TB testing income, due to poor farm gate prices providing falling returns from farmers.

d) The only scientifically proven practical solution currently on offer that can be implemented immediately and make a difference is controlled culling of TB infected badgers in infected areas of Northern Ireland. FFA have already publicly stated that the Northern Ireland Assembly is in the unique position for MLA's to come together and unanimously must support a Northern Ireland TB infected badger cull immediately, i) thereby, carrying out Brussels wishes for the eradication of TB; ii) any votes lost due to an infected NI badger cull would therefore have no effect on any individual party or independent at the next election; iii) MLA's can no longer justify money going into the removal of TB reactor cattle, while hospitals remain devoid of Doctors, Sisters, Nurses and beds; iv) NI farmers can not carry the cost of reduced payments for TB reactor cattle while Northern Ireland's politicians and DARD continue to try and white-wash Brussels and the Northern Ireland taxpayer.

FFA intend to go on record over the next five years stating that any lack of political will in Northern Ireland to immediately implement a DARD cull from this day forward of infected badgers in hotspot areas of Northern Ireland will result in the bovine TB situation getting worse and spreading to other species and possibly humans in other words following the South West of England and Wales' experience. No Cull, No Change!

Now is the time for Northern Ireland MLA's to show what they are made of, to show that they are worthy of the votes of all the commonsense people of Northern Ireland, to show them that they are capable of making decisions for the greater good of rural Northern Ireland.

Annex

http://www.fwi.co.uk/Articles/24/04/2012/132578/Farmer-tells-story-of-how-she-caught-TB.htm

Farmer tells story of how she caught TB

http://www.fwi.co.uk/Articles/24/04/2012/132578/Farmer-tells-story-of-how-she-caught-TB.htm
April 27, 2012

A livestock owner who started a website to raise awareness of bovine tuberculosis in alpacas is seriously ill with the disease herself.

Dianne Summers was diagnosed with human TB caused by Mycobacterium bovis last week, after doctors initially thought she was suffering from pneumonia.

Ms Summers, of Redruth, Cornwall, founded the Camelid TB Support & Research Group after losing one of her own alpacas to the disease almost four years ago. The group and its website have since become an important source of information about bovine TB for camelid owners across the country.

She fell ill in February, presenting symptoms of a severe common cold. Doctors suspected she was suffering from pneumonia, but tests later confirmed her worst fears that she had contracted TB.

“I thought this was all behind me, but this has just ruined me again,” she said. “My consultant told me humans can harbour the disease for years before it presents itself.”

Ms Summers is bedridden and doctors have prescribed her a cocktail of drugs, including ethambutol, risampicin, isoniazid and pyridozine, and taking them has led to some serious side effects. They have told her recovery will take nine months.

She has stopped working while she recovers and is living in self-imposed isolation. Friends are looking after her herd of 20 alpacas and three sheep.

Ms Summers lost her first alpaca to bovine TB in 2008. Seven further losses were confirmed in November 2009. However, she said her herd of alpacas was currently TB free.

She is a member of the British Alpaca Society and in her role she advises other camelid owners about how to deal with the disease in the animals.

Ms Summers has visited dozens of herds around the country and given advice about how to deal with the problem. She is still waiting to find out if her disease is linked to her own herd or others she has been involved with.

Ms Summers started AlpacaTB.com to highlight the risk posed by bovine TB to camelids, such as alpacas and llamas, and provide advice to their owners.

More usually associated with badgers and cattle, bovine TB has also affected 56 alpaca and llama herds in England and Wales as of 1 March 2012.

But she believes bovine TB in camelids is more common in the UK than reports suggest and accused the British Alpaca Society of “sweeping the problem under the carpet”.

“There have now been 59 herds affected, which is a lot. But I believe there are many more holes being dug in fields across the UK,” she added.

Ms Summers urged alpaca and llama owners who suspect TB in their herds to act responsibly and report any suspected cases.

"Alpacas can be absolutely riddled with lesions, but still be able to walk around perfectly well," she said.

"If you are suffering losses in your herd, make sure you have a post-mortem examination.

"Alpaca farmers need to know if they have got bovine TB in their herd, not only for the risk to their animals, but also themselves and their family."

The Health Protection Agency said there were 35 cases of human TB caused by mycobacterium bovis in the UK in 2009, 29 in 2008 and 28 in 2007.

But an agency spokesperson said the risk of people contracting TB from livestock, including alpacas, was "very low".

"Human TB caused by Mycobacterium bovis counts for less than 1% of the total TB cases in the UK. It's a really tiny percentage," said the spokesperson.

The British Alpaca Society said a blood test has recently been developed which can detect bovine TB in infected camelids. But the test is still awaiting full approval from authorities.

A spokesperson for the society said: "Human TB caused by Mycobacterium bovis used to be a huge problem caused mainly by people drinking unpasteurised milk. But cases are now very rare, and as far as we know, Dianne's is the first case in a person with camelids.

"Dianne has done a tremendous amount of work for us, helping farmers whose herds have been infected with TB. "We are already doing a lot to raise awareness of the disease among camelid owners. But I suspect Dianne would like us to be shouting about it more widely. We wish her a speedy recovery."

DEFRA said there were currently no statutory movement restrictions for camelids.

"Our statistics show that camelids are not a major reservoir of bovine TB and are not a major cause of it spreading," said a spokesman.

"With alpacas and other non-bovine animals, we work with the owners of camelids on testing and put in measures to stop the spread of the disease. We also work with owners to cull any infected animals and compensate them for their losses."

However, DEFRA is currently reviewing its measures concerning non-bovine animals that contract TB and assessing whether changes to legislation are necessary.

http://www.fwi.co.uk/Articles/24/04/2012/132567/Livestock-owner-confirmed-with-bovine-TB.htm

Livestock owner confirmed with bovine TB

http://www.fwi.co.uk/Articles/24/04/2012/132567/Livestock-owner-confirmed-with-bovine-TB.htm
April 27, 2012

A livestock owner who started a website to raise awareness of bovine tuberculosis has herself contracted the disease.

Dianne Summers started AlpacaTB.com to highlight the risk posed by bovine TB to camelids, such as alpacas and llamas, and provide advice to their owners.

More usually associated with badgers and cattle, bovine TB has also affected 56 alpaca and llama herds in England and Wales as of 1 March 2012.

Ms Summers, who lives near Redruth, Cornwall, founded the Camelid TB Support & Research Group after losing one of her own alpacas to the disease almost four years ago.

“The initial phone call when you are told that the post mortem has revealed suspicion of TB in your herd is devastating,” she wrote afterwards.

The group and its website have since become an important source of information about bovine TB for camelid owners across the country.

But now Ms Summers has herself contracted the disease.

An update posted on the group’s website said: “Dianne Summers has had confirmation that she has TB mycobacterium bovis herself and has begun treatment.

“Human treatment for TB mycobacterium bovis takes nine months and consist of a variety of drugs with some unpleasant side effects – it is not a quick or simple fix.

“We wish her a full and speedy recovery.”

This underlines the reasons TB should be taken so seriously, says the website.

“If it is in your herd you, your family and friends can contract TB. TB is a zoonotic disease – to be clear that means it can be passed on to people.”

Human cases of mycobacterium bovis were once relatively common.

More than 50,000 new cases and 2,500 human TB deaths were reported annually in Britain during the late 19th and early 20th centuries.

But the toll reduced with pasteurisation laws and eradication programmes in cattle.

Today, bovine TB is believed to behind only 1% of TB cases in the western world. The rest are caused by the human TB bug mycobacterium tuberculosis.

LMC Submission

FAO Stella McArdle

Clerk to the Committee for Agriculture and Rural Development

Further to your recent correspondence to the Livestock & Meat Commission (LMC) regarding the Committee's preparations for undertaking a thematic review of Bovine Tuberculosis I would like to submit a few comments on behalf of LMC, following consideration of the matter at our Board meeting on 18 April 2012

1. Bovine TB has a very significant disruptive effect on the movements of livestock and this can impede the ability of farmers to capitalize on livestock trading opportunities not only within Northern Ireland but also in live export markets.

2. Northern Ireland is heavily dependant on the export of its animals and animal products throughout the UK, the European Union and increasingly into Third Country markets and it is imperative from the point of view of marketability of our industry and it's products that Bovine TB is effectively controlled in this region.

LMC fully endorses the Committee's terms of reference for the review. Our vision is for 'a sustainable and profitable future for the Northern Ireland beef and sheep meat industries at all levels of the supply chain' and any additional measures that can be taken towards a general improvement in the Bovine TB position will be very helpful in achieving that vision.

Thank you for communicating with LMC on this matter and if you require any further information please do not hesitate to contact us again

Regards

Ian

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NBA Submission

Dear Sir/Madam

I act on behalf of a number of Breed Societies and NBA and I refer to a number of previous submissions made on their behalf. It seems to my clients that the solution to the problem of Tb in cattle is perfectly straightforward and should be based on scientific evidence. The strategy should be twofold. Firstly in the longer term to pursue a vaccination policy and, secondly, in the shorter term to reduce the level of infection. In relation to the latter we can only proceed when there is scientific evidence on the causes of infection and the percentage of cases attributed to each cause, again based on scientific evidence. The Department has completely failed to address the issue. When that scientific evidence is obtained then the next stage is to create policies which will minimise the risk of each cause of infection. That approach again should be twofold. First of all what can be done to encourage measures of prevention by farmers and, secondly, what the Department can do by way of legislation to remove or reduce the sources of infection if these are outside the control of farmers.

It seems to us that the Committee should seek to hear evidence from the British Cattle Veterinary Association on the scientific aspects of the present difficulty.

Regards

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NI Audit Office Submission

Agriculture and Rural Development Committee: Review of Bovine Tuberculosis

NIAO Written Submission - 16 April 2012

Introduction

1. NIAO carried out a detailed review of the progress made by the Department of Agriculture and Rural Development (DARD) under its Bovine Tuberculosis (bovine TB) eradication programme. The main fieldwork was carried out in 2006 and 2007, following which there was a series of extensive consultations, with DARD, on the findings. Our report[1] was published in March 2009. The Assembly's Public Accounts Committee (PAC) subsequently held an Evidence Session with the Accounting Officer and reported its conclusions and recommendations in June 2009.[2]

Scope of the NIAO and PAC Reviews

2. NIAO and the PAC focused on five main areas:

- The level and cost of bovine TB in Northern Ireland
- Testing for bovine TB
- Preventing the spread of bovine TB
- Compliance with the EU Directive
- Compensation, enforcement and tackling fraud.

A number of the key points are outlined in the following paragraphs.

The Level and cost of Bovine Tuberculosis

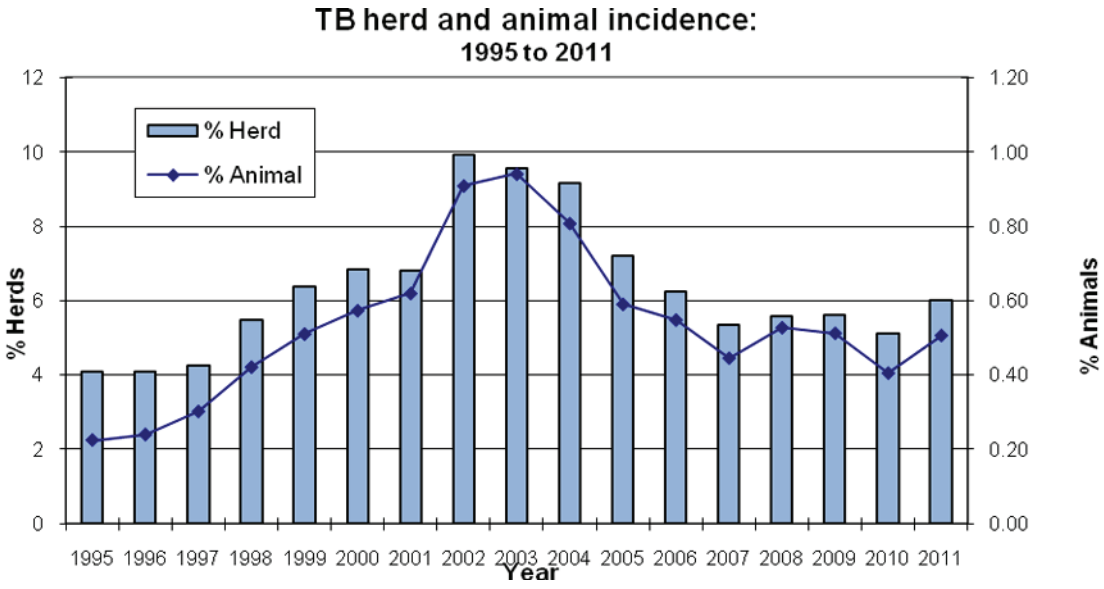
3. Northern Ireland currently has some 26,000 herds of cattle, with around 1.6 million animals. Bovine TB has been a significant problem for decades, with at least one quarter of herds having had the disease. The Westminster PAC reported on bovine TB in 1993-94. At that stage, DARD was in the midst of a three-year 'Enhanced bovine TB Eradication Programme' which aimed to reduce the disease to 1986 levels when, on average, only 0.06% of animals tested were reactors. However, results were disappointing - at the close of the Programme in 1995, incidence levels had increased and were some four times higher than targeted.

4. From 1997, there was a significant increase in cases of bovine TB, rising from around 4 per cent of herds tested in 1996 to a peak of some 13% in 2002. This was the highest level of bovine TB in Europe. By 2007, the herd incidence of the disease had reduced to some 5.4%, although this was still significantly higher than the pre-1997 level. Over the past four years, the level has remained largely static, but with an increase in the past year to just over 6% at December 2011 – see **Figure 1**.

1 'The Control of Bovine Tuberculosis in Northern Ireland' NIA 92/08-09, 18 March 2009.

2 'Report on the Control of Bovine Tuberculosis in Northern Ireland', Twelfth Report of Session 2008/2009.

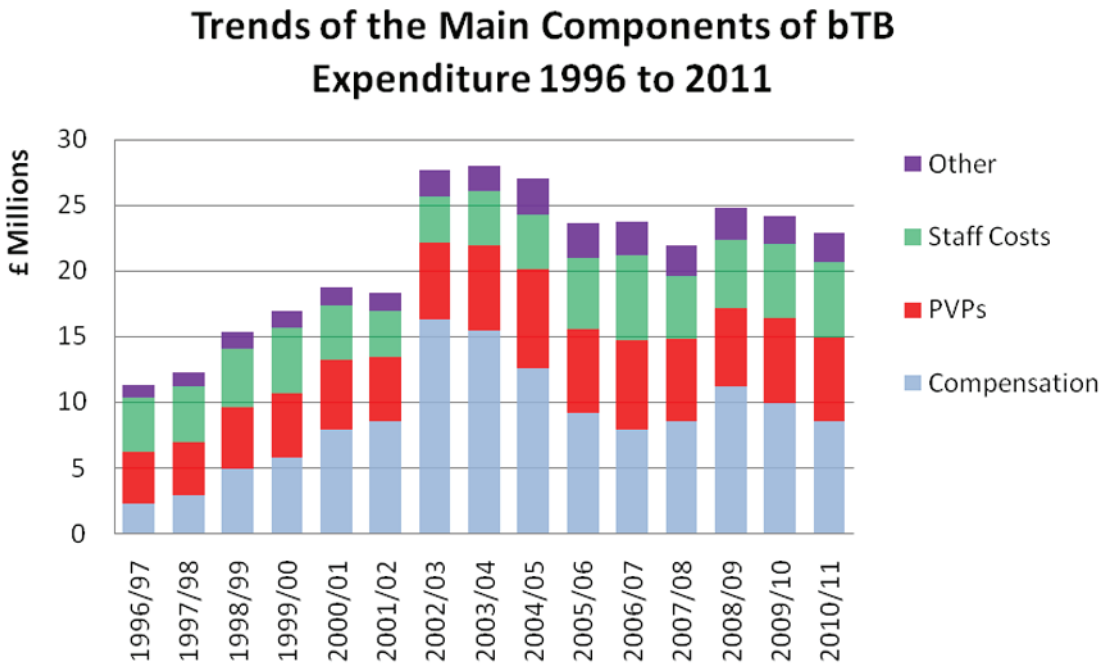
Figure 1:



Source: DARD

5. The significant increase in prevalence of bovine TB has had a major impact on public expenditure. Over the 15 years to March 2011, DARD has spent £317 million on its bovine TB programme. This included £132 million on compensation to farmers for the compulsory slaughter of animals, £86 million to Private Veterinary Practitioners (PVPs) for herd testing, and staff costs of £71 million – see **Figure 2**. Total expenditure in 2010-11 was almost £23 million. Despite the huge cost, the evidence suggests that DARD is still many years from achieving eradication.

Figure 2:



Source: DARD

Testing for bovine TB

6. There are limitations in the tests used to detect bovine TB. The annual 'skin test' is the EU-recognised standard for identifying the disease in cattle, but it is not always accurate and

fails to detect up to 1-in-4 infected animals. As a result, a reservoir of infection can remain within a herd. The 'gamma interferon' blood test is an ancillary test that may be used to complement the skin test. In June 2007, its use, on a voluntary basis, was confirmed as part of DARD's bovine TB control programme. Because the blood test has a greater 'sensitivity' than the skin test, it is particularly suitable for use in high risk herds

7. DARD said that it was looking at whether compulsory use of the blood test may be warranted, but highlighted two issues. The 'specificity' of the blood test is not yet as good as the skin test and so it will also identify, as reactors, a number of animals that are not actually infected. Second, the blood test costs £20 compared with the skin test at £2.50 (as at 2009). Given the cost implications, PAC recommended that DARD consider conducting a trial, in a high incidence area, as a basis for a cost-benefit assessment. PAC also recommended more research into the efficacy of the blood test and urged DARD to ensure that sufficient resources are applied as a high priority.

Private Veterinary Practitioners

8. PAC acknowledged the major contribution by PVPs to DARD's bovine TB programme, noting that, in the majority of cases, they have diligently carried out their responsibilities. Nevertheless, the evidence did show that, on occasion, not all private vets managed to meet the high standards required. At various times between 2002 and 2006, DARD reported concerns about the quality of PVP testing. Specific issues included late reporting of test results, the testing of exempt animals, failure to check dates of birth, failure to comply with health and safety requirements and the use of out-of-date tuberculin. PAC felt that this also pointed to a lack of supervision and control by DARD itself. We note that DARD has subsequently reported improvements across the various areas of concern.

9. Another issue noted was that detection rates differ considerably between PVPs and in-house staff. Data collected in two comparison exercises over a 10-year period from 1988 showed that, when compared on a like-for-like basis, in-house staff were between 1.5 and 1.8 times more likely to identify bovine TB than private vets. However, the reasons were not clear. The AVSPNI and NIVA[3], in a submission to PAC, queried whether the absence of a supervision process for DARD staff, similar to that for PVPs, undermined the use of their testing results as a benchmark for PVPs. They also suggested there should be regular meetings between Divisional Veterinary Offices and local practices and that test result statistics, of individual vets testing within a practice, be made available to practice principals on a regular basis, to facilitate internal quality review.

10. The Department's 'Review of bovine TB testing arrangements' has made slow progress. Recommended in 2002, it took until 2005 to engage consultants. The consultants reported in 2006, recommending a range of improvements to testing arrangements. Our understanding is that these have not yet been implemented.

Preventing the Spread of bovine TB

11. A 2002 Policy Review highlighted that inadequate boundary fencing (including stone walls and hedging) has been a major impediment to the successful control of bovine TB and noted that 79% of fencing did not prevent nose-to-nose contact between herds (DARD's 2004 Biosecurity Code specifies double-fencing with at least a 3-metre gap.) DARD was unable to provide PAC with a more up-to-date figure, but we understand that inadequate fencing remains a significant problem. More widely, DARD said that it wanted to link its Biosecurity Code to disease compensation, so that poor biosecurity would lead to a reduced level of payment. It appears, however, that this initiative has been shelved.

3 'Association of Veterinary Surgeons Practising in Northern Ireland' and 'North of Ireland Veterinary Association'.

12. PAC considered that DARD should be much more proactive in encouraging farmers to attend training on early disease recognition and farm biosecurity planning and wanted the number of participants substantially increased. Between late 2004 and 2008, only 1,134 herdkeepers out of 26,000 had undertaken the DARD course. PAC also considered that attendance should be compulsory for farmers whose herds have suffered repeated infection, with failure to attend resulting in a reduction of compensation in future outbreaks.

13. DARD analyses in 1996 and 2002 indicated that a significant proportion of bovine TB breakdowns were caused by purchasing infected animals. The shortcomings of the skin test in detecting disease means that there is still a significant risk of purchasing infection, even from herds classified as 'Officially Tuberculosis Free'. In PAC's view, there was a strong case for pre-movement testing on a wider scale than at present. However, this recommendation was not accepted by DARD.

14. Infection in wildlife, particularly badgers, has long been considered a factor in bovine TB transmission. In submissions to PAC, both the AVSPNI and the Ulster Farmers' Union specifically highlighted this problem and DARD itself has attributed around 16-17% of outbreaks in recent years to wildlife. While the scientific evidence is complex and at times contradictory, long-term badger-culling trials in both Great Britain and the Republic of Ireland suggest that culling of badgers is not in itself a cost-effective solution to the bovine TB problem and, in certain circumstances, may even increase the spread of the disease. Another approach is to develop a vaccine for badgers. In Great Britain, DEFRA is undertaking a 5-year vaccine trial, its aim being to develop an oral vaccine by 2014.

15. To date, the Department has not actually intervened to tackle the wildlife factor in Northern Ireland, although it set up a 'Badger Stakeholder Group' in 2004 and commissioned a badger population survey in 2008. Given the scale and longevity of the wildlife issue, PAC considered that DARD had been slow to take action and expressed concerns about the timescale for future progress.

Compliance with the EU Directive

16. Isolation of reactors has been a significant problem in a number of herds, with farmers facing major logistical difficulties, particularly in dairy herds or where animals are in housing. Notwithstanding, it is incumbent upon the industry to meet the requirements of the EU Directive and farms should be properly equipped to apply the standard control procedures.

17. For many years, DARD did not comply with the EU Directive on 'inconclusive' test results - it allowed two re-tests rather than the one permitted by the EU and argued that compliance would cost £1.1 million annually. However, through its non-compliance, DARD cut itself off from additional funding made available by the EU to help eradicate disease. We understand that, in January 2010, DARD finally fell into line with the EU Directive and has since secured additional funding of some 5 million euros per year for 2010, 2011 and 2012.

Compensation, Enforcement and Tackling Fraud

18. There were a number of cases where multiple compensation claims had been paid to the same herdowners. PAC recognised that it can be difficult to eradicate bovine TB from herds but was concerned whether a 100% compensation rate provided sufficient incentive for herdowners to prevent infection. In its view, it was not right that the cost of repeated disease breakdowns rests entirely with the taxpayers – it felt that a share of the cost should be borne by the industry.

19. Given the 100 per cent compensation rate, the inherent risk of fraud is high. PAC considered that, as an added deterrent against fraud, DARD should seek to introduce a system of penalties against future compensation claims, where claimants have previously been found guilty of fraud. This was not accepted by DARD.

PAC's Conclusions

20. Both NIAO's and PAC's overall conclusion was that the Department's progress in tackling bovine TB had been much too slow. While acknowledging that the eradication of bovine TB in Northern Ireland represented a major challenge, PAC considered that, if DARD was to make real progress, there had to be a fundamental change in mindset - it must adopt a much more strategic approach, with a clear focus on eradication of the disease rather than mere containment. In its opinion, spending hundreds of millions of pounds on a programme that was not explicitly aimed at the eradication of bovine TB seemed a poor use of taxpayers' money. PAC also believed that DARD would have to work much more closely with both the cattle industry and PVPs than it had done in the past. In total, PAC made 26 recommendations for improvement.

Developments since the NIAO/PAC Reviews

21. While progress has been made in reducing the incidence of bovine TB from its peak in 2002, the level currently remains significantly higher than in 1996 and many times higher than the 1986 level. Moreover, the annual cost of combating the disease also remains twice that in 1996-97.

22. NIAO has not carried out any further fieldwork on this topic since publishing its March 2009 report. However, in January 2012, DARD provided a report to PAC on progress against the undertakings which it gave to PAC in the Department of Finance and Personnel Memorandum of September 2009[4]. Further detail will be provided at NIAO's oral briefing to the Committee on 24 April.

NIAO

16 April 2012

4 'Department of Finance and Personnel Memorandum on the Twelfth Report from the Public Accounts Committee, Session 2008-09: Control of Bovine Tuberculosis in Northern Ireland.'

NI Badger Group Submission

Northern Ireland Badger Group

www.badgersni.org.uk

Northern Ireland Badger Group submission to the Northern Ireland Assembly Agriculture Committee review into bovine TB

1 Introduction

The Northern Ireland Badger Group is a voluntary organisation working for the protection, conservation and welfare of badgers in Northern Ireland. We are a member group of the Badger Trust, the only charity dedicated to the conservation of badgers throughout England, Wales and all Ireland.

The Badger Trust's objectives are to promote the welfare, conservation and protection of badgers, their setts and their habitats for the public benefit. The Trust provides expert advice on all badger issues and works closely with Government, the police and other conservation and welfare organisations.

It is well known across sectors for its thorough and incisive research. As a result, the Trust's campaigns are well respected and have resulted in policy changes which have had a direct benefit for badgers and the environment. The Badger Trust campaigns on a wide range of badger protection issues, not solely those relating to bovine TB.

The Trust uses all lawful means to campaign for the improved protection of badgers. The Trust is a member of the Partnership for Action Against Wildlife Crime (PAW) and Wildlife and Countryside Link. It absolutely does not condone any non-lawful, intimidating methods of campaigning and it strongly discourages such behaviour.

The Northern Ireland Badger Group welcomes this opportunity to contribute to the Agriculture Committee review on bovine TB.

Our members recognise the economic and personal hardship that bovine TB brings to the farming industry as well as the cost to the taxpayer. Based on a robust scientific rationale, we advocate a coordinated, inclusive and cooperative approach to tackling bovine TB throughout Ireland. We are committed, and will do all we can, to make a positive contribution to Northern Ireland's bovine TB strategy.

2 Bio-security measures, testing and cattle movement

We commend the Department of Agriculture and Rural Development for the success of its evidence-based cattle management approach to reducing bovine TB in the Northern Ireland herd.

Cattle form the primary reservoir of bovine TB in Ireland and there is conclusive evidence linking cattle movement to the spread of bovine TB. (*Gilbert et al, 2005*)

Consequently we believe that existing bio-security and movement control measures should be consolidated and action taken to maximise compliance within the industry.

We understand that the current testing method (the skin test) fails to detect approximately 25% of infected cattle. It follows that the shortcomings of this test contribute significantly to the difficulties experienced in eradicating the disease in cattle.

In its final report to the Westminster Government of the time, the Independent Science Group[1] concluded that cattle testing, monitoring and movement controls should form the primary tools for mitigating the geographical spread of the disease.

We believe that particular attention should be given to animals coming in to Northern Ireland and that everything possible should be done to eliminate the threat of unauthorised traffic, especially across the Irish border.

There is reliable primary and anecdotal evidence that a minority of individuals ignore, flaunt or exploit existing guidelines and regulations. These cases pose a serious threat to disease control and must be taken seriously by the authorities.

Therefore adequately resourced structures for effective detection of malpractice along with enforcement of regulations should be implemented to support the wider bovine TB strategy.

It is our experience - and we are constantly surprised by it - that some long-established large animal veterinary practitioners have a very poor understanding of bovine TB beyond the testing regimen. The implications of this are very worrying, not least because stock keepers may receive misleading or factually incorrect information or advice.

We propose that the comprehensive TB policy produced by DARDNI in 2002 be reviewed and actions taken in relation to this policy since its release be audited openly and transparently. It is our assessment that many of the pertinent issues raised in this document by the department are not as frequently or publicly discussed as the proposed wildlife reservoir in badgers alone.

Note that whilst we applaud the far reaching remit of the 2002 policy document, we do not view it as exhaustive and actions should be taken to describe other aspects of the disease that must be investigated in order for a true and scientific assessment of the epidemiological question.

3 Compensation

The Northern Ireland Badger Group holds the view that adequate compensation for cattle lost to bovine TB is an important component of any bovine TB strategy.

1 In 1998, the Independent Scientific Group on Cattle TB (ISG), a group of independent scientists, was commissioned by the Westminster Government to conduct a Randomised Badger Culling Trial (RBCT) in order to establish the effects of badger culling on the incidence of bovine TB in herds. In 2007 the ISG final report http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/index.htm was presented to the Secretary of State for DEFRA. Based on almost a decade of research costing over £50 million and 11,000 culled badgers, the report concluded that: “The ISG’s work – most of which has already been published in peer-reviewed scientific journals - has reached two key conclusions. First, while badgers are clearly a source of cattle TB, careful evaluation of our own and others’ data indicates that badger culling can make no meaningful contribution to cattle TB control in Britain. Indeed, some policies under consideration are likely to make matters worse rather than better. Second, weaknesses in cattle testing regimes mean that cattle themselves contribute significantly to the persistence and spread of disease in all areas where TB occurs, and in some parts of Britain are likely to be the main source of infection. Scientific findings indicate that the rising incidence of disease can be reversed, and geographical spread contained, by the rigid application of cattle-based control measures alone.” [emphasis added]. These findings have not been rebutted and even putting the case at its highest, DEFRA only anticipates a net slowdown in new incidents of bovine TB of between 12-16% after 9 years, and at a net loss in cost-benefit terms according to its own Economic Impact Assessments.

Therefore, we believe that individual farmers that have met the requirements of existing guidelines and regulations should not be penalised financially in the event of suffering a herd breakdown.

Neither should the honest and compliant majority of farmers be penalised by the actions of the minority who fraudulently, negligently or opportunely fail to meet industry or regulatory expectations.

We believe that herd keepers who can demonstrate high standards of animal husbandry, best farm practice and robust infection control should receive compensation equal to the value of the animal(s) concerned.

Financial incentives for compliance should be balanced with punitive measures for noncompliance or fraud.

In our view, it would be prudent to link compensation payments to the claimant's compliance with current guidelines and regulation. This should be balanced with effective enforcement measures, such as spot checks, and penalties for those individuals whose actions pose a threat to the health of the herds and livelihoods of others, and who jeopardise assurance of value-for-money on the Departmental spend of tax-payer public funds in this area.

Department resources might be effectively used to aid and incentivise farmers in terms of bio-security compliance, especially in terms of lateral spread of the disease (i.e. herd to herd transmission).

4 Vaccination

Bovine TB vaccines for cattle (and associated tests which can distinguish infected from vaccinated cattle) are being developed.

The Northern Ireland Badger Group believes that, ideally, vaccination of cattle offers the most direct and robust method of dealing with bovine TB in the herd.

Cattle vaccination can be implemented using existing structures.

We also support vaccination of badgers as a cheaper, viable alternative to culling[2]. Vaccination offers a means of controlling bovine TB in badgers without affecting population dynamics. Disruption to social groups of badgers increases stress levels and compromises their immune system, leaving them more susceptible to infection.

There is no doubt that vaccination (an option which the Welsh Government has chosen based on the anticipated results and more favourable cost-benefit analysis) can prevent badgers from becoming infected with bovine TB.

Field trials on the use of the badger bovine TB vaccines are currently being undertaken at a number of locations around England and Wales. Meanwhile oral bait bovine TB vaccines for badgers are being developed.

A further point is that vaccination of any species is unlikely to devalue the existing herd and wildlife data held by DARDNI.

5 Dealing with bovine TB in wildlife

The role of badgers and other wildlife in the transmission of bovine TB is poorly understood.

2 The Northern Ireland Assembly will no doubt be aware of its international legal obligations under the Bern Convention on the Conservation of European Wildlife and Natural Habitats and that it may only permit culling of badgers as part of a bovine TB strategy if there is no satisfactory alternative. The Bern Committee is currently considering a complaint against the Westminster Government on this point. Given the rapidly evolving science in this area, it is quite possible they will consider the cull breaches the Convention.

It is commonly considered that a small proportion of wild badgers are infected with *Mycobacterium bovis*, the causative agent of bovine tuberculosis. However, cattle to cattle transmission is a major contributory factor to the incidence of bovine TB.

Eight years of intensive badger culling (40,000 badgers culled) in the Republic of Ireland has failed to make any significant contribution to lowering levels of infection in the Republic's national herd. By contrast, cattle-based measures alone have reduced bovine TB in Northern Ireland by around 50%.

Against this background, we urge you to take on board the Independent Scientific Group's conclusion that *"badger culling cannot meaningfully contribute to the control of cattle TB……'* Culling badgers would be nothing more than a costly, counterproductive and deeply unpopular distraction from tackling the real issue of cattle-cattle spread.

In our view, the disproportionate focus on badger culling has polarised thinking and inhibited a more progressive approach to solving the bovine TB problem.

6 Research into bovine TB

Bovine TB is a complex disease, and many aspects of it remain unclear. Much of the research to-date has been conflicting, insufficient or inconclusive. and it is important that any bovine TB strategy is evidence-based.

Currently much of the debate in the public domain in favour of badger culling appears to rest on hearsay, misinformation and a genuine lack of understanding of the core issues.

The Northern Ireland Badger Group believes that Northern Ireland has a unique opportunity to research, develop and implement an effective, progressive bovine TB strategy:

- Structures for monitoring and testing the Northern Ireland herd are well established.
- DARDNI possesses a wealth of data from herd monitoring and research studies.
- Significantly, the badger population in Northern Ireland remains stable, both in terms of numbers (2008 Northern Ireland mean population estimate = 33,500), as well minimal disruption of the badger population to-date.

We propose a cooperative approach whereby industry, veterinary and badger interests can contribute to a coherent and validated research programme.

7 Illegal badger removal and persecution

We believe that calls for a badger cull encourage a minority of individuals to engage in the illegal removal or persecution of badgers. This is known as the *green light effect*.

The number of reported badger persecution incidents in Northern Ireland increased significantly following the announcement in December 2008 of DARDNI's intention to progress a 'badger prevalence study'. This proposal included killing up to 1000 badgers and was referred to as a 'pilot cull' in some quarters. Spring 2009 saw the greatest number of badger persecution reports than any other season. *(National Wildlife Crime Unit Tactical Assessment February 2010)*

There is primary and anecdotal evidence of illegal badger killing (gassing, digging, shooting) throughout the province. We believe this is tacitly encouraged by the anti-badger hysteria generated in some quarters.

We would implore individuals with strong views on badgers to consider the possible consequences of their statements or emotive language in respect of the bovine TB question.

8 Concluding comments

We believe that TB-free status in Northern Ireland is possible but can only be achieved by adopting a fresh perspective on the problem.

The unsubstantiated perception that badgers are central - rather than peripheral - to the bovine TB problem must be replaced with a more pragmatic, evidence-based approach. Indeed, the failure to appreciate a wider and more objective view of the elements involved can only work to delay a fuller and more robust assessment of the epidemiology of this disease. Any such delay, as most would agree, will only result in: continued hardship for individual farmers; a sump of public-funds on tax-payer investment (with associated lost opportunity costs due to misdirected resourcing); animal welfare issues in terms of cattle husbandry, and encouragement of wildlife crime in terms of badger persecution.

As well as the specific issues addressed above, all possible factors that might contribute to the persistence of bovine TB in the NI herd should be investigated. These should include open, transparent and non-biased investigation of genetic composition of herds, livestock management, herd health and welfare, waste disposal etc.

The Northern Ireland Badger Group will do all it can to contribute to this challenge alongside other stakeholders

We are committed to progress and we look forward to discussing this submission with the Agriculture Committee.

On behalf of the Northern Ireland Badger Group,

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Coordinator
Northern Ireland Badger Group
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Belfast
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NIAPA Submission

Thank you for the opportunity to address the Committee on the issue of TB. Enclosed are some notes from our livestock committee regarding issues which we feel are relevant.

One thing that all farmers would agree on would be the eradication of TB in the Northern Ireland cattle herd. This is not only from a disease perspective but from an economic perspective and not totally associated with the obvious costs of testing and removal of infected animals. There are also hidden economic costs e.g. loss of thrive in animals which have been subjected to collecting and moved through handling facilities twice in one week and subsequent times if herd is positive. There are also additional costs associated with herds which do not finish animals for slaughter yet cannot sell stock until a herd has been cleared following a positive test. This adds to cash flow problems and unquantifiable stress on farm families.

We believe that all farms should follow a strict bio security system with cleansing and disinfecting; trying where possible to maintain a closed herd although these too have had breakdowns; have a quarantine system; operating vermin control and maintaining strong field boundaries. There are more issues involved here and we await the results of the Co Down DARD study.

At present there is EU legislation preventing vaccination of cattle against TB because BCG vaccination can interfere with the TB skin test. Drafting of a new European Health Law may create an opportunity to work on this. Licencing studies regarding BCG vaccination have been completed by DEFRA's Animal Health and Veterinary Agency and an application for marketing authorisations has been made but it will take some time to process given EU legislation. We would support a proven vaccination if it would help eradicate the disease but we believe we are some way off.

With regard to TB in wildlife, it is our belief that there is a problem with transmission between wildlife particularly badgers and cattle and we need to fully address this if we wish to eradicate the disease. Our comment on closed herds is associated with this. Badgers are being mentioned in every DARD document yet nothing is being done to deal with this. We need to look in particular at diseased badgers

Testing is a necessity which causes stress to both livestock and farm families. Timing of annual testing to accommodate farm businesses is a factor which needs to be considered. It is also obvious that the more frequently livestock have to be handled the more risk of injury to handler and stock.

Obviously the less movements stock makes the less stress and opportunity for transmission of disease.

Length of time taken to collect reactors is also an additional problem for farmers.

NT letter re. Bovine TB

National Trust

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13 April 2012

Stella McArdle
Clerk to the Committee for Agriculture and Rural Development
Room 244
Parliament Buildings
Stormont
BELFAST BT4 3XX

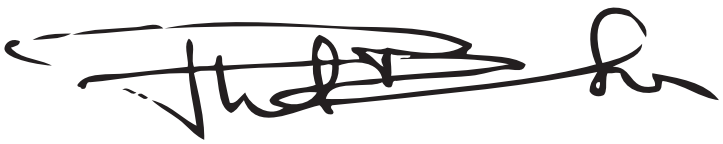
Dear Ms McArdle,

RE: Review of Bovine Tuberculosis

Thank you for the opportunity to make a submission to the Northern Ireland Assembly Committee for Agriculture and Rural Development on the proposed review of Bovine Tuberculosis (TB) and our submission is attached.

We would welcome the opportunity to give oral evidence and would ask that the Committee considers our request.

Yours sincerely



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NT Submission

Review of Bovine Tuberculosis
Submission to the Committee for Agriculture and Rural Development - 16 April 2012

The National Trust welcomes the opportunity to make a submission to the Northern Ireland Assembly Committee for Agriculture and Rural Development on the proposed thematic review of Bovine Tuberculosis (BTB) - "To explore all measures, including broad consideration of likely cost / benefit, that could be taken in Northern Ireland towards the reduction and eradication of Bovine Tuberculosis based on international and local experiences".

1.1 Introduction

As a conservation and environmental charity, the National Trust is responsible for the management of over 3,100ha of farmed land in Northern Ireland, the majority of which is managed on our behalf by over 80 farmers, through some 100 conacre licences. We are committed to helping to reduce the incidence of Bovine Tuberculosis not least because the cattle of at least a quarter of our 1500 tenant farmers across Northern Ireland, England and Wales are at risk from Bovine TB breakdowns. We also recognise the importance of the beef and dairy industry to the Northern Ireland, ROI, UK and North West Europe economies and we seek to minimise the risk to our tenant farmers' cattle herds of a Bovine TB breakdown.

The National Trust has a strong and long established relationship with Food & Environment Research Agency (FERA) and its predecessor, the CSL, in part because we own Woodchester Park in Gloucestershire where FERA conduct a long term study on badgers and Bovine TB. Furthermore we have contracted FERA staff to undertake our pilot badger vaccination programme at our Killerton Estate in Devon. We also recently facilitated a QUB's badger research project at one of our properties in Co Down.

We are aware that the incidence of bTb amongst cattle herds in NI has increased in the last six months and that the cause of this change is unclear.

1.2 National Trust Position Statement - Badgers and bovine TB – Summary

The National Trust strongly advocates the need for a comprehensive package of measures that serves to reduce cattle to cattle transmission, and transmission between cattle and wildlife especially badger populations. We recognise that there is little point in tackling one transmission route such as badger to cattle without tackling all the other routes such as cattle to cattle.

We accept the results of the RBCT, as captured in the Final Report of Independent Scientific Group (ISG) that badgers contribute to the incidence of Bovine TB in cattle herds. However we also accept the ISG's conclusions that killing badgers to reduce this source of infection is fraught with difficulties and could be counterproductive because of perturbation: the social disruption to badgers that survive cull programmes that can result in increases in the risk of transmission of Bovine TB from badger to badger and badger to cattle. This means that for badger culls to be effective in making a significant reduction to the incidence of Bovine TB in cattle herds they would need to be over a large area (100 s of km squares), conducted

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efficiently over at least four years, and in areas with badger-proof boundaries. In practice there are likely to be few areas in Bovine TB hotspot areas in England, Wales or NI in which these criteria can be met.

So whilst we are not, in principle, against killing badgers to reduce Bovine TB in cattle herds (provided such culls were legal and the methods used were subject to agreed welfare standards), we judge that there will be few areas in which such culls can be carried out effectively. To present an alternative to killing badgers which does not cause perturbation and is known to effectively immunise badgers, we have decided to vaccinate badgers on the farms in one of our estates in a hotspot area in England.

2 Bio security measures;

There are two aspects to this: reducing contact and so transmission between infected and infectious cattle and non-infected cattle, and reducing badger/cattle contact.

We have been impressed by the procedures adopted in and around the Welsh Government's Intensive Action Area (IAA), where there is a presumption against moving cattle from known hotspot areas outside the IAA to within it.

In NI the conacre tenancy system results in a majority of farmers having several neighbours. This may increase the risk of contact between infected cattle and non-infected cattle across boundary fences, compared with in England or Wales, where farmers have fewer neighbours. So, a key to minimising contact between infected and non infected cattle in NI may be to increase bio-security around parcels of land leased through the conacre system

Contact between badgers and cattle occurs at feed and water points in buildings, and out on pasture. For the former, research conducted by Fera funded by Defra indicates that badger proof barriers can be effective but need to be maintained. This points to the need to bring about behavioural changes amongst farmers to make sure that, for instance, a badger proof gate has indeed been closed.

There is also the question of isolation of cattle testing positive and their immediate removal from the herd. The timings on this can vary. In Wales we note that the great effort to minimise the time reactor beasts remain on the farm has probably contributed to reductions in the rate of increase of BtB, and the rigour with which it is adopted sends a strong signal to the industry about the need for greater bio-security.

3 Vaccinations;

3.1 Badger Vaccinations

We recognise the significance of recently published scientific trials demonstrating that the vaccination of badgers is effective in immunising non-infected badgers, and slows down the rate of development of the disease in uninfected individuals. We understand from Fera that the effect of vaccination over four successive years on the trial badger population was to generate herd immunity. This means that vaccination had minimised the risk of badgers infecting cattle with BtB in the trial area. For these reasons, we are piloting vaccination of badgers over the next four years on 18 farms on our Killerton Estate in Devon, which is in a hot spot for Bovine TB. Our aim is to minimise the risk of badgers infecting our tenant's cattle with Bovine TB.

3.2 Cattle Vaccination

We believe that much more work is need in the development of a cattle vaccine and with the bTb issues now in France and Spain the opportunity is now there to look at the use of cattle vaccine within the experimental context. We welcome the development of a diagnostic test that will distinguish cattle that have been immunised against Bovine TB from those that are infected, and welcome research on the vaccination of cattle.

4 Dealing with TB in wildlife;

As stated earlier any approach any approach to manage TB in wildlife needs to be considered in tandem with management of TB in the cattle herd. As stated in 1.2 a widespread badger cull would potentially be cost prohibitive and will not necessarily deliver a comprehensive result. If there were proposals to reduce bTb in badger populations by catching, testing and culling individuals that test positive for the disease one possible consequence is perturbation (the disruption of the social organisation and behaviour patterns of individual badgers in a population), leading to an increased rather than decreased risk of badger to badger, and badger to cattle transmission. So if this were a option it would be important to assess the consequences of selective culling in terms of perturbation of badger populations and the consequently increased risk to cattle herds. Wales considered this option a few years ago, and commissioned scientists from FERA to model the perturbation risk from selective culling. The models indicated that selective culling can increase the risk of perturbation and so result in a higher incidence of herd breakdowns so it would be important to learn from the Welsh study.

It is also important to note that any intervention with wildlife (culling, selected culling vaccination or combinations of these) needs to be fully costed. In any option that involves killing badgers, it is important to cost in disposal of carcases.

5 Testing for Bovine TB;

We welcomed the introduction of mandatory Pre-movement testing in hotspots areas in England and Wales, and note that this has contributed to a measurable reduction in the incidence of Bovine TB amongst cattle herds. We also welcome the use of double testing (skin test and Gamma Interferon) in hot spot areas, given that the latter can detect infection at a very early stage in development of Bovine TB within the animal. However, we recognise that the resources for comprehensive use of double testing are unlikely to be available in the long term and accept that its use needs to be targeted to where it will make the most difference in reducing the risk of transmission between cattle.

6 Cattle movement;

We applaud the rigorous application of both cattle testing and use of the cattle tracking system APHIS in NI. Both are likely to have contributed to the reduction in Bovine TB in NI over the last decade. However, as we note above, we are concerned that cattle movements within the same holding in the conacre system may increase the risk of contact with neighbouring possibly infected cattle, and more needs to be done to prevent this happening.

7 Research into Bovine TB;

We positively support DARD for undertaking its Case Study project in a hot spot area in Co. Down which seeks to compare the attributes of farms that had a history of Bovine TB Breakdowns with those that did not. We understand that this study is still on going and we look forward to hearing the outcomes of this project later this year. In addition to the research outcomes we would emphasis the importance and value of this project in furthering relationships with individual farmers. We would like to see DARD build on these relationships in order to get more successful deployment and implementation of bio-security measures in the area.

8 Additional comments.

National Trust is aware that around £4 million is available to fund Bovine TB work in Northern Ireland and participated in a workshop hosted by DARD in late 2011 where a range of options and issues were debated with other key stakeholders including UFU, private and state vets, CNCC, AFBI, UWT and others. We felt that this focussed inclusive approach enabled frank and clear exchange of views from a range of perspectives and gave a collective view as to where those stakeholders saw the best use of research funds to be. Sadly there has been no follow up to this or communication as to what decisions have been made.

Queens Submission

Queen's University Research on Bovine Tuberculosis and Badgers

The University has and continues to conduct research into various aspects of bovine tuberculosis, and, in particular, improving ways of detecting the disease in both cattle and badger populations. In addition, important studies on ascertaining how the ecology of the badger in Britain and Ireland differs. Finally, monitoring the NI badger population and factors affecting their numbers has been undertaken since the 1990s**. A short review of this research follows.**

Project 1

InvestNI funded research, Institute of Agri-food and Land Use, Queen's University Belfast to develop new and improved detection methods for exposure of cattle to bovine TB.

Researchers involved:

Professor Chris Elliott, Dr Sharon Doherty, Dr Angela Seaton, IAFLU, School of Biological Sciences, Queen's University Belfast

Collaborator: Dr James McNair, Veterinary Sciences Division, Agri-Food and Biosciences Institute for Northern Ireland, Stormont

Project description:

Current control measures for bovine TB (bTB) rely on the intradermal tuberculin skin test and the Interferon gamma (IFN-g) test. However, due to the complexity of the disease, both these tests do not correctly identify all infected individuals in the earliest stages of infection. Thus a reservoir of undetected, *M. bovis* infected cattle are present in the NI cattle herds and are a major contributory factor in the persistence of the disease.

A low dose respiratory challenge model was established in cattle that mimicked the typical lung and lymph node lesions found in natural infection. Samples from these animals were examined at regular intervals during the course of the infection to determine the various pathways activated in early stage of bTB. A very intensive study of changes in both gene and protein expression in these samples was undertaken.

Main findings:

We were able to ascertain that several hundred genes and more than 20 proteins had significant alterations in their expression profiles as a direct result of the infection. Pathway analysis of these changes revealed a number of significant pathways including: (1) Cell Mediated Immune Response, (2) Cellular Assembly and Organisation, cellular recognition, (3) Immunological disease, (4) Post translational modification, (5) Molecular transport small molecule biochemistry, and (6) Immune cell trafficking. While a number of these pathways have been implicated previously in tuberculosis infection we have identified potential novel targets which may be beneficial for diagnostic or possibly therapeutics investigation.

Recommendations:

The novel targets identified should be validated in a large field study in NI to determine their effectiveness in the early detection of infected cattle.

Defra-funded research at the Institute of Agri-food and Land Use Queen's University Belfast to develop new and better detection methods for Mycobacterium bovis

Project 2

A two year study to undertake rapid, specific and sensitive detection of *Mycobacterium bovis* infection in animals at slaughter using immunomagnetic separation in combination with phage assay (IMS-phage) has just been completed.

Researchers involved:

Dr Irene Grant, Dr Linda Stewart, IAFLU, School of Biological Sciences, Queen's University Belfast

Collaborators: Dr James McNair and Dr Lyanne McCallan, Veterinary Sciences Division, Agri-Food and Biosciences Institute for Northern Ireland, Stormont

Project description:

A range of *M. bovis*-specific antibodies and peptide ligands were produced to be coated onto paramagnetic beads. The most specific and sensitive coated beads were identified and then used for immunomagnetic separation (IMS) of *M. bovis* from lymph node tissue homogenate. For IMS, the antibody and peptide coated beads are incubated with homogenised lymph node sample and any *M. bovis* cells present bind to the antibody and peptide. When a strong magnet is applied the beads plus any bound *M. bovis* cells can be pulled out of suspension to side of tube and after a couple of washes, to remove residual tissue homogenate, the captured *M. bovis* are amenable to detection by a variety of methods (culture, PCR, ELISA, or phage assay). Our original intention was to couple IMS with a phage-based assay, but in light of early findings when naturally infected lymph nodes were tested, the project ultimately focused on employing IMS in conjunction with PCR (IMS-PCR) and MGIT culture (IMS-MGIT). The performance of the new IMS-based tests to detect *M. bovis* infection was assessed by comparison of IMS-PCR and IMS-MGIT results with statutory TB culture results for 280 bovine lymph node samples collected at slaughter.

Main findings:

- Several novel *M. bovis*-specific monoclonal antibodies and peptides were produced.
- An optimised IMS method for *M. bovis* capture, which employs magnetic beads dually coated with a monoclonal antibody and a peptide, was successfully developed (scientific paper describing this process will be published in May 2012).
- IMS could not be employed with the phage assay to test for viable *M. bovis* in lymph nodes, as originally envisaged, because the captured cells were, apparently, not in a fully viable state at point of capture.
- Instead IMS was employed in conjunction with PCR to provide DNA evidence of *M. bovis* infection in lymph nodes within 48 h of testing, and in conjunction with MGIT culture to detect presence of viable *M. bovis* in lymph nodes. IMS-MGIT culture necessitates up to 8 week incubation period (current statutory TB culture timescale), so does not represent a faster detection method.
- Results of a large-scale survey of 280 lymph nodes (non-visibly lesioned and visibly lesioned, majority from skin test reactor animals) indicated that, together, the IMS-based methods detected around 27% more *M. bovis* infected lymph nodes than current statutory TB culture method.
- Positive IMS-PCR results obtained 48 h post-testing generally translated into positive IMS-MGIT results 8 weeks later, plus a number of additional IMS-MGIT culture positive samples were obtained. These findings suggest that a dual testing approach could permit earlier identification of *M. bovis* infected animals and hence bTB affected herds.

Project 3

An 18 month study to develop and field validate a rapid immunomagnetic separation - lateral flow (IMS-LF) test for detecting *Mycobacterium bovis* infection in badgers and/or badger setts has recently commenced.

Researchers involved:

Dr Irene Grant, Dr Linda Stewart (IAFLU), Prof Ian Montgomery, Dr Neil Reid (*Quercus*), School of Biological Sciences, Queen's University Belfast

Collaborators: Dr Paul Meakin and Dr Jonathan Flint, Forsite Diagnostics Limited, York; Dr Paul (Dez) Delahay and Prof Robbie MacDonald, Food and Environment Research Agency (FERA), Woodchester Park, Gloucestershire

Project description:

Antibodies or peptides generated in course of Defra project SE3262 are being incorporated into a lateral flow device (LFD) test format to provide a rapid field test to detect presence of *M. bovis* in badger faeces. Once the novel *M. bovis*-specific LFD has undergone testing and evaluation in the laboratory for use in conjunction with immunomagnetic separation (IMS), the IMS-LFD test will be taken into the field to assess how it performs as a rapid method of detecting the presence of *M. bovis* in badger faeces collected at setts throughout Northern Ireland. Setts near to bTB affected and bTB unaffected farms will be visited in the course of the study. In the field, a crude IMS will be performed on badger faeces samples and beads applied to the LFD device. An IMS-LFD result will be obtained, photographed, and GPS coordinates recorded at the test site. The residual IMS samples will be returned to QUB to be tested for *M. bovis* by IMS-PCR and IMS-MGIT methods. An evaluation of the performance of the novel IMS-LFD test will be made by comparing field and laboratory results. The final part of the project will involve testing of faeces from badgers of known infection status at the Woodchester research site in Gloucestershire to confirm that the IMS-LFD test is applicable in the GB as well as the NI context.

Evidence on the badger population (Meles meles) in Northern Ireland

Researchers involved:

Dr Neil Reid - Centre Manager of *Quercus*, Northern Ireland's Centre for Biodiversity and Conservation Research. Prof W. Ian Montgomery - Professor of Animal Ecology, Queen's University Belfast.

Research Outcomes:

PhD theses by Feore (1994), Sadlier (1999), McCann (2002), George (2011) and Kostka (2011) plus a post-doctoral research project by Reid et al. (2008). Four key publications in international scientific journals are listed as highlights:

1. Feore, S. and **Montgomery, W.I.** (1999) Habitat effects on the spatial ecology of the European badger *Meles meles*. *J. Zool. Lond.* **247**, 537-549.

2. Sadlier, L and **Montgomery I.** (2004) The impact of sett disturbance on badger *Meles meles* numbers: when does protective legislation work? *Biological Conservation,* **119**, 455-462.

3. **Reid, N.**, Etherington, T.R., Wilson, G.J., **Montgomery, W.I.** & McDonald, R.A. (2011) Monitoring and population estimation of the European badger (*Meles meles*) in Northern Ireland. *Wildlife Biology*, 18; 46-57.

4. **Reid, N.**, Wilson, G.J., **Montgomery, W.I.** & McDonald, R.A. (2012) Changes in the prevalence of badger persecution in Northern Ireland. *European Journal of Wildlife Research* 58 (1), 177-183.

A summary of the major findings of this research are detailed below:

Project 4

Badger ecology and epidemiology

- Major aspects of the biology of badgers in Ireland and Great Britain are similar e.g. badgers live in social, territorial groups and are widely distributed across Northern Ireland.
- Differences between Great Britain and Ireland are due to landscape factors e.g. setts and groups smaller; variation in diet between land classes, social groups and at individual level.
- Marginal habitats have larger territories and smaller groups; lowland pastoral areas with occasional woodland have smaller territories with larger groups such that there can be up to 30-fold difference in density.
- Estimation by regular trapping probably underestimates badger numbers by 20%.
- Breeding is seasonal with usually one sow breeding and 2-3 young reaching yearling stage.
- Mature males can cross territorial boundaries; can wander several kilometres from home group.
- Badger territories embrace multiple farms (av. 9); most farms have only one badger social group.
- 40% badgers exposed to pathogen; 14% excrete the pathogen; comparable to other studies; a later study suggested 6% excreting and 2% 'super' excretors (+ve>1 occasion).
- More than 60% farms graze cattle next to neighbours without adequate barriers against cattle-cattle contact.
- Disturbance of setts is associated with smaller groups.
- Badgers show a stress response when trapped and anaesthetised; also elevated cortisol in culture positive badgers; stress is likely to play a role in disease transmission.
- Tb strain types in badger parallel strain types in cattle.
- The chance of badger-cattle contact may be determined by landscape, group and individual variation in behaviour.

Project 5

Current badger population and temporal change

- The number of badger social groups was estimated from a survey during 2007/08 covering 212 x 1km2 squares throughout Northern Ireland and compared to a similar study conducted during 1990/93.
- Badgers were widespread with 75% of squares containing at least one sett. The mean density of active main setts, which was equivalent to badger social group density, was 0.56 (95%CI 0.46-0.67) active main setts per km2 during 2007/08.
- Social group density varied significantly among land class groups and counties being highest in Drumlin farmland in County Down.

- The total number of social groups was estimated at 7,600 (95%CI 6,200-9,000) and, not withstanding probable sources of error in estimating social group size, the total abundance of badgers was estimated to be 34,100 (95% CI 26,200-42,000).
- There was no significant change in the badger population from that recorded during 1990/93.
- Sett locations were negatively associated with elevation and positively associated with slope, aspect, soil sand content, the presence of cover, and the area of improved grassland and arable agriculture within 300m of the sett. A model was developed to predict sett locations throughout Northern Ireland at a resolution of 25m.

Project 6

Changes in levels of persecution

- Temporal changes in the prevalence of badger sett disturbance in Northern Ireland were evaluated between 1990/93 to 2007/08 in relation to population status by examining signs of persecution at setts.
- A total of 12.6% of 445 setts surveyed during 1990/93 had been disturbed compared to 4.4% of 653 setts during 2007/08. This was a significant decline (-65%) in the incidence of sett disturbance over the 14-18-year period.
- Most notably, the incidence of digging at badger setts, indicative of local badger baiting activity, declined from 50% to 3.5% of disturbed setts.
- During 1990/93 the most common type of disturbance (50.0%) was “digging at setts”, however, during 2007/08 there was a shift to 72.4% of setts being disturbed by “blocking of sett entrances” indicative of more opportunistic persecution.
- More generally, levels of persecution were associated with large setts in County Down situated in pastoral farming areas. Signs of recent disturbance were significantly more frequent at disused setts suggesting that once disturbed, badgers may vacate a sett indicative of “population perturbation”.
- Implementation of full legislative protection of the badger in Great Britain is thought to have led to increases in badger abundance due to reduced levels of persecution. Conversely, prevalence of badger persecution in Northern Ireland was historically much higher than in Great Britain, and badger abundance remained stable over time despite similar legislative protection.
- The number of badger social groups in Northern Ireland did not differ between the two study periods, suggesting that previously high levels of badger persecution did not limit the number of badger social groups.
- The stability of the badger population in Northern Ireland compared to the growing population in Great Britain cannot be attributed to changes in the prevalence of persecution.

Recommendations Project 4-6

Culling of badgers:

- British and Irish experiences differ. The former find little evidence in favour of culling - any benefit is offset by ‘perturbation’ i.e. there is a rise in disease around the culled area.
- Benefits are relatively small and may last only a few years.
- Ultimately, this approach is not regarded as cost effective.
- The RoI experience suggests otherwise with a sustained reduction in disease levels in culled areas.

- Differences between GB and RoI are probably due to a combination of the differences in study design and differences in environmental context of the disease. Without a clearly defined, isolated area over which to conduct a cull that is more or less 100% efficient, it is unlikely that any overall benefit in terms of disease control would ensue. Local and national studies suggest that tb in badgers in small, disturbed groups would rise and, hence, make the problem worse.
- **We strongly advise against culling of badgers as a means of controlling bovine TB in its wildlife reservoir.**

Bio-security:

- It has been demonstrated clearly that badgers are a disease reservoir and so keeping them away from places where they might come into contact with cattle is important. Farm buildings are important in this context and relatively cheap measures could be deployed to reduce cattle-badger contact.
- Improved fencing around areas with setts, elevation of water and feeding troughs, use of electric fencing around pasture before cattle are introduced etc. should be routine measures to reduce badger-cattle contact throughout farms.
- Cattle to cattle transmission could be reduced by all round better biosecurity between fields and farms.
- Continued pre- and post-movement testing of cattle is an essential means of reducing disease transmission.
- **Consideration should be given to the deployment of cost effective biosecurity measures for the control of bovine NI. This would require ascertaining the situation 'on the farm'.**

Vaccination of badgers:

- Trials are underway in Great Britain and Ireland using BCG. Results are promising in that BCG reduces incidence of +ve serology by 74% but BCG does not prevent infection.
- Chambers et al (Proc Roy Soc B 2010) suggest 'BCG vaccination of badgers could comprise an important component of a comprehensive programme of measures to control bovine TB in cattle.'
- **Hence, we recommend research on the parameters likely to assist in any such programme of control being initiated in Northern Ireland. For example, factors affecting the status of the disease in the badger population using more advanced test protocols (see Projects 1-3)**.

Concomitant research is needed to ascertain changes in badger abundance for the purposes of studying disease epidemiology at the local level. Whilst we can be confident that the number of badger social groups has not changed significantly over the last 14-18 years we have little confidence in assessing the change in badger abundance. A large proportion of the variance in badger numbers is accounted by changes in social group size and not numbers of social groups. Thus, if data are required on the actual numbers of badgers prior to any putative population intervention strategy further research is required to estimate social group size using intensive focal sampling techniques, principally genetic analyses.

RSPB Submission

Committee for Agriculture and Rural Development: Review of Bovine Tuberculosis

A response from RSPB Northern Ireland

The RSPB is calling on Government to base its policy on combating bovine TB on sound science. Measures should focus on cattle testing, biosecurity and the development and deployment of vaccines. Detailed scientific trials suggest that the culling of badgers is a high-risk, impractical, unsustainable approach to reducing bovine TB in cattle. If asked the RSPB will oppose access to its reserves for culling badgers but, if part of a co-ordinated programme, will allow access for badger vaccination.

Summary

- Bovine Tuberculosis (bTB)is a significant and costly disease for the cattle industry
- Effective measures must be found to reduce the incidence of bTB in cattle
- Livestock farming plays a critical role in managing important habitats
- Cattle to cattle transmission remains a significant pathway for transmission of bTB in Northern Ireland
- Several studies have shown reactive culling of badgers is ineffective and can actually increase bTB infection levels in cattle
- The final report of the Independent Scientific Group on Cattle TB concluded that 'the rising incidence of disease can be reversed, and geographical spread contained, by the rigid application of cattle-based control measures alone
- The RSPB is opposed the coalition government decision to trial cull areas in SW England in autumn 2012
- The RSPB welcomed the 20th March 2012 decision by the Welsh Assembly Government to pursue a badger vaccination programme instead of a widespread cull
- We believe that badger vaccination provides a satisfactory alternative solution to culling that does not risk making the situation worse. Detailed field trials of an injectable badger vaccine showed that it reduces the number of badgers testing positive to bTB by 74%
- will continue to press Government to work with farmers to ensure appropriate cattle testing and biosecurity measures are carried out on farms, and to maintain funding for vaccine development (both for oral badger vaccine and cattle vaccine)

Background

Bovine Tuberculosis (bTB) is a significant and serious disease for the cattle industry. It is clear that badgers can play a part in the transmission of this disease but cattle to cattle infection is also important. It is important that effective measures are found to address the disease reservoir in badgers or to break the cycle of infection if this disease is to be controlled and eventually eradicated. However, by no means is culling badgers the only option for doing so.

Main points

The RSPB is sympathetic to the impact that bTB and the current control measures has on cattle farming in parts of the UK. It causes considerable distress for farmers to lose their herds as well as having financial impacts for individuals and the taxpayer. Livestock farming plays a critical role in managing important habitats and the RSPB owns, manages and uses cattle on our nature reserves.

Cattle to cattle transmission remains an important pathway for disease transmission (Goodchild and Clifton-Hadley, 2001). Cattle-to-cattle transmission may result from several routes:

- **Contact with infected contiguous herds:** Northern Ireland has a high dependence on the beef sector and 99% of herds have contiguous neighbours owning cattle, most of which have experienced TB infection at some time over a three year period. McCann (2002) found that 63.6% of cattle farms in Northern Ireland grazed herds contiguously in fields with inadequate barriers to "nosing"
- **Purchase and subsequent importation of infected cattle:** Cattle movements can be an important source of *M. Bovis* introduction into disease-free herds. The importance of cattle movements became clear in the wake of the foot and mouth disease outbreak in 2001 (Figure 1), when large numbers of cattle were purchased and moved in order to restock culled animals (Gopal *et al*., 2006). Disease data for live badgers in Northern Ireland are limited to four PhD projects by Feore (1994), Sadlier (1999), McCann (2002) and George (2011), but combined figures from these studies suggest that incidence of the disease in badgers may be dependent on cattle prevelance. Feore (1994) found no culture-positive badgers but Sadlier (1999) found that 7.7% tested culture-positive. By 2002, after the Foot and Mouth outbreak, 13.8% of badgers were culture-positive (McCann, 2002) but this had fallen by 2010 to 6.6% (George, 2011). Woodroffe *et al*. (2006b) also found that bTB prevalence in badgers almost tripled after the foot-and-mouth outbreak. This raises the question of whether *M. bovis* is self-sustained within the badger population or whether it only persists due to failure to eradicate the disease in cattle
- **Transmission within housing:** A number of studies have shown that cattle-to-cattle transmission within housing is possible, but the quality of housing is the determining factor in the risk of disease transmission (Phillips *et al*., 2003). Close contact between cattle feeding from shared troughs and in neighbouring cubicles may increase transmission of infectious bacilli and facilitate establishment of the disease in susceptible animals (Goodchild and Clifton-Hadley, 2001). Poorly ventilated housing, with low sunlight and high humidity, is ideal for transmission of *M. bovis* (Philips *et al*., 2003)

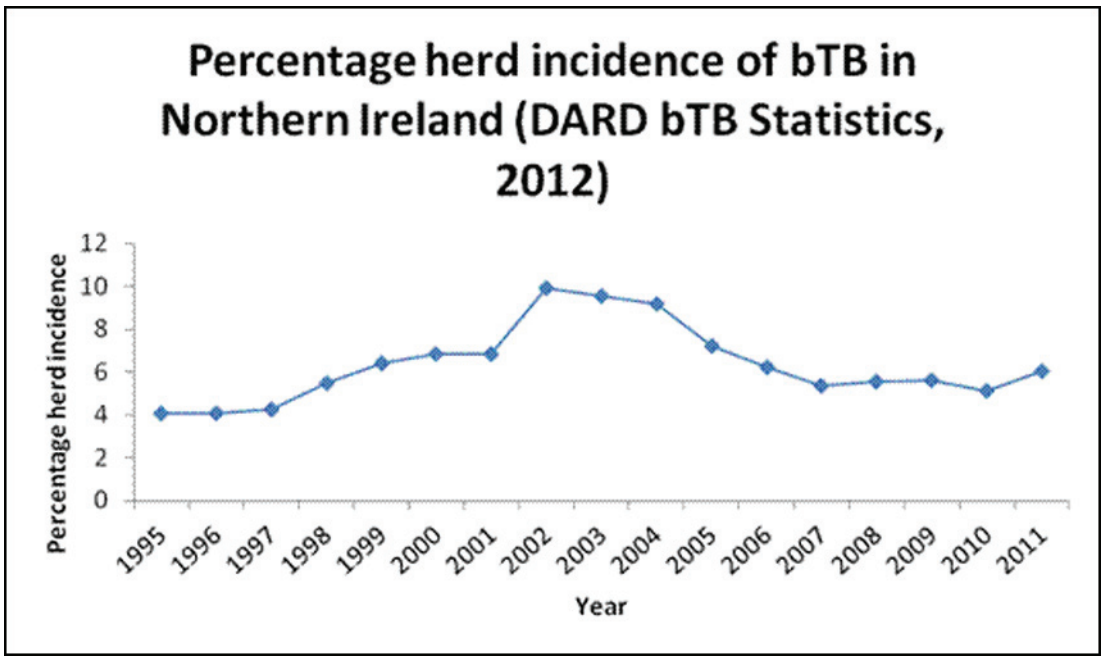

Figure 1: percentage herd incidence of bTB in cattle herds increased dramatically in response to restocking of cattle after the Foot and Mouth outbreak in 2001.

Biosecurity measures to reduce the contact between badgers and cattle also have an important role to play in disease control. We welcome the initiative from DARD to look at cattle and wildlife risk factors in County Down. In assessing the need for biosecurity measures on farms in Northern Ireland we hope that the findings of a detailed research project in England (Judge et al 2011) and the measures that have been introduced in the TB intensive action area in West Wales are fully evaluated.

The results of a detailed, ten year study on the effects of badger culling showed that localised, reactive culling is ineffective and can actually increase bTB infection levels in cattle. Culling of badgers results in considerable disruption to the social organisation and behaviour of individuals, inward dispersal in search of new home ranges, breakdown of the discrete group territories associated with medium to high-density populations (Carter *et al*., 2007), increased roaming (Woodroffe *et al*., 2006a), changes in biometrics and age structure (Tuyttens *et al*., 2000), and it can increase *M. bovis* prevalence in the remaining badger population (Jenkins *et al*., 2007).

These impacts on badger social structures are referred to as perturbation. The study did show that a well co-ordinated, simultaneous cull of badgers over a substantial area (at least 150 square kilometres) over a protracted period (at least four years) would in theory reduce bTB in cattle in and around the cull area by about 16% (Defra 2011). However, it would only be effective in areas with boundaries impermeable to badger recolonisation (Donnelly *et al*., 2003). As appropriate natural boundaries only occur on a local scale, prevention of recolonisation on a wider scale is not currently practical and Bourne et al (2007) concluded that badger culling is not likely to represent an effective method of controlling bTB in Britain.

Jenkins *et al*. (2010) have followed the effects of culling on cattle TB since culling ended in 2007. They found that detectable benefits of culling inside the cull zones persisted for several years after culling ended, however, they concluded that the cost of culling far out-weighs the modest reduction in cattle TB. This study also highlighted the potentially divisive impacts of badger culling because although culling produced a small reduction in the incidence of bovine TB overall it actually increased TB for those farmers just outside the culling zone.

The final report of the Independent Scientific Group on Cattle TB concluded that 'the rising incidence of disease can be reversed, and geographical spread contained, by the rigid application of cattle-based control measures alone.' (Bourne et al 2007)

In December 2011, the coalition Government announced it is decision to progress two pilot culls in SW England in autumn 2012. Depending on the results of these pilots, a series of area based culls could be licensed in following years. The RSPB is opposed to these proposals because they are based on a high-risk, untested method (shooting free ranging badgers) and they risk making TB worse. In addition, the two pilots will not produce a scientifically sound trial of the proposed cull and Natural England will not be able to set cull levels that ensure that local extinctions of badgers do not occur. This risks contravening the Bern Convention on the Conservation of European Wildlife.

The RSPB welcomed the 20th March 2012 decision by the Welsh Assembly Government to pursue a badger vaccination programme instead of a widespread cull. This decision was made after a review of the scientific evidence, deeming a cull inappropriate and not cost effective in the long term.

We believe that badger vaccination provides a satisfactory alternative solution to culling that does not risk making the situation worse. Detailed field trials of an injectable badger vaccine showed that it reduces the number of badgers testing positive to bTB by 74% (Chambers et al 2010). This vaccine is available now and we believe that the Government should be doing more to support and encourage its use. This position appears to be shared by the centre-right think tank the Bow Group which has called on the coalition Government to scrap badger cull plans (Bow Group 2012).

We will continue to press Government to work with farmers to ensure appropriate cattle testing and biosecurity measures are carried out on farms, and to maintain funding for vaccine development (both for oral badger vaccine and cattle vaccine). We will assist where possible with appropriate and co-ordinated vaccination programmes, but will oppose access to our nature reserves for culling badgers.

References:

Bourne, F. J. (2007). Bovine TB: The scientific evidence. *Final Report of the Independent Scientific Group on Cattle TB*

Bow Group 2012 report available from here http://www.bowgroup.org/news/bow-group-urges-government-scrap-badger-cull-plans.

Buddle, B. M., McCarthy, A. R., Ryan, T. J., Pollock, J. M., Vordermeier, H. M., Hewinson, R. G., *et al*. (2003). Use of mycobacterial peptides and recombinant proteins for the diagnosis of bovine tuberculosis in skin test-positive cattle. *The Veterinary Record, 153*(20), 615-620.

Carter, S. P., Delahay, R. J., Smith, G. C., Macdonald, D. W., Riordan, P., Etherington, T. R., *et al*. (2007). Culling-induced social perturbation in Eurasian badgers *Meles meles* and the management of TB in cattle: An analysis of a critical problem in applied ecology. *Proceedings of the Royal Society B: Biological Sciences, 274*(1626), 2769-2777.

Chambers, M. A., Rogers, F., Delahay, R. J., Lesellier, S., Ashford, R., Dalley, D., *et al*. (2010). Bacillus calmette-guérin vaccination reduces the severity and progression of tuberculosis in badgers. *Proceedings of the Royal Society B: Biological Sciences, 278*(1713), 1913-1920.Defra (2011) Bovine TB – Key conclusions from the meeting of scientific experts, held at Defra on 4th April 2011. http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/bovinetb-scientificexperts-110404.pdf

Defra (2011) Bovine TB – Key conclusions from the meeting of scientific experts, held at Defra on 4th April 2011. http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/bovinetb-scientificexperts-110404.pdf

de la Rua-Domenech, R., Goodchild, A. T., Vordermeier, H. M., Hewinson, R. G., Christiansen, K. H., and Clifton-Hadley, R. S. (2006). Ante mortem diagnosis of tuberculosis in cattle: A review of the tuberculin tests, gamma-interferon assay and other ancillary diagnostic techniques. *Research in Veterinary Science, 81*(2), 190-210.

Department of Agriculture and Rural Development (DARD) Statistics (2012). Tuberculosis statistics for Northern Ireland. Available online at http://www.dardni.gov.uk/index/dard-statistics/animal-disease-statistics.htm.

Donnelly, C. A., Woodroffe, R., Cox, D. R., Bourne, J., Gettinby, G., Le Fevre, A. M., *et al*. (2003). Impact of localized badger culling on tuberculosis incidence in British cattle. *Nature, 426*(6968), 834-837.

Feore, S. (1994). The distribution and abundance of the badger (Meles meles) in Northern Ireland. Ph.D., Queen's University Belfast.

George, S. (2011) Stress, energetics and disease in the Eurasian badger (*Meles meles*). Ph.D., Queen's University Belfast.

Green, L. E., and Cornell, S. J. (2005). Investigations of cattle herd breakdowns with bovine tuberculosis in four counties of England and wales using VETNET data. *Preventive Veterinary Medicine, 70*(3-4), 293-311.

Goodchild, A. V., and Clifton-Hadley, R. S. (2001). Cattle-to-cattle transmission of *Mycobacterium bovis*. *Tuberculosis (Edinburgh, Scotland), 81*(1-2), 23-41.

Gopal, R., Goodchild, A., Hewinson, G., de la Rua Domenech, R., and Clifton-Hadley, R. (2006). Introduction of bovine tuberculosis to north-east England by bought-in cattle. *The Veterinary Record, 159*(9), 265-271. Jenkins, H.E., Woodroffe, R., Donnelly, C.A., Cox, D.R., Johnston, W.T., Bourne, F.J., Cheeseman, C.L., Clifton-Hadley, R.S., Gettinby, G., Gilks, P., Hewinson, R.G., McInerney, J.P. & Morrison, W.I. (2007). Effects of culling on spatial associations of *Mycobacterium bovis* infections in badgers and cattle. *Journal of Applied Ecology, 44*, 897-908.

Jenkins, H. E., Woodroffe, R., and Donnelly, C. A. (2010). The duration of the effects of repeated widespread badger culling on cattle tuberculosis following the cessation of culling. *PloS One, 5*(2), e9090.

Judge, J., McDonald, R.A., Walker, N. and Delahay, R.J. (2011) Effectiveness of Biosecurity

Measures in Preventing Badger Visits to Farm Buildings. *PLoS ONE* 6(12): e28941.

doi:10.1371/journal.pone.0028941, available here:

www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028941

McCann, P. (2002). Aspects of the ecology and physiology of the Eurasian badger (*Meles meles* L.) cattle management and the epidemiology of bovine tuberculosis. Ph.D., Queen's University Belfast.

Phillips, C. J., Foster, C. R., Morris, P. A., and Teverson, R. (2003). The transmission of *Mycobacterium bovis* infection to cattle. *Research in Veterinary Science, 74*(1), 1-15.

Pottumarthy, S., Morris, A. J., Harrison, A. C., and Wells, V. C. (1999). Evaluation of the tuberculin gamma interferon assay: Potential to replace the mantoux skin test. *Journal of Clinical Microbiology, 37*(10), 3229.

Ryan, T. J., Buddle, B. M., and De Lisle, G. W. (2000). An evaluation of the gamma interferon test for detecting bovine tuberculosis in cattle 8 to 28 days after tuberculin skin testing. *Research in Veterinary Science, 69*(1), 57-61.

Sadlier, L. (1999). The behavioural ecology of the badger (Meles meles) on pastural farmland. Ph.D., Queen's University Belfast.

Thom, M. L., Hope, J. C., McAulay, M., Villarreal-Ramos, B., Coffey, T. J., Stephens, S., *et al*. (2006). The effect of tuberculin testing on the development of cell-mediated immune responses during *Mycobacterium bovis* infection. *Veterinary Immunology and Immunopathology, 114*(1-2), 25-36.

Tuyttens, F. A. M., Delahay, R. J., Macdonald, D. W., Cheeseman, C. L., Long, B., and Donnelly, C. A. (2000). Spatial perturbation caused by a badger (*Meles meles)* culling operation: Implications for the function of territoriality and the control of bovine tuberculosis (*mycobacterium bovis)*. *Journal of Animal Ecology, 69*(5), 815-828.

Woodroffe, R., Donnelly, C. A., Cox, D. R., Bourne, F. J., Cheeseman, C. L., Delahay, R. J., *et al*. (2006a). Effects of culling on badger *Meles meles* spatial organization: Implications for the control of bovine tuberculosis. *Journal of Applied Ecology, 43*(1), 1-10.

Woodroffe, R., Donelly, C. A., Jenkins, H. E., Johnston, W. T., Cox, D. R., Bourne, F. J., Cheeseman, C. L., Delahay, R. J., Clifton-Hadley, R., S., Gettinby, G., Gilks, P., Hewinson, R. G., Mclnerney, J. P. and Morrison, W. I. (2006b). Culling and cattle controls influence tuberculosis risk for badgers. *Proceedings of the National Academy of Sciences, 109*(40), 14713-14717.

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UFU Submission

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19th April 2012

FROM THE PRESIDENT

Stella McCardle
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Dear Stella

ULSTER FARMERS' UNION'S (UFU) SUBMISSION OF WRITTEN EVIDENCE TO THE COMMITTEE FOR AGRICULTURE AND RURAL DEVELOPMENT REGARDING THE REVIEW OF BOVINE TUBERCULOSIS.

Thank you for your letter of 27th March seeking the UFU's views on the above subject. The Ulster Farmers' Union (UFU) is the largest farming organisation in Northern Ireland representing over 11,000 farming families and as such would like to make the following comments;

Introduction

In 1949, Northern Ireland (NI) introduced the Tuberculosis (Attested Herds) Scheme designed to encourage the establishment in NI of cattle herds certified as officially free of bovine TB. Compulsory testing of TB was introduced in 1959 and in the decades since has fluctuated between annual, biennial and triennial testing depending on disease levels. However since 1983 NI has been on annual testing entirely. For 63 years farmers have been dealing with the burden of TB and in this time there has never been a sufficiently robust policy to eradicate the disease.

The UFU recognise that there are a range of factors that contribute to the control and eradication of TB. Unfortunately the policy to date has concentrated on cattle control measures. The UFU believe that the current policy will not deliver in terms of eradicating TB but will instead only prolong the burden that TB imposes on the farming community. Cattle control measures, biosecurity and rigorous testing procedures will never eradicate the disease unless all sources of the disease are addressed. The remainder of this document outlines the current control programme, the impact that TB has on farmers and the additional measures that must be prioritised immediately in order to create a more robust TB eradication programme.

The key elements of the existing Northern Ireland TB Control Programme

The programme consists of the following elements

- TB testing of all herds in Northern Ireland on an annual basis;
- Valuation, removal and slaughter of reactor and in-contact animals;
- Abattoir surveillance, of all cattle carcasses, for the presence of tuberculosis lesions;

Established 1918
Clarke Black, Chief Executive

- Increased frequency of TB testing for individual animals and herds where there is considered to be an increased risk of disease e.g lateral risk testing;
- Severe interpretation of the tuberculin test in some cases;
- Post mortem examination, including histology and/or bacteriology, to confirm disease;
- Movement restrictions on herds and/or animals where the presence of disease is
- suspected or established, until disease free status is re-established;
- Forward and backward tracing of animals from breakdown herds and associated risk testing;
- Investigation of confirmed breakdown herds by a Veterinary Officer;
- Establishment and maintenance of a real time computerised animal identification and movement recording system; and
- Financial compensation to the owners of reactor or in-contact animals.

Impact on the Farming Community
The Northern Ireland Agri-Food Better Regulation and Simplification Review produced in April 2009 estimated (based on 2007 incidence) the administrative cost of TB to be £8.23 million per annum.
There is also a significant impact on farmers health and well being. Having to deal with the pressures of TB restrictions and constant herd breakdowns can be detrimental to the mental health of farmers.

Measures that should be taken to Reduce and Eradicate TB
Against this background, the UFU priority remains the same as it has done for the past number of years, to see meaningful action taken to address the disease in wildlife. Based on the previous DARD Minister's (Michelle Gildernew) three stranded approach to eradicating bovine TB it must be recognised that farmers have fully embraced the first two strands which were: 1) real partnership between government and industry and 2) controlling the spread of TB between cattle. The third strand, addressing the wildlife factor, remains undelivered. To address this the UFU believe that DARD should take the following actions.

a. DARD should recognise that tackling the reservoir of TB disease in wildlife is an essential part of an effective TB disease eradication programme.
b. Both the Minister and DARD should commit to developing a Wildlife Intervention Programme, which will include time based milestones by which a series of agreed actions will have been carried out.
c. DARD should establish a Group to operate with the sole aim of working up the elements, both practical and conceptual, which would form the basis under which a robust, effective and defendable, Wildlife Intervention Programme, would be delivered.
d. DARD Veterinary Service should commit to identifying a series of "hot spot" or "recent outbreak" locations where focussed actions and research could be carried out with a view to further informing the already existing science and supporting the planned Wildlife Intervention Programme.
e. Whilst the UFU recognise that while it may remain an aspiration of DARD to reduce TB compensation levels, no such reduction will be implemented by the Department until an agreed Wildlife Intervention Programme is operational in rural areas.

UFU Comments on the Remaining Aspects of TB Control and Eradication

Bio-security measures: Biosecurity undoubtedly plays an important role in controlling the spread of TB. Biosecurity measures should be incentivised at farm level as adopting biosecurity measures to prevent cattle to cattle spread and the incursion of wildlife can be very difficult and extremely costly.

Vaccination: The UFU recognises that vaccination is likely to have a very important role to play in the control of TB however there are very real problems with the availability of vaccine for cattle and badgers. Cattle vaccine production has consistently been delayed and even if it is developed, deployment will be delayed due to EU regulation. Oral badger vaccine will not be available until at least 2015 and therefore the only current vaccination option is an injectable badger vaccine. The process of injecting badgers has practical difficulties and is therefore a costly option however the injectable vaccine could have an important role in reducing the effects of perturbation in the future.

Dealing with TB in Wildlife: This is the key priority for the UFU. TB will never be eradicated if the disease is not dealt with in wildlife. Farmers are extremely frustrated that there has been no meaningful action to tackle the disease in wildlife to date. The UFU would like to see action taken by DARD as outlined above. It is important to note that the Republic of Ireland operate a badger intervention policy where badgers are identified as a probable cause in breakdown herds.

Testing: The tuberculin test is not perfect. However, according to DARD it is the best test currently available. It can be expected to detect approximately 75% of infected cattle at any one test. Herds in which reactors are found are tested a number of times in order to give the best chance of eliminating infection from the herd. It is further known that when the test is used on cattle without disease, it wrongly classifies a non-infected animal as diseased less than once in 1,000 times. Some cows may be less likely to give a positive reaction if they are close to calving. The test may also occasionally miss an infected animal, which may show evidence of disease later when it is slaughtered.
Testing in general is a significant burden to farmers. Testing costs farmers both time and money and contributes to over 70% of the administrative burden associated with TB.

Cattle Movements: The UFU believe that Northern Ireland's "eradication" programme is one of the most robust in Europe with regard to cattle movements. Herd restrictions can cause significant overstocking difficulties for farmers who rely on selling animals to markets.

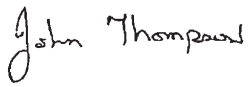
Research into BTB: Minister O'Neill has allocated £4m for research and studies into TB. It is important that this money is not spent on studies that "reinvent the wheel". Any research that is done should concentrate on providing evidence for a wildlife intervention policy.

Other Areas of Importance

Compensation: The UFU's position on compensation is very clear. Until the outstanding TB control issue of disease in wildlife is addressed our members are unwilling to consider any changes to compensation arrangements for TB and therefore the UFU believe the current arrangements must be maintained.

Conclusion
DARD's existing TB policy will not eradicate the disease from Northern Ireland. Cattle control measures are only one aspect of dealing with the disease and until meaningful action is taken to deal with all sources of the disease, particularly wildlife, farmers will have to continue to carry the burden of an ineffective policy. For over six decades TB has blighted the industry and unless policy changes are made it will continue to do so. A series of measures must be implemented by the Minister immediately to allow progress with eradication to be made.

Yours sincerely



JOHN THOMPSON

UWT letter re. Bovine TB

Ulster Wildlife Trust

Stella McArdle
Clerk to the Committee for Agriculture and Rural Development
Room 244
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16/04/2012

Dear Ms McArdle,

The Ulster Wildlife Trust welcomes the opportunity to submit written evidence to the Committee, as part of its review of Bovine Tuberculosis. In accordance with your request, we attach a written briefing document, which outlines our thoughts on the aspects upon which the Committee has requested evidence.

In addition to this evidence, we would like the Committee to consider inviting oral evidence from the Ulster Wildlife Trust. We would welcome the opportunity to bring to the Committee one of our Wildlife Trust colleagues, Dr Gordon McGlone, OBE, who is regarded as a UK expert in the matter of bTB, badgers and cattle. Gordon also has been involved in the vaccination trials and as such has a very sound understanding of the most recent developments regarding badger vaccinations, and has indeed been in discussions regarding cattle vaccinations at the EU level.

We would also like to draw to the attention of the committee a seminar that was held in Greenmount on October 25th 2011 *"Bovine Tuberculosis (TB) and Wildlife Studies Stakeholder Forum"*. This event was really well attended by stakeholders interested in the subject, and the facilitated workshops resulted in some good transparent debates and general agreements on the way forward for eradication of bTB.

Once again, thank you for the opportunity to respond to your review.

Best Regards,

Victoria Magreehan

Development Director
Ulster Wildlife Trust
www.ulsterwildlifetrust.org

UWT Submission Agriculture and Rural Development Committee Bovine TB Review

Ulster Wildlife Trust written evidence

The Ulster Wildlife Trust welcomes that the NI Assembly's Agriculture and Rural Development Committee is carrying out a review of Bovine TB and having been involved in the issue for considerable time, we are pleased to respond to the call for written evidence and look forward to further engaging with the review.

For ease of review by committee, this document is set out using the subjects suggested in the committee's invite letter, and is limited to 2000 words as instructed.

1.0 Ulster Wildlife Trust Introduction

The Ulster Wildlife Trust is NI's largest locally based nature conservation charity. We are supported by over 11,500 members from across Northern Ireland. Our aim is a Northern Ireland, rich in wildlife and valued by all. We work towards this aim with people and places across NI, for both living landscapes and living seas. We have been a member of the bTB badger stakeholder group, and have a considerable interest in the issue, as do the other Wildlife Trusts across the UK.

2.0 UWT position summary:

The Ulster Wildlife Trust believes the priorities for eradicating the disease should be –

1. To continue to improve on-farm bio-security measures to reduce cattle to cattle and cattle to badger transmission.

2. To implement a short to medium term programme of badger vaccination to reduce bTB transmission from badgers to cattle.

3. Facilitate the development of a cattle vaccine along with a change to EU legislation to allow a cattle vaccine to be used.

3.0 Biosecurity measures

It is now widely agreed that tight biosecurity measures are essential if we are to limit the spread of bTB within herds, as well as containing outbreaks within geographical areas. This means implementing measures such as:

- Limiting contact between cattle and local wildlife, particularly badgers by 'badger proofing' sheds and feeding areas, and fencing off setts where appropriate.
- Carrying out frequent bTB testing and subsequently isolate and slaughter infected cattle
- Eliminating the spread of bTB between herds with measures such as pre-movement testing

A key activity in moving NI closer to best practice regarding biosecurity and bTB, has to be understanding the current practices and identifying any correlation between activity and outbreaks. It is encouraging to note the bTB research budget committed in the Programme for Government by DARD, and we hope that this can be instrumental in finding a solution. We also look forward to the results of the Co Down biosecurity study which are due out 'later this year'.[1]

Bio-security measures to exclude badgers from cattle in farmyard buildings have proven to be achievable and effective at reducing potential points of contact. The Central Science Laboratory (CSL) in York conducted an experiment to assess whether it was possible to

1 http://www.dardni.gov.uk/tb-biosecurity-study-questions-and-answers-leaflet.pdf

reduce contact between badgers and cattle within farmyard buildings and what the likely cost of such measures would be.[2]

The methods used to exclude badgers from farm buildings in which cattle and cattle feed were housed were solid metal gates, gates with adjustable metal panels, solid metal fencing, feed bins and electric fencing. Badger activity was monitored using motion-triggered, infrared cameras for at least 365 nights on each of the farms in the study. Comparing with controls, CSL discovered that badgers were not able to access buildings if exclusion measures were used. When consistently employed, these measures were 100% effective in preventing badgers accessing buildings. The average cost per farm of implementing these badger exclusion measures was £4045. We would also encourage the Department to consider biosecurity measures for inclusion in any future grant-aided programmes, e.g. the Farm Modernisation programme.

Research has shown that the spread of bTB between herds is most likely to occur when cattle are transported around the countryside.[3]

If infected animals are moving around the country or between herds, it is clear that bTB will continue to spread. Movement of animals between farms is a critical factor in the increase in bTB, and cattle controls were enhanced in NI following the 2002 TB Policy Review, since this there has been a 50% decrease in bTB.

A recent article in the Farmer's Journal quoted a DARD Official as saying that biosecurity in Northern Ireland's farms was not something to be proud of. It is clear that further work can be done on improving biosecurity on farms here.

4.0 Vaccinations

Vaccination of cattle and badgers has the potential to reduce bTB without the negative impacts of perturbation arising from a badger cull (info on perturbation below). Since 1998, the UK Government has invested £30 million in developing TB vaccines for cattle and badgers. The current status of vaccine development is:

- Cattle vaccine has been developed but requires regulatory approval and changes to EU legislation to permit its use;
- Injectable BadgerBCG vaccine available since 2010;[4]
- Oral badger vaccine being developed but needs to be tested before potential submission to regulatory bodies.
- The UK Government has now completed development of a cattle vaccine and submitted an application in January 2012 to the Veterinary Medicines Directorate (VMD) for marketing authorisation. Defra has also made progress in the development of a Differentiate Infected from Vaccinated Animals (DIVA) test and expects to seek certification later in 2012.

Cattle in the UK are routinely vaccinated against diseases, but the use of TB vaccine is banned under EU law (Directive 78/52 EEC, 1977). This is because the bovine BCG vaccine interferes with the mandatory tuberculin skin test. Cattle that had been vaccinated would technically fail the test, meaning they couldn't be declared Officially TB Free. There is an opportunity to lift the EU prohibition on vaccination of cattle against TB through the development of the new European Animal Health Law currently under consideration. The Wildlife Trusts have recently initiated meetings with the European Commission's Directorate

2 An experiment to assess the cost-effectiveness of farm husbandry manipulations to reduce risks associated with farmyard contact between badgers and cattle - SE3119 2009, available here: randd.defra.gov.uk/Document.aspx?Document=SE3119_8676_FRP.doc

3 Gilbert, M., et al., Cattle movements and bovine tuberculosis in Great Britain. Nature, 2005. 435(26): p. 491-496; and: Carrique-Mas, J.J., et al., Risk of bovine tuberculosis breakdowns

4 Bovine TB Eradication Programme for England, Defra 19 Jul 2011: www.defra.gov.uk/publications/files/pb13601-bovinetb-eradication-programme-110719.pdf

General for Health and Consumers to discuss removal of EU regulatory barriers to cattle vaccination.

Vaccination of badgers is a practical and immediate step that the NI government should commit to as a viable alternative to a cull. Injectable Badger Bacillus Calmette-Guérin (BadgerBCG) is identical to the BCG vaccinations with which school children were immunised aged 13 between 1953 and 2005.

Field trials of the BadgerBCG vaccine have been taking place for years and there is clear evidence that deployment of the vaccine is effective in reducing bTB in badgers. For example, in 2008, a vaccination field trial led by The Food and Environment Research Agency (FERA), involving a population of more than 800 badgers in a high-risk area of Gloucestershire, demonstrated a 73.8% reduction in the incidence of positive serological TB test results in wild badgers.[5],[6]

The only current method for immunising badgers is via injection; however, Oral Badger BCG is being developed in collaboration with other countries, including the Republic of Ireland and New Zealand and Defra has invested £6m on this research since 2005. It is possible that an oral vaccine could be available as soon as 2015, resulting in potential cost reductions for vaccination programmes.

Ultimately, badger vaccination is a cheaper method than culling. During current small scale studies, Gloucestershire Wildlife Trust has undertaken to keep accurate records of costs.[7]

The resulting estimations of costs showed badger vaccination could be carried out for an average of £51 per hectare, or £765,000 per 150km2. The Gloucestershire Wildlife Trust also calculated the costs of vaccination for their 66 ha farm holding to be approximately £2,856. These costs are, in fact, higher than they would be, should the Government adopt a larger vaccination programme (DEFRA's figures for vaccination are half). It should be noted that cost depends on badger density, ease of access to land and accurate estimates follow badger activity surveys.

From trial results so far, it is reasonable to conclude that a widespread badger vaccination programme could increase immunity in the badger population and significantly reduce the proportion of infected badgers within 5 years. **It is on this basis that Wales, and ROI have committed to badger vaccination as a replacement for culling of badgers, and indeed the recent report from the UK government think tank, the Bow Group recommends that England adopts vaccinations a central to eradication of bTB.[8]**

5.0 Dealing with TB in wildlife

It has long been known that TB can be transmitted between cattle, between badgers and between the two species. Other animals that can carry the disease incluxde pigs, camelids, sheep, goats, deer.

Badgers are believed to be one of the main risks of transmission of the disease, largely as their roaming grounds overlap with farms. Badgers are listed in the Convention on the

5 Report of GCP (veterinary) study on wild badgers 2009, Defra 2009, available here: http://randd.defra.gov.uk/Document.aspx?Document=SE3250b.pdf

6 Chambers B. et al (2010). "Bacillus Calmette-Guérin vaccination reduces the severity and progression of tuberculosis in badgers", Proc. R. Soc. B 22 Jun 2011 vol. 278 no. 1713 1913-1920: rspb.royalsocietypublishing.org/content/278/1713/1913.full.pdf+html

7 Nature Reserves Badger Vaccine Deployment Programme 2011, Gloucestershire Wildlife Trust: http://www.gloucestershirewildlifetrust.co.uk/sites/wt-main.live.drupal.precedenthost.co.uk/files/GWT-Badger-Vaccination-Deployment-Programme-2011_0.pdf

8 http://www.bowgroup.org/files/bowgroup/Badger%20Culling%20Bow%20Group%20Target%20Paper%20-%20Mar%202012.pdf

Conservation of European Wildlife and Natural Habitats (the Bern Convention)[9], which came into place in 1982, to protect European Wildlife and Natural Habitats. They are also protected locally in the Wildlife (NI) Order 1985. Badgers are an important part of NI's natural heritage and the Ulster Wildlife Trust believes we all have a responsibility to ensure that bTB is eradicated from this species of local wild mammal and that government should invest in vaccinations for badgers. Culling is not a long term solution, would be a very costly exercise, would convey a very negative image of farming to the general public, and public opinion would be firmly opposed to a cull.

Much work has been carried out in England to identify if culling of badgers could be part of a long term solution, this included the Randomised Badger Culling Trials (also referred to as the Krebs Trials, 1998-2007.) This work was overseen by an Independent Scientific Group (ISG) which published its final report in 2007.

After years of research involving the culling of approximately 11,000 badgers and a cost to the taxpayer of £50m, the ISG concluded

> *"After careful consideration of all the RBCT and other data presented in this report, including an economic assessment, we conclude that badger culling cannot meaningfully contribute to the future control of cattle TB in Britain."*[10]

This report affirms on this basis that killing badgers could actually increase the spread of bTB in areas around the cull, making matters worse, facts which are accepted in Defra's Nov 2011 impact assessment.[11]

Having considered the available scientific evidence, we believe there will be no winners from continuing to pursue badger culling as an option. To pursue badger culling is not a viable long-term solution - it ignores the main body of scientific evidence relating to culling, which shows that at best it is ineffective, and at worst can exacerbate the problem through perturbation.

Perturbation is used to describe the effect upon the socio-spatial organisation of badger populations, whereby badger groups move into neighbouring setts where culling has taken place, and the immigrant badgers are then exposed to infection and risk further spread of the disease[12] – see figure 1.

Lord Krebs, the architect of the Randomised Badger Culling Trials informed the Bow Group in Feb 2012 that *"Defra has said it wishes its policy for controlling TB in cattle to be science-led. There is a substantial body of scientific evidence that indicates that culling badgers will not be an effective or cost-effective policy. The best informed independent scientific experts agree that culling on a large, long-term, scale will yield modest benefits and that it is likely to make things worse before they get better. It will also make things worse for farmers bordering on the cull areas. Furthermore, it is not a credible national strategy. It is hard to imagine that the policy could be deployed over the whole 38,000km2 of TB affected farmland, which would involve killing perhaps a quarter of the UK badger population, year after year. Instead the focus should be on further improvements to bio-security and vaccination. The long-term aim must be a cattle vaccine with a marker to distinguish vaccinated from the infected cattle."*

9 Convention on the Conservation of European Wildlife and Natural Habitats 1979: http://conventions.coe.int/treaty/en/Treaties/Html/104.htm

10 Bovine TB: The Scientific Evidence, Final Report of the ISG on Cattle TB: http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/report/final_report.pdf

11 Measures to address bovine TB in badgers, Defra 30 Nov 2011, available here: http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/bovine-tbimpact-assessment.pdf

12 Woodroffe, R., Donnelly, C.A., Cox, D.R., Bourne, F.J., Cheeseman, C.L., Delahay, R.J., Gettinby, G., McInerney, J.P. & Morrison, W.I. (2006). Effects of culling on badger (Meles meles) spatial organization: implications for the control of bovine tuberculosis. Journal of Applied Ecology. 43: 1-10.

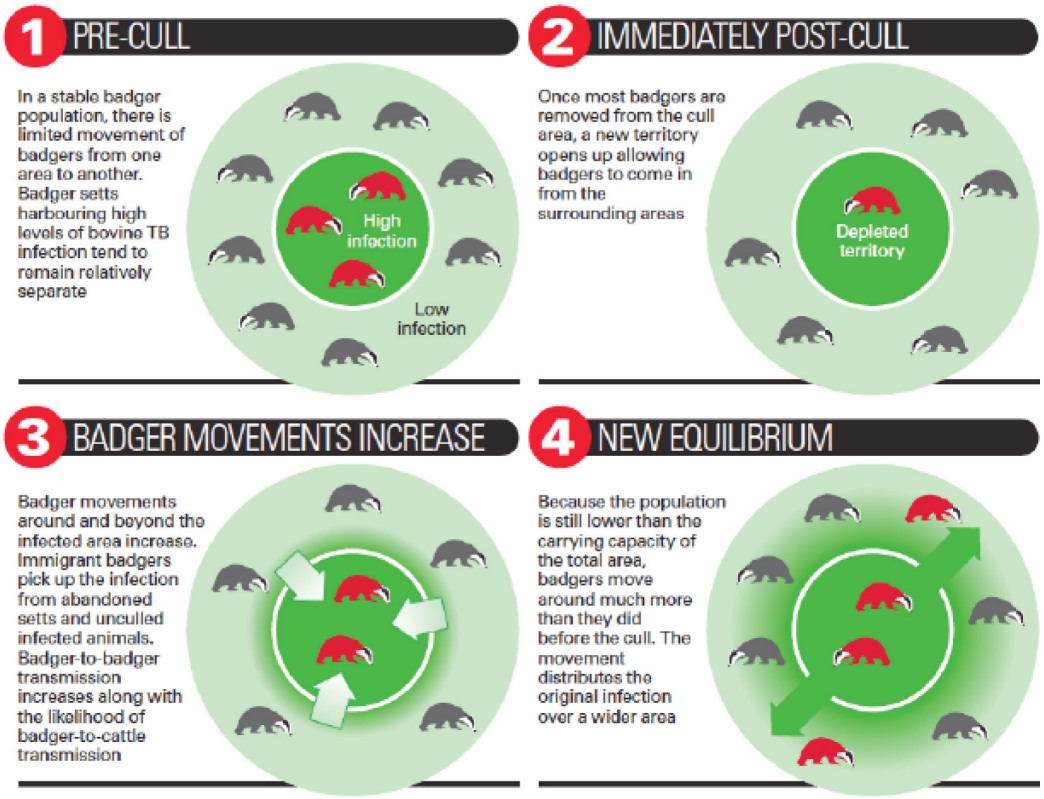


Figure 1: The Perturbation Effect – source The Wildlife Trusts

6.0 Any other issue

We would like the Committee in their review of bTB, to consider the wider impact on the ecosystem of removal of badgers in any area. A study carried out by the Central Science Laboratory (of York) has concluded that removal of badgers from an ecosystem does have a knock-on effect, with a main observation being a significant increase in fox numbers where badgers have been culled, bringing with it a whole new set of problems[13]. Increase in fox numbers in turn has an effect on ground nesting birds and hares, and foxes are often held responsible for predating upon agricultural livestock such as piglets, poultry and lambs.

7.0 Conclusion

The Ulster Wildlife Trust fully supports the aim of eradication of bTB – a disease which has brought significant hardship to many in the farming community and become one of NI's most expensive animal health problems. It is a complex disease, and requires long term commitment from both government and landowners to achieve the ultimate goal of eradication. A stronger preventative approach is needed and a major part of this should be support offered to landowners to improve biosecurity, including guidance and support on badger-cattle separation measures.

We will continue to work with Government, farmers and landowners here to confront this disease, taking a science-based approach.

www.ulsterwildlifetrust.org

13 The ecological consequences of removing badgers from an ecosystem - ZF0531 2007, available here: randd.defra.gov.uk/Document.aspx?Document=ZF0531_6288_FRPdoc

Appendix 4

List of Witnesses

Appendix 4 – List of Witnesses

Mr Joe Campbell	NI Audit Office
Mr Robert Hutcheson	NI Audit Office
Professor Seamus Kennedy	Agri-Food and Biosciences Institute
Dr Stanley McDowell	Agri-Food and Biosciences Institute
Dr Robin Skuce	Agri-Food and Biosciences Institute
Dr Sam Strain	Agri-Food and Biosciences Institute
Mr Colin Hart	Department of Agriculture and Rural Development
Mr Roly Harwood	Department of Agriculture and Rural Development
Mr Ian McKee	Department of Agriculture and Rural Development
Mrs Colette McMaster	Department of Agriculture and Rural Development
Professor Christopher Elliott	Institute of Agri-Food and Landuse
Dr Irene Grant	Queens University Belfast
Dr Neil Reid	Queens University Belfast
Professor Ian Montgomery	Queens University Belfast
Mr Michael Clarke	NI Agricultural Producers' Association
Mr Sean Fitzpatrick	NI Agricultural Producers' Association
Mr Donal McAtamney	NI Agricultural Producers' Association
Mr Wesley Aston	Ulster Farmers' Union
Mr Harry Sinclair	Ulster Farmers' Union
Mr Colin Smith	Ulster Farmers' Union
Mr William Taylor	Farmers' For Action
Mr Sean McAuley	Farmers' For Action
Mr Bert Allison	Vet NI
Mr Kevin Corry	Vet NI
Mr John Johnston	Vet NI
Ms Lindsey Read	Vet NI
Dr Pol Mac Cana	NI Badger Group
Mr Mike Rendle	NI Badger Group
Mr David Wilson	Ulster Society for the Prevention of Cruelty to Animals
Dr Johanna Judge	Food and Environment Research Agency
Mr Patrick Begg	National Trust
Ms Philomena Davidson	National Trust
Ms Heather Thompson	National Trust
Ms Jenifer Fulton	Ulster Wildlife Trust
Mr Joe Furphy	Ulster Wildlife Trust
Mr Conor McKinney	Ulster Wildlife Trust
Mrs Michelle O'Neill	Minister of Agriculture and Rural Development
Mr Bert Houston	Department of Agriculture and Rural Development
Mr Gerry Lavery	Department of Agriculture and Rural Development
Ms Colette McMaster	Department of Agriculture and Rural Development

Appendix 5

Research Papers

Appendix 5 – Research Papers

1. RaISe: Bovine TB – Comparative Models for Compensation and Eradication/Control
2. RaISe: Bovine TB – Biosecurity Measures
3. RaISe: The link between Bovine TB and Badgers – an overview of key research and policy milestones from the Krebs Review/Report to the Environment. Food and Rural Affairs Committee Inquiry
4. RaISe: The 4 areas Badger Cull conducted in Ireland – overview, main findings and comparison with the RBCT
5. RaISe: Comments on DARD Report "TB Testing in N. Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons"
6. RaISe: 'Multiple' claims for Bovine TB compensation – further analysis of DARD data
7. RaISe: Badger policy related to Bovine TB in Wales – key milestones 2008-2012
8. EU Cattle Vaccination Policy

Research and Information Service
Research Paper

10th November 2011 NIAR 459-11

Mark Allen

Bovine TB – comparative models for compensation and eradication/control

This paper provides a comparison of the Bovine Tuberculosis compensation, eradication and control systems currently in operation within Northern Ireland, Ireland, England, Scotland, Wales, Australia, Canada, New Zealand and the United States of America.

Research and Information Service briefings are compiled for the benefit of MLAs and their support staff. Authors are available to discuss the contents of these papers with Members and their staff but cannot advise members of the general public. We do, however, welcome written evidence that relate to our papers and these should be sent to the Research and Information Service, Northern Ireland Assembly, Room 139, Parliament Buildings, Belfast BT4 3XX or e-mailed to RLS@niassembly.gov.uk

Key Points

- Bovine Tuberculosis is caused by the bacterium Mycobacterium bovis which can also affect humans, deer, goats, pigs, dogs and cats, as well as many others mammals including badgers;
- The symptoms of Bovine TB can take months to exhibit in cattle but in the late stages of the disease common symptoms include emaciation, a low–grade fluctuating fever, weakness and lack of appetite. Bovine TB affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability;
- Bovine TB free status is internationally defined and agreed as being in effect when the incidence of TB in herds is below 0.2% for 3 consecutive years;
- It has been DARD's (and its predecessor departments) policy to eradicate the disease within Northern Ireland since 1964;
- There are currently 1.58 million cattle within Northern Ireland spread across 25,930 active herds, with dairy cows/heifers accounting for 21% of the national herd while beef cows/heifers account for 18%;
- Bovine TB herd incidence within Northern Ireland peaked in 2002 when the annual herd incidence was calculated at 10.2%. Individual animal incidence peaked in 2003 when just under1% of animals tested proved positive;
- The 2010 herd incidence rate was 5.12% and the individual animal incidence rate was 0.405% (based on August 2011 figures);
- DARD currently pays compensation for TB reactor cattle at 100% of market value of the animal/animals involved;
- DARD recently undertook a second public consultation on the issue of compensation arrangements for Bovine TB and Brucellosis. The consultation documentation included proposed options for the introduction of a compensation cap;
- On an annual basis DARD submits a Bovine TB monitoring, eradication and control programme to the European Commission as a pre-requisite for EU co-financing. This programme outlines mechanisms dealing with animal testing, slaughter of TB reactors, movement controls, biosecurity, risks from wildlife, vaccination and areas for further research;
- Many EU countries are Bovine TB free (incidence of less than 0.20%) and in those countries where this is not the case such as Spain it was extremely difficult to access recent data in English relating to incidence rates, compensation levels and eradication/ control measures;
- Compensation mechanisms and rates of payment for Bovine TB differ across the countries referred to in this report (Australia, Canada, England, Ireland, New Zealand, Scotland, the USA and Wales);
- Eradication and control provisions for Bovine TB are also varied.

Executive Summary

The eradication of Bovine TB has been a priority for DARD (and its predecessor departments) since 1964. The disease, which is caused by the Mycobacterium bovis affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

Under internationally defined standards, for a country to be defined as Bovine TB free there must be a herd incidence rate of less than 0.2% for 3 consecutive years. Whilst the incidence of Bovine TB within Northern Ireland does appear to be declining the most recently available data points to a herd incidence rate of 5.12%.

At present DARD is currently conducting a second public consultation on the issue of compensation schemes for Bovine TB and Brucellosis. The current compensation scheme operates on a basis that farmers receive 100% of the market value of any TB reactor cattle. The public consultation document contains different proposals for the introduction of a cap in compensation.

With regard to the monitoring, eradication and control of Bovine TB, as part of the requirement for accessing EU co-financing, DARD develops and submits an annual programme setting out a series of specific measures and actions. The most recent plan submitted in April 2011 contains details covering animal testing, slaughter of TB reactors, movement controls, biosecurity, risks from wildlife, vaccination and areas for further research.

Looking at the incidence of Bovine TB within a wider context it is apparent that Northern Ireland has a higher herd incidence rate than many nations, both local and further afield. It is also worth noting that many EU nations have achieved Bovine TB free status.

Compensation rates and payment mechanisms across the UK and wider world are varied. Whilst some schemes (mainly within the UK) are close to that operated within Northern Ireland, it is evident that some other countries operate schemes which utilise different compensation calculation methods and also in some instances require inputs from the industry. Some systems also contain additional features designed to supplement the income of affected farms in the months following herd depopulation.

On the issue of eradication and control it is evident that the approaches taken within different countries also varies widely but also appears to be multi faceted. Whilst there would appear to be some commonality in relation to the issue of testing, there is much greater variation in relation to the approaches taken to movement control for example. Biosecurity measures would also appear to vary in both their scale and focus as do approaches to the reduction of wildlife vector risk from animals such as deer, possums and badgers.

A common thread across many nations appears to be on the need to develop vaccines for either cattle or wildlife vectors as a cost effective means of reducing or eradicating the incidence of Bovine TB, but it is evident that much of this work is at an early stage and as such will require further research and investment.

Contents

1 Context and background

This research paper provides an overview of the scale of Bovine TB within Northern Ireland as well as outlining some of the differing approaches to compensation and eradication/control in other selected countries.

Bovine Tuberculosis is caused by the bacterium Mycobacterium bovis which can also affect humans, deer, goats, pigs, dogs and cats, as well as many others mammals including badgers.

The symptoms of Bovine TB can take months to exhibit in cattle but in the late stages of the disease common symptoms include emaciation, a low–grade fluctuating fever, weakness and lack of appetite. Bovine TB affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

Bovine TB free status is internationally defined and agreed as being in effect when the incidence of TB in herds is below 0.2% for 3 consecutive years[1].

2 Bovine TB within Northern Ireland

2.1 Incidence

It has been DARD's (and its predecessor departments) policy to eradicate the disease within Northern Ireland since 1964.

There are currently 1.58 million cattle within Northern Ireland spread across 25,930 active herds, with dairy cows/heifers accounting for 21% of the national herd while beef cows/heifers account for 18%[2].

Bovine TB is recognised as a scheduled and notifiable disease under the Diseases of Animals (Northern Ireland) Order 1981, and as such farmers are required to inform DARD of any suspected or confirmed cases within their livestock.

As well as a mandatory annual skin test for TB as set out in EU Directive 64/432[3] farmers are encouraged to regularly check their cattle for TB symptoms such as lesions as well as subjecting all herds to an annual test.

As shown in figure 1 below, Bovine TB herd incidence peaked in 2002 when the annual herd incidence was calculated at 10.2%. Individual animal incidence peaked in 2003 when just under1% of animals tested proved positive.

The recent trend for both herd and individual animal incidence appears to be downward but it should be recognised that the figures recorded in 2010 are still higher than those recorded from 1995-1997. **As things currently stand the 2010 herd incidence rate was 5.12% and the individual animal incidence rate was 0.405%**.[4]

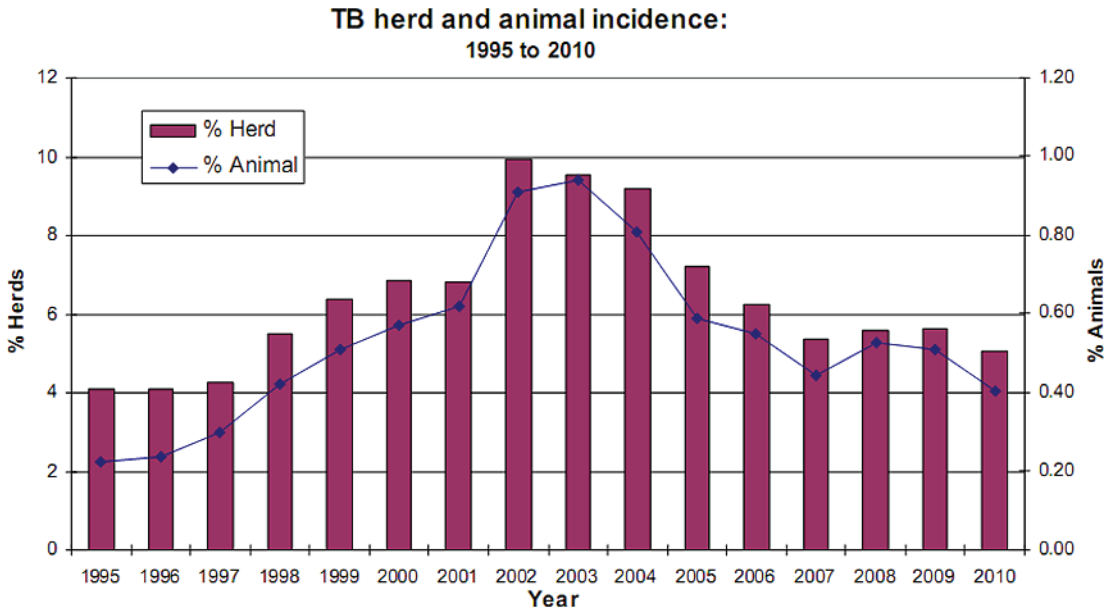
1 Chapter 11.6, Bovine Tuberculosis, Terrestrial Animal Health Code, World Organisation for Animal Health (OIE)

2 TB monitoring, eradication and control programme 2012, DARD, submitted to EC 15th April 2011

3 Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine.

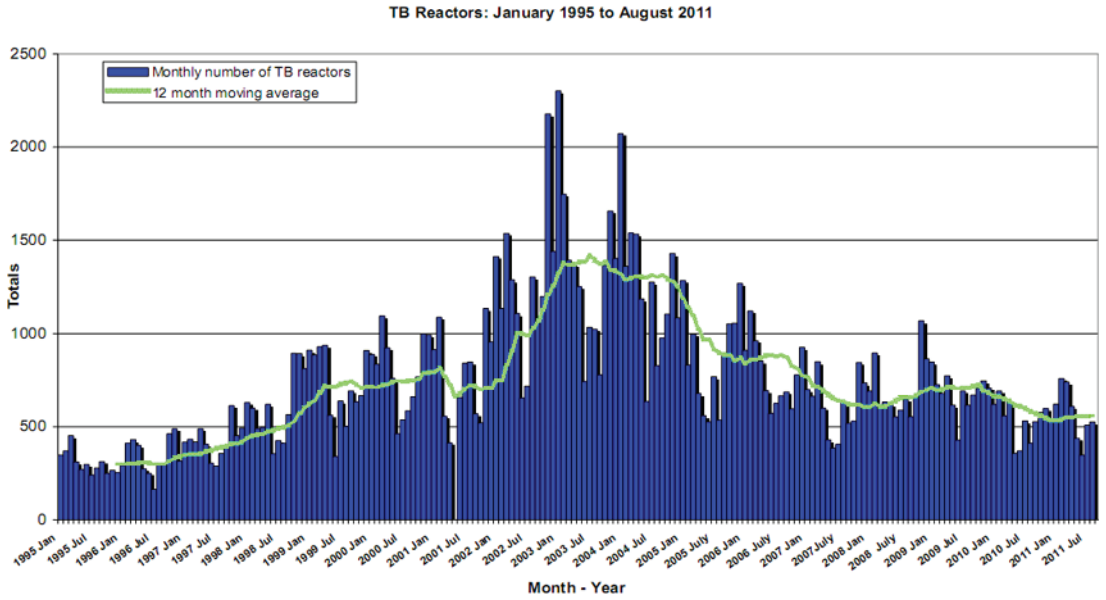
4 Full year data for 2010 derived from Tuberculosis - internet monthly statistics - August 2011, DARD

Figure 1: Bovine TB and animal incidence within Northern Ireland, 1995 - 2010[5].



As shown in figure 2 the most recent quarter for which data is available also witnessed a 2% increase in the number of TB reactors (1,395 TB reactors cf. 1,365 during the same period in 2010[6]) compared to the same quarter in 2010. The number of reactors did peak in 2003 but the fact remains that the current number of reactors is still higher than the figures recorded between 1995 and 1997.

Figure 2: Bovine TB reactors within Northern Ireland, January 1995-August 2011[7]



5 Bovine brucellosis (BR), bovine tuberculosis (TB) and bovine spongiform encephalopathy (BSE), Quarterly Update: April - June 2011, DARD Quarterly Disease Report

6 ibid

7 Tuberculosis - internet monthly statistics - August 2011, DARD

2.2 Compensation provisions

As things currently stand and under the auspices of the Tuberculosis Control Order (Northern Ireland) 1999[8], DARD will pay compensation for animals testing positive for TB at 100% of market value of the animal/animals involved.

According to the Order the market value of an animal means—

(a)in the case of an animal over 30 months old either—.

(i)the price which might reasonably have been obtained for it at the time of valuation from a purchaser in the market if it had been free from disease; or.

(ii)the value of that animal to the owner had it been slaughtered under and in accordance with Commission Regulation (EC) No. 716/96[9] adopting exceptional support measures for the beef market in the United Kingdom(5),

whichever is the higher; or

(b)in the case of an animal 30 months old or under, the price which might reasonably have been obtained for it at the time of valuation from a purchaser in the market if it had been free from disease..

Valuations to determine market value are decided by agreement between an inspector of the Department and the owner of the animal, or failing that are decided by an independent valuer paid by the Department and selected by the owner from a list of at least three such valuers submitted by the Department to the owner.

As a result of Article 11A the Tuberculosis Control (Amendment) Order (Northern Ireland) 2005[10]:

The Department (DARD) or the owner of the animal may submit an appeal to a tribunal of persons, appointed by the Department for the purpose, if dissatisfied with the determination of the market value of any animal –

(a) in the case of an appeal by the Department, under Article 11(6)(b), or

(b) in the case of an appeal by the owner, under Article 11(6)(b), (7) or (11)."

DARD is currently undertaking a second public consultation on the issue of compensation arrangements for Bovine TB and Brucellosis. This consultation period will close on the 2nd December 2011 and contains a number of options for changes to Bovine TB and Brucellosis compensation as follows:

- Introduce separate compensation caps for commercial and pedigree animals based on the NI average market value data (commercial animals) and an uplift of £800 (for pedigree animals);
- Introduce a cap similar to that used in the South of Ireland; and
- Introduce separate caps for commercial and pedigree animals based on the NI average market value data (dairy commercial animals) and an uplift of £300 (for pedigree animals). This is an extension of the existing approach used for brucellosis reactors.

8 Tuberculosis Control Order (Northern Ireland) 1999

9 adopting European Commission Regulation (EC) 716/96 exceptional support measures for the beef market in the United Kingdom

10 Tuberculosis Control (Amendment) Order (Northern Ireland) 2005

2.3 Eradication/Control provisions

As stated previously DARD policy since 1964 has been the eradication of Bovine TB. On an annual basis DARD submits a Bovine TB monitoring, eradication and control programme to the European Commission as a pre-requisite for EU co-financing.

The most recently submitted document for the year 2012 reveals that DARD takes a strategic approach to both the eradication of Bovine TB and the design of the programmes to achieve this objective.

A new management structure is now in place within the department based in 3 key components as follows:

- TB Steering Group – to oversee strategic direction.
- TB Policy Development Group – to develop proposals / manage specific projects.
- TB Programme Delivery Group – to ensure effective delivery of this programme and monitor key performance indicators.

Since 2008, and in line with the views of the then Minister, Michelle Gildernew MLA[11], DARD has continued to pursue a policy focused on the eradication of bovine TB. The approach that continues to this day is essentially 3 stranded:

- control cattle to cattle spread;
- address any wildlife component; and
- create a partnership with the agricultural industry in the delivery of the strategy.

Table 1 below sets out the current Bovine TB monitoring, control and eradication methods employed within Northern Ireland.

Table 1: Current Bovine TB monitoring, control and eradication measures employed in Northern Ireland[12]

Measure	Specific details
Testing	Annual testing of all herds is mandatory TB testing is undertaken only by DARD approved Veterinary Surgeons, using the Single Intradermal Comparative Cervical Test (SICCT) for internal control All animals slaughtered for human consumption undergo Post Mortem Examination (PME). Results are available on the Animal and Public Health Information System (APHIS) immediately All herds in NI at all times are allocated an OT herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). Failure to test a herd on an annual basis results in the OTF status being suspended immediately in all cases. Further delay in testing will result in automatic increased movement sanctions and downgrading the herd status to OTW

11. Gildernew sets course for way ahead in TB fight, DARD press release, 9th December 2008.

12. Derived from DARD Bovine TB programme for monitoring, eradication and control of Bovine TB, submitted to the European Commission, 15th April 2011

Measure	Specific details
Testing *(continued)*	In NI, animals are allowed one skin test with an inconclusive result without compulsory removal. A non-negative result at a second consecutive test results in mandatory removal as a reactor animal. Herdkeepers may be advised to slaughter the animal at any time during this period. Contiguous tests are undertaken in herds that are in close proximity to infected herds, usually neighbouring them
Slaughter of TB reactor animals	Confirmed TB reactors are removed by DARD subcontracted hauliers for immediate slaughter. Slaughter may include full herd depopulation if considered necessary to stop spread of the disease. In the case of total herd depopulations the following action is taken: • No animals are allowed to move into the premises for one month following the depopulation. • A full Cleansing and Disinfection is required after depopulation. • The herdkeeper is advised of the control of risk from slurry. • Two months after re-stocking a TB test is required. If this test occurs within a year of the breakdown it is classed as reactor (RH1) test. If the RH1 is clear the restriction is removed and then a post restriction test (CHT) is set for six months later and an Annual Herd Test set twelve months after the completion of the post–restriction test. If a farm premises is depopulated for more than 12 months then the restriction is removed at 12 months and the test following the purchase of animals is classed as an Annual Herd Test.
Movement controls	All calves born after 1 January 1998 must be identified with an ear tag in each ear within 20 days from the birth of the animal. All cattle identification numbers are authorised by DARD and recorded on the Animal and Public Health Information System (APHIS) computer database so that no duplication should be possible. Movement control from all herds, at all times, is controlled by a combination of the OT herd status and status reason applicable to the herd. As all movements must be recorded on APHIS, including those to market and abattoir, immediate movement control is applied. Since the year 2000 the implementation of movement control documents require a producer to notify the Department within 7 days of an animal either leaving or arriving on his/her farm. Markets are required to notify movements on and off to the Department by the end of the next working day. However, in the case of a restricted animal the producer is required to obtain a movement licence from the Department in advance of moving the animal out of his/her herd. All movements are recorded and can be traced on APHIS Herds with either OTS and OTW status applied are both subject to movement restrictions immediately. This is controlled through APHIS

Measure	Specific details
Movement controls *(continued)*	Where a test becomes overdue, increasingly stringent movement controls are applied routinely as below: • Immediately overdue, no live moves to market, export, or other holdings. • 1 month overdue, no live moves to market, export, other holdings or slaughter. No moves in are allowed except one breeding bull on exceptional licence. All animals over 42 days are subject to the single intradermal test and interpretation within 30 days of export
Biosecurity	A TB Biosecurity Study is currently underway in a TB high incidence area in Co. Down. The Study is designed to compare farm characteristics in both herds that have recently had a TB breakdown and those that have had no recent history of a breakdown in this TB high incidence area. Consideration of selected cattle and wildlife risk factors are key elements of this research. As well as establishing relevant farm business information, a survey of on-farm buildings and a farm boundary survey are being carried out. Radial badger sett survey work on and around the main farm buildings of participating farms is also being undertaken. The findings of the Study should be available by the middle of 2012. The conclusions will inform evidence-based biosecurity advice to be provided to livestock farmers and will inform policy decisions. All herdkeepers are currently sent an advisory booklet on biosecurity measures http://www.dardni.gov.uk/biosecurity_code_booklet_for_northern_ireland_farms.pdf
Wildlife	TB been isolated from deer and badgers in Northern Ireland. A survey carried out in 1995, in which deer of the three species found here were sampled, demonstrated a prevalence of 5.8% (397 deer sampled). A small surveillance exercise carried out in 2009, in which fallow and sika deer were sampled, revealed a prevalence of 2% (146 deer sampled). The low number of deer (less than 3,500 estimated), their restricted range, limited contact with cattle, and the enteric nature of the infection, suggests that their role in the epidemiology of bovine TB is likely to be limited if not entirely insignificant With regard to badgers A Badger Stakeholder Group was formed in 2004 in NI, which was tasked with assessing the available information and considering the potential need for a badger management strategy within NI. Following consideration by the Badger Stakeholder Group of the evidence available from the completion of various extensive trials elsewhere (most notably the Randomised Badger Culling Trial in GB) and the adoption of lethal intervention as a policy to control bovine TB in cattle in another Member State (the Republic of Ireland (ROI)), it was concluded in their report, published February 2008, that no recommendation could be made on the way forward for Northern Ireland without first undertaking work to gather information specific to the Northern Ireland situation. The Badger Stakeholder Group agreed that this should include:- • a survey of the badger population in Northern Ireland to determine the number and distribution of badgers (completed in 2008),

Measure	Specific details
Wildlife *(continued)*	• developing a proposal for a study of the prevalence of bTB infection in badgers (ongoing), • assessing the available evidence in relation to the role of badgers in bovine TB to inform an appropriate course of action in NI, including whether it is appropriate to run a badger culling pilot (ongoing), • considering participation in a vaccination trial, and • undertaking a cost benefit assessment of the future options for any proposed badger management strategy in NI, once the information arising from the above actions is available.
Vaccination	DARD continues to develop collaborative links with work ongoing in England and ROI regarding the development and trialling of vaccines for bovine TB in badgers. Vaccines developed for badgers may be the most feasible solution in the long term administered by either injection or orally. DARD also maintains an interest in ongoing work by Defra on the development of a so called DIVA (Differentiating Infected from Vaccinated Animals) test which would enable the vaccination of cattle, although this would also require a change in EU law (current EU Directive 78/52/EEC- article 13ii prohibits vaccination[13]) to make vaccination with BCG and the use of a DIVA test legal. This development is however some way off at this time.
Research	DARD continues to work in partnership with the NI Agri-Food and Biosciences Institute (AFBI) to establish critical knowledge gaps in relation to TB and to identify and explore further research and development options that would complement and assist current research. DARD has commissioned AFBI and DARD's Veterinary Epidemiology Unit (VEU) to conduct a number of literature reviews which will help identify and fill critical knowledge gaps in relation to bovine TB generally and also to wildlife in particular. The TB literature reviews being carried out by AFBI are: (i) cattle to cattle transmission; (ii) badger to cattle transmission; (iii) cattle bTB tests and effective deployment; and (iv) bTB tests in badgers. In addition, DARD's VEU is currently conducting a literature review on badger vaccines. It is anticipated that these reviews will better inform DARD in relation to future TB R&D projects.

3 Bovine TB Incidence and Approaches to compensation and eradication/control within other selected jurisdictions.

The initial thinking behind this paper had been to compare the Bovine TB situation in Northern Ireland with Ireland, the rest of the UK and other EU nations. An initial scan of the data however revealed that many EU countries are Bovine TB free (incidence of less than 0.20%) and in those countries where this is not the case such as Spain it was extremely difficult to access recent data in English relating to incidence rates, compensation levels and eradication/control measures.

With this caveat in mind the focus for the remainder of this paper is on those nations for which data on incidence rates, compensation levels and eradication/control measures was both up to date and accessible.

3.1 Incidence

Table 2: Bovine TB herd incidence rates - selected countries

Country	Herd incidence %
Australia	Officially Bovine TB free since 2002
Canada	Officially Bovine TB free (State of Manitoba has split status due to some incidence)
England	8.72%[14]
Ireland	4.65% (31/12/2010)[15]
New Zealand	0.13% (30/6/2010)[16]
Scotland	Officially Bovine TB free since 2009 (herd incidence rate of 0.18% in 2010[17])
USA	Officially Bovine TB free with exception of states of California (1 positive herd in 2011 so far[18]), Michigan (4 positive herds in 2010[19]), Montana and New Mexico which are working towards TB free status.
Wales	6.57%[20]
Northern Ireland	5.12%

In compiling the data outlined in table 2 it needs to be recognised that the comparison of herd incidence rates across different jurisdictions needs to be treated with extreme caution, if not avoided all together, given the differing approaches to testing employed (see footnotes relating to England and Wales by way of example) and the impact this can have on incidence rates.

In light of these limitations with herd incidence data DARD epidemiologists are currently finalising work with colleagues from GB and Ireland that should enable a comparative analysis of Bovine TB disease trends over time, and a paper outlining this work is due to be published shortly.

14. Defra do not provide Bovine TB herd incidence statistics and this figure is derived from Detailed TB statistics 1Jan to 31 Dec 2010 by taking the number of Total New TB incidents as a proportion of the Total number of herd tests conducted. One of the problems with this form of incidence calculation, is that it doesn't take into account risk based testing. Herds in higher risk areas are tested on an annual basis, whereas herds in lower risk areas are tested every second, third or fourth year. The problem with this from the incidence point of view, is that as you change the testing policy, you influence the incidence rate. Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra
15. Bovine TB statistics, Department of Agriculture, Fisheries and Food, DAFF website, 19th September 2011
16. Annual Report for the year ending 30th June 2010, Animal Health Board of New Zealand
17. Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra
18. Information about Bovine TB, State of California Department of Food and Agriculture, website, 20th September 2011
19. Bovine TB positive testing herd statistics, State of Michigan Department of Agriculture website
20. Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra. The Welsh figures may well be lower than the English figures as a result of The Welsh Government currently having an annual testing policy for all herds, including the lower risk herds in the north of Wales, which will partially explain why the incidence rate in Wales is lower than in England – in effect the impact of high risk areas is diluted by the tests from low risk areas.

3.2 Compensation provisions

Table 3: Bovine TB compensation arrangements - selected countries

Country	Compensation scheme details
Australia	Despite Bovine TB free status, compensation is payable at 'farm gate value' for positive reactors under the auspices of the Emergency Animal Response Disease Agreement which is an agreement between government and industry on how to manage cost and responsibility for an emergency response to an animal disease outbreak. Under this Agreement Bovine TB is defined as a category 4 disease and as such any compensation paid is split between the government 20% and the industry 80%.[21]
Canada	Under the Compensation for Destroyed Animals Regulations[22] which are part of the Health of Animals Act[23] compensation is payable at market value that the animal would have had at the time of its evaluation if it had not been required to be destroyed. Payments are up to a maximum of $CN 8000 for registered animals and $CN 2,500 for non-registered animals.
England	Compensation for animals slaughtered because of bovine TB is determined primarily through table valuations, based on average market prices for 47 pre-determined cattle categories. Table value rates are updated monthly and published, as compensation information bulletins[24], at the start of each calendar month, on the Defra website. On rare occasions it may be necessary to use individual on-farm valuations to determine compensation. Individual animals are only recognised as "pedigree" when a pedigree certificate has been issued by a recognised breed society by the day of the assessment of the category into which the animal falls
Ireland	On Farm Market Evaluation Scheme main measure employed – removed animals are compensated at market value (equivalent price which might reasonably have been obtained for the animal at the time of determination of compensation) determined by independent valuer to a ceiling of €2,800 per individual animal (inclusive of factory salvage price), except in respect of one pedigree stock bull per breakdown episode with a ceiling of €3,500 (inclusive of factory salvage price)[25]. Currently herdkeepers in the south of Ireland contribute through a production levy (currently €1.27 per animal and €0.0006 per litre of milk) towards the cost of the TB and brucellosis eradication schemes with the remainder being from public funds and the EU Veterinary Fund. The revenue from the producer levies was approximately €5m in 2010.

21. Frequently Asked Questions, Emergency Animal Response Disease Agreement, Animal Health Australia website.
22. Compensation for Destroyed Animals Regulations 2000
23. Health of Animals Act 1999
24. Table showing compensation for Bovine TB, BSE, Brucellosis and Enzootic Bovine Leukosis, September 2011, DEFRA website, 31 August 2011
25. Compensation Arrangements for TB and Brucellosis - Important Information for Farmers Booklet (Revised June 2009), Department of Agriculture, Fisheries and Food website

Country	Compensation scheme details
Ireland *(continued)*	Other measures which could be classified as compensatory are provided in support of herd keepers with infected cattle as follows: • Depopulation grant - An owner/keeper whose herd is depopulated (totally or partially) in the interest of disease control may qualify for a Depopulation Grant, which is designed to compensate farmers for income lost during the rest period up to a maximum of €228.52 per animal; • Income Supplement - payable in cases where disease breakdown results in the removal of more than 10% of animals in a herd and where depopulation is not deemed appropriate. Payment is in respect of each animal removed as a reactor from a herd, subject to a maximum of 100 animals qualifying for payment up to a max of €38.09 per animal; • Hardship Grant - The Hardship Grant eligibility period runs from 1 November to 30 April. This Scheme is designed to alleviate the costs difficulty of some owner/keepers whose holdings are restricted on foot of a herd re test and where animals are retained and fed during periods of restriction. Potentially eligible owner/keepers must meet certain conditions including requirements that they (i) must not have any income from milk sales and (ii) must not have any off farm income. The Grant may provide eligible owner/keepers with a payment of up €250.00 per month for a period not exceeding 4 months within the period 1 November to 30 April of the following year.
New Zealand	Payable at a rate of 65% of the fair market value of each reactor animal, up to the maximum allowable as defined in the Biosecurity (National Bovine Tuberculosis Pest Management Strategy) Order 1998.[26] Owners of Tb Reactor cattle which are eligible for compensation, are not liable for the cost of transporting these animal(s) to slaughter or for slaughter fees.
Scotland	In line with provisions of The Tuberculosis (Scotland) Order 2007[27] compensation is payable at 100% of market value of animals. Valuations of market value can either be agreed between the owner and government, be made by 1 valuer agreed by the owner and government, made by 2 valuers, 1 appointed by government and other by owner, or failing agreement 1 valuer can be appointed by the Institute of Auctioneers and Appraisers in Scotland.
USA	Fair market value (based upon prices achieved at markets) up to $3000 per animal testing positive for Bovine TB, minus any amount received for slaughter, if sent to slaughter. Transportation costs to slaughter are also often paid either in full or partially. Valuations are completed by either APHIS staff, private valuers or by the use of a valuation calculator using a few key parameters.[28] Questions remain over whether the Federal Government has the budget to continue to pay this compensation for all animals testing positive.
Wales	Under Tuberculosis (Wales) Order 2010[29] new system in place to encourage better practice by cattle keepers. Compensation is now calculated using the following formula: Market value of animal (provided by independent assessor) x multiplier based on compliance with TB testing times, adherence to legislation and best practice guidance = level of compensation paid.

26. National Operational Plan: 1 July 2005-30 June 2013, National Bovine Tuberculosis Pest Management Strategy, Animal Health Board, New Zealand.

27. Tuberculosis (Scotland) Order 2007

28. Email from Dr Stephen Ott,, Appraisal-Indemnity-Compensation Specialist, APHIS, USDA.

29. Tuberculosis (Wales) Order 2010

3.3 Eradication/Control provisions

Table 4:Bovine TB eradication and control measures - selected countries

Country	Eradication/Control programme details
Australia	Australia's national eradication campaign (Brucellosis and Tuberculosis Eradication Campaign or BTEC) ran for 27 years from 1970 to 1997, achieving freedom from bovine TB by OIE standards on 31 December 1997. BTEC included the following measures: • TB detection through meat inspection and systematic field testing; • quarantining and repeated testing of infected herds; • movement controls to prevent TB spreading between herds; and • slaughter of animals with high risk of infection and those returning positive tests, with compensation paid to the owners. Starting in 1973, the cattle industry made major contributions to the funding of BTEC through levies. Following eradication of the disease Tuberculosis Freedom Assurance Programmes (TFAP) ran from 1998-2002 (Part1) and from 2003-2006 (Part 2) in order to 'mop up' any residual disease. These programmes included measures such as: • maintenance of a TB case register; • Effective surveillance was achieved via the National Granuloma Submission Program; • providing policy advice, legislation and all infrastructure to support diagnostic and eradication activities; • reviewing and revising surveillance schemes for TB; • using herd surveillance programs where required; • using tail or ear tags to identify cattle to their property of origin; • eradicating infection from infected herds, providing compensation and additional assistance measures for affected producers. At present Australia has its Emergency Animal Disease Response Agreement[30] ('EADRA) which a contractual arrangement that brings together the Commonwealth, state and territory governments and livestock industry groups to collectively and significantly increase Australia's capacity to prepare for, and respond to, emergency animal disease (EAD) incursions. Bovine TB is recognised as a category 4 disease and as such there are surveillance, control, removal and compensation measures contained within this mechanism.

30. EAD Response Agreement, Animal Health Australia website.

Country	Eradication/Control programme details

Canada	Bovine TB is a reportable disease under the Health of Animals Act and Regulations and Canada follows a strict surveillance and eradication program for this disease.
	
	In terms of surveillance routine slaughter granulomas are supplemented by on-farm testing where:
	
	• Sector has insufficient slaughter numbers (farmed cervids (elk and deer))
	
	• Risk of disease from wildlife exists (Riding Mountain – Manitoba – risk from elk and deer)
	
	Under the National Bovine TB Eradication Program, whenever the infection is confirmed in a herd of cattle, farmed bison, or farmed cervids (elk and deer), the CFIA(Canadian Food Inspection Agency) institutes disease eradication measures that include[31]:
	
	• Aggressive stamping out policy applied:
	
	  • Automatic depopulation of all exposed susceptible animals required since 1983 for all infected herds required;
	
	• Province/zone accreditation based on disease findings:
	
	  • All provinces, including split-status province of Manitoba, are classified as TB-free (equivalent to accredited-free under US programme)
	
	• Control movement out of province/zone that loses TB-free status:
	
	• Triggers regulations requiring permit from CFIA – all imported animals from outside Canada must originate from an officially TB free country/ zone/herd; and be tested for TB prior to import with negative results; and be accompanied by an official veterinary health certificate. Animal imports from Mexico are also banned.
	
	In areas of wildlife risk such as Manitoba, Canada also implements bio security measures to reduce the risk to wildlife infecting domestic cattle that include the following measures:
	
	• Ban on any baiting or feeding of elk & deer;
	
	• Require hay to be removed from fields to be eligible for crop insurance;
	
	• Prescribed burns to improve elk habitat; and
	
	• Barrier fencing of hay storage & feeding yards on 95% of farms in proximity to deer and elk habitat.

31. Canada's Bovine Tuberculosis Eradication Program, Powerpoint presentation by Dr.Connie Arguue and Dr.Maria Koller–Jones, Canadian Food Inspection Agency, July 2009.

Country	Eradication/Control programme details
England	Within England the Department for Environment, Food and Rural Affairs has the lead responsibility for the eradication and control of Bovine TB. Recent years have seen a considerable growth in Bovine TB infections in high risk areas such as the South West of England and as a result Defra has publicly stated that it will '..take decades to eradicate the disease' within England. The approach adopted in The Bovine TB Eradication Programme for England[32] published in 2011 has a number of key principles as follows: • Partnership working - recognising the progress and continuing to develop working between government, the industry and veterinary science; • Responsibility and cost-sharing - giving farmers more control and choice, empowering the industry to take greater responsibility for tackling TB; • Working effectively in the EU: ensuring compliance EU legislation, while pushing for a more flexible, risk-based EU legal framework; • Supporting farmers - reducing unnecessary burdens and restrictions on farmers where possible and without compromising disease controls. Also, working with the industry and veterinary profession to provide targeted advice and support to farmers. In terms of practical actions to eradicate Bovine TB within England these could be characterised as being either surveillance or control measures and those that have been in use for a number of years include the following: • A significant expansion of the areas on annual and two-yearly routine testing - routine testing is risk based in England – herds in higher risk areas are testing on an annual basis, whereas herds in lower risk areas are tested every second, third or fourth year. • Enhanced controls on some high risk herds; • Clarifying TB breakdown terminology so farmers better understand disease risk; • Enhanced surveillance for TB at abattoirs; • Extended the use of gamma interferon blood testing to infected herds in two-year routine testing areas; • Reviewed and confirmed the effectiveness of the pre-movement testing policy; and • DNA tagging of TB positive cattle from April 2011 – to prevent fraud.

Country	Eradication/Control programme details
England *(continued)*	The 2011 Eradication Plan also contains the following new proposals: • Revising some of the existing pre-movement testing exemptions; • Reducing compensation payments for reactor animals from herds where TB tests are significantly overdue; • Reviewing options for an enhanced risk-based approach to routine TB surveillance; • Reviewing the procedures for TB infected herds regaining OTF status; • Assessing the feasibility of options for a risk-based trading system; • Developing a more rigorous, risk-based TB compliance and enforcement strategy; and • Continuing to invest in the development of a cattle vaccine and seek to persuade the EU to lift the current ban on TB vaccination of cattle. Defra strategy also recognises the need for steps to reduce the threat of TB infection posed by the badger population and with this in mind work continues in the following ways: • 2010 public consultation on a proposal to enable the issuing of licences under the Protection of Badgers Act 1992 and the Wildlife and Countryside Act 1981 to farmers and/or landowners to cull and/or vaccinate badgers for the purpose of preventing the spread of bovine TB in cattle – government recently completed a second round of consultation before deciding whether or not to proceed with a cull; • invested over £11 million on research into badger vaccines -as a result an injectable BCG badger vaccine is now available for use on prescription, subject to a licence from Natural England; • badger vaccine deployment project - During the first trapping year more than 500 badgers were vaccinated in the 100km2 pilot project area in Gloucestershire; • developing an oral badger vaccine, which, if it can be done, has the potential to make an important contribution to reducing infection levels in badgers, and as a result, badger to cattle transmission.

Country	Eradication/Control programme details
Ireland	A scheme for the eradication of bovine tuberculosis in cattle commenced in Ireland in 1954 with a voluntary scheme for the eradication of bovine tuberculosis in cattle commenced initially in counties Sligo and Clare. The scheme was gradually extended to other areas and intensified from 1958 onwards, and was given a statutory basis Diseases of Animals (Bovine Tuberculosis) Act, 1957 and included measures for the · provision for the identification and declaration of areas in which bovine tuberculosis is to be eradicated; · testing in those areas; · removal and slaughter of reactors; and · provision of compensation to farmers. In April 1988, a new initiative, ERAD, the Eradication of Animal Disease Board, was established by the Irish Government as a specialised agency to implement a vigorous four-year TB eradication programme and implemented the following measures: · pre-movement testing; · a comprehensive testing programme using a more potent tuberculin (30,000 I.U./ml); and · a more severe interpretation than that required by Directive 64/432/EEC, both at individual herd, including full herd depopulation, and at area based level. The period of 1988-1992 also saw the first connections between badgers and Bovine TB and this led to the development of an interim wildlife control strategy where badger capturing and removal took place in areas associated with bovine herd TB breakdowns. From 1992 to the present measures that have been employed to eradicate Bovine TB have included[33]: · an annual round screening test of all herds (farmers pay for routine surveillance tests themselves – government pays in instances of outbreak); · controls on movement of animals; · restriction of holdings; · removal and slaughter of reactors and specific targeted testing including the use of blood tests, with appropriate follow-up testing; · compensation for farmers whose herds are affected by disease; · a focused badger population control where they have been implicated as a probable cause of TB; and · continued work towards the development and introduction of a vaccine to prevent TB in badgers.

33. 2011 TB Control Programme, Department of Agriculture, Fisheries and Food, DAFF website

Country	Eradication/Control programme details
New Zealand	The TB control programme in New Zealand is guided by the National Pest Management Strategy for Bovine TB[34] (NPMS). It is managed by the Animal Health Board under the programme name "TB free New Zealand. Between 2009 and 2010 the programme has witnessed a 25% decrease in Bovine TB incidence. Contact with infected wildlife remains the main source of the disease for domestic cattle and deer herds. While possums are the main carrier of the disease in the wild, ferrets are also a common infection source in some areas. These infected wild animals are known as TB vectors and the areas they inhabit are classified as vector risk areas (VRAs). Control and eradication methods employed to deal with Bovine TB are as follows: • disease control - aiming to control and contain the spread of the disease within cattle and deer herds – primarily achieved through a regular testing programme and associated classification/register of herd status; • movement control - controlling the spread of the disease between herds -AHB has developed Movement Control Areas (MCAs) in which certain movement restrictions apply. Cattle or deer over 90 days old and inside an MCA must have a pre-movement test within 60 days prior to being moved. Stock going direct to slaughter do not need a pre-movement test ; • vector control - aiming to control and contain the wild animal species mostly responsible for spreading the disease to cattle and deer – include surveys of wild animal populations are undertaken to determine the presence and/or extent of infected wildlife, ground and aerial baiting with poison and trapping to remove infected wildlife; New Zealand is also proactively involved in the development of a BCG vaccination for cattle which would afford immunity but not result in a positive skin test for TB in vaccinated cattle[35].

34. National Operational Plan: 1 July 2005-30 June 2013, National Bovine Tuberculosis Pest Management Strategy, Animal Health Board, New Zealand

35. Annual Report for the year ending 30th June 2010, Animal Health Board of New Zealand

Country	Eradication/Control programme details
Scotland	As such no TB eradication plan exists due to TB free status. Control measures are however set out in the Implementation Plan for Officially Tuberculosis Free Status in Scotland[36]. These include legal requirement for cattle over 42 days old that move from 1 or 2 yearly testing parishes into a Scottish herd to have Pre & Post movement tests. The Pre-movement test must occur within 60 days prior to entering a Scottish herd, and the post-movement test between 60-120 days of their arrival. All pre and post movement tests must be arranged and paid for by the herd owner. Other measures are as follows: · With effect from 28 February 2010, a clear TB test prior to movement to Scotland is also required for cattle from all low incidence areas of England and Wales (3 and 4 yearly tested parishes) no more than 60 days before movement and no less than 60 days after any previous test with the following exceptions: · Cattle which can be shown to have spent their whole lives in low incidence areas; · Cattle being sent direct to Scotland for slaughter; · Calves less than 42 days of age. · bTB Isolation units in Scotland which permit Irish imports to be exempt from post import testing will be phased out by the end of December 2010, and importers will be required to meet the cost of post import testing (as for movements from high incidence areas in GB); · The current requirement for pre- and post-movement testing of cattle from 1 and 2 yearly tested parishes in England and Wales to Scotland. · Pre-export tuberculin testing of cattle over 42 days of age. (To be reviewed annually) · Enforcement of compliance through cross checks using existing and new cattle movement reports from BCMS and routine checks by animal health staff. · Abattoir surveillance through meat inspection. · TB is a notifiable disease and suspect cases should be reported · Source and spread tracings of breakdowns. · Gamma interferon testing for all new confirmed breakdowns in Scotland · Routine tuberculin testing will continue during the transitional period with a four yearly default testing frequency period - The proposed future approach is : · Risk analysis to establish criteria for at-risk herds; · Consideration of whole herd tests vs. selected animal tests; · Consideration of ceasing routine testing on islands with low disease risk.

36. the Implementation Plan for Officially Tuberculosis Free Status in Scotland, Scottish Government Website, 22nd September 2011

Country	Eradication/Control programme details
USA	In 2000, a comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis was announced in conjunction with an emergency declaration by the Secretary of Agriculture. A goal of final eradication was set for the end of 2003 but has not been achieved, although 46 states have reached this status.[37] Under the most recent programme States, zones, or regions are classified into five categories based on prevalence of TB in cattle and bison as follows[38]: • Accredited-free - herd prevalence of zero for bovine tuberculosis in cattle and bison; • Modified Accredited Advanced - must have had a bovine tuberculosis prevalence of less than 0.01% of the total number of cattle and bison herds in the State or zone for each of the most recent 2 years; • Modified Accredited - must have had a tuberculosis prevalence of less than 0.1% of the total number of cattle and bison herds in the State or zone for the most recent year ; • Accreditation Preparatory - have a tuberculosis prevalence of less than 0.5% of the total number of cattle and bison herds in the State or zone ; and • Non-Accredited - have an unknown tuberculosis-affected herd prevalence or a tuberculosis herd prevalence of 0.5% or greater. The state status determines the interstate and intrastate TB testing requirements for cattle. The classification system ensures that the state meets the requirements necessary for obtaining national eradication of bovine TB.
	In terms of eradication and control measures the approach adopted within the USA is characterised as being based upon detection and removal. Detection of the disease is achieved by: • Live Animal Surveillance - herds are subjected to skin tests; and • Routine Slaughter Surveillance - cattle slaughtered at state and federally inspected slaughter plants are inspected for granuloma lesions. Suspect lesions undergo laboratory diagnostics to confirm presence of M. bovis.

37. the Implementation Plan for Officially Tuberculosis Free Status in Scotland, Scottish Government Website, 22nd September 2011

38. Bovine Tuberculosis Eradication, Uniform Methods and Rules, Effective January 1, 2005, United States Department of Agriculture

Country	Eradication/Control programme details
USA *(continued)*	In instances of detection the following steps are followed[39]: • a herd is confirmed as infected by laboratory testing, • the herd is classified as an affected herd and placed under quarantine and TB tested to determine the presence or absence of other infected animals. • epidemiological tracing of cattle movement into and from the affected herd is performed and additional contact herd testing is conducted. • owners of affected herds may either depopulate the affected herd or engage in a test and removal plan. • In a test and removal plan cattle are repeatedly tested. Infected and suspect cattle at each test are removed to slaughter until the remaining herd tests negative for the disease. This process will take 4-7 years to attain a required series of negative herd tests. Following on from an October 2009 APHIS published entitled "A New Approach for Managing Bovine Tuberculosis" the following moves were instigated in 2010[40]: • New Policy for Management of TB-Affected Herds - Historically, Federal funding was used to depopulate entire TB-affected herds and indemnify herd owners as the primary management option. Rather than recommending whole-herd depopulation, APHIS now tailors its approach to a particular herd. In simple terms this means that a test and remove approach can now be employed in circumstances where data supports it; • Joint TB and Brucellosis Regulatory Working Group - In September 2010 APHIS formed a working group of Federal, State, and tribal subject matter experts to discuss new directions for the bovine tuberculosis (TB) and brucellosis eradication programs. Development of the proposed TB and brucellosis regulation was expected to take approximately 2 years and work is ongoing on this front; • TB Serum Bank - he serum bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results for samples from infected animals. The serum bank samples will be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the United States Animal Health Association; • Collaborations with Mexico – APHIS continues to work with Mexico animal health authorities to help advance the country's TB eradication program and to significantly reduce the risk of importing TB-infected and -exposed animals into the United States.

39. Bovine Tuberculosis, Information for Livestock Producers, Animal Health and Food Safety Services, Animal Health Branch, California Department of Food and Agriculture, 2011

40. Chapter 3 – Animal Disease Surveillance and Management, 2010 United States Animal Health Report , United States Department of Agriculture

Country	Eradication/Control programme details
Wales	The Welsh Assembly Government developed a TB Eradication Programme for Wales in 2008 which was overseen by the TB Eradication Programme Board, a Technical Advisory Group and the Welfare Strategy Steering Committee. The Programme had the following objectives: • keeping infection out of clean farms and clean areas by raising standards of biosecurity; • rapid, early identification of infection; • containment of infection through immediate imposition of movement restrictions once disease is suspected and actively tracing potentially infected cattle; • elimination and eradication of infection from infected herds and • infected areas Key elements of this programme included: • TB Health Check Wales – every cattle herd in Wales tested to establish a baseline for the disease; • Biosecurity measures – including improved animal husbandry; • Pre movement testing and new testing measures; • Compensation scheme; • Culling of badgers within an Intensive Action Pilot Area (IAA); • Development of badger and cattle vaccines. 2008 also saw the creation of 3 Regional Eradication Delivery Boards in Wales, covering North Wales, Carmarthen and Cardiff. These Regional Boards are tasked with controlling and eradicating Bovine TB taking account of what works best within their region[41]. Since 2010 the eradication of TB in Wales has been an integral part of the UK TB Eradication Plan as set out previously in this table relating to England. It is also worth noting that since January 2010 all herds of cattle in Wales are annually tested for TB.
	The Badger (Control Area) (Wales) Order 2011[42] provided the legislative means for a badger cull within Wales as well as establishing a control area (IAA) mainly covering Pembrokeshire and small parts of Carmarthenshire and Ceredigion. As of today however no badger cull has been instigated within this control area. On 21 June 2011, Welsh Minister for Environment and Sustainable Development John Griffiths announced that there will be a review of the scientific evidence base regarding the eradication of bovine TB in Wales. These experts will peer review the scientific evidence base for the comprehensive programme for the eradication of bovine TB in Wales. The panel will be chaired by an independent expert with the other members being relevant recognised experts. It is expected that the report will be delivered in November 2011.

41. Regional Eradication Delivery Boards page, Welsh Government Website, 14th October 2011

42. The Badger (Control Area) (Wales) Order 2011

Northern Ireland Assembly

Research and Information Service
Briefing Paper

Paper 000/00 26 April 2012 NIAR 279-12

Mark Allen and Bronagh Gillen

Bovine TB - Biosecurity measures

1 Background and context

The eradication of Bovine TB has been a priority for DARD (and its predecessor departments) since 1964. The disease, which is caused by the Mycobacterium bovis affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

Based upon worldwide experience, it is generally accepted that the control and ultimate eradication of Bovine TB is dependent upon the development, delivery and adherence to a range of measures that either reduce or eliminate the risk of exposure to the disease.

This briefing paper is in response to a request from the Committee for Agriculture and Rural Development for information on biosecurity measures developed across the world to tackle Bovine TB. The paper draws upon a previous research paper on Bovine TB – comparative models for compensation and eradication/control (NIAR 245-22).

In producing this paper it is important to realise that there is no commonly used definition of either biosecurity or what can be constituted as a biosecurity measure. The United Nations Food and Agriculture Organization(FAO) promulgated a definition for biosecurity as follows,

> *'Biosecurity is a strategic and integrated approach that encompasses the policy and regulatory frameworks (including instruments and activities) that analyse and manage risks in the sectors of food safety, animal life and health, and plant life and health, including associated environmental risk. Biosecurity covers the introduction of plant pests, animal pests and diseases, and zoonoses, the introduction and release of genetically modified organisms (GMOs) and their products, and the introduction and management of invasive alien species and genotypes. Biosecurity is a holistic concept of direct relevance to the*

sustainability of agriculture, food safety, and the protection of the environment, including biodiversity[1].'

In promoting this definition the FAO acknowledged that biosecurity was still an emerging and evolving term that had varying usage among countries.

The data contained within table 1 is presented in this context and as a result should be viewed as an indicative rather than definitive view of biosecurity measures employed to control and eradicate Bovine TB in the identified countries.

2 A comparison of Bovine TB biosecurity measures

Country	Biosecurity measures
Australia	The Department of Agriculture, Fisheries and Forestry publish biosecurity advice including cleansing guidelines, managing the movement of farm visitors, quarantining new animals and the maintenance of records.[2] Past and current measures include: • Quarantining and repeated testing of infected herds; • Movement controls in place; • Reviewing & revising herd surveillance schemes; • Utilising herd surveillance programs.
Canada	• Control of movement out of province's that lose TB-free status; • All imported animals must originate from a TB free country/zone/herd and be tested for TB prior to import and be accompanied by an official veterinary health certificate; • Animal imports from Mexico are banned; • Ban on baiting or feeding elk & deer; • Hay to be removed from fields to be eligible for crop insurance; • Prescribed burns to improve elk habitat; • Barrier fencing of hay storage & feeding yards on 95% of farms in proximity to deer and elf habitat.
England	Biosecurity and husbandry advice is published is by DEFRA. It includes guidance on good ventilation in cattle housing, not overstocking cattle, following guidelines on cleansing and disinfecting and providing cattle with a balanced diet.[3] Other measures include: • Pre-movement testing policy in place; • Expansion of routine testing; • Investing in development of a cattle vaccine & lobby the EU to lift current ban on TB vaccination of cattle; • Consultation on a badger cull to prevent the spread of the disease – progressed to proposals to conduct trail cull – decision now subject to judicial review; • BCG badger vaccine available – Gloucestershire Wildlife Trust pilot; • Work on development of an oral badger vaccine;

1 Committee on Agriculture, United Nations Food and Agriculture Organization, Seventeenth Session, Biosecurity in Food and Agriculture , Rome 31 March-4 April 2003

Country	Biosecurity measures
Ireland	• Annual routine screening test of all herds – paid for by farmer; • Pre-movement testing; • Controls on movement of animals; • Restriction of holdings; • Focused badger population control where they have been implicated as a cause of TB; • On-going development & introduction of a vaccine to prevent TB in badgers.
New Zealand	• Regular testing programme and associated classification/register of herd status; • Movement Control Areas developed. Cattle or deer over 90 days old and inside a MCA must have a pre-movement test within 60 days prior to being moved outside the MCA; • Control of wild animal species through surveys of populations, ground and aerial baiting with poison and trapping to remove infected wildlife;
Northern Ireland	• Annual testing of all herds is mandatory • A full Cleansing and Disinfection is required after any herd depopulation; • Movement control for all herds, at all times, is controlled by a combination of the OT herd status and status reason applicable to the herd. As all movements must be recorded on APHIS, including those to market and abattoir, immediate movement control is applied; • A TB Biosecurity Study is currently underway in a TB high incidence area in Co. Down. The Study is designed to compare farm characteristics in both herds that have recently had a TB breakdown and those that have had no recent history of a breakdown in this TB high incidence area – final report due Summer 2012 • All herdkeepers are currently sent an advisory booklet on biosecurity measures3
Scotland	The Scottish Government has published advice on biosecurity practices for animal health. This includes guidance on separation and isolation, hygiene and slurry management.[4] Other measures include: • Legal requirement for cattle over 42 days old that move from 1 or 2 yearly testing parishes into a Scottish herd to have Pre & Post movement tests. The Pre-movement test must occur within 60 days prior to entering a Scottish herd and the post-movement test between 60-120 days of their arrival. All pre and post movement tests must be arranged and paid for by the herd owner; • Farmers importing cattle from Northern Ireland to carry out post-movement testing at their own expense, as is already the case for cattle coming to Scotland from high incidence bTB areas of England and Wales; • Testing prior to movement for cattle from low incidence areas in England and Wales; • Importers pay for pre-import testing; • Pre-export tuberculin testing of cattle over 42 days of age.
USA	• Approach adopted in USA is characterised as being based on detection and removal; • Live herds subject to skin tests; • Collaboration with Mexico to advance the country's eradication program thus helping to reduce the risk to imports to the USA.

Country	Biosecurity measures
Wales	The Welsh Government has published advice on biosecurity measures including maintaining fences, good hygiene and pest control programmes.[5] Past and current measures include: • TB Health Check Wales 2008 – every cattle herd tested to establish a baseline; • Improved animal husbandry; • All herds of cattle are tested annually for TB; • Regional TB Eradication Boards - development of local biosecurity plans; • Government published literature for farmers advising how they can improve biosecurity measures; • Pre-movement testing; • Proposed culling of badgers within pilot Intensive Action Area (IAA) – proposal abandoned in favour of a badger vaccination programme in 2011 but still within IAAs • Cattles farmers within IAA have the option of veterinary assistance in assessing biosecurity measures; • Development of badger and cattle vaccines.

Table 1: Selected biosecurity measures employed or proposed in selected countries

Endnotes

1 Australian Government, Department of Agriculture, Fisheries and Forestry, Animal Biosecurity. Available at: http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity/animal_biosecurity Australian Government, Department of Agriculture, Fisheries and Forestry, Animal Biosecurity. Available at: http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity/animal_biosecurity

2 DEFRA, Biosecurity and husbandry. Available at: http://www.defra.gov.uk/animal-diseases/a-z/bovine-tb/animal-keepers/biosecurity/

3 DARD, Biosecurity code booklet http://www.dardni.gov.uk/biosecurity_code_booklet_for_northern_ireland_farms.pdf

4 The Scottish Government, Biosecurity Practices for Animal Health. Available at: http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/animal-welfare/Diseases/15721

5 Welsh Government, Biosecurity. Available at: http://wales.gov.uk/topics/environmentcountryside/ahw/biosecurity/?lang=en

Research and Information Service
Briefing Paper

Paper 000/00 27th April 2012 NIAR 278-12

Mark Allen

The link between Bovine TB and Badgers – an overview of key research and policy milestones from the Krebs Review/Report to the Environment, Food and Rural Affairs Committee Inquiry

1 Background and context

Bovine Tuberculosis, which is caused by the Mycobacterium bovis (M bovis) affects the health and welfare of cattle, lowers productivity and fertility and consequently impacts on herd keepers' profitability.

As things currently stand, within the UK, only Scotland has achieved officially Bovine TB free status (herd incidence of less than 0.20%) and recent data would suggest that Bovine TB incidence in England, Wales and Northern Ireland has actually increased, rather than decreased (see table 1). Ireland has also yet to reach the standard for Official Bovine TB status but has reduced the disease incidence.

Table 1: Bovine TB Herd Incidence statistics - UK and Ireland

Country	Herd incidence % in 2010	Latest annual herd incidence %
England	8.72%1	10.73% (situation on 2/11/11)2
Ireland	4.65% (31/12/2010)3	4.18% (31/12/2011) 4
Scotland	Officially Bovine TB free since 2009 (herd incidence rate of 0.18% in 20105)	Officially Bovine TB free since 2009 (herd incidence rate of 1.52% in 20116)
Wales	6.57%7	6.47%(1Jan to 31st Aug 2011) 8
Northern Ireland	5.12%	6.01%9 (31/12/11)

1 Defra do not provide Bovine TB herd incidence statistics and this figure is derived from Detailed TB statistics 1Jan to 31 Dec 2010 by taking the number of Total New TB incidents as a proportion of the Total number of herd tests conducted. One of the problems with this form of incidence calculation, is that it doesn't take into account risk based testing. Herds in higher risk areas are tested on an annual basis, whereas herds in lower risk areas are tested every second, third or fourth year. The problem with this from the incidence point of view, is that as you change the testing policy, you influence the incidence rate. Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra

2 2011 Provisional annual projections for England – extrapolated from data from the first six months of the year ,UK (GB) Bovine TB Eradication Plan 2012, Defra, 14th September 2011.

3 Bovine TB statistics, Department of Agriculture, Fisheries and Food, DAFF website, 19th September 2011

4 Bovine TB statistics, Department of Agriculture, Fisheries and Food, DAFF website, 5th March 2011

5 Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra

6 Derived from Defra data - Detailed TB statistics, GB by region, 1st January to 31st August 2011, Defra

7 Derived from Defra data Detailed TB Statistics, GB by region, 1 Jan to 31 Dec 2010, Defra. The Welsh figures may well be lower than the English figures as a result of The Welsh Government currently having an annual testing policy for all herds, including the lower risk herds in the north of Wales, which will partially explain why the incidence rate in Wales is lower than in England – in effect the impact of high risk areas is diluted by the tests from low risk areas.

8 Derived from Defra data - Detailed TB statistics, GB by region, 1st January to 31st August 2011, Defra

9 Bovine TB statistics - Cumulative herd incidence in year (%), December 2011, DARD

It is within this context that the role of the wild badger population in the potential spread and control of Bovine TB continues to attract much attention and controversy. What is an established fact is that the wild badger population is a reservoir for TB but what is less clear is how the interaction between cattle and badgers contributes to the incidence of the disease in both species of animal.

This briefing paper provides an overview of the main efforts carried out under the instigation of successive UK governments to both better understand the relationship between TB incidence in cattle and badgers as well as associated work that has been taken to control and eradicate the disease. Figure 1 sets these interventions within a timeline ranging from 1996 to 2008.

It should however be stressed that the majority of this work is focussed on GB and more particularly England and Wales, given Scotland's officially Bovine TB free status which

has resulted in little if any work focussed on the research relating to badgers and the transmission of bovine TB[1].

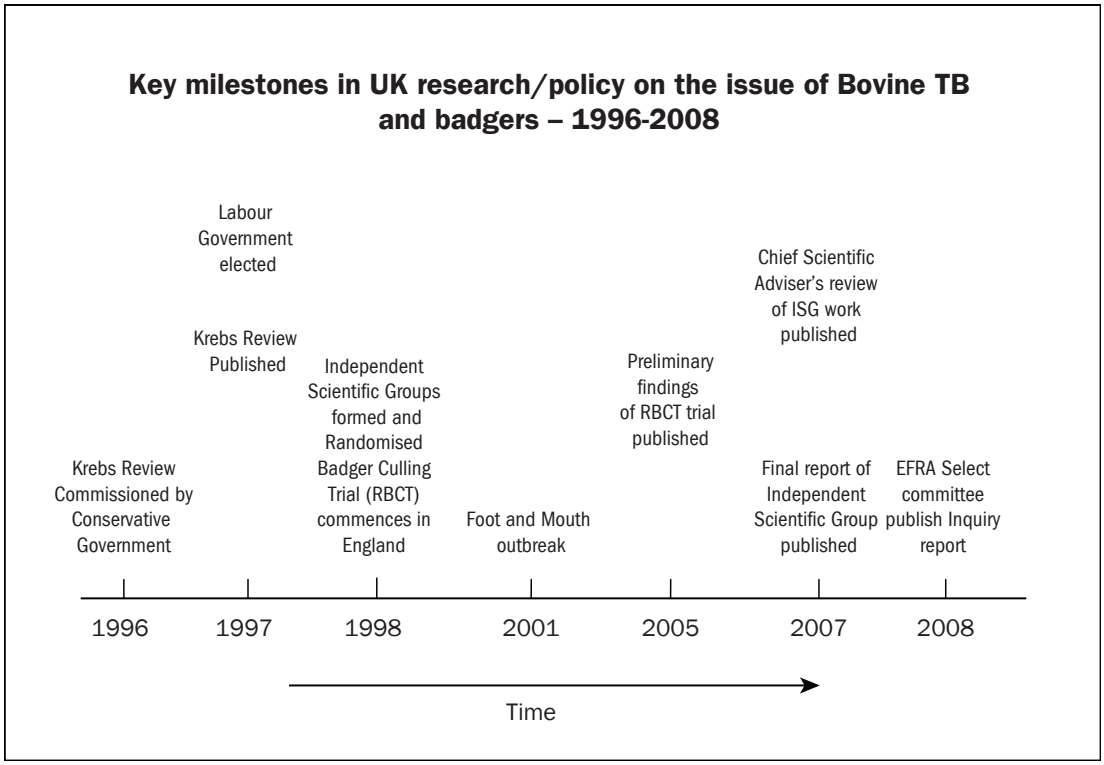


Figure 1: Key milestones in UK research/policy on the issue of Bovine TB and badgers – 1996-2008

2 The Krebs Review/Report

The work that led to the publication of the so called Krebs Review/Report was instigated by the then Conservative Government in 1996 with the actual terms of reference given to Professor Krebs and the Independent Scientific Review Group being as follows:

> *'To review the incidence of tuberculosis in cattle and badgers and assess the scientific evidence for links between them; to take account of EU policies on reducing and eliminating the incidence of tuberculosis in cattle; to take account of any risk to the human population; and accordingly to review, in light of the scientific evidence, present Government policy on badgers and tuberculosis and to make recommendations'.*

In seeking to meet these terms of reference, Professor John Krebs and the other members of the Independent Scientific Review Group considered a range of existing scientific evidence from different sources.

Focussing on the specific issue of the evidence for a link between TB in cattle and badgers the Krebs review gathered and considered scientific evidence under particular themes as set out in the finalised Krebs Review/Report which was published in 1997[2].

1 Scottish Parliament Question S3W-23642: Liam McArthur, Orkney, Scottish Liberal Democrats, Date Lodged: 07/05/2009 and answer from Richard Lochhead (21/05/2009):

2 Krebs J Professor, Independent Scientific Review Group, Bovine Tuberculosis in Cattle and Badgers, 1997

2.1 Krebs Review/Report Conclusions

On the basis of the available scientific data the Krebs Review/Report made conclusions that included:

Table 2 : Key Krebs Review/Report conclusions

Theme	Conclusions
Background	· Bovine TB is not a uniquely British problem and as such it is important to learn from experience in other countries; · Bovine TB has severe economic implications for affected farms · The money spent on Bovine TB research is small given the economic cost of the disease and the uncertainties surrounding many key issues; · The relatively small amount of research currently contracted out does not reflect that best use is being made of available expertise; · Badgers are not an endangered species and the badger protection legislation confers on badgers a degree of protection which is beyond that necessary to preserve their current distribution.
Evidence for the transmission of M bovis from badgers to cattle	· Several wildlife species are infected with M bovis with notable examples being moles, foxes, mink, rats, wild deer (red, roe fallow and sika) and ferrets. This work also established that prevalence was higher in badgers when compared to these other sample species, although it was recognised that the sample suffered from unquantifiable biases; · Available evidence also suggested that only animals that actively shed bacteria are infectious. On this basis evidence established that bacteria shedding lesions associated with M bovis were only to be found in ferrets, deer and badgers; · There is strong circumstantial evidence to suggest that badgers represent a significant source of M bovis in cattle; · The causal link between M bovis infection in badgers and cattle herd infections has not been proven due to the lack of controlled, randomised experiments carried out to date, and the fact that sampling for isolates is too infrequent and does not cover other wildlife species;
TB in badgers	· Badger density appears to have increased in parts of Britain over the last 10 years (1987-1987); · Badger removal operations are not a threat to overall badger numbers with badgers killed on the roads exceeding the number removed · Transmission of M bovis from badgers to cattle would be most likely to occur when infected badgers deposit sputum, urine, faeces or pus containing bacteria into the environment which they share with cattle; · TB infection can be highly localised within infected badger populations and transmission seems to occur more frequently within, rather than between social groups; · Badgers prefer to forage on short grass pasture, where cattle are also less likely to avoid grass contaminated by badger urine and faeces
Spatial and temporal trends in M bovis infection in cattle and badgers	· A survey of road traffic accident badgers offers the best available source of information in the underlying prevalence of TB in badgers; · Monitoring M bovis strains over time in cattle, badgers and other wildlife should, in principle provide conclusive evidence on whether and to what extent badger to cattle transmission takes place; · The present MAFF protocol for attribution of the cause of herd breakdowns is not sufficiently vigorous.

Theme	Conclusions
Control Strategies	· There is some evidence to suggest that the gassing and clean ring strategies were more effective than the interim strategy in reducing the prevalence of TB in badgers and hence also, theoretically reducing the risk of herd breakdowns; · TB prevalence in MAFF taken badgers culled as part of removal operations has been high, and higher than road traffic accident badgers tested over the same period; · Fertility control is likely to be less effective than culling as a strategy to reduce TB in badger populations and hence any transmission to cattle; · Quantitative data in recolonisation time is scant; · Trapping may not always be the most efficient method of removal of badgers – the efficacy, cost and welfare implications of alternative methods, including stop-snaring should be further considered · If badgers are the cause of a substantial number of breakdowns, husbandry could make an important contribution to tackling the problem.
TB diagnosis and vaccines	· Development of a cattle vaccine currently appears more viable than a badger vaccine, but is premised on the fact that any cattle vaccination programme would require a diagnostic test capable of differentiating between infected, including cattle infected following vaccination, and vaccinated animals; · Small scale badger removals may not substantially reduce contact between cattle and infected badgers because partial removal of social groups causes disruptions in territorial and dispersal behaviour and this may actually increase the risk of transmission to cattle;

2.2 Krebs Review/Report Recommendations

Drawing on their findings the Krebs team also made recommendations that included:

Table 3: Key Krebs Review/Report recommendations

Theme	Recommendations
The link with badgers and other wildlife	· The attribution of the cause of cattle herd breakdowns should be made more transparent and all breakdowns should be classified according to the presence of absence of badgers in the area. Information on whether or not infection has been detected (including the severity of any infection) in any badgers present should also be recorded where this information is available; · The risk to cattle from wildlife, other than badgers, should be assessed in areas of high herd breakdown risk taking account of the key factors of prevalence of the disease, severity of the disease and its effect on infectivity, abundance of the species and the extent of contact with cattle including the movement range of the wildlife;
Field studies of badgers	Future research on badgers should include 3 priorities: (i) extensive surveys that will contribute to analyses of how variation between local areas in the risk of herd breakdown is connected with badger presence or absence and variations in the prevalence and severity of the disease in badgers; (ii) using molecular epidemiology to understand more about the badger to cattle transmission dynamics within intensively studied areas; (iii) estimation of recolonisation times at sites subject to the proactive and reactive culling strategies;

Theme	Recommendations
Epidemiology of the disease in badgers and in cattle	· A limited reintroduction of the road traffic accident survey targeting within areas with high or increasing herd breakdown rates and nearby areas with low breakdown rates. Data gathered in this way on the prevalence and severity of the disease will allow a more rigorous analysis of the link between herd breakdowns and the prevalence of TB in badgers over time and space; · An analysis should be carried out to determine the correlates of local variation in risk. Relevant data will include presence/absence of badgers, prevalence and severity of TB in badgers, husbandry, climate and landscape variables;
Molecular typing of the infective agent	· Extending the use of molecular fingerprinting tools to analyse the spatial and temporal dynamics of the disease in badgers and other wildlife as well as cattle. This should be a carefully designed, intensive study over restricted areas. The optimal procedure would involve a combination of two or more methods of molecular typing;
Modelling	· The use of mathematical modelling should be extended due to its value in better understanding the epidemiology and control of M bovis in badgers
Badger management and control strategies	· The development of a randomised block experiment of three strategies: a reactive culling strategy; a proactive culling strategy and a no culling strategy that should be initiated by Spring 1998 and which should have the ownership and participation of farmers at an operational level; · Further research should be done on recolonisation times in areas subject to reactive and proactive culling strategies; · No badger culling should be carried out outside the proposed experimental hot spot areas; · An independent Expert Group including statisticians and mathematical epidemiologists should be established to oversee the detailed experimental design, including the final determination of the areas to be included in the experiment; · The possibility of testing various proactive husbandry strategies should be explored with the farming industry to determine how effective these might be in reducing risk;
Diagnostic tests	· Work on the development of improved TB tests for badgers should be pursued in the context of the vaccination programme, but this should have a lower priority than development of the vaccine related diagnostic test for cattle;

Theme	Recommendations
Vaccines	• The best prospect for control of TB in the British Cattle herd is to develop a cattle vaccine and this should be a high priority whilst acknowledging that this a long term policy and success cannot be guaranteed; • Vaccine development work should be co-ordinated with comparable programmes for human TB and that MAFF should give further consideration to how this might most effectively be achieved; • Progress on the development of a cattle TB vaccine should be formally reviewed after 5 years; • As use of a TB cattle vaccine is prohibited by current EU legislation due to the fact that it would compromise the tuberculin skin test. In this context the development of a specific diagnostic test that can detect and differentiate between infected animals, including those that have become infected even after vaccination, vaccinated animals and this should be developed alongside work on a vaccine; • The option of a badger vaccine, using information gained in cattle work, should be retained as a fall back option if the cattle vaccine requirements cannot be met;
Biological control	• Further consideration should be given to developing techniques for reducing TB infection in badgers through biological control, for example using bacteriophages (virus that infects and destroys bacteria) to destroy M bovis in the environment;
Data availability	• Should be a clear commitment by government to ensure that TB data is made readily available to researchers at the earliest opportunity;
Research	• MAFF should ensure in future that research is commissioned from those with the best expertise from throughout the UK research community and MAFF should also look at partnerships with industry, universities and other funding agencies to develop a more co-ordinated approach; • Government should review the amount spent on research in absolute terms and consider whether the allocation of resources between research and control costs is correct and the extent to which it would be reasonable for the main beneficiaries (farmers) to contribute to the control costs from which they benefit directly

3 The UK Randomised Badger Culling Trial (RBCT)

3.1 Background and methodology

The Randomised Badger Culling Trial (RBCT) , also commonly referred to as the Krebs Trial, was instigated to determine the impacts of different types of badger culling on the incidence of Bovine TB within the UK, but all of the trial areas where located within England.

The motivation for the RBCT can be found within the recommendations of the previously discussed Krebs Review/Report. The specific recommendation that led to this course of action called for *'…a randomised block experiment of three strategies: a reactive culling strategy, a proactive culling strategy and a no culling strategy*[3]*.'*

In making this recommendation the Krebs Review/Report team were seeking to meet the need to establish whether badger culling could be effective in the control of Bovine TB.

3 Krebs J Professor, Independent Scientific Review Group, Bovine Tuberculosis in Cattle and Badgers, 1997, page 128.

In light of this and other recommendations, in 1998 the Labour Government also decided to establish an Independent Scientific Group (ISG) on Cattle TB. The ISG designed and oversaw the implementation of the RBCT but also undertook a range of other work, which is often overlooked, dealing with issues such as Bovine TB diagnosis, pathogenesis (manner of development of a disease) and the control of TB in cattle and badgers.

On the specifics of the RBCT, the ISG decided to conduct the cull within 30 high risk areas for cattle TB within England. Each of the 30 pilot areas measured approximately 100km^2, and these 30 areas were grouped into 10 sets of 3, each called a triplet which were further divided as follows (see figure 2 also):

- 1 area was subjected to approximately annual culling across all accessible land (proactive culling);
- 1 area exercised a local cull of badgers on or near where recent outbreaks of TB had occurred in cattle (reactive culling); and
- 1 area received no culling (survey only) and effectively acted as a control against which comparison could be made.

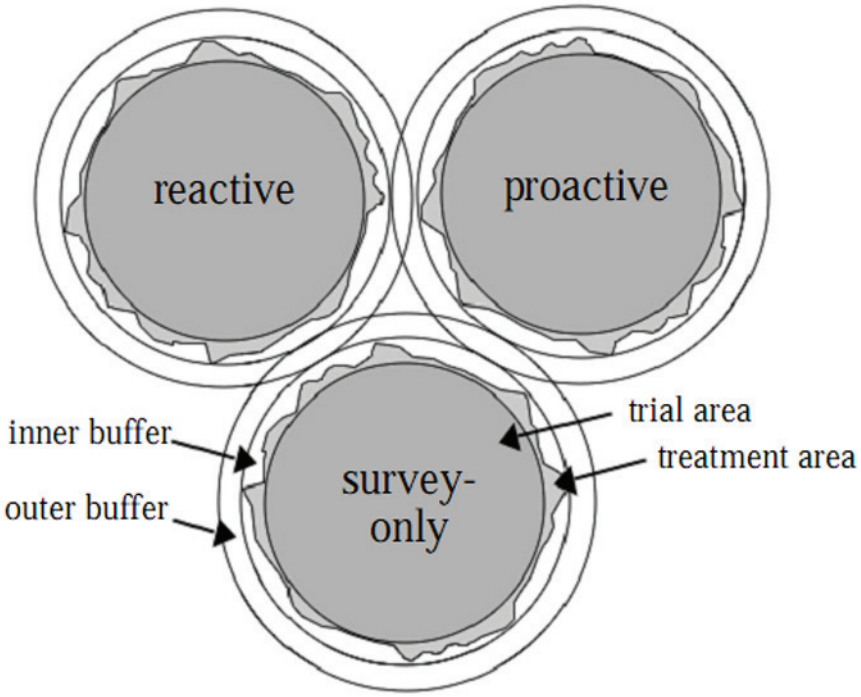


Figure 2: Schematic representation of trial areas in a triplet[4]

The distribution of the 30 areas in which work was undertaken is set out in figure 2 below which also groups these areas into their 10 constituent triplets (A-J) as well as indicating whether the area was subject to a proactive, reactive or no cull.

4 Bovine TB: The Scientific Evidence, Final Report of the Independent Scientific Group on Cattle TB, June 2007, page 36

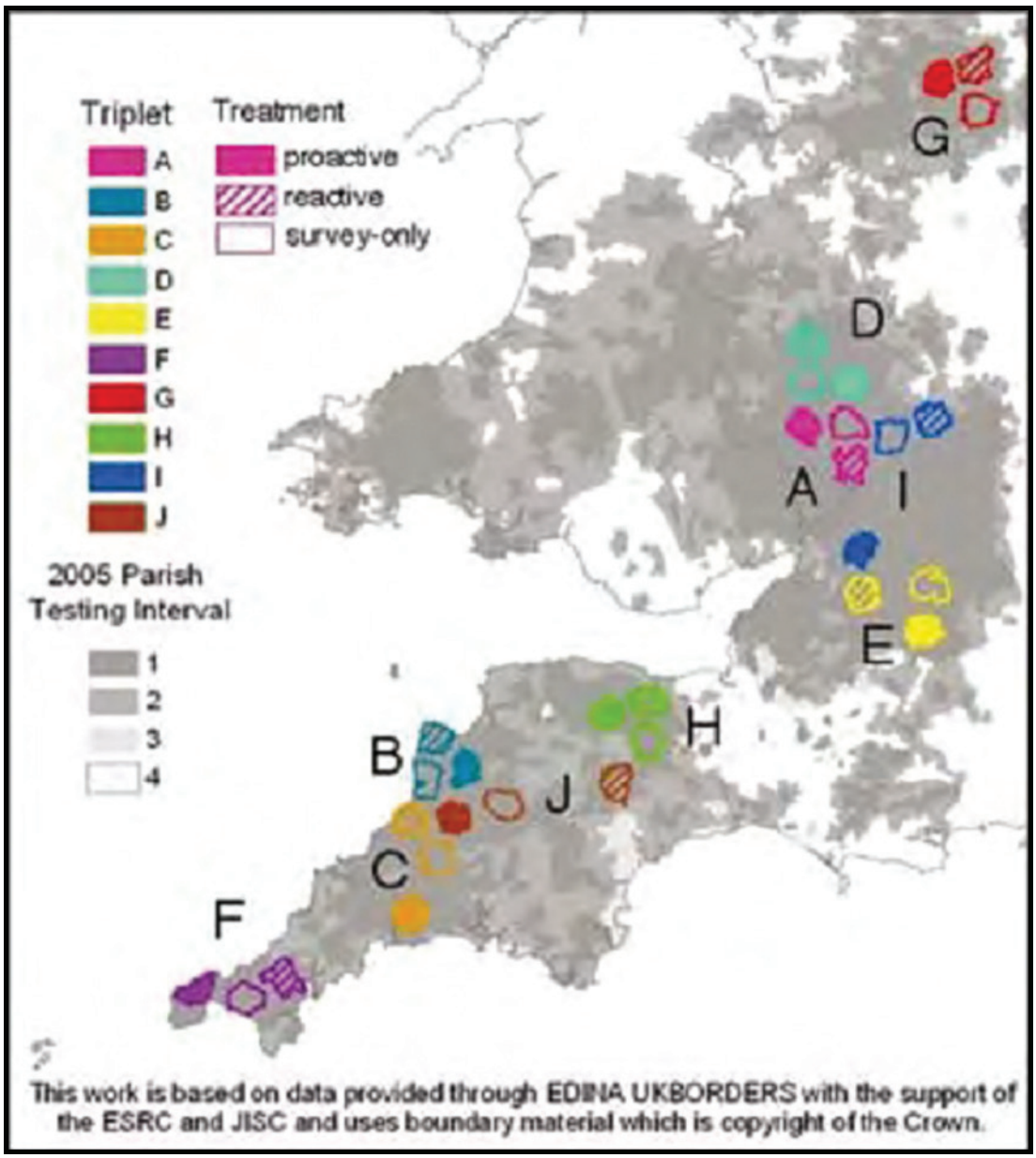


Figure 3 : Randomised Badger Culling Trial (RBCT) areas[5]

As is evident in Figure 2 the RBCT trial areas were found in South West and West England within the counties of Devon, Cornwall, Gloucestershire, Somerset, Herefordshire, Staffordhsire and Derbyshire.

Culling was conducted by trapping animals in baited cages and then shooting them, and this work was conducted by staff from the then Ministry of Agriculture, Fisheries and Food's (MAFF) Wildlife Unit (WLU). This method was employed as it was deemed to be more humane than methods such as gassing or snaring.

All badger carcases resulting from the cull were sampled, labelled and delivered to the Veterinary Laboratories Agency for post most analysis that enabled culturing and genetic typing of M Bovis infection when discovered.

The RBCT commenced in November 1998 and ran to October 2005 and included an annual closed season, when no culling occurred, from February to April. The trial was also disrupted by the Foot and Mouth Outbreak across the UK in 2001.

5 Bovine TB: The Scientific Evidence, Final Report of the Independent Scientific Group on Cattle TB, June 2007, page 46

3.2 RBCT Findings

3.2.1 Preliminary findings

A preliminary analysis of the results from the RBCT were published in Nature on the 14th December 2005[6] and revealed what appeared to be contradictory findings in that they showed that badger culling could both increase and decrease Bovine TB incidence.

The data showed that **proactive culling of badgers reduced the incidence of Bovine TB by 19% within the proactive cull area, but also increased Bovine TB incidence by 29% up to a distance of 2km outside the proactive cull area**.

With regard to **reactive culling, the data revealed that this process actually led to a 27% increase in Bovine TB incidence with the reactive cull area**. This finding was less surprising as this information had come to light **in November 2003**[7] **when Defra had halted the reactive cull strategy as part of the RBCT**, in light of the negative impact it was having on Bovine TB incidence rates.

3.2.2 Reaction to Preliminary Findings

The reaction to these preliminary findings focussed on either efforts to better understand why culling could result in a reduction in Bovine TB incidence in some areas whilst there was an apparent simultaneous increase in other neighbouring areas or simply sought to question the validity of the RBCT findings when compared to other comparable work.

In relation to the former position, a paper published in the Journal of Applied Ecology in February 2006 and written by several members of the original Krebs Review/Report team concluded that

> *"Badger home ranges were consistently larger in culling areas. Moreover, in areas not subjected to culling, home range sizes increased with proximity to the culling area boundary. Patterns of overlap between home ranges were also influenced by culling.*
>
> *and*
>
> *"…that culling badgers profoundly alters their spatial organization as well as their population density. These changes have the potential to influence contact rates between cattle and badgers, both where culls occur and on adjoining land.*
>
> *These results may help to explain why localized badger culling appears to have failed to control cattle TB, and should be taken into account in determining what role, if any, badger culling should play in future control strategies."*[8]

As a counter to this position however, some advocates of badger culling as a means to reduce Bovine TB incidence pointed to evidence that seemed contrary to the RBCT findings.

The most commonly quoted evidence in this context is that from the so called Four Areas Badger Culling Trial conducted In Ireland between September 1997 and August 2002 within Counties Cork, Donegal, Kilkenny and Monaghan.

This trial, which saw the removal of badgers by stop snare on both a proactive and reactive basis similar to that adopted by the RBCT, saw reductions in herd incidences of Bovine TB

6 C Donnelly et al., Positive and negative effects of widespread badger culling on tuberculosis in cattle, Nature, 14 December 2005

7 Defra Press Release 457/03, Suspension of badger culling in reactive areas, 4th November 2003

8 R Woodroffe et al, Effects of culling on badger Meles meles spatial organization; Implications for the control of bovine tuberculosis, Journal of Applied Ecology, February 2006, volume 43 page 1

of 51%, 64%, 68% and 59% in the study areas within Counties Cork, Donegal, Kilkenny and Monaghan respectively[9].

In considering the 'Four Areas' data, the ISG final report does question whether it is directly comparable with the RBCT data, given factors such as the apparent lower badger density within the 'Four Areas' trial, the different trapping method employed which may be more efficient but less humane, and the fact that the 'Four Areas' had substantial natural boundaries such as rivers and coastline which restricted badger movement and recolonisation.

An additional argument put forward by some badger cull advocates focussed on the number of baited traps that had been interfered with or removed as part of the RBCT.

A Parliamentary Question by the then Shadow Minister for Environment, Food and Rural Affairs, Owen Paterson MP, to the then Secretary of State for Environment, Food and Rural Affairs, Margaret Beckett MP, on the 8th December 2003 seeking to discover the level of trap interference during the RBCT established that:

> *"Interference with badger traps laid in the Randomised Badger Culling Trial is variable between operations. It is usually quite geographically localised and repetitive within a culling operational area. Management records indicate that over 116 culling operations, across 19 trial areas, between December 1998 and 10 October 2003, during which 15,666 traps were sited there were 8,981 individual occasions where a trap was interfered with, and 1,827 individual occasions when a trap was removed[10]."*

On the basis of these trap interference and removal figures, which equate to 57% of traps being interfered with and 12% of traps removed between December 1998 and 10 October 2003, some critics of the RBCT and the ISG's analysis of the data have raised concerns that this interference and removal may have contributed to the spread of TB outside of cull areas identified in the RBCT analysis. This assertion is based upon the fact that there is no way of determining how many of the removed traps in particular may have contained TB infected badgers and whether these may have been released in proximity to the cull area, and what impact this may have had on spreading the disease to other badgers.

3.2.3 Final Report of the Independent Scientific Group on Cattle TB

The final analysis of the raw data from the RBCT was contained in Final Report the Independent Scientific Group on Bovine TB[11] which was presented to the then Secretary of State for Environment, Food and Rural Affairs, The Rt Hon David Milliband MP in June 2007.

In considering and analysing all of the available RBCT data in addition to other completed research on other issues associated with Bovine TB this report made the following findings:

- Removing badgers by culling was found to disrupt their social organisation, causing remaining badgers to range more widely both inside and around the outside of culled areas;
- Probably linked to the previous point, the proportion of badgers infected with TB rose markedly in response to repeated culling and infections became more widely dispersed;
- The overall incidence of confirmed TB Breakdowns in cattle was 23.2% lower inside proactively culled trial areas than inside survey-only areas;

9 Griffin et al, The impact of badger removal on the control of tuberculosis in cattle herds in Ireland, Irish Veterinary Journal 2005, 58:629-636

10 Parliamentary Question (No 141971) by the Shadow Secretary of the State for Environment Food and Rural Affairs, Mr Owen Paterson MP, to the Secretary of State for Environment Food and Rural Affairs, Margaret Beckett MP, 8th December 2003, Official Record, House of Commons, Session 2003-4

11 Bovine TB: The Scientific Evidence, Final Report of the Independent Scientific Group on Cattle TB, June 2007

- The overall incidence of confirmed TB breakdowns in cattle was 24.5% higher on land up to 2km outside proactive trial areas, than that on land neighbouring survey-only areas;
- The overall estimate was that incidence of confirmed TB breakdowns in cattle was 23.7% higher in reactive cull trial areas, than that inside survey only areas;
- In general terms proactive badger culling reduced the incidence of cattle TB inside trial areas but elevated incidence on unculled land up to 2km outside, whilst reactive culling increased the incidence of cattle TB inside trial areas;
- The beneficial and detrimental effects of proactive culling changed over time, with the detrimental effect (increases in cattle herd TB incidence) dominating initially. Only after the fourth proactive cull did the estimated number of breakdowns prevented by proactive culling consistently exceed the estimated number induced, but the overall gains in terms of reduced cattle herd breakdowns were small;
- Badger culling as conducted under the RBCT, required substantial effort by a large number of staff – proactive culling entailed over 160,000 trap nights conducted over 4-7 years per area. Simple economic analyses reveal that a culling policy based on cage trapping as in the RBCT would incur costs that were between four and five times higher than the economic benefits gained inside a proactively culled area of 100km^2;
- The RBCT yielded some evidence of the transmission of M bovis infection from cattle to badgers. The majority of cattle TB testing was suspended during the Foot and Mouth outbreak in 2001 resulting in infected cattle remaining on farms and being able to transmit M bovis infection. During this time the prevalence of M bovis infection in badgers rose markedly and declined again after cattle testing was resumed;
- The risk of Bovine TB herd breakdown is multifactorial and has been observed to be associated with a variety of farm management, wildlife and environmental factors. Factors amenable to management associated with herd breakdowns include cattle movements, herd contacts, housing, fertiliser usage, feeding practices and badger contact;
- The Tuberculin skin test, which is a critical component of TB control policy in Britain, fails to identify a significant number of infected animals. In heavily infected herds the interferon blood test (IFN) diagnosed 27% more animals with confirmed infection than were diagnosed by the disclosing tuberculin skin test – this has serious implications for the persistence of the disease in infected herds, for the spread of infections within the herd and locally and for the spread, by cattle movement, to geographically distant parts of the country;

Building upon these findings the ISG's Final Report put forward the following conclusions and recommendations:

- Detailed evaluation of RBCT and other scientific data highlights the limitations of badger culling as a control measure for cattle TB. The overall benefits of proactive culling were modest (representing an estimated 14 breakdowns prevented after culling 1,000km^2 for five years), and were realised only after coordinated and sustained effort. While many other approaches to culling can be considered, available data suggest that none is likely to generate benefits substantially greater than those recorded in the RBCT, and many are likely to cause detrimental effects. Given its high costs and low benefits we therefore conclude that badger culling is unlikely to contribute usefully to the control of cattle TB in Britain, and recommend that TB control efforts focus on measures other than badger culling;
- In contrast with the situation regarding badger culling, our data and modelling suggest that substantial reductions in cattle TB incidence could be achieved by improving cattle-based control measures. Such measures include the introduction of more thorough controls on cattle movement through zoning or herd attestation, strategic use of the interferon blood test (IFN) in both routine and pre-movement testing, quarantine of purchased cattle,

shorter testing intervals, careful attention to breakdowns in areas that are currently low risk, and whole-herd slaughter for chronically affected herds;

- Continued research will be critical to refine cattle-based TB control strategies. Further refinement and field experience of the interferon blood test (IFN), more detailed interrogation of existing data, particularly cattle testing and tracing data, will be of value. The involvement of independent expert scientists, as a complement to the excellent scientific expertise already available to Defra through its Executive Agencies, will ensure the application of the most appropriate and up-to-date approaches and is likely to generate the most effective control strategies.

4 Responses to ISG report findings on the RBCT

The publication of the ISG's final report in June 2007 instigated a range of reviews and policy responses with notable contributions set out here in chronological order.

4.1 Government's Chief Scientific Adviser Review – July 2007

At the behest of the government, the Chief Scientific Adviser, Professor David King, convened a group of experts to review the ISG's final report and the data on which it was based. This additional work was undertaken with a view towards recommending a course of action for the Government.

Professor King presented his report in July 2007[12] which focussed on the links between TB in badgers and cattle and drew the following conclusions:

- Badgers are a clear source of infection for cattle. Reducing the density of badgers in those areas of England where there is a significant level of TB in cattle reduces the incidence of TB in cattle in the same area;
- Removal of badgers should take place alongside the continued application of controls on cattle. Genuine commitment by all interested parties to the overall TB strategy is needed if TB is to be successfully controlled;
- Removal of badgers is the best option available at the moment to reduce the reservoir of infection in wildlife. But in the longer term, alternative or additional means of controlling TB in badgers, such as vaccination, may become available. Research into these should continue;
- Removal of badgers should only take place in those areas of the country where there is a high and persistent incidence of TB in cattle. It is not an appropriate measure in other areas;
- The minimum overall area within which badger removal should take place is 100 km^2, although increasing the area would increase the overall benefit;
- Where there is inaccessible land within the overall removal area, badgers should be removed on the accessible land bordering it;
- Badger removal programmes should be sustained (unless replaced or supplemented by alternative means of control);
- The removal process must be effectively and humanely carried out by competent operators. Removal which is improperly carried out, or which is fragmented in space or time, could cause detrimental effects on the incidence of cattle TB. Further consideration should be given to the way in which the removal process should be carried out;
- There is some evidence of an adverse effect on the incidence of cattle TB in the area 0.5 - 1.0 km outside the removal area. This may or may not be totally related to the removal

12 Bovine Tuberculosis in Cattle and Badgers, A Report by the Chief Scientific Adviser, Sir David King, submitted to Defra 30th July 2007

programme, and there should be monitoring outside the removal area to detect any such effect. Measures should be taken to limit the risk of such an effect by:

(i) where possible, reducing the migration of badgers into the removal area by hard geographical boundaries such as rivers or motorways or, where these do not exist, soft boundaries (such as arable land with no cattle) which are at least 1km wide; or

(ii) if immigration of badgers into the removal area cannot be prevented or sufficiently inhibited, then, subject to epidemiological findings, sustaining removal (or replacing it by or combining it with measures such as vaccination once they become available).

- The incidence of TB in cattle in the removal areas should be monitored on an annual basis. After four years, the badger removal programme should be reviewed. This may entail some assessment of the prevalence of TB in badgers.
- The badger population should be monitored.

Whilst praising the work of the ISG, Professor King also drew attention to areas where he and his assembled experts differed from the ISG in terms of analysis of the RBCT data with notable examples being:

- …the ISG states that "badger culling cannot meaningfully contribute to the control of cattle TB in Britain". However, the data do not support such an unqualified conclusion.
- We agree that the data in the ISG report demonstrate that removal gives a real reduction in the incidence of cattle TB within the removal area. However, we consider that the ISG's view that this benefit was largely offset by the increase in incidence outside the removal area is unsound and should be subject to further spatial and temporal analysis.

Professor King's report concluded with the following recommendation to the government:

- In our view a programme for the removal of badgers could make a significant contribution to the control of cattle TB in those areas of England where there is a high and persistent incidence of TB in cattle, provided removal takes places alongside an effective programme of cattle controls.

This recommendation was clearly at odds with the recommendation put forward within the ISG Final Report that badger culling was unlikely to contribute to the control of cattle TB in Britain. This very clear difference of opinion became clear when Professor John Bourne, the Chairman of the ISG, appeared before the Environment, Food and Rural Affairs Select Committee on the 25th October 2007. When asked to comment on Professor King's report Professor Bourne revealed that

"I think there is a real difficulty here, (David), with this report in that it was clearly hastily written and because of that it is very superficial; it is also very selective. What is so important is that you do not just cherry pick bits of data from the report but that you look at the totality of the data that we presented as a result of gathering this over 10 years to draw your conclusions. One can select bits and pieces of data as they have done here, but it gives a very superficial sound bite, which is totally inappropriate to considering the data in its totality.[13]"

4.2 Environment, Food and Rural Affairs Select Committee Inquiry

The differing views on the issue of badger culling between the reports prepared by the ISG and Professor King prompted the Environment, Food and Rural Affairs Select Committee at Westminster to conduct an inquiry with a view to better understand the work completed to date as well as seeking to plot a way forward.

13 Oral evidence session 75, Professor John Bourne CBE, former Chairman, Professor Christl Donnelly, Environment, Food and Rural Affairs Select Committee Inquiry, 24th October 2007

The Inquiry took evidence from a range of interested parties and stakeholders that included Professor King and Professor Bourne and other colleagues from the ISG.

The Select Committee published their Inquiry report in February 2008[14] and made the following general conclusions:

- The Government must show its commitment to finding a way to ease the grip that cattle TB has upon the country. To do this, its policy must be to reverse in the short term the rising level of incidence of the disease with a long term goal of eradication through the use of vaccines. (Paragraph 192)
- The Government must continue to fund research into vaccines and the efficacy of biosecurity measures. It must also continue not only to fund the routine testing of cattle, but must examine carefully the benefits of increasing the frequency of testing and the introduction of the parallel use of gamma interferon testing alongside the tuberculin skin test.
- More frequent and thorough testing will lead in the short term to an increase in the number of cattle reactors that are found and slaughtered.
- The Government must re-consider the levels of compensation currently paid to farmers and must ensure that it does not shirk its responsibility to pay farmers a fair price for their cattle.
- The Government cannot countenance the reduction of its spending on the disease at this stage given the advice from the ISG that current cattle controls are not stringent enough. Defra must ensure that a cost benefit analysis (including farmers' costs and benefits) is prepared of the cattle-based measures recommended by the ISG and its agencies to ensure that it is able to plan for the proper levels of expenditure needed to fulfil its cattle TB policy.
- To match the Government's commitment to fight the disease, it is right that farmers may be asked to increase their own spending on pre- and post-movement testing and on-farm biosecurity measures. We acknowledge that this could mean an additional financial burden for farmers, as well as an unwelcome increase in the time and effort already spent by farmers and vets on the administrative burden demanded by the testing regime. The farming industry is already suffering from the financial and emotional consequences of the steady increase in the number of cattle TB breakdowns, but it must work together with the Government, veterinarians and scientists to monitor the outcome of measures taken to tackle the disease if we are to plug the fundamental gaps in our understanding of how cattle TB is transmitted.

On the specific issue of badger culling the committee concluded that;

- We have recommended that the culling of badgers in high risk areas should in principle be licensed under the Protection of Badgers Act to counter the spread of cattle TB provided that the licensee is able to fulfil conditions based on the findings of the ISG Report. The Government must provide a practical framework of guidelines for Natural England as the licensing authority. The farming industry must accept that the Government is unlikely to fund the culling of badgers as a method of tackling the wildlife reservoir. Whilst the farming industry is likely to have to bear the costs of any cull if it chooses to go down that road, farmers must also accept that culling, in accordance with the conditions agreed between the ISG and Sir David King, cannot become the cornerstone of a Government TB policy as it would not be suitable as a control method in all areas.

As well as putting on record that

- The Committee recognises that under certain well-defined circumstances it is possible that culling could make a contribution towards the reduction in incidence of cattle TB in hot spot areas. However, as there is a significant risk that any patchy, disorganised or

14 Badgers and cattle TB: the final report of the Independent Scientific Group on Cattle TB, Fourth Report of Session 2007–08, Environment, Food and Rural Affairs Committee, House of Commons, 27th February 2008

short-term culling could make matters worse, the Committee could only recommend the licensed culling of badgers under section 10 of the Protection of Badgers Act 1992 if the applicants can demonstrate that culling would be carried out in accordance with the conditions agreed between the ISG and Sir David King, which indicated that there might be an overall beneficial effect. These were that culling should: be done competently and efficiently; be coordinated; cover as large an area as possible (265km^2 or more is the minimum needed to be 95% confident of an overall beneficial effect); be sustained for at least four years; and be in areas which have “hard” or “soft” boundaries where possible.

Northern Ireland Assembly

Research and Information Service
Briefing Paper

Paper 000/00 25th May 2012 NIAR 384-12

Mark Allen

The 4 areas Badger Cull conducted in Ireland – overview, main findings and comparison with the RBCT

1 Background

Bovine TB continues to be an issue within Ireland with the most recently available data revealing an annual herd incidence rate of 4.18%[1]

The Irish Government currently operates what could be defined as a reactive badger cull programme, with culling being conducted in instances where badgers are implicated in a Bovine TB disease breakdown.

This reactive badger cull programme operates in a context where the badger has been a protected species in Ireland since 1976 under the auspices of the Wildlife Act[2].

This paper provides an overview of the so called 4 Areas Badger Cull Trial completed in Ireland between September 1997 and August 2002 which tested the impact of proactive badger culling on Bovine TB incidence within 4 defined areas.

1 2011 TB stats (from 1/1/2011 to 31/12/2011), Department of Agriculture, Food and the Marine

2 Wildlife Act, 1976

As well as providing an overview of the methodology and findings this paper deals with some of the differences between the 4 areas trail and the Randomised Badger Culling Trial (RBCT).

Unless otherwise stated, all data relating to the 4 areas trail is taken from the paper published by J.M. Griffin et al in 2005.[3]

2 Motivation for the 4 areas trial – East Offaly Study

The role that badgers and other wildlife play in Bovine TB continues to be a source of vigorous debate across the UK and Ireland. Anecdotal and scientific evidence suggests that there is a connection but to date there is relatively little understanding of how TB moves between species.

Within Ireland a study conducted between 1989 and 1994 and generally referred to as the East Offaly study was the first piece of work commissioned to determine the impact of badger culling on cattle TB. **This work, which incorporated both limited (in response to TB outbreaks) and widespread culling (proactive) through the use of snares, led to an apparent reduction in cattle TB incidence of 26% (36% if year one data is excluded) within the removal (proactive cull) area**. The overall data collected from the East Offaly Study is presented in table 1 below.

It is also worth noting that critics of the East Offaly Study point to the fact that no attempt was made to investigate whether badger culling within the removal area led to an increase in cattle TB within the neighbouring control area. By way of example, the work of the Randomised Badger Culling Trial (RBCT) in England did identify this effect just outside the culled areas, a factor which could potentially exaggerate the cattle TB incidence within the control area.

Table 1: Numbers of individual cattle showing evidence of TB exposure, and numbers of cattle tested as part of the East Offaly study[4]

Year	Control (limited culling) area – cattle tested	Control (limited culling) area – cattle infected	Removal (widespread culling) area – cattle tested	Removal (widespread culling) area – cattle infected
1989	294,088	982	103,032	362
1990	286,425	904	103,332	299
1991	218,813	979	72,202	194
1992	234,888	594	65,803	89
1993	212,382	404	67,086	54
1994	210,339	443	68,527	54
All years	**1,456,935**	**4,306**	**479,982**	**1,052**
Incidence		0.296%		0.219%
Reduction				26%
First year excluded	**1,162,847**	**3,324**	**376,950**	**690**

3 Griffin et al, The impact of badger removal on the control of tuberculosis in cattle herds in Ireland, Irish Veterinary Journal 2005, 58:629-636

4 Eves, J.A,, Impact of badger removal on bovine tuberculosis in east County Offaly, Irish Veterinary Journal 52 page 199-203, 1999

Year	Control (limited culling) area – cattle tested	Control (limited culling) area – cattle infected	Removal (widespread culling) area – cattle tested	Removal (widespread culling) area – cattle infected
Incidence		0.286%		0.183%
Reduction				36%

3 The 4 areas Trial

3.1 Study areas

The 4 areas Trial sought to build upon the work of the East Offaly Study by objectively assessing the impact of badger removal on cattle TB across differing geographical regions and utilising a greater amount of data.

The study was conducted between 1st September 1997 and 31st August 2002 within 4 study areas in Counties Cork, Donegal, Kilkenny and Monaghan that total 1,961km^2, approximately 3.9% of the agricultural land area of the Republic of Ireland.

Each of the study areas was further subdivided into removal areas and reference areas and the criteria utilised in the selection of these areas is set out in table 2 below.

Table 2: 4 areas trial selection criteria for Removal and Reference areas

Removal Area Selection Criteria	Reference Area Selection Criteria
Apparent disease prevalence i.e. problem areas with historic or recent evidence of higher than average apparent disease prevalence	Reference areas were matched to removal areas
Presence, if possible of natural geographical boundaries such as: • Rivers; • mountain ranges; and • sea inlets	Matching criteria based on factors known to influence badger density and herd prevalence of cattle TB such as: • Livestock density; • Herd size; • Farm enterprise type • Disease prevalence; and • Selected geographic features (including land use and soil type)
Areas representative of the diverse Irish landscape	When natural barriers where absent, each reference area was separated from both the removal and (where present) adjoining buffer areas by a distance of at least 3km, in an effort to minimise the effects of badger migration on TB cattle levels
Where natural barriers where absent buffer areas where created, up to 6km in width at the boundary of each selected removal area.	

The areas which met these criteria, and their individual attributes, are set out in table 3 and figure 1 below.

Table 3: 4 areas trial study areas - background information

Study Area	Size	Agricultural type	Natural barriers	Buffer area	Badgers removed prior to study
Cork	387km^2	Major dairying area 89% pasture land High grazing density	Removal area bounded to south and east by Blackwater and Allow rivers.	Removal area had a total of 119km^2 buffer areas to the North and West	87 removed mostly 1990-1993 with an average of 0.04 and 0.01 badgers/km^2 during the 8 years prior to the study start in removal and reference areas respectively
Donegal	490km^2	Suckler cattle production – small herds 37% pasture land Low grazing density Area dominated by mountain, heathland bog and sea inlets	Removal area bounded by sea	Removal area bounded by small buffer area (11km^2) to the south	133 removed mostly 1990-1992 with an average of 0.07 and 0.003 badgers/km^2 during the 8 years prior to the study start in removal and reference areas respectively
Kilkenny	505km^2	Suckler and beef production Average herd size and grazing density being larger than all other study areas	Removal areas bounded on east by river Barrow, on the west and south by the river Nore	Removal area bounded by buffer areas to the north and south east – 61km^2 in total	301 removed mostly 1995-1996 with an average of 0.10 and 0.04 badgers/km^2 during the 8 years prior to the study start in removal and reference areas respectively
Monaghan	579km^2	Intensive suckler production High grazing densities	Removal area separated from Northern Ireland by river Blackwater to the north east and by the series of mountains to the north west	Removal area bounded by buffer area to the south (63km^2)	249 removed mostly 1994-1996 with an average of 0.09 and 0.01 badgers/km^2 during the 8 years prior to the study start in removal and reference areas respectively

Figure 1: Map of Ireland indicating location of 4 areas trial study areas

3.2 Methodology

Within each of the study areas the following approaches were employed in relation to badger removal.

Removal area and adjoining buffer area (where present)

- Comprehensive survey conducted on participating farms (voluntary decision) of badger habitat and activity within each removal, buffer and reference area prior to commencement of study;
- Location of each badger sett recorded by GIS;
- Initial removal of as many badgers as possible on a pro-active basis using snares;
- Badgers were snared by placing snare restraints at active badger setts within removal areas for 11 nights with an inspection every morning – occasionally restraints were left in place for a second 11 night period depending on the level of badger activity;
- Snared badgers were removed by a trained operative and killed using a 0.22 calibre rifle;
- Ongoing effort, 2 to 3 times per year to remove badgers on all land within removal and buffer areas.

Reference areas

- Comprehensive survey conducted on participating farms (voluntary decision) of badger habitat and activity within each removal, buffer and reference area prior to commencement of study;
- Location of each badger sett recorded by GIS;
- Badger removal by snare only following severe outbreaks of TB in cattle herds within the reference area – severe outbreak defined as four or more standard tuberculin reactors. Source of TB also needed to be reasonably attributed to badgers;

- Removal generally limited to a single operation but could be repeated if evidence of badger activity was subsequently detected;
- Snared badgers were removed by a trained operative and killed using a 0.22 calibre rifle.

In both removal and reference areas a gross post mortem investigation was conducted on all euthanased badgers and if gross evidence of TB was detected all affected tissues were sent for histopathological examination and for culture. If no evidence of TB was found, bacteriological culture was conducted on a pool of defined tissues, including lymph nodes, kidney and lung tissue. **A badger was considered positive for TB only if it was positive at histopathological examination and/or culture**.

3.3 Results

Over the course of the study a **total of 2,618 badgers were removed across all of the removal, buffer and reference areas**. This figure can be further broken down as follows:

- Removal and Buffer areas –2,360 badgers removed over the study period;
- Reference areas – 258 badgers removed over the study period due to 64 outbreaks of severe Bovine TB (4 or more standard tuberculin reactors).

Turning to the TB infection status of these removed badgers the following figures were recorded:

- Of the **2,360 removed from the Removal and Buffer areas, 2310 (97.9%) had post mortem and culture and/or histopathology work conducted on them**. As a result of an error, the remaining 50 badgers were only subjected to post-mortem examination. **In the 2,310 badgers subjected to the full assessment, TB was present in 450 (19.5%);**
- Of the **258 badgers removed from the Reference areas, 218 were subjected to post mortem and culture and/or histopathology work**, with the remaining 40 only being subject to post mortem examination. **In the 218 badgers subjected to the full assessment, TB was present in 57 (26.1%).**

The apparent impact of badger removal on TB incidence in cattle within the 4 study areas can be seen in the data presented in tables 4,5,6 and 7 and figures 2,3,4 and 5 below. This data covers the period from 1992-2002 and as such provides a 4 year baseline picture due to the fact that the 4 areas trial didn't commence until September 1997.

Table 4: Cork study area - number of cattle herds within reference and removal areas and number and percentage of these herds with confirmed restrictions for tuberculosis, 1992-2002.

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1992-1993	265	9	3.4	290	27	9.3
1993-1994	266	18	6.8	292	22	7.5
1994-1995	270	26	9.6	294	30	10.2
1995-1996	273	24	8.8	293	36	12.3
1996-1997	270	36	13.3	292	48	16.4
1997-1998	272	30	11	288	29	10.1

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1998-1999	271	45	16.6	285	22	7.7
1999-2000	271	33	12.2	282	11	3.9
2000-2001	274	12	4.4	270	2	0.7
2001-2002	269	13	4.8	259	3	1.2

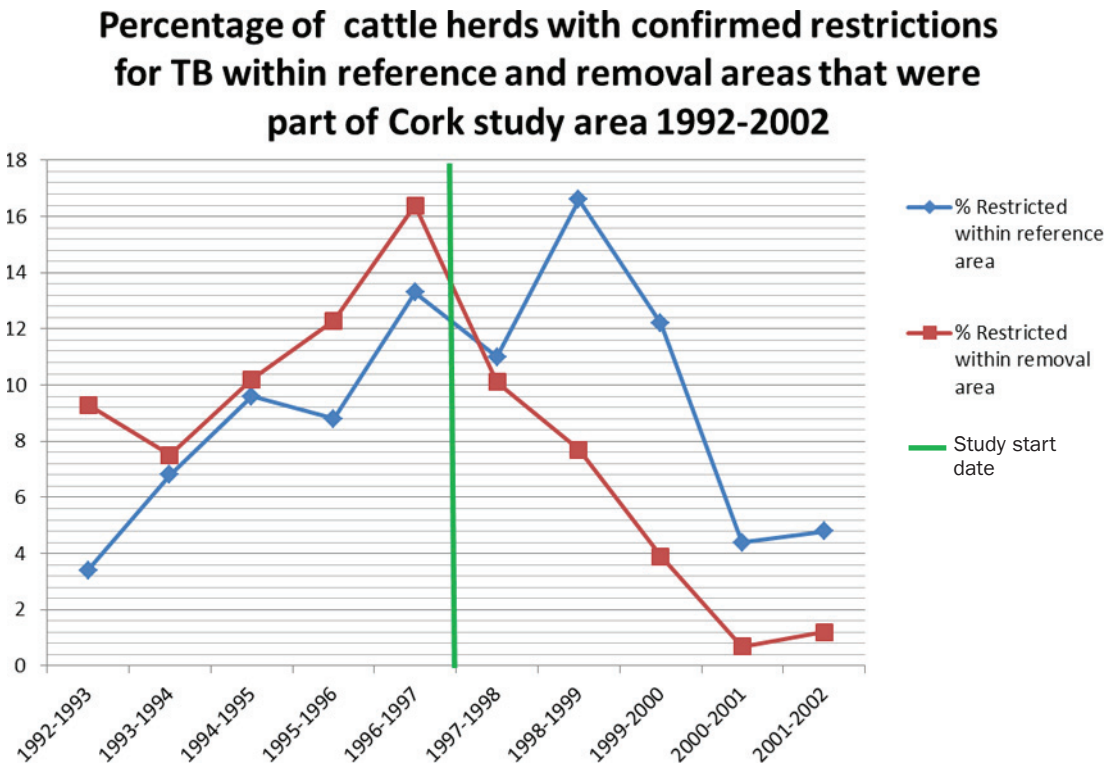


Figure 2: Percentage of cattle herds with confirmed restrictions for TB within reference and removal areas that were part of Cork study area 1992-2002

Table 5: Donegal study area - number of cattle herds within reference and removal areas and number and percentage of these herds with confirmed restrictions for tuberculosis, 1992-2002.

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1992-1993	369	8	2.2	392	12	3.1
1993-1994	369	4	1.1	396	16	4.0
1994-1995	374	4	1.1	394	30	7.6
1995-1996	370	13	3.5	390	14	3.6
1996-1997	362	1	0.3	379	1	0.3

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1997-1998	361	4	1.1	375	3	0.8
1998-1999	349	5	1.4	375	6	1.6
1999-2000	343	5	1.5	375	3	0.8
2000-2001	334	4	1.2	370	1	0.3
2001-2002	320	18	5.6	365	1	0.3

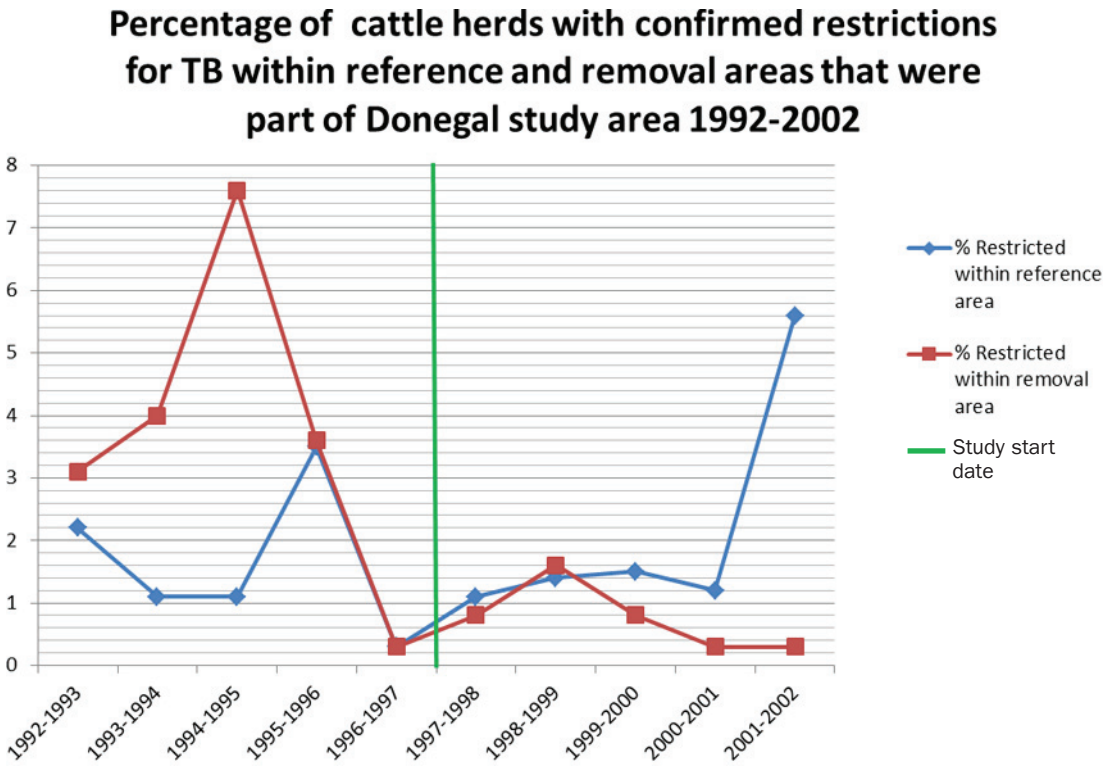


Figure 3: Percentage of cattle herds with confirmed restrictions for TB within reference and removal areas that were part of Donegal study area 1992-2002

Table 6: Kilkenny study area - number of cattle herds within reference and removal areas and number and percentage of these herds with confirmed restrictions for tuberculosis, 1992-2002.

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1992-1993	215	15	7.0	215	9	4.2
1993-1994	225	19	8.4	233	9	3.9
1994-1995	231	15	6.5	232	17	7.3
1995-1996	232	15	6.5	231	29	12.6

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1996-1997	232	19	8.2	229	21	9.2
1997-1998	230	20	8.7	230	14	6.1
1998-1999	222	28	12.6	230	4	1.7
1999-2000	214	25	11.7	229	6	2.6
2000-2001	213	12	5.6	225	6	2.7
2001-2002	206	16	7.8	214	4	1.9

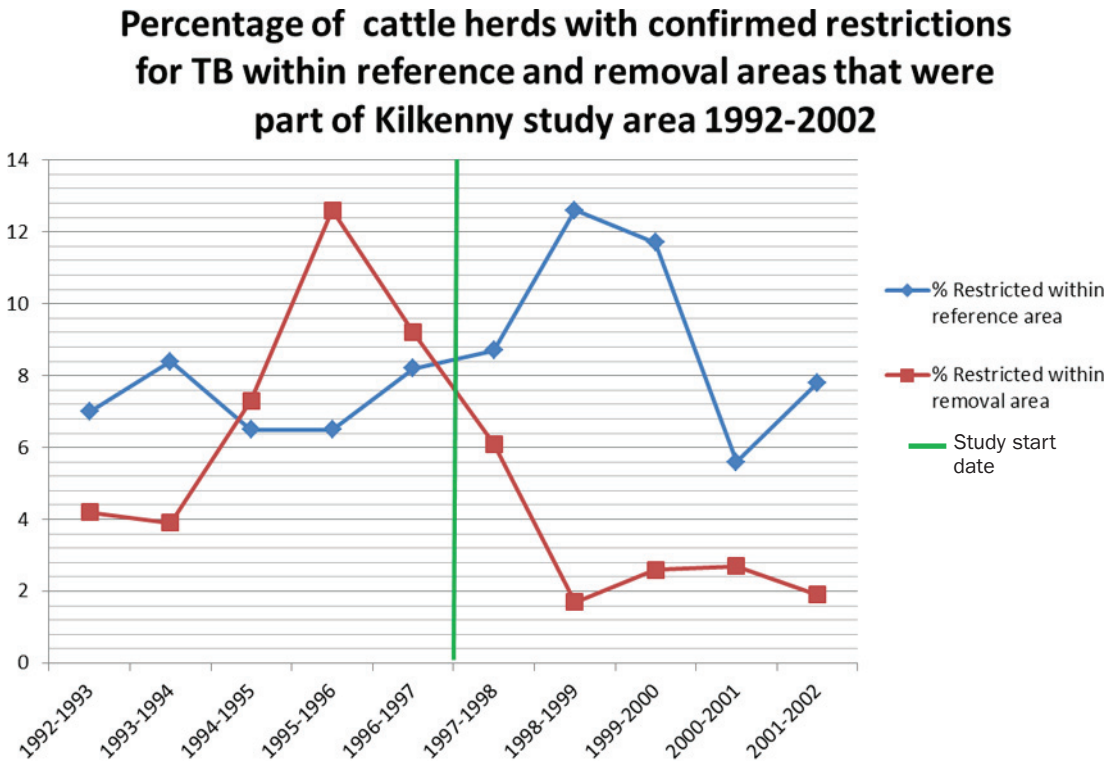


Figure 4: Percentage of cattle herds with confirmed restrictions for TB within reference and removal areas that were part of Kilkenny study area 1992-2002

Table 7: Monaghan study area - number of cattle herds within reference and removal areas and number and percentage of these herds with confirmed restrictions for tuberculosis, 1992-2002.

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1992-1993	533	52	9.8	658	50	7.6
1993-1994	535	57	10.7	650	49	7.5
1994-1995	538	48	8.9	653	49	7.5

Year	Number of herds in reference area	Number of herds in reference area with confirmed restrictions for tuberculosis	% Restricted within reference area	Number of herds in removal area	Number of herds in removal area with confirmed restrictions for tuberculosis	% Restricted within removal area
1995-1996	540	42	7.8	558	42	6.3
1996-1997	545	30	5.5	680	36	5.3
1997-1998	554	57	10.3	687	19	2.8
1998-1999	565	62	11.0	701	32	4.6
1999-2000	565	42	7.4	681	24	3.5
2000-2001	559	38	6.8	661	24	3.6
2001-2002	545	29	5.3	644	13	2.0

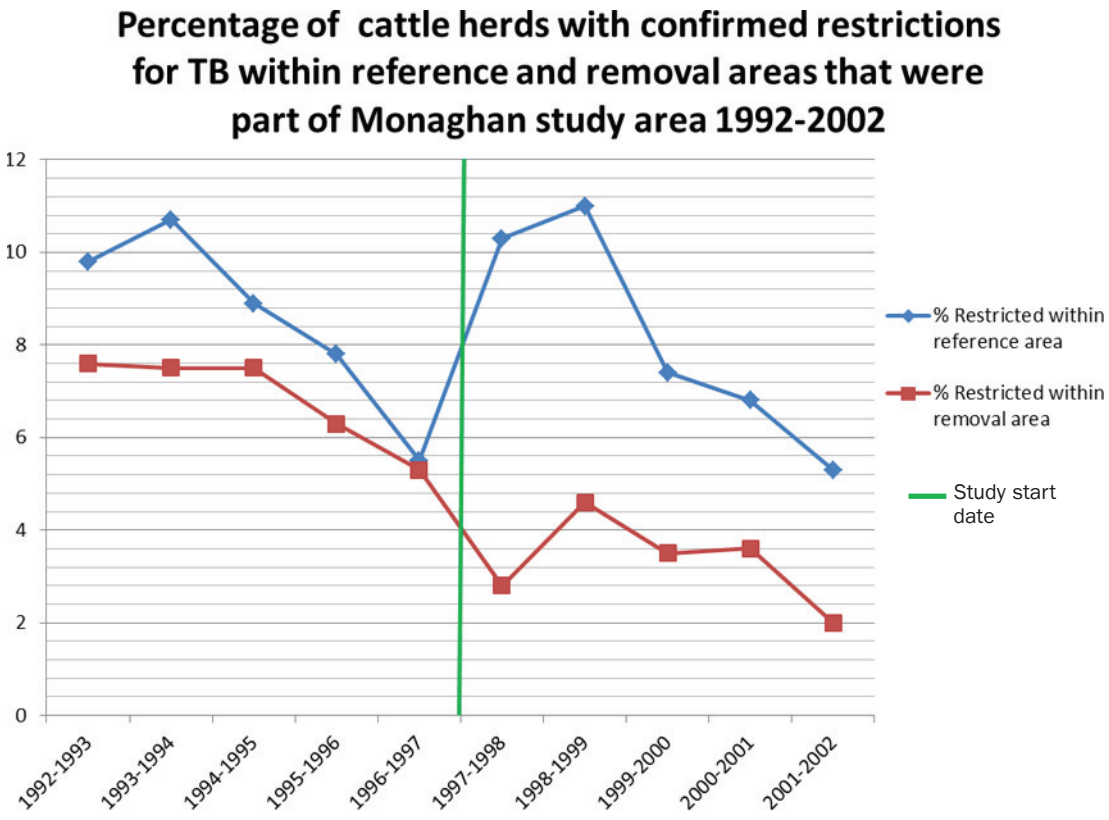


Figure 5: Percentage of cattle herds with confirmed restrictions for TB within reference and removal areas that were part of Monaghan study area 1992-2002

As the previous figures and tables show, within each of the four study areas the percentage of cattle herds with confirmed TB restrictions was lower in removal areas as compared to reference areas by the end of the study in 2002.

Table 8 below compiles the data collected within the Removal and Reference areas during the 4 areas study (1997 -2002) and shows that the Removal areas within the 4 study areas saw the following reductions in the incidence of confirmed restrictions for Bovine TB, when compared to the Reference areas:

- Cork – 51% reduction;
- Donegal – 64% reduction;

- Kilkenny – 68% reduction; and
- Monaghan – 59% reduction.

Table 8: Numbers of cattle herds with confirmed restrictions for Bovine TB in the 4 areas trial, during years in which badger culling occurred[5]

	Cork		Donegal		Kilkenny		Monaghan	
Year	Reference	Removal	Reference	Removal	Reference	Removal	Reference	Removal
97-98	30/272	29/288	4/361	3/375	20/230	14/230	57/554	19/687
98-99	45/271	22/285	5/349	6/375	28/222	4/230	62/565	32/701
99-00	33/271	11/282	5/343	3/375	25/214	6/229	42/565	24/681
00-01	12/274	2/270	4/334	1/370	12/213	6/225	38/559	24/661
01-02	13/269	3/259	18/320	1/365	16/206	4/214	29/545	13/644
All years	133/1357	67/1384	36/1707	14/1860	101/1085	34/1128	228/2788	112/3374
Incidence	9.8%	4.84%	2.11%	0.75%	9.31%	3.01%	8.18%	3.32%
Reduction		51%		64%		68%		59%

3.4 Conclusions

Based upon the collected data, Griffin et al **concluded that proactive badger culling, within the 4 areas Removal areas had reduced the risk of a confirmed TB restriction within a Removal area, as compared to any of the 4 area trial Reference areas which had only been subject to reactive badger culling**.

In highlighting the apparently positive impact of proactive badger culling on cattle TB incidence, the researchers also emphasised that **whilst feasible, widespread badger culling is not a viable strategy for the long term control of TB in the Irish cattle population** and that options such as the development of an effective vaccine for badgers merited further investigation.(By way of update badger vaccination trails are continuing in Ireland with the most recent 3 year trail commencing in Kilkenny in the Autumn of 2008).

4. Comparisons between the 4 areas trial and Randomised Badger Culling Trial (RBCT).

The 4 areas trial in Ireland and the Randomised Badger Culling Trial (RBCT) in GB are two the most cited pieces of research utilised by lobbies either in favour of or opposed to the practice of badger culling as a means of reducing the incidence of cattle TB.

As mentioned previously the 4 areas trial research team concluded that proactive badger culling reduce the risk of cattle TB restrictions, whilst the RBCT team concluded that *'… badger culling is unlikely to contribute positively, or cost effectively, to the control of cattle TB in Britain'*[6].

The differing conclusions drawn by these two significant pieces of work have been the subject of substantial scientific analysis and discussion. Whilst this is not the primary focus of this paper table 8 below sets out some of the key features and findings within both pieces of work.

5 Bovine TB: The Scientific Evidence, Final Report of the Independent Scientific Group on Cattle TB, June 2007, page 117

6 Bovine TB: The Scientific Evidence, Final Report of the Independent Scientific Group on Cattle TB, June 2007, page 23

Table 9: Comparison of features and findings between the 4 areas trial and RBCT[7].

Features and Findings	4 areas trial	RBCT
Main study elements	Badger Removal areas (proactive), Reference areas (reactive removal) and buffer areas Lack of areas with no culling i.e. control	Proactive culling area, reactive culling area and survey only area (no culling)
Site selection criteria	Non random selection of sites – areas selected had higher than average incidence of BTB and also designed to incorporate natural barriers such as rivers, sea or mountains	Selected areas in West and South West of England with high BTB incidence but individual sites were then randomly selected and allocated in 9 of the 10 study areas
Badger density – pre cull	· **2.49 setts/km²** · **Mean badger density of 1.9 badgers/km²**	· **6.05 setts/km²** · **Mean badger density of 3.2 badgers/km²**
Badger trapping method	Stop snare	Baited cage trap
% removed badgers BTB positive	· Of 2360 captured in **removal and buffer areas**, 2310 were examined for TB: **19.5% considered TB positive**. · Of 258 captured in **reference area**, 218 were examined for TB: **26.1% considered TB positive**	· Of 8910 captured in **proactive area**, 8892 were examined for TB: **14.7% considered TB positive** · Of 2065 captured in **reactive area**, 2063 were examined for TB: **15.6% considered TB positive**
Impact of cull on cattle BTB herd Incidence	· **Removal area: Reduction of 51%, 64%, 68% and 59% for Cork, Donegal, Kilkenny and Monaghan respectively** · **Reference area: Increase of 0.88% on mean of herd incidence in 5 years of study** in comparison to mean of herd incidence of five years (1992-1997) prior to study	· Proactive area: **Reduction of 23.2% in comparison to survey only areas** · Land neighbouring **proactive area: Increase of 24.5%** · **Reactive area: Increase of 27%** (experiment halted in November 2003
Conclusions drawn	**The significantly lower odds and hazard ratios of a confirmed restriction in the removal areas in comparison to the matched reference area can reasonably attributed to the effect of proactive badger removal**	**While badgers are clearly a source of cattle TB, careful evaluation of our own and other data indicates that badger culling can make no meaningful contribution to the cattle TB control in Britain**

The reasons for the differing conclusions between these two studies are myriad and also subject to claim and counter claim, particularly in instances where individuals seek to compare the two studies. Some of the caveats and areas of concern raised by various researchers within this context include:

7 Derived from O'Connor C.M., Haydon, D.T. and Kao, R.R., Great Britain and Republic of Ireland badger culling trials: An initial comparative study, Boyd Orr Centre for Population and Ecosystem Health, Institute of Comparative Medicine, Faculty of Veterinary Medicine, University of Glasgow, 2009

The choice of study area – the 4 areas study areas were not randomly selected, but were rather selected taking account of a series of criteria. Critics of the 4 areas trial in particular point to the natural barrier criteria which would have had an impeding effect on badger recolonisation of culled areas, and would logically have enabled a more efficient and sustained removal of badgers. By contrast, most of the RBCT areas, which were randomly selected, lacked such barriers on their boundaries and as such it seems fair to assume that badger recolonisation of these areas would have been higher and easier when compared to the 4 areas trail areas. In these instances the RBCT areas would have been expected to have higher cattle TB incidence rates

The use of control areas (with no badger culling) – the RBCT study areas all incorporated control areas within which no badger culling was conducted, whilst the 4 areas trial had no such provision, with reactive culling being conducted within the so called Reference areas. This difference makes direct comparison of the two studies extremely difficult as some researchers postulate that the presence of control areas within the RBCT enabled an accurate assessment of the impact of reactive badger culling. The RBCT data established that reactive culling increased cattle TB incidence, which could potentially account for the apparent increase in TB restriction incidence within the 4 areas trial Reference areas. If this did occur it could have inflated the difference in incidence between Removal and Reference areas and as such would make proactive culling appear more effective than it may actually be.

The impact of a lack of data for buffer areas – all of the 4 areas trial study areas had buffer areas which could be up to 6km wide. Culling was conducted within these areas but no data on TB incidence within these areas was available. The size of the buffer areas in effect meant a herd within a removal cull area could be very distant from the cull zone boundary. This situation contrasted markedly with the RBCT trial, where herds inside the proactive cull area were never more than 1km from the boundary of the culling area. This difference could well be significant as the RBCT data highlighted that a badger cull was less effective in herds close to the culling area boundary. Due to the lack of data for the buffer areas within the 4 areas trial however such an analysis cannot be conducted however.

Differing cull methods and badger population densities – As evidenced in table 9 the four areas trial and RBCT started from different places in terms of the density of the badger population. The lower badger population density in conjunction with the stop snare means of capture, a higher compliance from landowners, and the presence of recolonisation reducing natural barriers, has led some researchers to claim that the 4 areas trial may have been more effective at reducing badger density than the RBCT trial, and by default may have had a greater impact on reducing cattle TB incidence.

Comments on DARD Report "TB Testing in N. Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons"

Introduction

This is one of a number of reports produced by DARD comparing the probability of TB-positive animals and herds being detected by private veterinary surgeons (PVPs) and DARD employed veterinary surgeons (VOs and VOTs)[1]. The analysis uses data collected over a 22 year period (1/1/90 – 31/12/11). In addition to comparing differences between the results obtained by the different types of vet, the statistical model takes account of other factors in the outcome (year of test; geographical area; test status – routine/restricted/risk; and type of test – herd or individual). After taking account of these other factors, the conclusion from the analysis was that VOTs were more likely to detect positive animals or tests than PVPs (in 2011, and in almost every one of the 22 years analysed). The report concludes that 'the reason for this consistent difference remains unclear'.

Further Analysis

Further analysis of the data and some helpful discussions with DARD reveal the following:

1) There are clear differences in the way the different types of veterinary surgeon are employed, with VOTs carrying out most of the tests on restricted herds, VOs carrying out most of the 'at risk' individual animal tests, and PVPs carrying out most of the routine tests and most of the tests on 'at risk' herds (Figure 1).

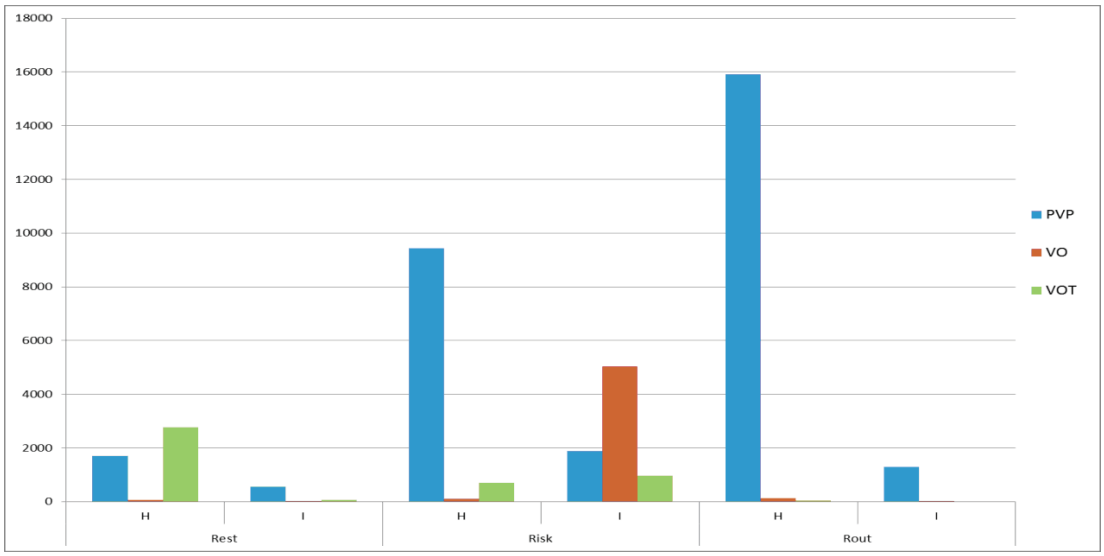


Figure 1. Number of tests carried out in 2011 by type of veterinary surgeon and reason for test (restricted, at risk and routine; 'H' = Herd, 'I' = Individual)

1 VOs are more generalist Veterinary Officers, whereas VOTs are specialist 'testing' Veterinary Officers.

2) The differences in test results obtained by private vets and DARD vets appear to apply only to 'restricted' and 'at risk' tests i.e. overall, it appears that there are little or no differences between the two types of veterinary surgeon in test results for routine tests (see Figures 2, 3 and 4). In 2011, private vets were, in fact, slightly more likely to record positive results for individual animals in routine tests (0.28% v 0.24% of all animals tested).

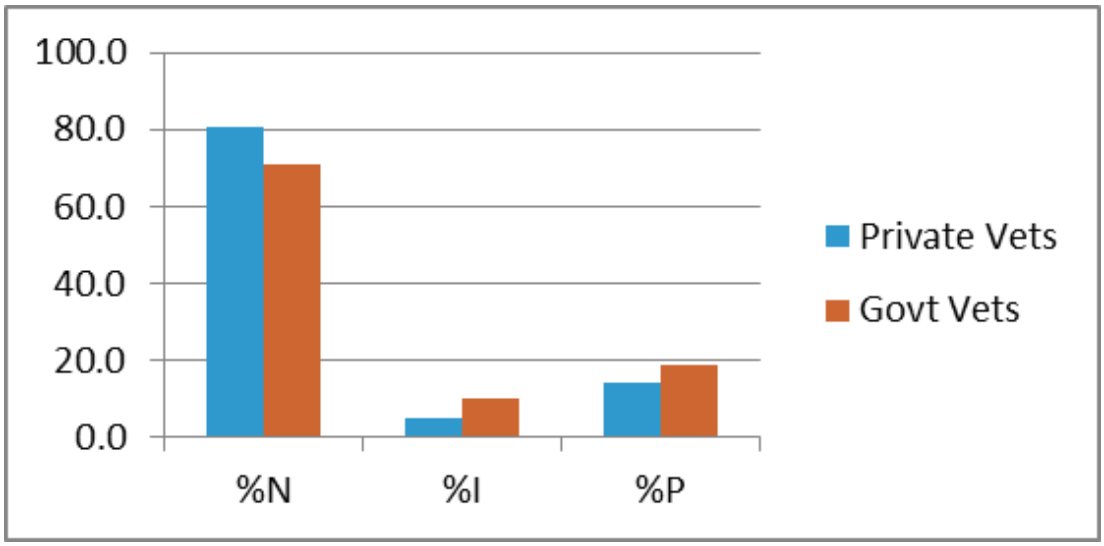


Figure 2. 2011 'Restricted' test results by type of Vet ('N' = Negative 'I' = Inconclusive 'P' = Positive)

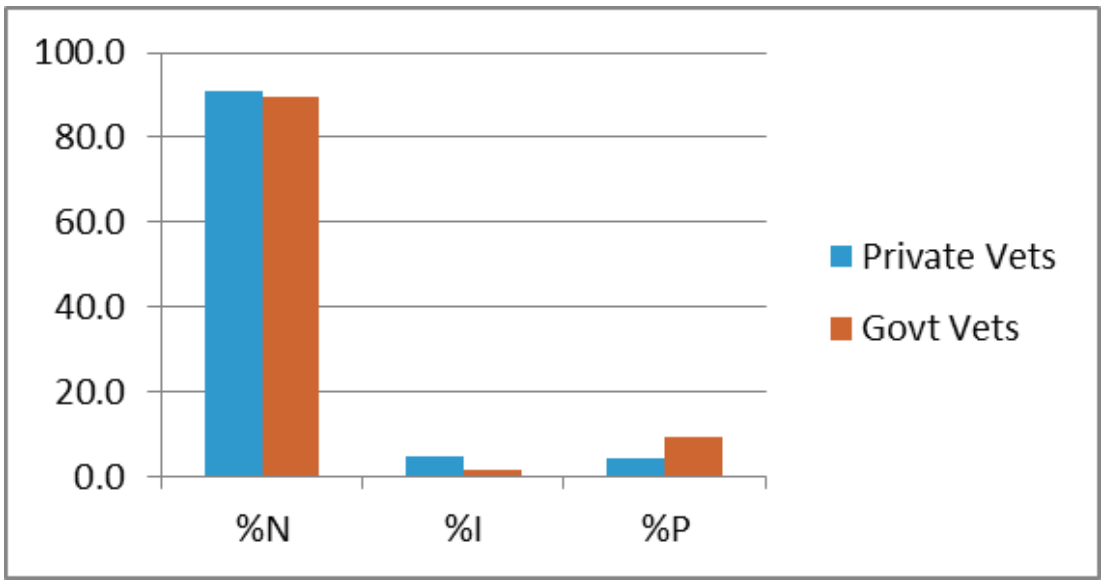


Figure 3. 2011 'At Risk' test results by type of Vet ('N' = Negative 'I' = Inconclusive 'P' = Positive)

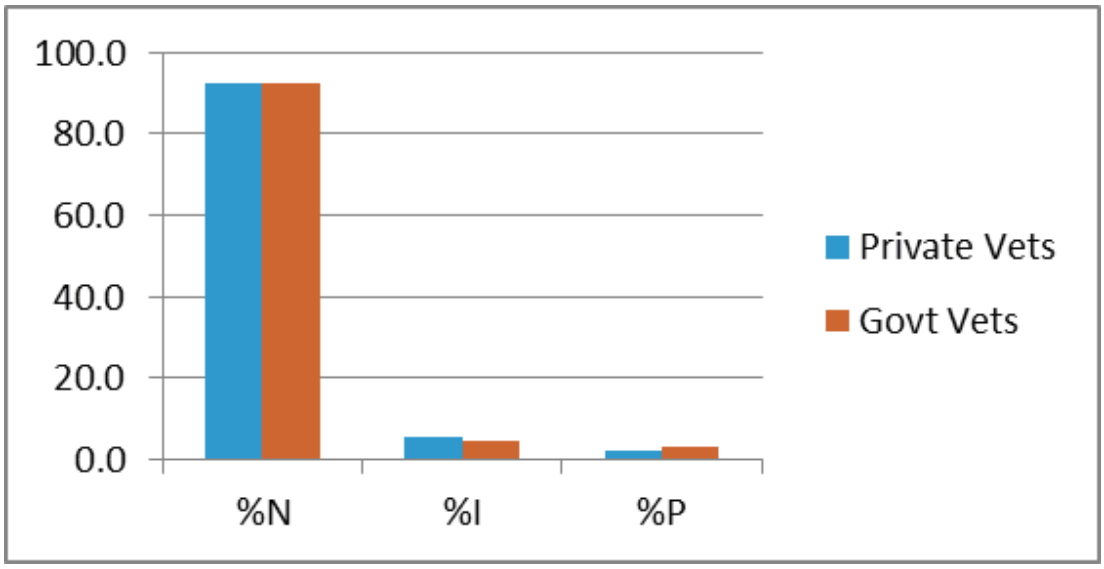


Figure 4. 2011 Routine test results by type of Vet ('N' = Negative 'I' = Inconclusive 'P' = Positive)

3) For 'restricted' and 'at risk' tests, in 2011, there was little difference between results obtained by private vets and VOs (91% negative for both on 'restricted' and 80.7% v 78.5% negative respectively for 'at risk'). For test results generally, the main source of difference appears to come from the test results obtained by VOTs. VOs were, however, the most likely of the three groups to obtain positive results for individual animals in both 'restricted' and 'at risk' tests.

4) Analysis based on herd ID numbers seems to suggest that VOTs carry out more tests on the same herd for whatever reason. For tests carried out in 2011, 40% of herd tests carried out were on herds that had previously been tested that year. The equivalent figures for VOs and PVPs were 5% and 20% respectively. These 'repeat' tests appear to boost the likelihood of obtaining a positive result

5) There appears to be some variation between the average numbers of animals tested in herd tests by different types of vet, with VOTs testing larger numbers on average and VOs testing the smallest numbers on average. Not surprisingly, the likelihood of obtaining a positive herd test result increases with the number of animals tested.

6) The DARD analysis does not include test reason, which also has a bearing on the outcome.

7) Seasonality has not been included in the analysis and may be another factor worth considering, particularly if, for example, private vets are more likely to be employed at certain times of the year to cover holiday periods.

Conclusion

While there do appear to be differences in the TB testing results obtained by private vets and DARD vets, the differences may not be as large when other factors (outside of those included in the DARD statistical analysis) are taken into account. Further analysis taking account of herd size, 'repeated' herd tests, test reason and (possibly) seasonality might be worth doing, assuming any analysis involving the pre-2011 data can also control for the impact of any policy or testing methodology changes over time.

Robert Barry
Research and Information Service

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Research and Information Service
Briefing Paper

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Mark Allen

‘Multiple’ claims for Bovine TB compensation – further analysis of DARD data

1 Background

The ARD committee within the Assembly is currently undertaking an Inquiry into Bovine TB in an effort to examine all possible measures that could be taken in Northern Ireland to reduce and eradicate the disease in cattle.

A key component of the response to Bovine TB in Northern Ireland is the compensation scheme which currently means that farmers with cattle compulsorily removed under TB orders are compensated at 100% of the market value.

In a briefing provided to the ARD committee in May 2012 DARD officials made reference to the fact that the total compensation paid in relation to TB reactors and negative in contacts with a disease test in 2011-12 equated to £12,857,079, which was split across 1,860 herds, giving an average total payment per herd of £6,912.

This paper provides further background analysis of the data provided by DARD as well as further exploring the nature of so called ‘multiple’ claims. For the purposes of this paper a multiple claim relates to 2 or more compensation payments per cattle herd over a stated time period.

2 The current BTB compensation regime and process in Northern Ireland

2.1 BTB testing regime in Northern Ireland

At present all cattle in Northern Ireland are subject to a mandatory annual Bovine TB test using the single intradermal comparative cervical tuberculin test (SICCT) (more commonly referred to as the Tuberculin test). It is also worth noting that a cattle herd may be subject to additional TB testing, outside the annual regime in circumstances as follows:

- A farmer or vet suspects that cattle within the herd are infected with TB;
- A neighbouring/associated herd tests positive for TB;
  - Contains animals traced from an infected herds
  - Has routinely slaughtered an animal that discloses signs typical of TB at post mortem examination
- A farmer intends to export cattle, both to GB and other EU Member States – all animals over 42 days are subject to the single intradermal test (a more severe interpretation of the skin test) and interpretation within 30 days of export as required.

Northern Ireland also concurrently and as both part of its TB Programme and Veterinary Public Health responsibilities, operates a Post Mortem Examination (PME) system, which sees DARD staff inspecting all cattle carcasses bound for human consumption for the presence of TB lesions.

2.2 How is a bovine TB breakdown currently defined?

A reactor to the Tuberculin test and any associated/in contact animals, as determined by an officer of the Department as being at significant risk, are removed for slaughter. These conditions also apply in relation to animals in contact/associated with animals on which TB lesions are discovered as part of a routine abattoir inspection, but a herd test would be conducted before animals would be removed compulsorily from the herd.

All herds in NI are at all times allocated an official Tuberculosis (OT) herd status, a herd status reason, and a next test type. The herd status may only be officially tuberculosis free (OTF), officially tuberculosis suspended (OTS), or officially tuberculosis withdrawn (OTW). These statuses are as defined in CD 64/432 EEC[1]. In addition to CD 64/432 EEC requirements, where any herd in NI discloses more than five skin reactors without regard to disease confirmation, or where considered otherwise epidemiologically prudent, the herd is made OTW.

A positive skin test or abattoir lesion discovery (where no alternative diagnosis is made) also means that the cattle herd is acknowledged as having a Bovine TB breakdown and that as a result the herd's status is changed from Officially TB Free (OTF) to either Officially Tuberculosis Withdrawn (OTW) or Officially Tuberculosis Suspended (OTS). The circumstances under which these changes in herd status can be applied and consequently removed are set out in table 1 overleaf.

1 COUNCIL DIRECTIVE of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine

Table 1: Officially TB Suspended (OTS) and Officially TB Withdrawn (OTW) status conditions[2]

	Officially TB Suspended (OTS)	Officially TB Withdrawn (OTW)
Circumstances for application of status	• A suspect tuberculosis lesion is disclosed at abattoir. • Disclosure of an inconclusive reactor. • A herd test is overdue. • 5 or less reactors are disclosed at a test, with no PME or laboratory confirmation. • And when, in the judgment of the patch VO, there is no over riding epidemiological reasons to apply OTW status	• Disease is confirmed by PME and/or laboratory procedures. • When disease has not been confirmed, OTW status is applied where a Veterinary Officer has considered it to be epidemiologically prudent, for example recent movement out of a herd of an animal that is disclosed as a reactor in another herd. This decision is at the discretion of the patch VO and will be based on their knowledge of the breakdown, the area and any other relevant epidemiological evidence available to them. • In any case, where there are more than five reactors disclosed at a skin test OTW status is routinely applied.
Movement restrictions linked to status	• No live movement out except directly to slaughter in NI. • Note: OTS herds with the status reason "RI (inconclusive) but no TB confirmed within three years" are derogated under CD 64/432EEC Annex A 3.A(d) to allow local live movement within UK. However, animals from the herd or those that have originated in the herd since the last clear herd test are not allowed to be exported to another MS. • Note: the movement restrictions described above may, where considered epidemiologically necessary, be increased to prevent any movement off farm even to direct slaughter or cease movement onto farm.	• No live animal movements out except directly to slaughter in NI. • Note: the movement restrictions described above may, where considered epidemiologically necessary, be increased to prevent any movement off farm even to direct slaughter or cease movement onto farm.

2 Derived from 2012 DARD BTB Eradication and Control submitted to the European Commission 15 April 2011

	Officially TB Suspended (OTS)	Officially TB Withdrawn (OTW)
Requirements for removal of status and return to Officially TB Free (OTF) status	• The Veterinary Officer is content that there are no epidemiological factors that indicate the herd status should be retained or made OTW (see OTW above) • Testing is completed in accordance with CD 64/432 Annex A (3A) or, where applicable, • The inconclusive animal is resolved by testing or slaughter with negative PME and laboratory results.	• Two consecutive clear herd skin tests have been completed in accordance with CD 64/432 Annex A (3B), and • Cleansing and disinfection procedures are completed as necessary.

By way of emphasis, a TB outbreak is acknowledged as existing from the moment of detection of the disease within a cattle herd until the point when, as a minimum, the clear herd skin test(s) required by the Directive have been achieved and other disease control stipulations, such as cleansing and disinfection, have been met. In relation to skin tests, and in line with the EC Directives, 2 clear skin tests are required in instances when a disease outbreak is confirmed and OTW status is applied to the herd, but 1 clear skin test will suffice in instances where a disease outbreak is unconfirmed and OTS status is applied to the herd providing the number of reactors is not more than 5.

2.3 Compensation payable

At present compensation for any TB Programme cattle removed to slaughter is payable at 100% of market value. The associated costs are borne by DARD, with any salvage value from the carcase also going to DARD.

Market value is determined by DARD livestock valuation officers who assess what the animal would have made at market if it was healthy.

There is an appealate procedure for instances where the livestock owner disagrees with the valuation proposed by the DARD livestock valuation officer. This may involve a second individual animal valuation carried out by an independent valuer.

3 DARD 2011-12 TB compensation payment data

As the body which actually manages and pays out compensation for Bovine TB within Northern Ireland, DARD (through its Veterinary Service) maintains detailed records on the levels of compensation paid out.

A lot of this data is derived from DARD's Animal and Public Health Information System (APHIS) which was the source for the compensation data covering 2011-12 which was presented to the ARD committee in May 2012.

As stated previously, the total compensation paid in relation to TB reactors and negative in contacts with a disease test in 2011-12 equated to £12,857,079, which was split across 1,860 herds, giving an average total payment per herd of £6,912. This data was also broken down into Divisional Veterinary Office (DVO) area, as set out in table 2 below.

Table 2: Bovine TB compensation paid out per DVO office 2011-12

Divisional Veterinary Office (DVO)	No of herds paid	Total Paid	Average payment per herd
Armagh	161	£1,260,490	£7,829
Ballymena	77	£278,916	£3,622
Coleraine	216	£1,048,851	£4,856
Dungannon	174	£822,070	£4,725
Enniskillen	226	£1,552,592	£6,870
Londonderry	59	£156,025	£2,644
Mallusk	76	£402,870	£5,301
Newry	369	£3,235,170	£8,767
Newtownards	224	£2,291,725	£10,231
Omagh	278	£1,808,370	£6,605
Total	**1860**	**£12,857,370**	**£6,912**

The data in table 2 clearly reflects the sub regional variation in Bovine TB incidence and highlights the fact that just over half of the money (£6,787,385 or 53%) is paid out in the areas covered by Armagh, Newry and Newtownards DVOs (i.e. Counties Armagh and Down). However, it must also be noted that this is also influenced by herd numbers, herd size, type and individual value of stock.

It is also worth noting that the highest average payment per herd relates to the area covered by the Newtownards DVO. Whilst the reasons for this are not made clear within the provided data they may be related to the nature of the cattle herds in this area, in terms of their size, numbers of reactors in each herd or the number of higher value cattle within them, for example.

Looking at the 2011-12 data in greater detail it is apparent that the number of payments relating to individual herds over the course of the year varies widely. Whilst many herds had only one compensation payment within the period there are instances of 'multiple' payments (2 or more). Table 3 below provides a breakdown of the compensation data in terms of the amount paid out within each DVO area and how much was for single payments and how much was for 2 or more payments.

Table 3: 2011-12 Bovine TB compensation paid out in single and multiple (2+) payments

DVO area	Total compensation paid 2011-12	Amount paid out single payments (% of total compensation)	Amount paid out in 2 or more payments (% of total compensation)
Armagh	£1,260,490	£278,610 (22%)	£981,880 (78%)
Ballymena	£278,916	£103,361 (37%)	£175,555 (63%)
Coleraine	£1,048,851	£396,545 (38%)	£652,306 (62%)
Dungannon	£822,070	£302,485 (37%)	£519,585 (63%)
Enniskillen	£1,552,592	£560,710 (36%)	£991,882 (64%)
Londonderry	£156,025	£90,910 (58%)	£65,115 (42%)
Mallusk	£402,870	£151,390 (38%)	£251,480 (62%)
Newry	£3,235,170	£762,840 (24%)	£2,472,330 (76%)
Newtownards	£2,291,725	£680,675 (30%)	£1,611,050 (70%)
Omagh	£1,808,370	£588,935 (33%)	£1,219,435 (67%)
Total	£12,857,079	£3,907,671 (30%)	£8,949,408(70%)

In overall terms the total amount of compensation paid in 2 or more payments accounted for 70% of the total compensation paid in 2011-12.

With regard to the DVO areas the total amount of compensation paid out in multiple payments exceeded the amount paid out in single payments, in 9 of the 10 DVO offices - Londonderry being the exception.

The actual number of payments per DVO office during 2011-12 and how these were broken down is set out in table 4 below

Table 4: Breakdown of Bovine TB compensation payments 2011-12 per DVO office area and by number of payments made- derived from DARD data.

DVO	1 payment	2 payments	3 payments	4 payments	5 payments	6 payments	7 payments	8 payments
Armagh	127	24	4	4	1	1	0	0
Ballymena	61	14	2	0	0	0	0	0
Coleraine	154	42	15	4	0	0	1	0
Dungannon	118	31	19	6	0	0	0	0
Enniskillen	156	46	20	3	0	1	1	0
Londonderry	52	6	1	0	0	0	0	0
Mallusk	64	6	2	2	2	0	0	0
Newry	230	88	28	11	9	1	1	1
Newtownards	153	40	18	6	4	0	2	0
Omagh	210	42	16	9	1	0	0	0
Total	**1,325**	**339**	**125**	**45**	**17**	**3**	**5**	**1**

It is clear from the data presented in table 4 that across all areas covered by the 10 DVO offices the greatest number of compensation payments were single payments. This contrasts with the aforementioned fact that the greatest amount of compensation, equating to £8,949,408, was paid out in 2 or more payments. Rather than being contradictory the data presented in tables 4 and 5 emphasises the fact that single payment amounts appear to be smaller than multiple (2 or more) payments.

By way of illustration of this point, the average single payment in 2011-12 was calculated to be £2,949 as compared to the average payment for 2 or more payments which was £16,727.

It should however be emphasised that the available data enabled no analysis on the number of payments per disease outbreak.

The conclusions that can be drawn from all of this data are limited given the following caveats that need to be considered:

- The comparing of incidence of single and multiple payments within a given calendar year is not a wholly accurate or fair comparison given the complex nature of Bovine TB outbreaks and the fact that a single outbreak can occur over a number of years(see next section of report);
- Within each outbreak of TB in a herd, there may be multiple payments reflecting the progressive diagnosis and elimination of infection from the herd
- To build upon the previous point, data for one calendar year does not provide the full picture for compensation paid in relation to a cattle herd. By way of example a farmer receiving a single claim payment every year over a ten year period may actually receive more compensation than a farmer who only receives 'multiple' payments within one calendar year;
- The primary financial data collated by DARD does not include sufficient information to enable the determination of risk factors that can contribute to either a TB outbreak or the persistence of the disease within a herd and the subsequent payment of compensation in either a single or multiple payments;
- The fact that compensation claims and payments, as set out previously, are primarily determined by a positive Tuberculin (SICCT) test – but the sensitivity and hence reliability of the SICCT is estimated at between 60% and 95% (Clegg et al. , 2011[3]; Adams, 2001[4]; Costello et al. 1997[5]; Monaghan et al., 1994[6]) which means that there are positive cattle which are not being identified and as such for which compensation claims are not being made. It is also worth noting that some evidence suggests that the sensitivity to SICCT test is lower in animals that are tested at frequent levels, raising the possibility that a herd might be viewed as OTF due to the fact that cattle are failing to respond to the test rather than being an indication that TB has been eliminated. DARD recognises these limitations through their use of gamma interferon testing and severe interpretation of the SICCT (any skin reaction of 2mm or more is a positive reaction).
- Building upon the previous point on the limitations of the SICCT test, and by way of elaboration, it is fair to surmise that there are herds which have received a compensation payment(s) within the given period which could actually have made more claims on account of the fact that TB was still present within the herd.

3 Clegg, T. A. Duignan, A. Whelan, C., Gormley, E., Good, M., Clarke, J., Toft, N., More, S. J. 2011. Using latent class analysis to estimate the test characteristics of the gamma- interferon test, the single intradermal comparative tuberculin the first tested a multiplex immunoassay under Irish conditions. Vet Micro 151 68-76

4 Adams. L. G. 2001. In vivo and in vitro diagnosis of Mycobacterium bovis infection. Rev Sci Tech; 20: 304-324.

5 Costello, E., Egan, J. W., Quigley, F. C., O'Reilly, P. F. 1997. Performance of the single intradermal comparative tuberculin test in identifying cattle with tuberculosis lesions in Irish herds. Vet Rec 141: 222-224.

6 Monaghan, M. L., Doherty, M. L., Collins, J. D., Kazda, J. F., Quinn, P. J. 1994. The tuberculin test. Vet Microbiol; 40: 111-124.

4 More detailed contextual data provided by DARD relating to compensation claim data

As discussed in section 3 of this paper the usefulness of the compensation payment data provided by DARD is limited without further contextual information. In light of this situation Ralse requested additional background information about the disease outbreaks that had triggered compensation payments as they related to the herds identified in the 2011-12 data over a 5 year period, from 2007 to the present.

In an effort to further understand the intricacies of Bovine TB outbreaks, and their interaction within this data Ralse asked DARD for further background information on 4 herds randomly selected by Ralse. This required details such as herd type, size, farm business model employed, breakdown of disease episodes and conclusions that could be drawn.

The 4 randomly selected herds and the number of compensation payments, and total compensation they had received in 2011-12 and 2007-12 are set out in table 5 below.

Table 5: Bovine TB compensation paid to 4 randomly selected herds 2011-12 and 2007-12

Identifier No.	DVO office	Single or multiple compensation payments in 2011-12	Total compensation paid in 2011-12	Single or multiple compensation payments 2007-12	Total compensation paid 2007-2012
37	Mallusk	Multiple (5 payments)	£26,880	Multiple (10 payments)	£55,930
633	Newry	Multiple (4 payments)	£15,115	Multiple (11 payments)	£24,495
1493	Dungannon	Single	£1,550	Single	£1,550
1795	Omagh	Multiple (2 payments)	£9,050	Multiple (2 payments)	£9,050

3 of the randomly selected herds had been in receipt of multiple (2+) compensation payments during 2011-12 and the overall period of 2007-12.

Turning to the data relating to these 4 herds over the last 5 years and presented in Appendix 1 it is clear that 2 of the 4 randomly selected herds (Herd identifier 37, Mallusk and Herd identifier 1795, Omagh) have been subject to more than one TB outbreak over the last 5 years. By way of reemphasis a disease outbreak is defined as existing from detection of the disease within a cattle herd until the point when the required clear herd skin test(s) has been achieved.

Herd identifier 633, Newry and herd identifier 1493, Dungannon have only experienced what can be defined as one disease outbreak over the last 5 years. It is however worth noting that disease outbreak in herd identifier 633 Newry has been protracted and continued from December 2006 to the present.

The additional data provided by DARD also highlights the particular risks presented by factors such as the business model employed by the farm which can increase the risk of Bovine TB, such as a high turnover of stock.

5 Conclusions

Looking at the initial and subsequent data provided by DARD relating to Bovine TB compensation it is clear why compensation payments are an area of public interest, given that according to the data provided by DARD for the five year period of 2007-12 compensation payments for Bovine TB had totalled £51,835,551.96.

Whilst the emphasis on compensation is understandable, in instances of more than 1 Bovine TB breakdown or a protracted long term single breakdown such as that relating to herd identifier 633 within the Newry DVO, it is perhaps more pertinent to focus on the factors that are contributing to reoccurrence or persistence of Bovine TB within a herd.

It also needs to be restated that the conclusions that can be drawn from the financial data provided by DARD to date are extremely limited. Bovine TB is a complex disease, a point illustrated by the supplementary data provided by DARD for the 4 randomly selected herds, and as such data for either a 1 year or 5 year time period does not provide a sufficiently detailed picture on which to draw any significant conclusions,

Whilst the supplementary data provided by DARD does assist in understanding why the disease is reoccurring or persisting there are nonetheless outstanding questions around what could be done to stop reoccurrence or persistence as follows.

- Rather than focusing on compensation data it may be useful to ask DARD to provide details on the number and length of disease outbreaks within cattle herds here over a longer time period. The provision of such data would potentially provide a better indication of those areas or herds experiencing recurring or persistent outbreaks.
- It appears that particular business models may well increase the risk of Bovine TB occurrence, reoccurrence or persistence and by default elevate the levels of compensation claimed – what more if anything can be done to address these risks whilst still allowing herdkeepers to maintain a viable business? In these instances is eradication of the disease realistic or is control more achievable?
- Recently published research conducted by the academics from the University of Warwick7 concludes that a farm history of Bovine TB suggests the persistence of Bovine TB on the farm. Whilst the causes for this situation can be myriad, and include factors such as wildlife and animal husbandry, a fundamental challenge for eradication of the disease on a farm remains the fact that the SICCT is not picking up all infected animals and that as such is likely contributing to the occurrence, reoccurrence or persistence of the disease. This situation is directly contributing to the ongoing need to pay compensation for infected animals and as such the question remains over how or if the disease can be better identified through a more sensitive test which is both cost effective and for which regular exposure does not reduce sensitivity in cattle.
- In herds where Bovine TB is persistent and protracted there is a real need to better understand the reasons for this situation. In this context, DARD's recently announced 3 year research project looking at risk factors associated with multiple reactor and chronic herds8 is to be welcomed but it would at this stage be useful to know how chronic herds will be defined within this study.

7 Green L.E, Carrique-Mas J.J., Mason S.A, Medley G.F., Patterns of delayed detection and persistence of bovine tuberculosis in confirmed and unconfirmed herd breakdowns in cattle and cattle herds in Great Britain, School of Life Sciences, University of Warwick

8 DARD Directed Agri-Food and Biosciences Institute (AFBI) Research Work Programme 2012/13 (Supplementary A), DARD, May 2012, page 6

Appendix 1 – Detailed background information on 4 randomly selected herds – data provided by DARD

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
Herd no 37 – Mallusk DVO	Pedigree dairy	None	Currently 385	2 disease episodes over the last 5 years	Disease episode 1 – 21/12/2009 – 18/5/2011 First indication of disease: 1 reactor @ RI1 (inconclusive retest) 19/02/2010 This is where a routine test has indicated an inconclusive test result and a further test of the animal resulted in removal as a reactor. Consequent tests/ issues in this episode: ·Disease confirmed in the disclosing animal above. This herd now needs two consecutive clear tests to regain OTF status. ·5 reactors @ RH1 (1ST Restricted herd test) 22/04/2010 (1 confirmed TB positive) -327 cattle tested. Not a clear test, therefore two consecutive clear tests still required. ·10 reactors @ RH2 (2nd Restricted herd test) 26/08/2010 (7 confirmed TB positive)-340 cattle tested. Not a clear test, therefore two consecutive clear test still required. ·5 reactors @ RH1 28/10/2010 (3 confirmed TB positive) -340 cattle tested. Not a clear test, therefore two consecutive clear tests still required. ·346 cattle tested clear @RH1 14/01/2011 ·352 cattle tested clear @ RH2 15/04/2011 ·Satisfactory cleansing and disinfection recorded 17/05/2011	These two episodes have led to two tranches of payments Each tranche has had multiple claims within them The two apparent episodes of disease, and therefore payment episodes, are highly likely to be related.

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					Disease Episode 2 - 10/10/2011 – present First indication of disease: 1 reactor @ CHT (Check Herd test -4-6 months post de-restriction) 06/10/2011 – 322 cattle tested ·TB confirmed ·This was a homebred cow present during previous breakdown Therefore may have been infected then and • not disclosed to the test, • been exposed to a source that was responsible for the first episode • or as the result of a new source of infection. Consequent tests/ issues in this episode: ·7 reactors @ RH1 09/12/2011(3 confirmed TB positive) – 351 cattle tested ·5 reactors @ RH1 10/02/2012 (4 confirmed TB positive) – 348 cattle tested ·1 reactor @ RH1 13/04/2012 (Not confirmed TB positive)-358 cattle tested ·6 reactors @ RH1 06/07/2012 (Not slaughtered at time of writing) - 397 cattle tested	

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
Herd no 633 – Newry DVO	Suckler cows/ beef	2 associated herds (Associated herds are epidemiologically linked for various reasons e.g. common housing or grazing .They are regarded as 1 herd for disease control purposes i.e. are under same restriction and same testing regime). 1 of the associated herds is a large dairy herd; the other is a small suckler cow /beef herd	Currently 445	One disease episode in past 5 year period Regularly imports young cattle from ROI and purchases suckler cows and young stock privately and via markets domestically	**14/12/2006-present** First indication of disease: Unconfirmed slaughter case 23/01/2007 (Animal in herd 15 months. TB histopathology was inconclusive .Culture was TB negative therefore 1 clear test required before de-restriction. Consequent tests/issues in this episode: •1 reactor @ RH1 02/03/2007 (Confirmed TB positive) -230 cattle tested (Animal purchased 6 months previously). This herd will now need two consecutive clear herd tests. •1 reactor @ RH1 04/05/2007 (Confirmed TB positive) - 96 cattle tested (part test). This was a targeted test of a distinct group deemed at risk from the infected animal. Animal purchased 7 months previously •1 reactor @ RH1 18/08/2007 (Not confirmed TB positive)-213 cattle tested •1 reactor @ RH1 07/12/2007 (Not confirmed TB positive)-233 cattle tested •1 reactor @ RH1 15/03/2008 (Confirmed TB positive)-224 cattle tested •Confirmed case @ routine slaughter* 30/01/2009 (Animal in herd 15 months)	This herd runs a high disease risk business model due to purchasing policy and close epidemiological relations with other herds. It has been an example of a continuous long term breakdown.

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					*Note: A herd keeper can decide to slaughter routinely during a breakdown episode and animals are subject to post mortem examination for public health reasons. This is not as a consequence of testing, but any lesions found at post mortem may influence future Programme matters such a testing / clearance. Animals slaughtered in these circumstances, and found to be infected, do not lead to a claim for DARD compensation	
					•Unconfirmed case @ routine slaughter 19/05/2009 (TB histopathology was inconclusive /culture was negative) •2 reactors @ RH1 22/08/2009 (1confirmed TB positive)-371 cattle tested. (Animal in herd 21 months) •Unconfirmed case @ routine slaughter 24/02/2010 •Confirmed case @ routine slaughter 20/07/2010(Homebred) •3 reactors @ RHT (Stabilising test following disclosure of TB @ routine slaughter) 03/09/2010 (2 confirmed TB positive)-325 cattle tested (Confirmed animals both in herd in excess of 2 years) •1 reactor @ RH1 04/12/2010 (Confirmed TB positive) -336 cattle tested (Animal in herd in excess of 2 years)	

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					•2 reactors @ RH2 06/05/2011 (1 confirmed TB positive) - 277 cattle tested. (Confirmed animal in herd 3 months) •Confirmed case @ routine slaughter 29/06/2011. (Animal in herd 16 months) •2 confirmed cases @ routine slaughter 29/08/2011. (Both in herd for at least 15 months) •Confirmed case @ routine slaughter 14/09/2011(Homebred) •2 reactors @ RHT 18/11/2011 (1 confirmed TB positive) – 399 cattle tested. (Confirmed animal homebred) •7 reactors @ RH1 30/03/2012 (5 confirmed TB positive) - 406 cattle tested. (Confirmed animals – 1 homebred / 4 in herd at least 8 months) •Confirmed case @ routine slaughter 23/07/2012. (Animal moved in 9 months previously)	
Herd no 1493 – Dungannon DVO	Suckler cows/ beef	None	Currently 134	1 disease episode in 5 year period	**14/10/2011-11/04/2012** First indication of disease: 113 cattle were tested @ BCT (Backward check test following disclosure of TB in an animal recently moved from the herd) completed 14/10/2011. (An inconclusive animal from the test was the reactor 02/12/2011) 1 reactor @ RI1 02/12/2011 •not confirmed TB positive. This indicates that only one clear herd test required prior to de-restriction.	This herd frequently purchases drystock, smaller numbers of suckler cows and occasional stock bull. There is a risk from the purchase policy in this herd, but this cannot be shown to have caused the episode.

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					Consequent tests/ issues in this episode: ·146 cattle tested clear @ RH1 07/04/2012. ·Cleansing and disinfection had been passed satisfactory on 05/01/2012. There were 14 animals forward traced to this herd from confirmed TB breakdowns during this time and tested as a result .None were identified as TB reactors. This indicates that although the purchasing policy is higher risk, there is no evidence it has caused a problem. The herd was also considered at risk to a contiguous herd. 64 cattle were tested @ AHT (Annual herd test) completed 02/02/2007 85 cattle were tested @ AHT (Annual herd test) completed 01/02/2008 87 cattle were tested @ AHT (Annual herd test) completed 06/02/2009 75 cattle were tested @ LCT (Lateral check test of herd at risk to confirmed TB breakdown) completed 28/01/2010 91 cattle were tested @ LCT completed 05/11/2010 104 cattle were tested @ LCT completed 11/03/2011	The herd was also at risk to another herd due to cattle to cattle proximity. This led to increased risk surveillance. An animal moved from this herd was identified as diseased in another herd and resulted in herd testing disclosing the disease.

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
Herd no 7795 – Omagh DVO	Beef herd	None	Currently 210	4 episodes requiring restriction due to suspect disease during the 5 year period. In one episode an alternative diagnosis was found.	**Disease Episode 1 - 14/12/2007- 13/03/2009** First indication of disease: Confirmed TB identified @ slaughter of TB inconclusive 08/01/2008. (Animals which are not positive on skin test but also not negative require a repeat skin test to resolve their TB status .This is carried out at least 6 weeks following the initial test. Negative at retest =negative. Positive or inconclusive at retest = reactor. In this case, the further test of the animal resulted in removal as a reactor. Consequent tests/ issues in this episode: ·Disease confirmed in the disclosing animal above. This herd now needs two consecutive clear tests to regain OTF status. ·1 reactor @ RH1 29/05/2008 (Confirmed TB positive)-451 cattle tested ·1 reactor @ RH1 21/08/2008 (Not confirmed TB positive)-470 cattle tested ·2 intradermal inconclusive were identified on 663 cattle tested 11/12/2008. These animals tested clear 06/03/2009. ·Cleansing and disinfection was passed as satisfactory on the same date.	Herd operates a high risk strategy purchasing reasonably mature beef cattle for slaughter. These are likely to be three separate disease episodes.

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					(Disease) episode 2 - 15/06/2009-07/08/2009 ·Suspect slaughter case identified 15/06/2009 (TB not confirmed-Actinobacillosis diagnosed at histopathology / culture TB negative) ·No herd testing required as alternative diagnosis made and no TB identified. ·Note, this did not result in any payments from DARD	
					Disease episode 3 - 26/10/2009-31/08/2011 1 reactor @ CHT 23/10/2009 (Confirmed TB positive) - 687 cattle tested ·Animal not present during previous confirmed breakdown ·CHT is the test required about 6 months post clearance. In this case from the 12/07-3/09 episode ·Herd now requires two consecutive clearance tests ·Suspect slaughter case identified 05/01/2010 (TB not confirmed) ·2 reactors @ RH1 19/02/2010 (Not confirmed TB positive) – 586 cattle tested ·1 reactor @ RH1 24/06/2010 (Confirmed TB positive) - 407 cattle tested. (Animal purchased only 2 months previously)	

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					·Confirmed case @ routine slaughter 22/10/2010. (Animal moved in 35 days previously) ·1 reactor @ RH2 26/02/2011(Confirmed TB positive) – 563 cattle tested. (Animal moved in 4 months previously) ·131 cattle tested clear @ RH1 30/06/2011 ·Cleansing and disinfection passed satisfactory on 17/08/2011. ·43 cattle tested clear @ RH2 19/08/2011	
					Disease episode 4 24/11/2011-present ·2 suspect slaughter cases identified 24/11/2011 (TB not confirmed- Both had Actinobacillosis identified at histopathology and no TB identified.). No further testing required ·Confirmed case @ routine slaughter 16/01/2012. (Animal moved in 4 months previously). 2 clear herd tests required prior to de-restriction ·1 reactor @ CTT (Trace test of individual animal moved from confirmed TB breakdown) 06/02/2012 ·Confirmed TB identified @ slaughter of TB inconclusive 25/06/2012. (Animal moved in 3 months previously). 2 clear herd tests required prior to de-restriction Regularly purchases cattle, mainly steers, mainly through the market	

Selected herd and DVO	Herd Type	Associated herds	Approximate herd size	Overview	Detailed info on disease outbreaks over the last 5 years	Conclusions/ comments
					There were 26 animals forward traced to this herd from confirmed TB breakdowns during this time and tested as a result .1 was identified as a TB reactor. 235 cattle were tested @ CHT 22/06/2007 This was the only risk test carried out during the periods of Officially Tuberculosis free status during this period. There are currently 213 cattle in the herd	

Research and Information Service
Briefing Paper

Paper 000/00 5th September 2012 NIAR 383-12

Mark Allen

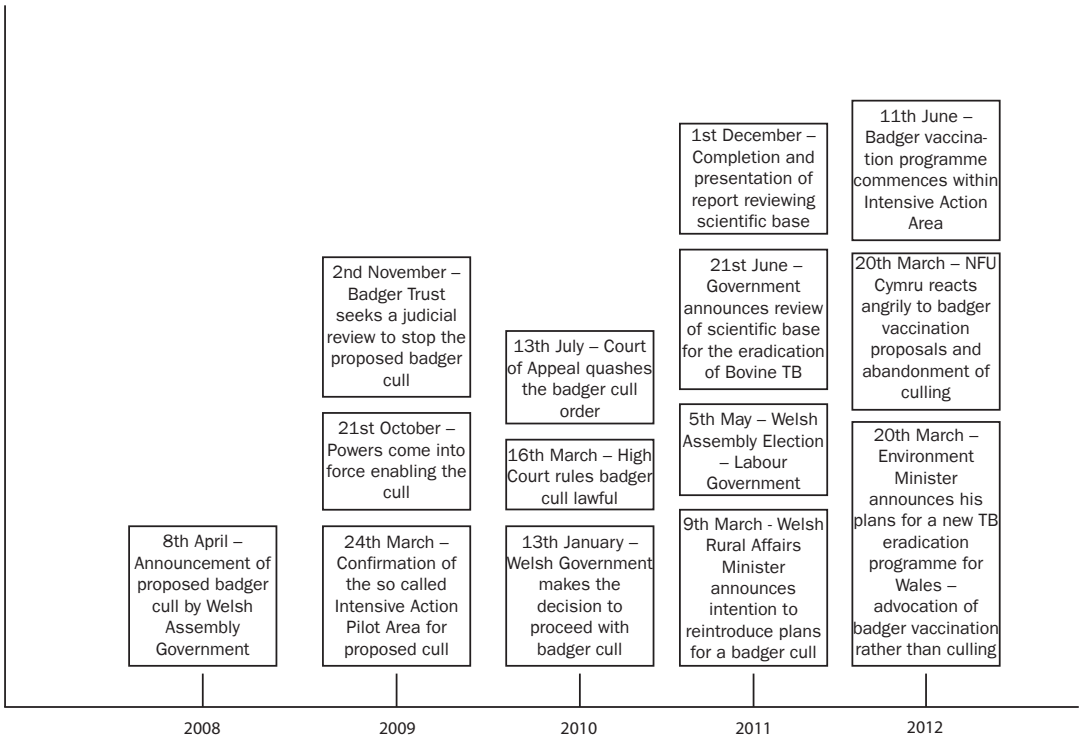
Badger policy related to Bovine TB in Wales – key milestones 2008-2012

1 Background

This paper provides an overview of progress on the adoption of badger culling and vaccination proposals as Bovine TB control/eradication measures within Wales between 2008 and 2012.

The National Assembly for Wales was formed in 1999 as part of the UK's government's commitment to the devolution of legislative powers to the constituent regions of the UK. The 60 elected members of the Welsh Assembly have responsibility for both the making of laws and holding the Welsh Assembly Government to account.

Since the creation of the Assembly in 1999, the makeup of the Welsh Assembly Government has changed from an initial Labour/Liberal democrat coalition to a Plaid Cymru/Labour coalition and the current Labour administration.



2 First announcement of a proposed badger cull – 8th April 2008

Welsh Rural Affairs Minister Elin Jones announced that the Welsh Assembly Government would be adopting '…a comprehensive action plan to eradicate Bovine TB in Wales' on the 8th of April 2008.

The action plan included the following proposals for the identification and removal of on farm sources of infection:

- TB Health Check Wales – testing of every cattle herd in wales for TB to establish both a baseline and better understanding of the disease;
- Improved animal husbandry;
- Improved biosecurity measures;
- Changes to the TB compensation scheme;
- Exploration of the potential for using cattle and badger vaccines; and
- A badger cull pilot within a so called Intensive Action Pilot Area.

On the specific issue of the proposed badger cull Minister Jones identified it as '….the most effective measure to address both sources of infection and cross-infection, subject to strict regulation and meeting a number of requirements, would be a targeted cull of badgers in TB high incidence areas. To take this forward we will prioritise the establishment of an intensive action pilot in an area which has been identified as a TB hotspot..No final decision has yet been made about a location capable of satisfying these criteria but I anticipate it would be in a defined high incidence area for the disease and subject to strict conditions. Additional areas would not be considered until the implementation and robust review and a proper evaluation of the cull and other measures in the intensive action pilot area has been undertaken.'

3 Confirmation of the so called Intensive Action Pilot Area for the proposed badger cull – 24th March 2009

A 200km^2 area within North Pembrokeshire, in West Wales was identified as the Intensive Action Pilot Area within which the proposed badger cull would be undertaken.

This study area was selected on the basis that it was the area with the highest incidence of Bovine TB within Wales. Data from May 2011 highlighted that 23% of cattle herds within North Pembrokeshire were subject to TB restriction as compared to 8% of herds in other parts of Wales.

4. Powers enabling the Welsh Government to undertake the proposed badger cull come into force – 21st October 2009

The Tuberculosis Eradication (Wales) Order 2009[1] provided the Welsh Assembly Government with the powers to implement a proposed badger cull within Wales.

The Order stipulated that the 'destruction of badgers must be accomplished by trapping and either shooting or giving a lethal injection, or by shooting without trapping.'

Whilst the powers for the implementation of a badger cull were in place for this date, Rural Affairs Minister Elin Jones stressed that the proposed cull would not begin before April 2010

5 Badger Trust seeks a judicial review to stop the proposed badger cull – 2nd November 2009

In response to the Tuberculosis Eradication (Wales) Order 2009 the Badger Trust made clear their intention to seek a judicial review to prevent any badger cull taking place on the basis that it was not 'underpinned by robust scientific evidence.'

6 Welsh Assembly Government makes the decision to proceed with the proposed badger cull and receives Assembly backing – 13th January 2010[2]

Minister Jones confirms that the cull will take place within the aforementioned Intensive Action Area and would be based upon 5 defined culls over a limited period each year within the pilot area. Culling would be carried in conjunction with strict cattle control measures.

7 High Court rules that the proposed badger cull order is lawful[3] – 16th April 2010

High Court Judge, Mr Justice Lloyd Jones concluded that the Welsh Assembly Government Ministers did have the discretionary powers to carry out a badger cull under the auspices of the Tuberculosis Eradication (Wales) Order 2009, and that as such refused permission for judicial review.

1 The Tuberculosis Eradication (Wales) Order 2009

2 Bovine TB pilot area given go-ahead, Welsh Assembly Government press release, 13th January 2010

3 Badger Trust, R (on the application of) v The Welsh Ministers [2010] EWHC 768 (Admin) (16 April 2010)

8 Court of Appeal quashes the badger cull order following an appeal by the Badger Trust – 13th July 2010

In response to the refused permission for judicial review the Badger Trust sought and won leave to appeal against the decision of Mr Justice Lloyd Jones on the 11th June 2010. The appeal was heard by Lord Justice Pill, Lady Justice Smith and Lord Justice Stanley Burnton who on the 13th July 2010[4] ruled that the Welsh Assembly Government's proposed badger cull was unlawful on the basis that the Assembly Government was wrong to make an order for the whole of Wales when it consulted on the basis of an Intensive Action Pilot Area (IAPA) which only supported a cull on evidence within the IAPA of North Pembrokeshire.

The judges revealed that if the order had been confined to the IAPA in north Pembrokeshire, they would have dismissed the Badger Trust appeal.

At this time the Welsh Assembly Government also stated that it would not be appealing the Appeal Court's decision to the Supreme Court

9 Welsh Rural Affairs Minister announces intention to reintroduce plans for a badger cull – Proposals laid before Welsh Assembly on the 9th March 2011

In light of the Court of Appeal's decision to quash the Welsh Assembly Government's proposed badger cull, Minister Jones announced her intention to bring forward revised plans for a badger cull following a period of consultation.

The Minister duly brought forward The Badger (Control Area) (Wales) Order 2011[5] on the 9th March 2011 which stipulated that any proposed cull would be limited to an Intensive Action Area covering north Pembrokeshire and parts of Ceredigion and Carmarthenshire.

The Welsh Assembly duly approved the implementation of The Badger (Control Area) (Wales) Order 2011 in a vote taken on the 23rd March 2011. The Order then came into force on the 31st March 2011.

Following this decision the Badger Trust stated that they were considering what legal options they had to thwart any cull.

10 Welsh Assembly Election – 5th May 2011

The elections for the Welsh Assembly on the 5th of May saw the Labour Party claim 30 of the 60 seats within the Assembly[6]. Despite lacking an overall majority the Labour Party chose to form the Welsh Assembly Government without relying on any coalition partners and John Griffiths was duly appointed as the Welsh Environment and Sustainable Development Minister with Alun Davies appointed Deputy Minister for Agriculture, Food, Fisheries and European Programmes.

4 England and Wales Court of Appeal (Civil Division) Decisions >> Badger Trust v The Welsh Ministers (includes Costs) [2010] EWCA Civ 807 (13 July 2010)

5 The Badger (Control Area) (Wales) Order 2011

6 2011 Assembly Election Results, National Assembly for Wales Research Service, May 2011

11 Announcement of review of scientific base for the eradication of Bovine TB in Wales by Environment and Sustainable Development Minister John Griffiths – 21st June 2011

Minister Griffiths announced his intention to commission a review of the scientific evidence base that would assist the Welsh Assembly Government as it sought to evaluate and review the best approach to tackling Bovine TB within Wales.

The Government's Chief Scientific Adviser, Professor John Harries was tasked with both overseeing the review and appointing the independent panel of experts who would contribute to it.

The appointed members of the group were as follows:

- **Professor Sir Mansel Aylward CB**, the Chair of Public Health Wales and Director of the Centre for Psychosocial and Disability Research at Cardiff University ;
- **Professor Malcolm Bennett FRCPath FHEA**, Co-Director of the UK National Centre for Zoonosis Research and Professor of Veterinary Pathology at the University of Liverpool;
- **Professor Bridget Emmett**, Deputy Director of the Biogeochemistry Programme, Section Head and Head of Site at the Centre for Ecology & Hydrology (CEH) in Bangor;
- **Professor Charles Godfray CBE FRS**, a Fellow of Jesus College, Oxford and Hope Professor at the Department of Zoology of the University of Oxford;
- **Professor Dirk Pfeiffer**, Professor of Veterinary Epidemiology, and Head of the Veterinary Epidemiology and Public Health Group in the Department of Veterinary Clinical Sciences at the Royal Veterinary College (University of London).

The review was to be completed by Autumn 2011 and during its development Minister Griffiths gave a commitment that there would be 'no cull of badgers in the Intensive Action Area'[7]

12 Completion and presentation of report reviewing scientific base for eradication of Bovine TB in Wales – 1st December 2011

Professor John Harries presented the final report of The Bovine TB Science Review Group to the Environment and Sustainable Development Minister on the 1st December 2011.

The conclusions outlined within the report relating to badgers included the following:

Badger culling

- There is an evidence base that the culling of badgers in areas where the incidence of infection is high will produce a reduction in confirmed Bovine TB cattle herd breakdowns when compared to non-cull areas, and that this persists for a number of years;
- The overall positive impact of culling is reduced by increases in incidence of confirmed Bovine TB cattle herd breakdowns at the periphery of the culled area (the 'perturbation' effect), but this does not persist beyond 18mths to two years after the cessation of culling;
- There is general consensus based on expert opinion that a reduction in the incidence of Bovine TB cattle herd breakdowns associated with the culling of badgers within an area requires the fulfilment of a series of criteria including a large area of land, a high level of land manager compliance, an effective and sustained cull, and where possible boundaries that are impervious to badger movement.

7 Review of scientific evidence base for the eradication of bovine TB in Wales, Welsh Assembly Government press release, 21st June 2011

Badger vaccination

- There is evidence, based on both laboratory and field studies, that vaccination of badgers against Bovine TB by injection does produce a reduction in the severity and progression of disease in that species. Such an effect can reasonably be expected to be of relevance epidemiologically in a wild population;
- No trials have been undertaken to assess whether the vaccination of badgers would reduce the number of Bovine TB cattle herd breakdowns; however it is logical to assume that over time this would be the case. Vaccination of badgers, either by the currently-available Badger BCG injection or in the future through oral administration via bait, could be considered as part of an eradication programme.

As well as providing an overview of the scientific evidence that should inform the Welsh Assembly Government's efforts to eradicate Bovine TB in Wales, the Bovine Science Review Group also recognised that '…while a Bovine TB Eradication Programme should be informed by the science evidence base, the precise measures adopted will be a political judgement based on an evaluation of a range of factors including the interests of the different stakeholders.'

13 Environment and Sustainable Development Minister John Griffiths announces his plans for a new TB eradication programme for Wales – 20th March 2012.

Having considered the report by the Bovine Science Review Group in conjunction with other evidence, Minister Griffiths formally launched the Welsh Assembly Government's Strategic Framework for Bovine TB Eradication[8] on the 20th March 2012.

The Framework contained a range of proposed actions under the themes of

- Cattle Surveillance
- Cattle Vaccination
- Compensation
- Biosecurity
- Non bovine surveillance and control

On the specific issue of badgers the framework outlines government plans to vaccinate rather than cull badgers with the following specific actions

- Design an appropriate badger vaccination project;
- Consider lessons learnt from the small scale vaccination trials undertaken in the UK;
- Initiate a 5 year vaccination study to evaluate the benefits of vaccination and increase the knowledge base.

The Minister also explained that he had asked his Chief Veterinary Officer (Christianne Glossop) to design a five year vaccination programme which would begin in the Intensive Action Area. He had also asked for other areas where vaccination could be expected to contribute to TB eradication to be considered.

8 Welsh Assembly Government's Strategic Framework for Bovine TB Eradication, 20th March 2012

14 National Farmers Union of Wales reacts angrily to proposals to vaccinate rather than cull badgers as TB eradication measure – 20th March

NFU Cymru's angry reaction to Minister Griffith's proposals to abandon a cull of badgers in favour of vaccination was motivated by what the union saw as 'conjecture' rather than 'proven science'.[9]

The union firmly asserted that a badger cull needed to be an essential element of any proposed framework designed to eradicate Bovine TB in Wales.

15 Commencement of badger vaccination programme within the Intensive Action Area – 11th June 2012

The actual badger vaccination programme commenced within the Intensive Action Area covering 288km^2 of north Pembrokeshire, small parts of Ceredigion and Carmarthenshire on the 11th June 2011.

Prior to commencement of the programme, operatives underwent a 4 day Cage Trapping and Vaccination of Badgers Training Course[10] delivered by the Food and Environment Research Agency (FERA).

In an effort to explain the rationale for, and details of, the badger vaccination programme, the Welsh Assembly Government also published a frequently asked questions guide in May 2012[11]. This document provided more details on the nature of the programme including the following:

- Badgers would be trapped in cages, injected with vaccine then released – they would not be tested for TB as there is currently no reliable diagnostic field test for bovine TB in live badgers, and it is not practical for badgers infected with bovine TB to be accurately identified in the field;
- Vaccination is expected to begin in the Intensive Action Area during summer 2012 and to be repeated annually for 5 years;
- Badgers will be trapped overnight, vaccinated and released in the same location the following day. They are unlikely to be in the trap for more than 12 hours;
- Badgers that are caught are given a temporary mark so that they are not vaccinated again if trapped on a subsequent night – vaccinated badgers will not be micro-chipped as it is not practical to attempt micro-chipping live trapped badgers without administering a general anaesthetic;
- Prior to vaccination, a closed season for badger vaccination will be agreed to reflect the environmental conditions and evidence available at that time to avoid this happening – ideally lactating badgers should not be held in a tarp overnight;

By the 14th June the programme had vaccinated 275 badgers.[12]

9 Welsh-Government-Institutes-Policy-based-on-Conjecture-rather-than-one-of-Proven-Science, NFU Cymru press release, 20th March 2012

10 Cage Trapping and Vaccination of Badgers Training Course, Food and Environment Research Agency (FERA)

11 http://wales.gov.uk/docs/drah/publications/120430iaafaqen.pdf

12 Badger vaccination in North Pembrokeshire is underway, Press release, Welsh Assembly Government, 14th June 2012

16 Key observations

- The Welsh Government position has changed from being pro badger cull (Plaid/Labour Coalition Government) to being anti-badger cull and pro vaccination (Labour Government) over the last 4 years;
- The issue has been highly contentious within Wales with the badger protection and farming organisations apparently being diametrically opposed on their views around both culling and vaccination;
- Whilst the Welsh Government has now commenced the 5 year badger vaccination programme there is no information in the public domain outlining how, or if, the success of the badger vaccination programme will or can be determined in relation to reducing the incidence of Bovine TB in Wales.

EU legislation that prohibits Cattle vaccination from TB

31978L0052

Council Directive 78/52/EEC of 13 December 1977 establishing the Community criteria for national plans for the accelerated eradication of brucellosis, tuberculosis and enzootic leukosis in cattle

Official Journal L 015 , 19/01/1978 P. 0034 - 0041

Finnish special edition: Chapter 3 Volume 9 P. 0150

Greek special edition: Chapter 03 Volume 19 P. 0235

Swedish special edition: Chapter 3 Volume 9 P. 0150

Spanish special edition: Chapter 03 Volume 13 P. 0175

Portuguese special edition Chapter 03 Volume 13 P. 0175

COUNCIL DIRECTIVE of 13 December 1977 establishing the Community criteria for national plans for the accelerated eradication of brucellosis, tuberculosis and enzootic leukosis in cattle (78/52/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community,

Having regard to Council Directive 77/391/EEC of 17 May 1977 introducing Community measures for the eradication of brucellosis, tuberculosis and leukosis in cattle (1), and in particular Article 13 thereof,

Having regard to the proposal from the Commission,

Whereas when laying down, in Directive 77/391/EEC, the basic principles for Community intervention for the eradication of brucellosis, tuberculosis and leukosis, the Council decided to establish subsequently the minimum criteria which the national plans for the eradication of the abovementioned diseases should satisfy in order to qualify for a financial contribution by the Community;

Whereas the first of these criteria relates to the acceleration of national plans, so that the campaign undertaken to eradicate the diseases in question in the Member States in which herds are still infected may be carried to a successful conclusion as rapidly as possible ; whereas to this end measures should be taken or strengthened, as far as possible simultaneously, concerning, in particular, checks on livestock, the functioning of laboratories and the compensation paid for cattle slaughtered under the eradication plans;

Whereas it is moreover necessary, depending on the diseases in question, to lay down the conditions in which slaughter, isolation, cleaning and disinfection should take place and the use which should be made of certain animal products;

Whereas it is also essential, in order to avoid the risk of reinfection, to practise strict control of movements of cattle, especially between herds of a different health status, and to make those movements conditional on certain tests;

Whereas the date on which Directive 77/391/EEC is to take effect should be fixed,

Has Adopted this Directive:

Article 1

In order to qualify for the Community financial contribution provided for in Directive 77/391/EEC, each eradication plan referred to in Articles 2, 3 and 4 of that Directive must, in respect of the herds to which it applies, satisfy at least the criteria laid down in the present Directive.

Article 2

For the purposes of this Directive, the following definitions shall apply:

1 in the case of brucellosis in cattle:

(a) type B1 bovine herds : herds in whose case the previous clinical history and vaccination and serological status are unknown;

(b) type B2 bovine herds : herds in whose case the previous clinical history and vaccination and serological status are known and in which routine monitoring tests are carried out in accordance with the national rules for bringing these herds up to type B3 or type B4 status;

(c) type B3 bovine herds : brucellosis-free herds within the meaning of Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine (2), as last amended by Directive 77/98/EEC (3);

(d) type B4 bovine herds : officially brucellosis-free herds within the meaning of Directive 64/432/EEC;

2. in the case of bovine tuberculosis:

(a) type T1 bovine herds : herds in whose case the previous clinical history and the tuberculin-test status are unknown; (1)OJ No L 145, 13.6.1977, p. 44. (2)OJ No 121, 29.7.1964, p. 1977/64. (3)OJ No L 26, 31.1.1977, p. 81.

(b) type T2 bovine herds : herds in whose case the previous clinical history and the tuberculin-test status are known, and in which routine monitoring tests are carried out in accordance with the national rules for bringing these herds up to type T3 status;

(c) type T3 bovine herds : officially tuberculosis-free herds within the meaning of Directive 64/432/EEC;

3. suspect animal : any bovine animal which shows symptoms indicating the possible presence of tuberculosis, brucellosis or bovine enzootic leucosis and for which an appropriate diagnosis has neither officially confirmed nor officially ruled out the presence of one or more of these diseases;

4. official veterinarian : the veterinarian designated by the competent central authority of the Member State;

5. means of transport : those parts of motor vehicles, rail vehicles and aircraft set aside for loading, the holds of ships and containers for land, sea or air transport.

CHAPTER I General provisions

Article 3

Member States shall ensure that, in all cases, the acceleration provided for in Directive 77/391/EEC involves a significant shortening of the period of time necessary for successfully completing eradication plans as compared with the time taken by programmes currently in progress.

The measures to be taken to achieve this end shall be the following:

1. The proportion of the national cattle population which is the subject of eradication and preventive measures must be so increased that most or all such cattle may be placed or kept under monitoring controls as soon as possible.

2. Compensation for animals slaughtered on the instructions of the official veterinarian must be so adjusted that breeders are appropriately compensated.

3. The number of laboratory staff must be increased and there must be an improvement in the conditions for carrying out diagnoses in the laboratory - in so far as such steps still remain to be taken - so as to attain a level that is sufficient to make possible the measures defined in point 1.

4. Measures introduced to combat enzootic diseases must be systematically applied.

To guarantee that acceleration is fully effective, the Member States shall ensure that all the measures outlined in points 1 to 4 are applied.

Article 4

1. For the purpose of officially monitoring the movement of the animals, Member States shall ensure that cattle are registered and identified in a permanent manner.

2. Member States shall, for each of the diseases for which an eradication plan exists, draw up and keep up to date an official record of bovine herds covered by such a plan classified according to their health status.

CHAPTER II Specific provisions relating to brucellosis in cattle

Article 5

Member States shall ensure that under a plan for the eradication of brucellosis:

(a) the presence and suspected presence of brucellosis are compulsorily and immediately notifiable to the competent authority;

(b) any therapeutic treatment of brucellosis is prohibited;

(c) if practised, anti-brucellosis vaccination is carried out under official supervision but is suspended as soon as possible so that the herds may pass to the stage of officially brucellosis-free herds.

Article 6

1. Where a herd contains an animal suspected of having brucellosis, the competent authorities shall ensure that the official investigations are carried out as soon as possible to confirm or rule out the presence of that disease.

Pending the outcome of these investigations, the competent authorities shall order: - the herd to be placed under official surveillance,

- the prohibition of all movement into or out of the herd unless authorized by the competent authorities for the purpose of slaughter without delay. However, movement of the castrated cattle on the farm may be authorized by the competent authorities after the isolation of the suspect animals, provided that the castrated animals are moved to fattening herds, and thence to the slaughterhouse,
- isolation within the herd of the suspect animals.

2. The orders referred to in paragraph 1 shall not be lifted until the presence or suspected presence of brucellosis in the herd concerned has been officially ruled out.

3. Where the presence of brucellosis is officially confirmed in a herd, the Member States shall take appropriate measures to prevent any spread of the disease and shall ensure in particular that: - all movement into or out of the herd in question is forbidden, unless authorized by the competent authorities for the purpose of slaughter without delay; however, movement of the castrated cattle on the farm may be authorized by the competent authorities after the isolation and the marking prior to slaughter of infected animals and of cattle regarded by the same authorities as infected, provided that the castrated animals are moved to fattening herds and thence to the slaughterhouse,

- animals in which the presence of brucellosis has been officially confirmed, and animals which may have been infected by them, are isolated within the herd,
- subject to observance of the terms of Directive 64/432/EEC, and those of Council Directive 78/51/EEC of 13 December 1977 prolonging certain derogation measures in respect of brucellosis and tuberculosis granted to Denmark, Ireland and the United Kingdom (1), the cattle are examined without delay for brucellosis,
- animals in which the presence of brucellosis has been officially confirmed, animals which have been examined as stipulated in the third indent with unfavourable results, and animals considered by the competent authorities as infected are isolated and marked until their slaughter pursuant to Article 7,
- milk from infected cows may only be fed to animals on the same farm after suitable heat treatment,
- without prejudice to national provisions concerning foodstuffs, milk from cows from an infected herd, cannot be delivered to a dairy, except to undergo suitable heat treatment,
- carcases, half-carcases, quarters, pieces and offal from infected animals intended for use as feed for animals are treated in such a way as to avoid contamination,
- foetuses, still-born calves calves which have died from brucellosis after birth or placentae are carefully disposed of and destroyed immediately, unless they are to be examined,
- straw, litter or any other matter and substance which has come into contact with the infected cow or calf or with the placenta is destroyed immediately, burnt or buried after soaking in disinfectant,
- official regulations for the control of establishments such as carcase disposal plants ensure that there is no danger of the material produced spreading brucellosis,
- manure from sheds or other quarters used by the animals is stored in a place inaccessible to farm animals, treated with a suitable disinfectant and stored for at least three weeks. Use of disinfectant is not required if the manure is covered with a layer of uninfected manure or earth. Liquid waste from sheds or other quarters used by the animals must be disinfected if it is not collected at the same time as the manure.

Article 7

Member States shall ensure that, following a bacteriological, pathological or serological examination, animals in which the presence of brucellosis has been officially established and those considered by the competent authorities to be infected are slaughtered under official supervision as soon as possible and not later than 30 days after their owner or the person in charge has been officially notified of the results of the tests and of his obligation, under the eradication plan, to slaughter the cattle concerned within that time limit.

Article 8

Member States shall ensure that:

1. after the slaughter of the cattle referred to in Article 7 and prior to restocking, sheds and other herd quarters, and all containers, equipment and other articles used for the animals are cleaned and disinfected under official supervision, in accordance with the instructions given by the official veterinarian. Re-use of pastures which have contained these animals must not take place for 60 days after their removal from such pastures, the competent authorities may however derogate from this prohibition in the case of castrated animals, subject to the condition that these animals only leave these pastures for slaughter or that they are moved to fattening herds and thence to the slaughterhouse;

2. all means of transport, containers and equipment are cleaned and disinfected after the transport of animals from an infected herd, or of materials from such animals, or of materials or substances which have been in contact with such animals. Loading areas for such animals must be cleaned and disinfected after use; (1)See page 32 of this Official Journal.

3. the disinfectant to be used and its concentrations are officially authorized by the competent authority of the Member State concerned.

Article 9

Member States shall ensure that after the slaughter of the cattle referred to in Article 7, - without prejudice to the provisions of Article 11, no cattle may leave the herd concerned unless authorization has been given by the competent authority for the purpose of slaughter without delay. However, movement of the castrated cattle on the farm may be authorized by the competent authorities, provided that the castrated animals are moved to fattening herds and thence to the slaughterhouse,

- brucellosis tests are carried out on the herd concerned to confirm that the disease has been eliminated,
- the herd is not restocked with animals for breeding until the animals over 12 months old remaining in it for this purpose have passed one or more official serological examinations for brucellosis. However, for cattle which have been vaccinated in accordance with the provisions of Directive 64/432/EEC, this test need not be carried out until they are 18 months old.

Article 10

Member States shall ensure that official serological testing is carried out in type B1 and type B2 herds until such time as they become type B3 or type B4.

Article 11

Member States shall ensure that:

(i) all female animals and all bulls from type B1 herds destined for type B2 herds: - if more than 12 months old, have passed an officially approved serological test carried

out within the 30 days prior to movement and are accompanied by a certificate to this effect from the official veterinarian,

- are isolated immediately upon arrival for at least 60 days and if more than 12 months old, have passed a further officially approved serological test before admission to the type B2 herd;

(ii) all female animals and all bulls from a type B2 herd destined for another type B2 herd: - if more than 12 months old, have passed an officially approved serological test carried out within the 30 days prior to movement and are accompanied by a certificate to this effect from the official veterinarian,

- do not come into contact, during transfer, with animals from herds of a lower health status;

(iii) transfers of animals between B3 and B4 herds are carried out subject to the observance of the requirements of Directive 64/432/EEC.

Article 12

Member States shall ensure that: - official control measures are taken to prevent a herd in which brucellosis has been eliminated from being re-infected from other sources of infection,

- all movements of cattle into and within herds covered by an eradication plan are subject to official monitoring,
- the movement control measures referred to in the second indent can be applied without prejudice to existing Community measures concerning movement into and out of brucellosis-free and officially brucellosis-free herds.

CHAPTER III Specific provisions relating to bovine tuberculosis

Article 13

Member States shall ensure that under a plan for the accelerated eradication of tuberculosis:

(a) the presence and suspected presence of tuberculosis are compulsorily and immediately notifiable to the competent authority;

(b) the following are prohibited:

(i) any therapeutic or desensitizing treatment of tuberculosis;

(ii) anti-tuberculosis vaccination.

Article 14

1. Where a herd contains an animal suspected of having tuberculosis, the competent authorities shall ensure that official investigations are carried out as soon as possible to confirm or rule out the presence of that disease.

Pending the outcome of these investigations, the competent authorities shall order: - the herd to be placed under official surveillance,

- the prohibition of any movement into or out of the herd unless authorized by the competent authorities for the purpose of slaughter without delay,
- isolation within the herd of the suspect animals.

2. The orders referred to in paragraph 1 shall not be lifted until the presence or suspected presence of tuberculosis in the herd concerned has been officially ruled out.

3. Where the presence of tuberculosis is officially confirmed, the Member States shall take appropriate measures to prevent any spread of the disease and shall ensure in particular that: - all movement into or out of the herd in question is prohibited unless authorized by the competent authorities for the purpose of slaughter without delay,

   - cattle in which the presence of tuberculosis has been officially confirmed, and cattle which may have been infected by them, are isolated within the herd,
   - the cattle undergo an examination for tuberculosis without delay,
   - cattle in which the presence of tuberculosis has been officially confirmed, cattle which have been examined as stipulated in the third indent with unfavourable results, and cattle considered by the competent authorities as infected are isolated and marked until their slaughter pursuant to Article 15,
   - milk from infected cows may only be fed to animals on the same farm after suitable heat treatment,
   - without prejudice to national provisions concerning foodstuffs, milk from cows from an infected herd, cannot be delivered to a dairy, except to undergo suitable heat treatment,
   - carcases, half-carcases, quarters, pieces and offal from infected cattle intended for use as feed for animals are treated in such a way as to avoid contamination,
   - official regulations for the control of establishments such as carcase disposal plants ensure that there is no danger of the material produced spreading tuberculosis,
   - manure from sheds or other quarters used by the animals is stored in a place inaccessible to farm animals, treated with a suitable disinfectant and stored for at least three weeks. Use of disinfectant is not required if the manure is covered with a layer of uninfected manure or earth. Liquid waste from sheds or other quarters used by the animals must be disinfected if it is not collected at the same time as the manure.

Article 15

Member States shall ensure that, following a bacteriological, pathological or tuberculin examination, animals in which the presence of tuberculosis has been officially established and those considered by the competent authorities to be infected are slaughtered under official supervision as soon as possible and not later than 30 days after the owner or the person in charge has been officially notified of the results of the tests and of his obligation, under the eradication plan, to slaughter the cattle concerned within that time limit.

However, in the case of animals which have been examined for tuberculosis with unfavourable results without showing clinical symptoms of the disease, the competent authorities may extend to not more than three months the period provided for in the above paragraph, - in the case of a female animal which is expected to calve within the three month period,

- where they order the slaughter of all cattle in a herd of more than 20 head in a region in which, for technical reasons connected with the capacity of the slaughter-houses designated for this purpose, slaughter cannot be carried out within the 30 days.

Article 16

Member States shall ensure that:

1. after the slaughter of the cattle referred to in Article 15 and prior to restocking, sheds and other herd quarters, and all containers, equipment and other articles used for the animals are cleaned and disinfected under official supervision, in accordance with the instructions given by the official veterinarian;

2. all means of transport, containers and equipment are cleaned and disinfected after the transport of animals from an infected herd or of materials from such animals or of materials or substances which have been in contact with such animals. Loading areas for such animals must be cleaned and disinfected after use;

3. the disinfectant to be used and its concentrations are officially authorized by the competent authority of the Member State concerned.

Article 17

Member States shall ensure that after the slaughter of the cattle referred to in Article 15, - without prejudice to the provisions of Article 19, no cattle may leave the herd concerned, unless authorization has been given by the competent authority for the purpose of slaughter without delay,

- tuberculosis tests are carried out on the herd concerned to confirm that the disease has been eliminated,
- the herd is not re-stocked until the cattle over six weeks old remaining in it have passed one or more official tuberculosis tests.

Article 18

Member States shall ensure that, under a plan for the eradication of tuberculosis, officially supervised intra-dermal tuberculin testing is carried out on all cattle over six weeks old at least every six months in type T1 and type T2 herds until such time as they become type T3 herds.

Article 19

Member States shall ensure that:

(i) any animal from a type T1 herd and destined for a type T2 herd: - has passed an intradermal tuberculin test carried out within the 30 days prior to movement and is accompanied by a certificate to this effect from the official veterinarian,

- is isolated immediately upon arrival for at least 60 days and has passed a further official intradermal tuberculin test before admission to the herd;

(ii) any animal from a type T2 herd and destined for another type T2 herd: - has passed an intradermal tuberculin test within the 30 days prior to movement and is accompanied by a certificate to this effect from the official veterinarian,

- does not come into contact, during transfer, with cattle from herds of a lower health status;

(iii) all transfers of cattle between type T3 herds are carried out subject to observance of the requirements of Directive 64/432/EEC.

Article 20

Member States shall ensure that:

- official control measures are taken to prevent a herd in which tuberculosis has been eliminated from being re-infected from other sources of infection,
- all movements of cattle into and within herds covered by an eradication plan are subject to official supervision,
- the movement control measures referred to in the second indent can be applied without prejudice to existing Community measures concerning movement into and out of officially tuberculosis-free herds.

CHAPTER IV Specific provisions relating to enzootic bovine leukosis

Article 21

Pending the entry into force of Community rules, and without prejudice to Article 4, third subparagraph of Directive 77/391/EEC, national provisions on the detection of leukosis and on the classification of herds with regard to leukosis shall apply.

Article 22

Member States shall ensure that, under a plan for the eradication of leukosis,

(a) the presence and suspected presence of leukosis, and in particular tumours of the lymphatic system and other organs of cattle, are compulsorily and immediately notifiable to the competent authority;

(b) therapeutic treatment or anti-leukosis vaccination of any kind is prohibited.

Article 23

Notwithstanding any measures adopted pursuant to national provisions in the event of leukosis being suspected, Member States shall, when the presence of leukosis is officially confirmed in a herd, take appropriate measures to prevent any spread of the disease and shall ensure in particular that: - any movement of animals from this herd is prohibited, unless authorized by the competent authorities for the purpose of slaughter without delay,

- the herd in question is isolated so that the cattle cannot come into contact with cattle not belonging to this herd,
- milk from infected cows may only be fed to animals after suitable heat treatment or delivered to a dairy to undergo such treatment ; feeding animals with milk which has not undergone heat treatment may be authorized for herds where all animals are to be slaughtered pursuant to Article 24, point 1,
- carcases, half-carcases, quarters, pieces and offal from infected animals intended for use as feed for animals are prepared in such a way as to avoid contamination,
- official regulations for the control of establishments such as carcase disposal plants ensure that there is no danger of the material produced spreading leukosis,
- the farmer notifies the official veterinarian of the death or emergency slaughter of any cattle from his farm.

Article 24

Member States shall ensure that, within the framework of the eradication plan,

1. where such plan provides for the slaughter of all cattle belonging to a herd in which leukosis has been officially established, these animals are slaughtered within a period to be set by the competent authorites;

2. where such plan provides for the slaughter of only those cattle in which leukosis has been officially established and possibly those considered by the competent authorities to be infected, such slaughter takes place within a period of 30 days after their owner or the person in charge has been officially notified of the result of the examinations and of his obligation, under the eradication plan, to slaughter the cattle concerned within this period.

Article 25

Member States shall ensure that, in the event of slaughter pursuant to Article 24, point 2, - no cattle may leave the herd concerned unless authorization has been given by the competent authorities for the purpose of slaughter without delay,

- leukosis tests are carried out on the herd concerned to confirm that the disease has been eliminated,
- only animals from herds considered by the competent authorities as not infected with leukosis may be used to re-stock the herd.

Article 26

Member States shall ensure that:

1. after the slaughter of the cattle referred to in Article 24 and prior to restocking, sheds and other herd quarters, and all containers, equipment and other articles used for the animals are cleaned and disinfected under official supervision, in accordance with the instructions given by the official veterinarian;

2. all means of transport, containers and equipment are cleaned and disinfected after the transport of animals or of materials from such animals or of materials or substances which have been in contact with such animals. Loading areas for such animals are cleaned and disinfected after use;

3. the disinfectant to be used and its concentrations are officially authorized by the competent authority of the Member State concerned.

Article 27

Member States shall ensure that cattle from a herd classified as not suspect do not come into contact with cattle from herds which are not so classified.

CHAPTER V Final provisions

Article 28

Before expiry of the three-year period provided for in Directive 77/391/EEC, the Commission shall submit to the Council a report on the application of the plans provided for in that Directive, accompanied if necessary by proposals to achieve closer harmonization of national preventive measures.

Article 29

1. Directive 77/391/EEC shall take effect on 1 January 1978.

2. Member States shall bring into force the laws, regulations and administrative provisions necessary for implementation of national plans for accelerated eradication adopted in accordance with Article 9 (2) of Directive 77/391/EEC, on the date laid down by the Commission in its Decision approving the plans, and for plans approved during 1978, not later than 31 December 1978.

3. The three-year period of execution provided for in Article 6 (1) of Directive 77/391/EEC shall run, for each Member State, from the date laid down by the Commission pursuant to paragraph 2. However, Community finance shall in all cases be restricted to slaughterings carried out before 1 January 1982.

4. The Council, acting unanimously on a proposal from the Commission, may, where implementation of the plan on the date laid down would meet with considerable difficulties in some Member States, postpone for such States the dates specified in paragraphs 2 and 3 by not more than one year.

Article 30

This Directive is addressed to the Member States.

Done at Brussels, 13 December 1977.
For the Council
The President
A. HUMBLET

Appendix 6

Correspondence

Appendix 6 – Correspondence

1. Departmental letter dated 27th April 2012 re. Bovine TB issues raised following NI Audit Office Briefing
2. Departmental e-mail dated 30th April 2012 re. Gamma Interferon tests comparison for other countries on cattle population
3. Department of Environment Letter dated 8th May 2012 re. Legislation governing badgers
4. Departmental letter dated 18th May 2012 re. Bovine TB and strains of TB and compensation
5. USPCA letter re. Badgers and Bovine TB
6. Departmental letter dated 31st May 2012 re. Bovine TB issues regarding compensation payments for Bovine TB 2011/12 financial year
7. Departmental letter dated 7th June 2012 re. Bovine TB testing and Brucellosis
8. UWT Memo dated 22nd June 2012 re. Extract from Cheeseman and Mallinson 1981
9. Departmental letter dated 3rd October 2012 re. Lay Tb Testing Pilot Post-Project Evaluation Report, and Annex
10. Departmental letter dated 4th October 2012 re. Bovine TB issues regarding finishing/ fattening units

DALO letter to Clerk re. Bovine TB

Department of
Agriculture and
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Corporate and European Services Division
Central Management Branch
Dundonald House
Upper Newtownards Road
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Belfast BT4 3SB

Tel: 028 90524331
Email: Joe.Cassells@dardni.gov.uk

Stella McArdle
Clerk to the Committee for Agriculture and Rural Development
Room 412
Parliament Buildings
Ballymiscaw
Belfast
BT4 3XX

27 April 2012

Dear Stella

Issues raised with DARD following NIAO evidence session on 24 April 2012

Further to the issues raised at the NIAO evidence session on 24 April Committee meeting, which you had directed to DARD to answer, I now attach written responses to these issues, to be tabled at the Committee meeting on 1st May 2012. Also included is detail in relation to the cost of R&D, which was the subject of our subsequent telephone call.

I do trust that this addresses the issues raised.

Yours sincerely

Joe Cassells
Departmental Assembly Liaison Officer

Issues raised with DARD following NIAO evidence session on 24 April 2012

A. Cost of bTB – what do staff costs cover and why does it appear that the staff costs for 2003/04 are half what they were in 2006/07.

Certain significant factors have influenced the rise in costs and these are as follows.

During 2002 DARD carried out a Policy Review of the TB Programme. One of the recommendations from the review was that the number of TVOs (or equivalent) should be significantly increased to at least 30 within the next 12 months.

Also additional Veterinary Officers were recruited to investigate and manage the higher levels of TB being detected in the years following the 2001 Foot and Mouth Disease outbreak. The additional staff were recruited in 2004/05 and over the next 2 years a steady increase in staff costs materialised.

DARD continues to maintain a robust time and task recording system to capture staff time spends on various tasks.

B. Tests / studies done on badgers killed on roads – how many in total and how many had bTB

The table below shows the number of road kill badgers reported to and collected by DARD, which were examined by AFBI for M bovis and the number in which M bovis was confirmed. While indicative of the levels of TB in badgers over time it must be noted that only road kill badgers are tested and it is possible that farmers with a recent TB breakdown are more likely to report badger carcases.

Year	Number Examined	Number with M bovis Confirmed
1998	3	1
1999	134	18
2000	78	18
2001	20	4
2002	61	15
2003	69	13
2004	56	12
2005	61	14
2006	100	10
2007	69	10
2008	101	14
2009	102	7
2010	96	13
2011	136	17

C. Multiple compensation claims – more information on such claims and if there is any geographical spread. The Committee appeared to be interested in what, if any interventions DARD took in such cases.

For the period 1 April 2009 to 31 March 2012 a total of 3942 herdkeepers received compensation payments for removal TB reactors (to skin or gamma interferon tests) or negative contact animals. The average number of payments was 1.8 per herd keeper.

Of those 3942 herdkeepers, 104 (2.6%) received over £50,000 with an average number of payments of 6.1 payments per herdkeeper. The multiple payments may have been as a result of one or more periods of restriction but it has not been possible to establish that detail using the data available.

All TB breakdowns are investigated by a Veterinary Officer and the necessary disease control measures applied. Additional epidemiological or technical advice is sought as required. Where irregularities are suspected the case is referred to the relevant body for further investigation.

A study which has started into "chronic" herds will investigate this type of disease pattern in detail.

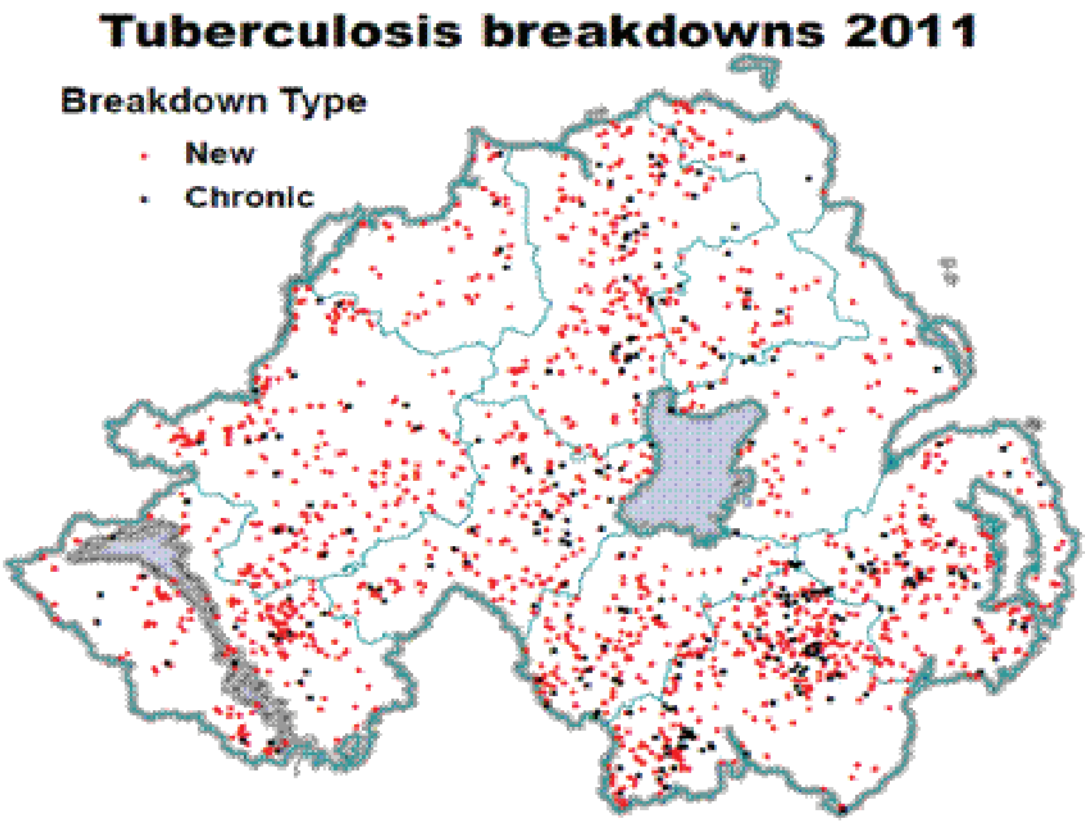
The distribution of the 104 herd keepers receiving more than £50,000 by Divisional Veterinary Office area is shown in the table below

DVO	Number
Armagh	11
Ballymena	2
Coleraine	8
Dungannon	6
Enniskillen	9
Mallusk	4
Londonderry	1
Newry	32
Newtownards	20
Omagh	11
	104

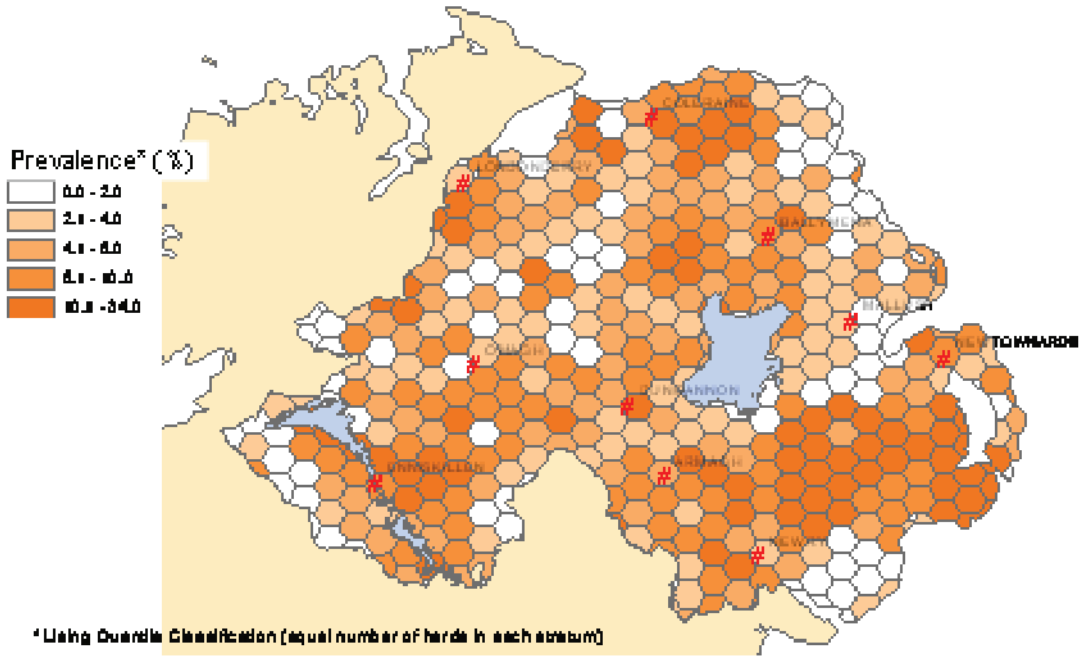
D. Geographical spread of bTB and any additional controls taken around border areas.

The maps below show the levels of disease across the 10 Divisional Veterinary Offices in Northern Ireland for the 2008-2011 period and distinguishes between new (a breakdown in a herd that has not had TB in the previous 12 months) and chronic breakdowns.

In general the disease is widely distributed across NI and levels will fluctuate year on year. Newtownards division has had the highest herd incidence for some time, although it has been falling steadily over the years. Mallusk (formerly Larne DVO) has the lowest herd incidence. Disease control measures are applied across all Divisions in accordance with staff instruction and based on veterinary risk assessment.



Mean Annual Reactor Herd Prevalence, 2008 to 2011



E. Details of work already commissioned from the £4 million for TB and Wildlife Research and Studies

We have commissioned an evaluation of interferon gamma testing for bovine TB. This will be conducted over 3 years (2011/12, 2012/13 & 2013/14) at an indicative cost of £222,000.

We have also commissioned a study of the interactions between badgers and cattle in the rural environment and the implications for bovine TB transmission. This will be conducted over 3 years (2011/12, 2012/13 & 2013/14) at an indicative cost of £476,000.

The international vaccination experts' scientific symposium, which takes place on 14-16 May 2012 in Belfast, will cost approximately £40,000.

5 Literature Reviews were completed in 2011/12 on cattle TB tests; badger TB tests, TB transmission in cattle; TB transmission in badgers; and badger vaccination. These reviews have helped inform our identification and prioritisation of further evidence needs.

We are looking at further potential studies and will continue during the budget period to commission further TB and wildlife research and studies to guide the TB eradication strategy.

We also maintain contact with research and studies being conducted in Britain and the south of Ireland, including in relation to the development of an oral bait badger vaccine that can be delivered in a cost effective way. Care is taken not to duplicate costly studies that are being conducted elsewhere.

F. Additionally, could DARD provide a written overview of the possible cattle vaccination and why it is tied up in legal and technical issues at EU level?

EU national TB eradication plans prohibit "anti-tuberculosis vaccination"[1] and so it is necessary to suitably amend the underpinning legislation to enable vaccination to take place.

TB-free status in cattle is determined through the tuberculin skin test. Even if the ban on cattle vaccination was overturned, BCG vaccinated animals could still react positively (for at least a number of months following vaccination) as if they were infected with bTB. This has disease control implications as well as preventing the export of vaccinated reactor animals to other Member States[2].

A test to differentiate infected from vaccinated animals (DIVA) is being developed by AHVLA at Weybridge. However before this can be deployed in the field it will be necessary obtain international validation for the test and amend the Directive so that a positive reaction to the skin test but a negative reaction to an alternative or ancillary test (such as the DIVA) is not considered a "positive reaction".

Regulations on the production of raw milk[3] and food of animal origin[4] are also linked to the tuberculin skin test or the classification of herds having bTB free status.

1 EU Directive 78/52/EEC and associated directives

2 EU Directive 64/432/EEC

3 Regulation (EC) No 853/2004

4 Regulation (EC) No 854/2004

DALO email to Clerk re. Bovine TB

Stella,

Please see below information requested by the Chair during last week's meeting, grateful if you would bring this to his and the Committee's attention.

Joe Cassells

Central Management Branch
Ext: 24331

From: Hart, Colin
Sent: 30 April 2012 17:02
To: Cassells, Joe
Cc: Hart, Colin; Harwood, Roly; McKee, Ian; McMaster, Colette
Subject: FW: Information to DALO

Dear Joe

At last week's ARD Committee meeting I said that I would let the Committee Chair know the details of the number of gamma interferon tests conducted in other countries compared to the cattle population. I have some figures that illustrate the point that in 2011 we tested proportionally more animals per head than GB or the Republic of Ireland, based on the figures currently available to us. The cattle population figures are approximate but sufficiently accurate to illustrate the point.

Country	Number of Gamma Tests	Number of cattle	% of cattle population
NI (2011)	17,000	1.6m	1.06
GB (2010)	26,000	8.34m	0.30
ROI (2011)	6,400	5.8m	0.11

I would be grateful if you could bring this to the attention to the Chair, as promised.

Colin Hart

Deputy Chief Veterinary Officer

Environment Committee Clerk Letter to Clerk re. Bovine TB

Northern Ireland Assembly

Committee for the Environment
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To: Stella McArdle
Clerk to the Committee for Agriculture and Rural Development

From: Alex McGarel
Clerk to the Committee for the Environment

Date: 8 May 2012

Subject: Review of Bovine Tuberculosis

1. At its meeting on 3 May 2012 the Committee for the Environment considered the attached Departmental response to Committee for Agriculture and Rural Development queries on Bovine Tuberculosis.

2. Please find attached a copy of the response for your information.

Alex McGarel
Clerk
Committee for the Environment

Annex

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Your reference:
Our reference: CQ 114/12

Mrs Alex McGarel
Clerk to the Environment Committee
Northern Ireland Assembly
Parliament Buildings
Ballymiscaw
Stormont
Belfast
BT4 3XX

Date: 24 April 2012

Dear Alex,

The Committee for Agriculture and Rural Development wrote to the Department's Northern Ireland Environment Agency regarding a review of Bovine Tuberculosis and have requested a response by 16 April.

The Committee is particularly interested in the legislation governing badgers in Northern Ireland and on whether it would allow a badger cull. The Committee would further welcome any information that can be provided on possible badger capture mechanisms.

Badgers are protected in Northern Ireland under the terms of The Wildlife (Northern Ireland) Order 1985 (as amended) and are listed on schedules 5, 6, and 7 of the above order.

Article 18 of the Wildlife Order provides the Department with the power to grant licences for purposes that would otherwise be illegal. Of the available purposes the following are the most relevant.

Article 18 (1) (a) can be used for 'scientific, research or educational purposes'

Article 18 (1) (c) can be used for 'the purpose of preventing the spread of disease'

Article 18 (3) (d) can be used for 'the purpose of preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber, pasture or any other form of property or to fisheries

Because of the ongoing scientific debate and current uncertainty concerning the role of badgers in the spread of Bovine TB, DOE would have significant concerns about issuing a badger licence (in relation to Bovine TB) for either 18 (1) (c) or 18 (3) (d).

A previous licence was issued to DARD in November 2008 to 'take badgers for scientific purposes' ie under article 18 (1) (a). This was granted to facilitate a scientific research project as outlined by DARD at the behest of the Badger Stakeholder Group. Although Ministerial approval was sought and subsequently granted for this project, DARD did not avail of this licence and it expired in December 2011.

Article 13(1) of the Disease of Animals (NI) Order 1981 could allow DARD, after consultation with the Department, to provide for the destruction of wild members of badger species. However, there would need to be a scientific link between the transmission of Bovine TB from badger to cattle as Article 13(1) provides that DARD must be satisfied:

(a) that there exists among the wild members of one or more species in the area a disease, other than rabies, which has been or is being transmitted from members of that or those species to livestock of any kind in that area; and

(b) that destruction of wild members of that or those species in that area is necessary in order to eliminate, or substantially reduce the incidence of, that disease in livestock of any kind in that area.

In our view this legislation requires a proven Bovine TB transmission link between badger and livestock before the power in Article 13(1) could be exercised

The Committee has asked for information in relation to badger capture mechanisms.

There are essentially two methods which have been used by either research institutions or statutory agencies in other countries in the past for the capture of badgers.

(a) Cage traps

(b) Restraints (snares)

Cage traps are generally considered more humane, although they cost more to use. The protocol for their use is covered in various literature, but generally involves a period of pre -baiting, with bait such as peanuts, before setting the traps (generally outside setts) for a defined period. Non-target captures can be released relatively unharmed. Animals captured for scientific research projects are generally anaesthetised with Ketamine hydrochloride before various measurements or samples are taken.

Restraints, for example as used in the badger removal programmes in the Republic of Ireland, are lengths of multi-strand steel wire, with a stop set at 28cm, which are laid in a loop on badger tracks and secured by an angle iron and wooden support stakes. The restraints are inspected each morning by a trained operative and captured badgers killed with a 0.22 calibre rifle.

Whilst cheaper to use, restraints have a higher potential to catch and cause injury to non-target species.

I trust this information is of assistance, should you require anything further please contact me directly.

Yours sincerely,

Helen Richmond

DALO
[by e-mail]

DALO Letter to Clerk re. Bovine TB

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Stella McArdle
Clerk to the Committee for Agriculture and Rural Development
Room 412
Parliament Buildings
Ballymiscaw
Belfast
BT4 3XX

18 May 2012

Dear Stella

Issues raised with DARD following the Committee Meeting of 1 May 2012

Further to your letter of 3 May 2012 requesting additional information to clarify issues raised during the above Committee meeting, I am writing to provide a response on each of the questions raised.

DARD Oral Briefing on the Review of Bovine TB

The Committee requested sight of DARD maps showing the strain of TB from farm to farm. Please find attached:

Annex A a DARD document entitled "Association between *M. Bovis* Strain Types in Cattle Herds and Road-Kill Badgers in Northern Ireland.

Annex B an AFBI document entitled "Bovine Tuberculosis (TB) – Surveillance of *M. Bovis* Strains in Northern Ireland", which includes a range of maps relating to TB strains detected in cattle and RTA badgers.

Annex C a copy of an article entitled "*Mycobacterium bovis* genotypes in Northern Ireland: herd-level surveillance (2003 to 2008)", which provides information on surveillance genotyping of *M. bovis* isolates from culture-confirmed bovine TB-affected herds in Northern Ireland for the years 2003 to 2008.

The Committee requested clarity on why some areas, such as Mallusk, has the lowest herd incidence of Bovine TB and yet has a higher compensation claim. Please find attached:

Annex D Clarification on compensation payments for TB for the period

1 April 2009 to 31 March 2012 along with the herd demographics and TB incidence across the 10 Divisional Veterinary Offices.

With regard to the request for information from 2009-2011 on the ratio of private vets/DARD vets finding non-negative animals/breakdowns on farm visits please find attached:

Annex E A comparison of the TB testing results for Northern Ireland in relation to different groups of Veterinary Surgeons.

The data was extracted, as requested. However when it was used to provide the figures for the proportion of tests carried out by PVPs an inconsistency was seen in the 2010 figures. This has required further investigation and as a result the data and proportion of tests carried out by PVPs in 2009, 2010 and 2011 are not yet available. We apologise for the delay and any inconvenience this may cause. This additional information will be provided as soon as practicable.

Annex F Dr Peter Cripps' epidemiological opinion of 1 November 2009 on the comparison of test results for Northern Ireland in relation to different groups of Veterinary Surgeons.

Finally the DARD contact point for statistical queries relating to Bovine Tuberculosis should be channelled via Ian McKee, Head of TB Policy Branch, (telephone 905 24551 or e-mail ian.mckee@dardni.gov.uk).

Should you require further information or clarification please do not hesitate to get in contact.

Yours sincerely

Joe Cassells

Departmental Assembly Liaison Officer

Annex A

Association Between M. Bovis Strain Types In Cattle Herds and Road-Kill Badgers in Northern Ireland

In order to better understand bovine TB source and spread, AFBI has developed DNA fingerprinting methods which allow the identification of distinct *M. bovis* strains or genotypes (DARD-funded). The techniques are referred to as strain typing or genotyping.

The first *M. bovis* isolate from each newly-confirmed TB incident in cattle herds has been genotyped for the period 2003 to present. This work has identified a large number (N=294) of genetically distinct *M. bovis* genotypes. Mapping has revealed strong geographical clustering of cattle *M. bovis* genotypes to particular regions. This is illustrated in Figures 1- 22 of the document attached at Annex B, with different *M. bovis* genotypes shown in different colours. Figure 1 shows only the 10 most prevalent *M. bovis* genotypes isolated from cattle herds.

DARD-AFBI has also investigated the extent of *M. bovis* infection in badgers in Northern Ireland through a survey of road-kill badgers. Where *M. bovis* was confirmed in road-kill badgers, isolates were also genotyped using the same methods as for cattle. Of the road-kill badgers analysed 181 yielded *M. bovis* isolates with 16 genetically distinct genotypes. In all cases these 16 genotypes identified in badgers were also found in cattle. However, 278 *M. bovis* genotypes from cattle were not isolated from the badgers sampled – although this may reflect the relatively small number of badgers tested in comparison to the number of cattle tested.

M. bovis genotypes in badgers also showed strong geographical clustering to regions and this pattern was very similar to that disclosed in cattle herds. Figures 47-55 show only those *M. bovis* genotypes which were shared between cattle (2003-present, solid colour circles) and road-kill badgers (1999-present, solid colour stars). *M. bovis* genotypes in both cattle and badgers were mostly clustered to the same geographical regions. This is indirect evidence of an 'association' between TB infections in cattle and badgers.

The observation that bovine TB strains (genotypes) in cattle and badgers were associated is no longer seriously disputed and the present data indicate that infections in cattle and badgers were associated with each other. However, this association does not indicate the direction of transmission, nor the relative importance of badger-to-cattle versus cattle-to-badger transmission in generating this association, whether on an individual animal/herd, regional or province-wide basis. Similar findings and interpretations have now been reported from studies in England and Wales.

It should be stressed that the badger sampling methodology used in formulating Figures 47-55 may not provide an accurate assessment of TB prevalence in badgers across the whole of Northern Ireland since only badgers which had been killed on the road were included (an inherent bias in the survey technique). Furthermore, it is likely that there has been a further reporting bias in the survey as farmers with TB affected herds may be more likely to report badger carcases.

It should also be noted that the sample numbers for badgers (181 isolates over approximately 13 years) is very small in comparison to the extensive sampling of cattle. It is important to note that maps 47-55 provide information based on a small number of badgers killed in road traffic accidents and alone does not provide a comprehensive assessment of TB prevalence in badgers in Northern Ireland. The statistical analysis required to interpret the data, which is essential in correctly understanding the information which the map provides, is ongoing. It is therefore important that the information on these maps is considered in the context of the additional information that we have provided.

The cattle herd survey, authored by AFBI scientists, was published in the 30 October 2010 edition of *The Veterinary Record* (copy enclosed). The cattle information provided in this paper demonstrates the complex nature of this disease.

Currently, the badger data is considered observational, although DARD may eventually publish the findings in a peer-reviewed scientific journal. This will require specialist statistical (spatial-temporal) analysis and, as already indicated, this analytical and validation work is ongoing.

14 May 2012

Annex B

ANNEX B
BOVINE TUBERCULOSIS (TB) - SURVEILLANCE OF *M. BOVIS* STRAINS IN NORTHERN IRELAND

Background

In order to improve bovine TB control it is crucial to understand the source and spread (transmission) of infection. To this end, AFBI has developed high-resolution DNA fingerprinting (strain typing) methods which allow the identification and tracking of genetically distinct *M. bovis* strains.

These methods and data have essentially two applications:

- To investigate important aspects of bovine TB epidemiology, such as cattle-cattle transmission, cattle-wildlife transmission, using descriptive studies, analytical studies, disease mathematical modelling studies etc.
- To inform TB outbreak investigations

To monitor trends in the current epidemic and to investigate whether different TB strains have different virulence and whether local changes in TB prevalence are due to particular TB strains, AFBI has undertaken systematic surveillance of the bovine TB strains present in Northern Ireland cattle herds.

- One *M. bovis* isolate from each newly-confirmed TB herd has been strain typed for the period 2003-present (all TB herds).
- In order to better understand within- and between-herd spread AFBI increased its surveillance in mid-2009 to include all confirmed TB cases (all TB animals).

Data available

Surveillance work has identified 294 genetically distinct *M. bovis* strains in 24,647 isolates from 8,366 affected herds. The 20 most prevalent TB strains make up 91% of the isolates. This work is ongoing and the data and maps are updated regularly. These data are made available to the DARD Veterinary Officers who are tasked with investigating TB breakdowns at the patch level.

In the time available, AFBI can only illustrate some of the findings and trends observed with the major TB strains detected. More detailed information could be presented directly by AFBI if requested.

Key findings

- Identified a surprising number of genetically distinct *M. bovis* strains.
- TB strains tend to be strongly geographically localised – useful in disease tracing.
- TB strain clusters identify linked transmission.
- TB strains can be moved substantial distances from their normal hotspot(s).
- The current TB epidemic tends to be driven by **local** infectious contacts.
- TB continues to generate and transmit a substantial number of new TB strains.
- Although the annual frequency of most TB strains is relatively stable, significant increases or decreases have been recorded.
- Cattle and RTA badgers tend to share the same TB strains in the same regions – evidence of **association** but not direction of transmission.
- Multi-reactor herds can yield the same or multiple TB strains depending on the enterprise type.
- Subtle (not significant) differences detected in 'virulence' between TB strains.
- TB strains in GB, ROI and NI belong to the same family.

TB strain mapping

Mapping has revealed striking and strong geographical clustering of cattle *M. bovis* strains to particular regions. Hence, with the possible exceptions of strains 001 and 002, TB strains have a genetic signature which indicates their likely geographic origin and provides useful information in disease tracing. This strong geographical clustering indicates that the current epidemic tends to be driven by **local** factors. The local epidemic can be described as a series of micro-epidemics, each driven by locally-prevalent TB strains. In effect, each TB strain cluster represents a micro-epidemic.

In the figures provided bovine TB cases were mapped to their herd of slaughter, regardless of whether they were born on that farm or elsewhere. Consequently, the TB strains appear more geographically dispersed than if they were mapped to home-bred animals only. Whilst new TB strains appear to emerge and cluster in specific regions, it is also clear that TB strains can be dispersed from such clusters and recovered at substantial distances. These observations indicate a role, as yet un-

quantified, for cattle movement in dispersing bovine TB. Also, herds are mapped to the known farm centre (farmhouse).

This is illustrated in the following series of Figures where different *M. bovis* strains are shown in different colours. These data are now available to DARD Veterinary Officers who are tasked with investigating all bovine TB breakdowns at the patch level

M. bovis continues to generate new TB strains, which are readily identifiable as daughters of existing TB strains, with which they share the same geographical location. These rare TB strains make up a sizeable proportion of the strains recovered, but they tend to be short-lived. However, some have transmitted and become established in some areas.

The frequency of recovery of the various TB strains over time is relatively stable year-on-year, particularly for the major TB strains. However, AFBI has detected both significant increases and decreases in relative frequency for some of these TB strains.

The cattle herd survey, authored by AFBI scientists, was published in the 30 October 2010 edition of *The Veterinary Record* (copy enclosed). The cattle information provided in this paper demonstrates the complex nature of this disease.

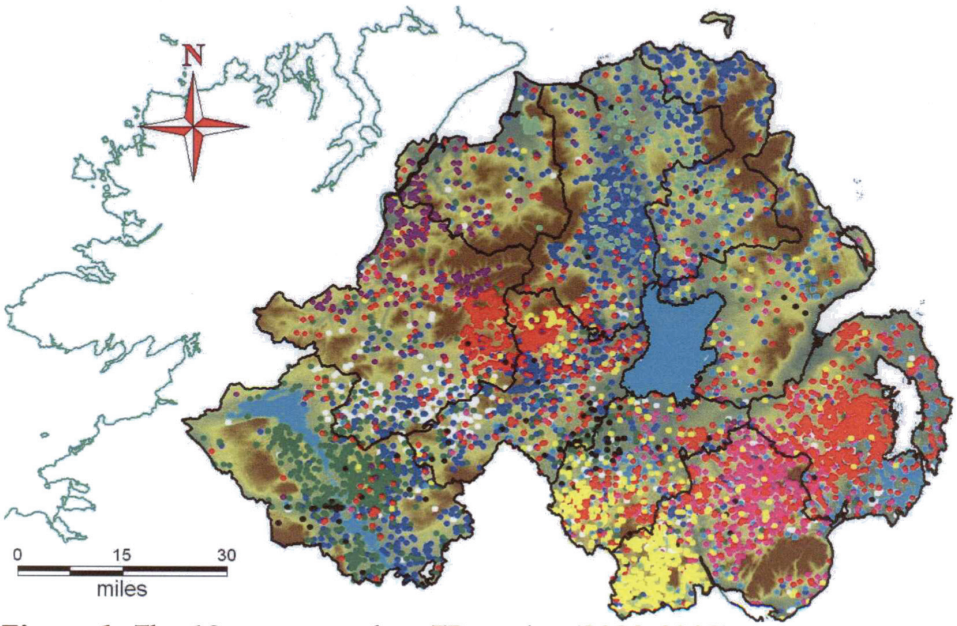


Figure 1. The 10 most prevalent TB strains (2003-2008).

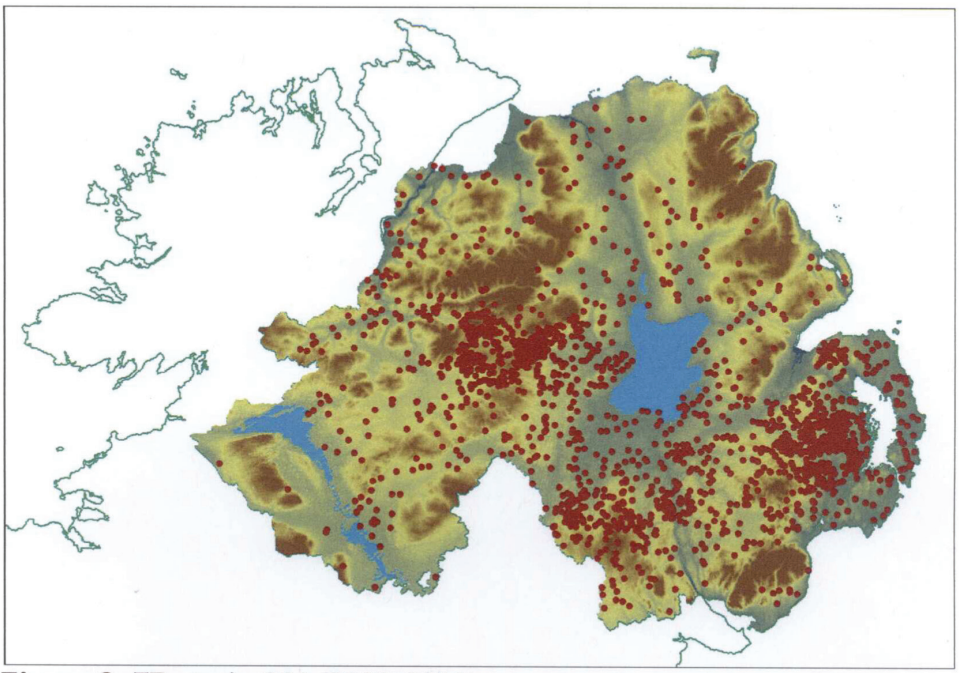


Figure 2. TB strain 001 (2003-2011)

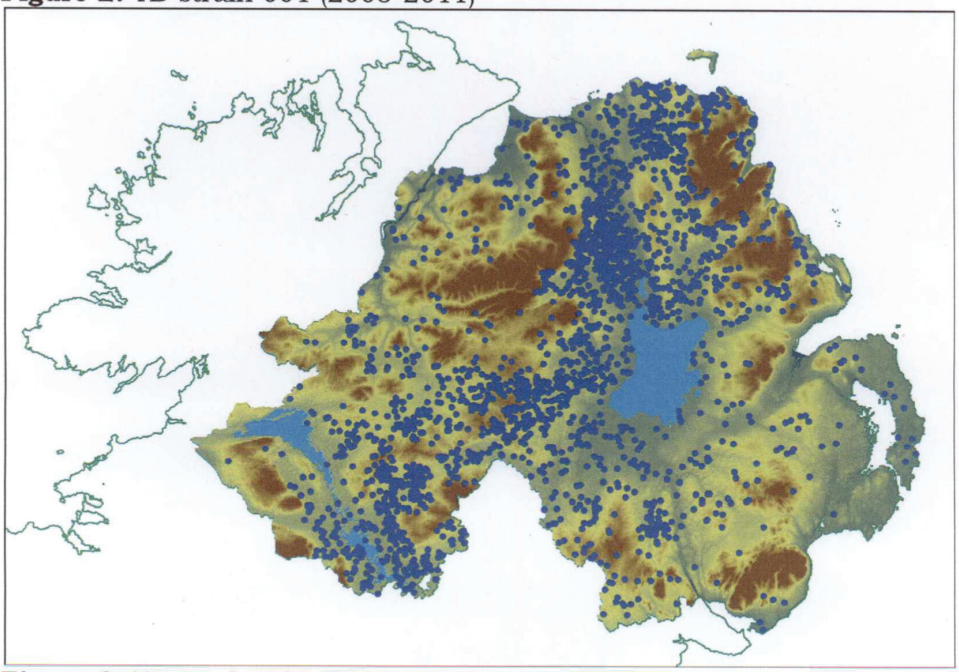


Figure 3. TB strain 002 (2003-2011)

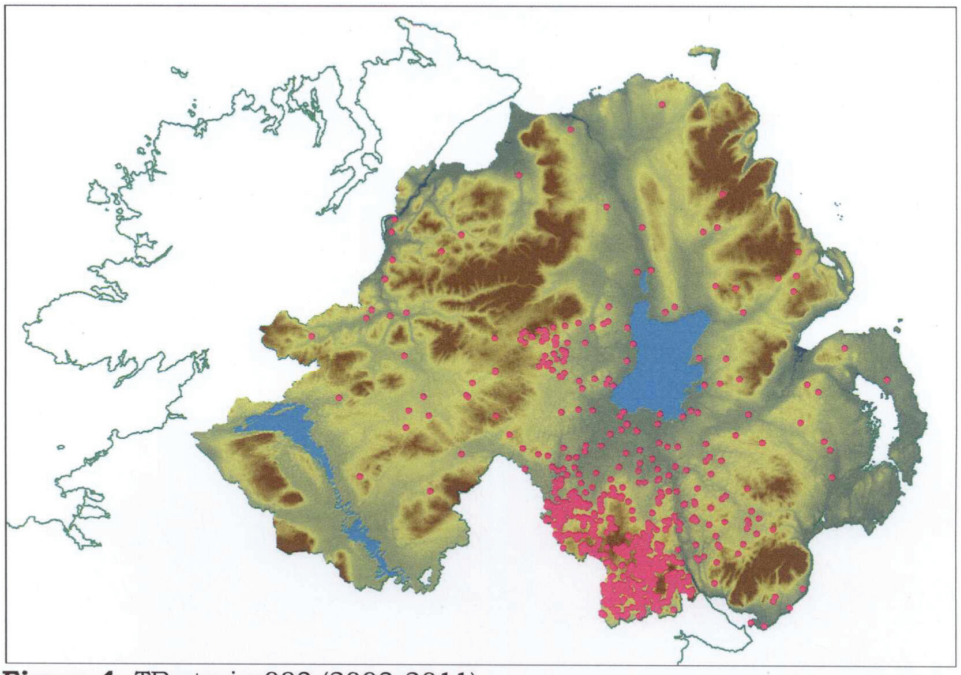


Figure 4. TB strain 003 (2003-2011)

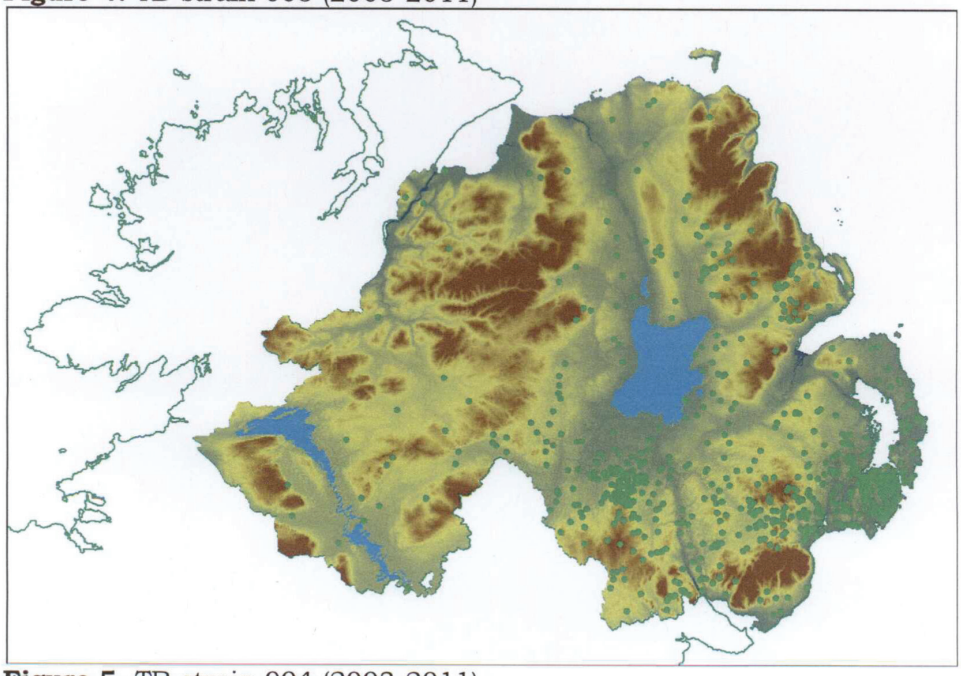


Figure 5. TB strain 004 (2003-2011)

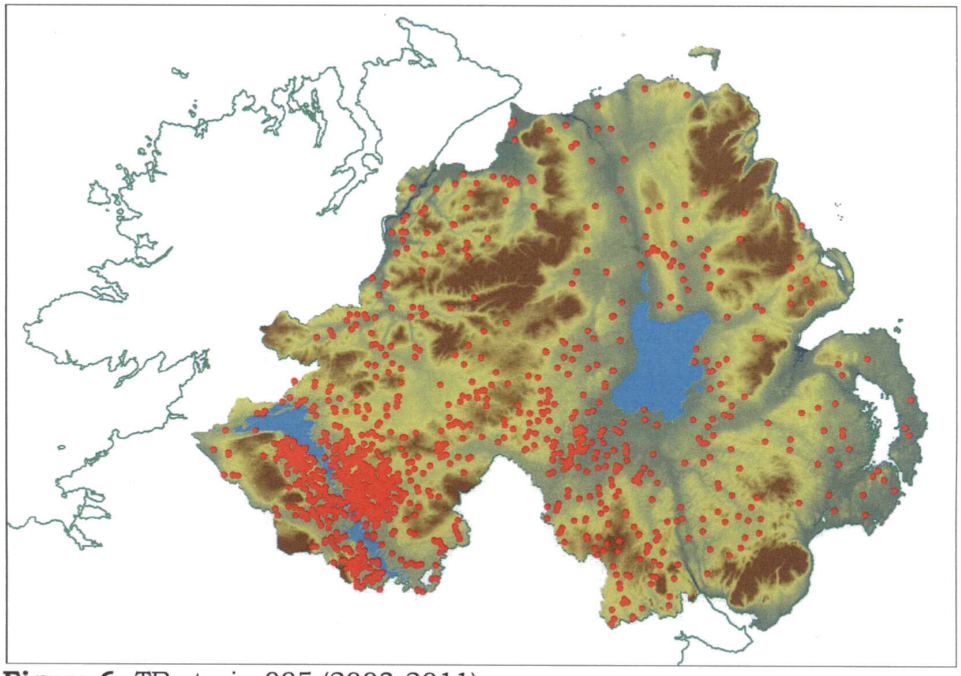


Figure 6. TB strain 005 (2003-2011)

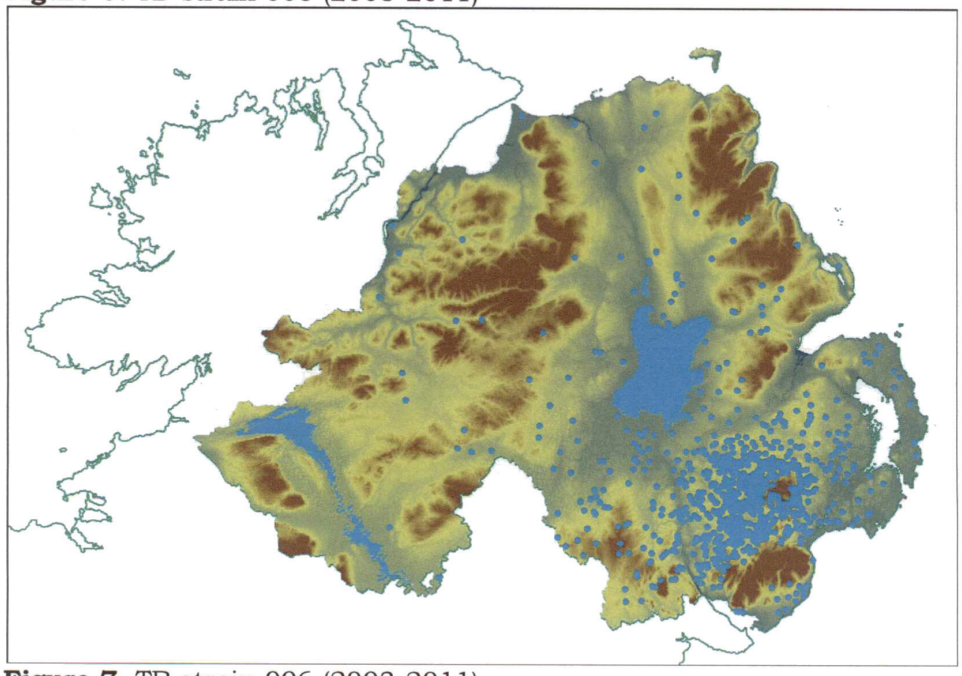


Figure 7. TB strain 006 (2003-2011)

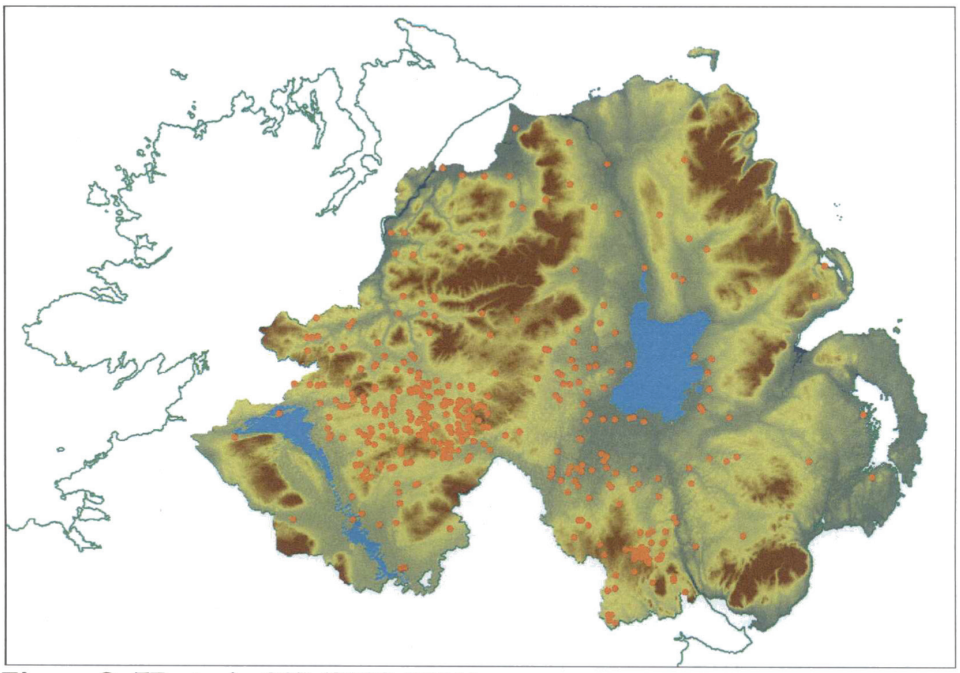


Figure 8. TB strain 007 (2003-2011)

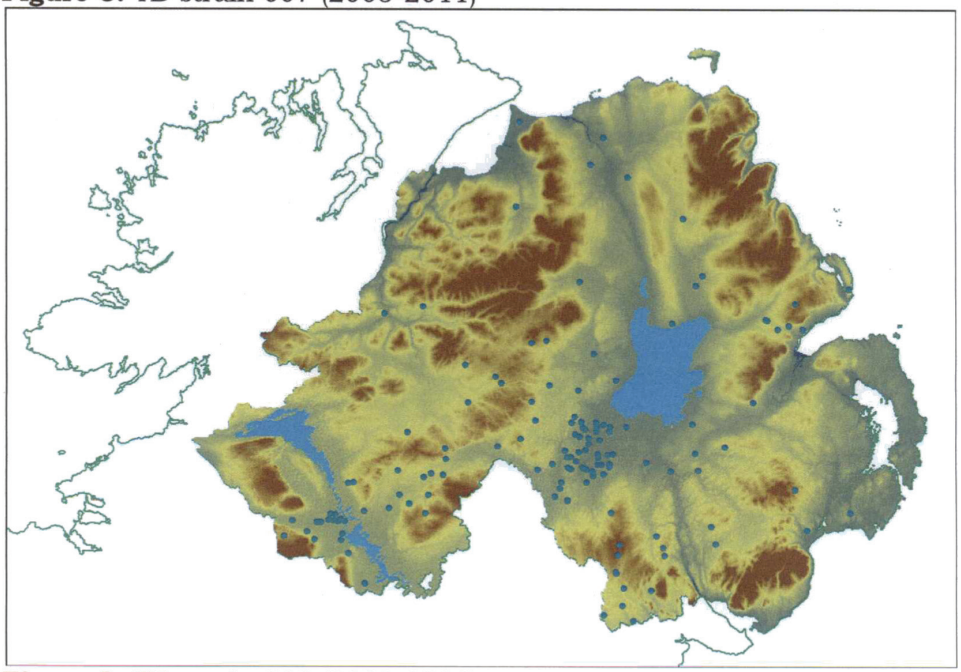


Figure 9. TB strain 008 (2003-2011)

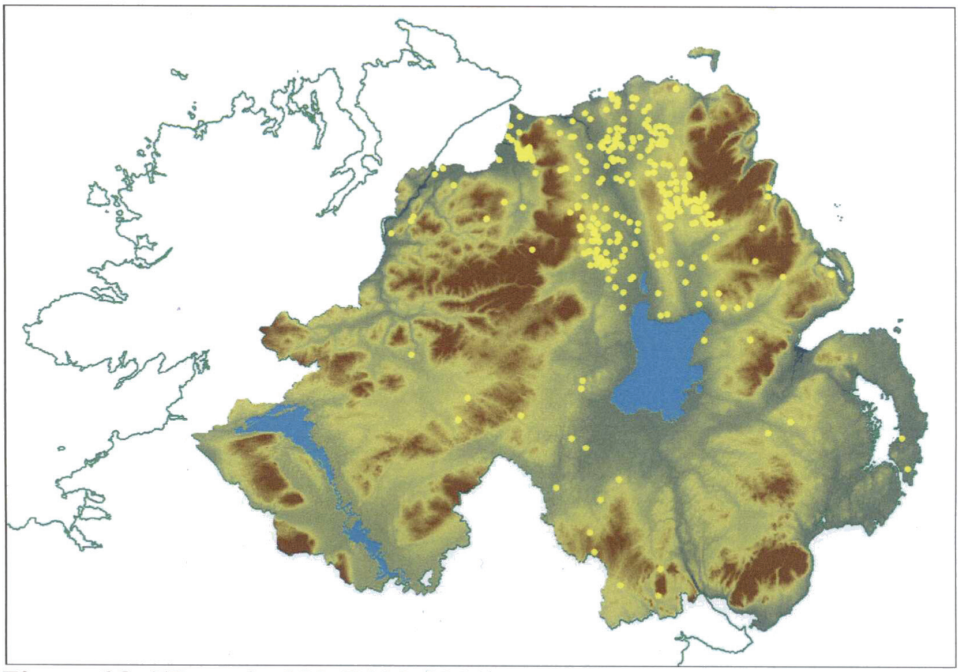


Figure 10. TB strain 009 (2003-2011)

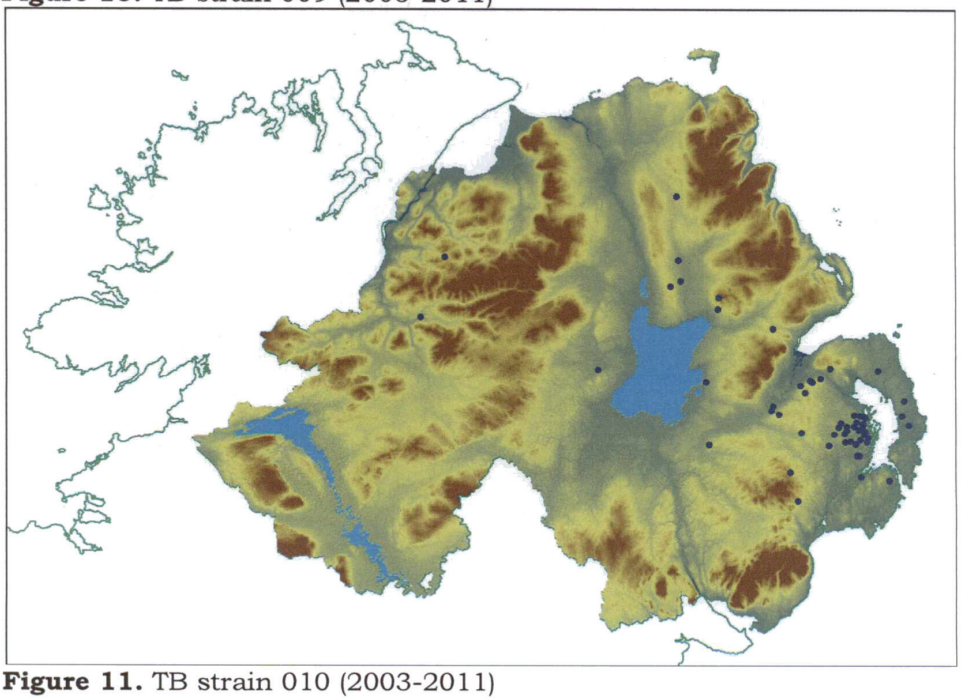


Figure 11. TB strain 010 (2003-2011)

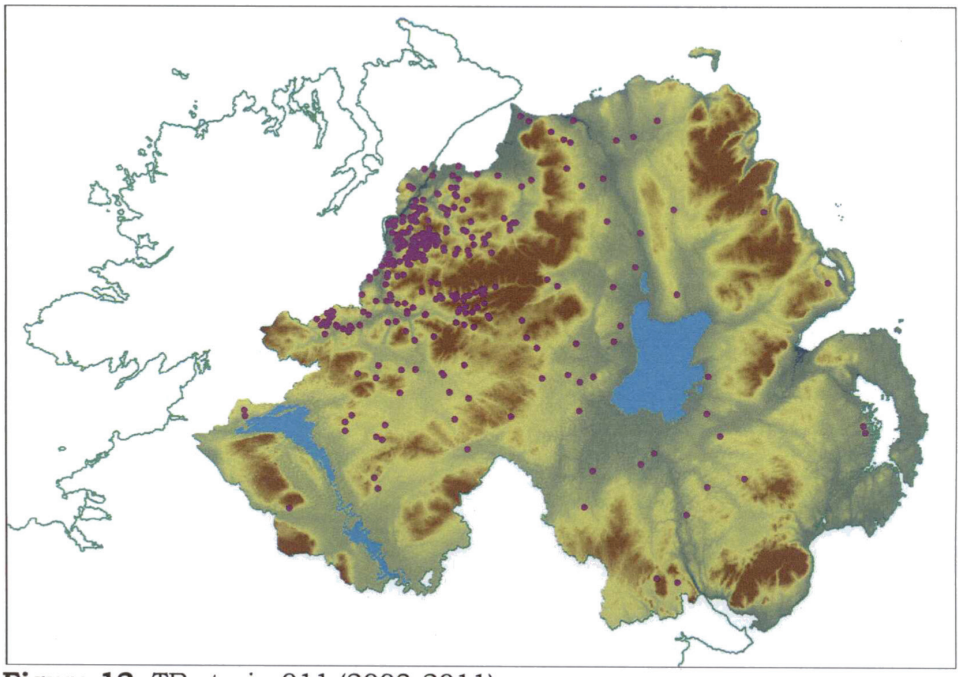


Figure 12. TB strain 011 (2003-2011)

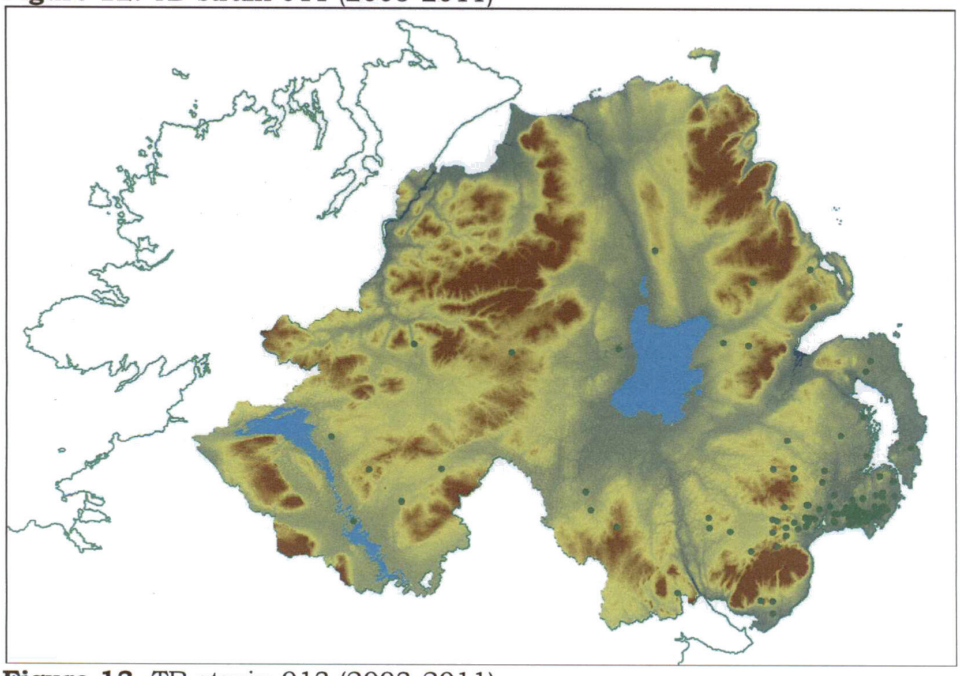


Figure 13. TB strain 013 (2003-2011)

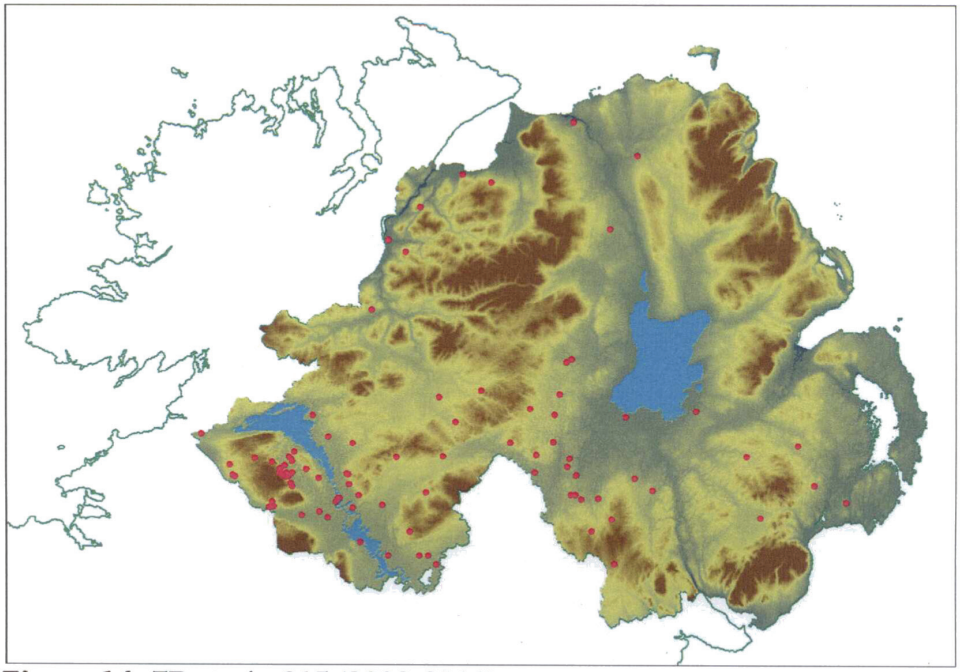


Figure 14. TB strain 015 (2003-2011)

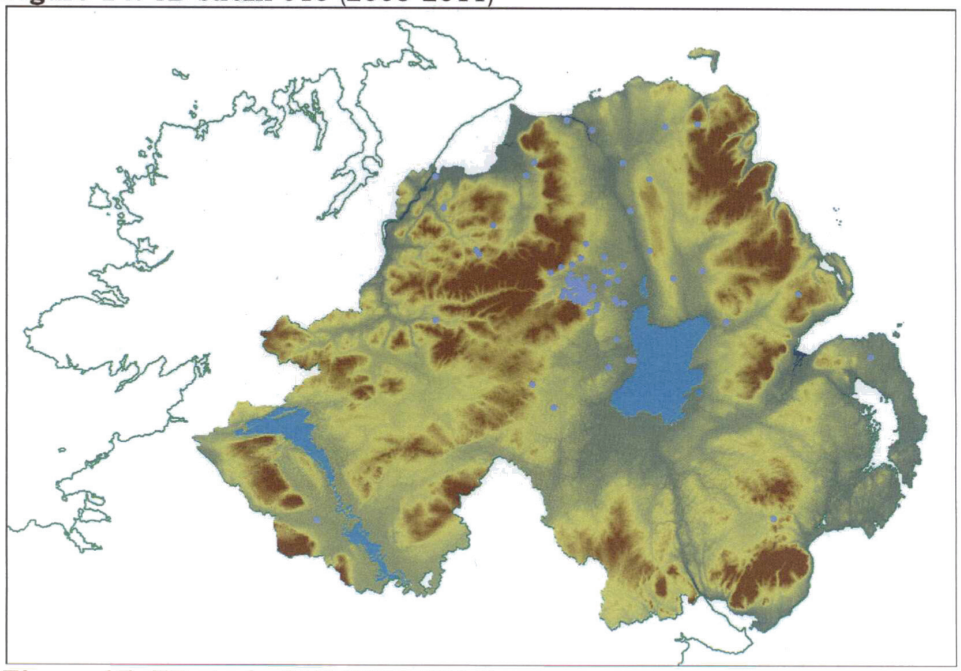


Figure 15. TB strain 017 (2003-2011)

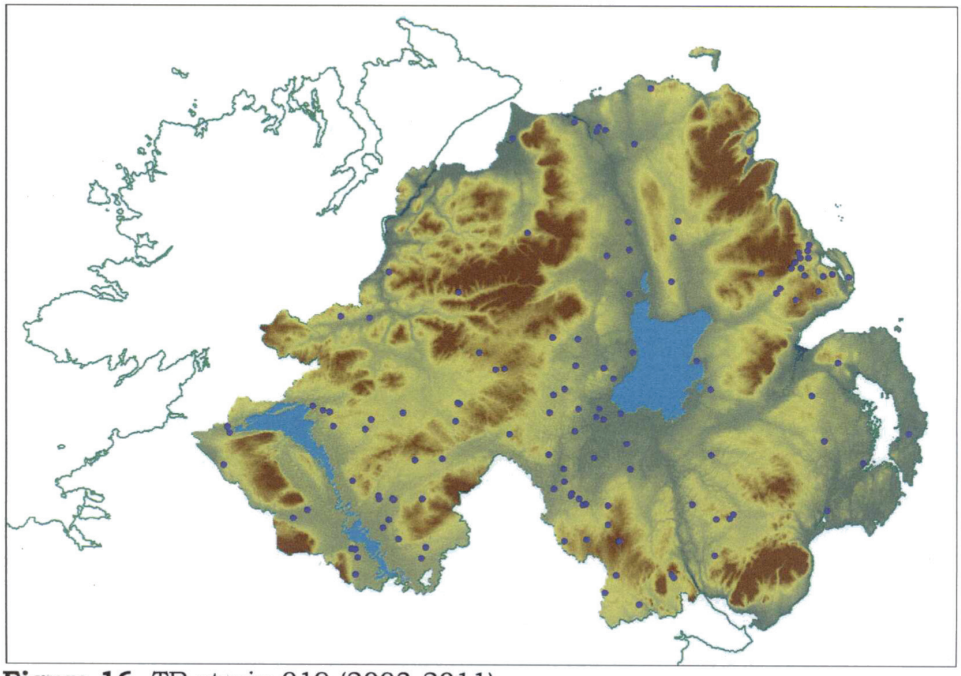


Figure 16. TB strain 019 (2003-2011)

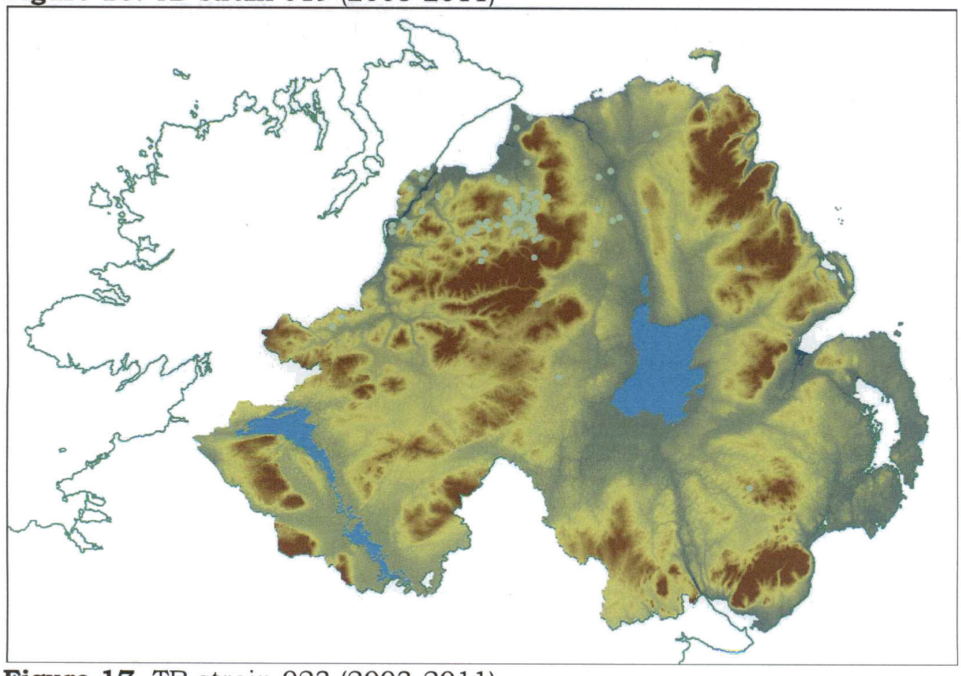


Figure 17. TB strain 023 (2003-2011)

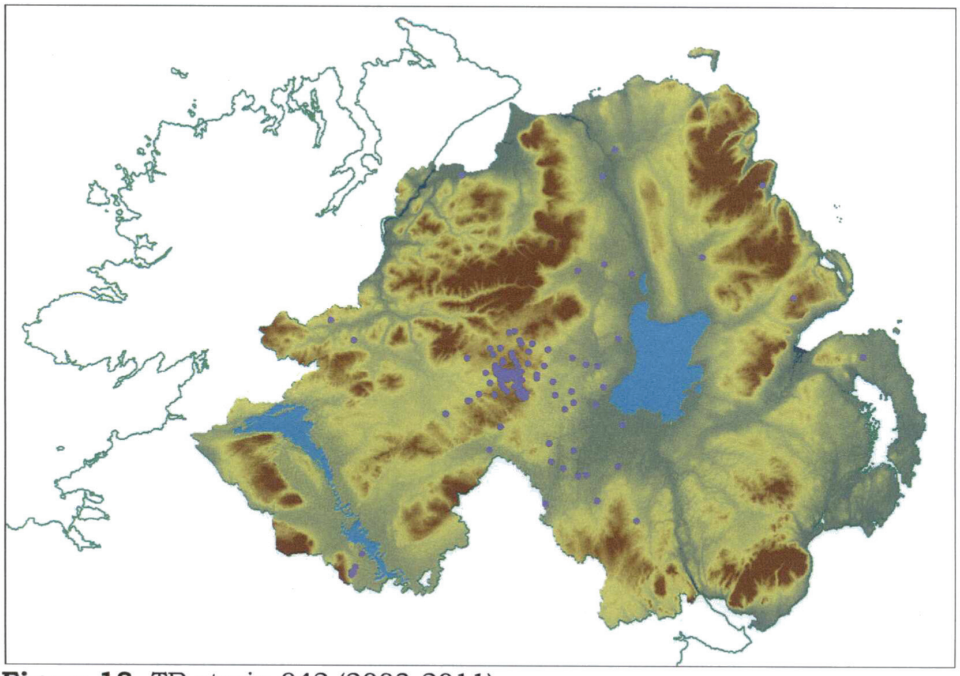


Figure 18. TB strain 042 (2003-2011)

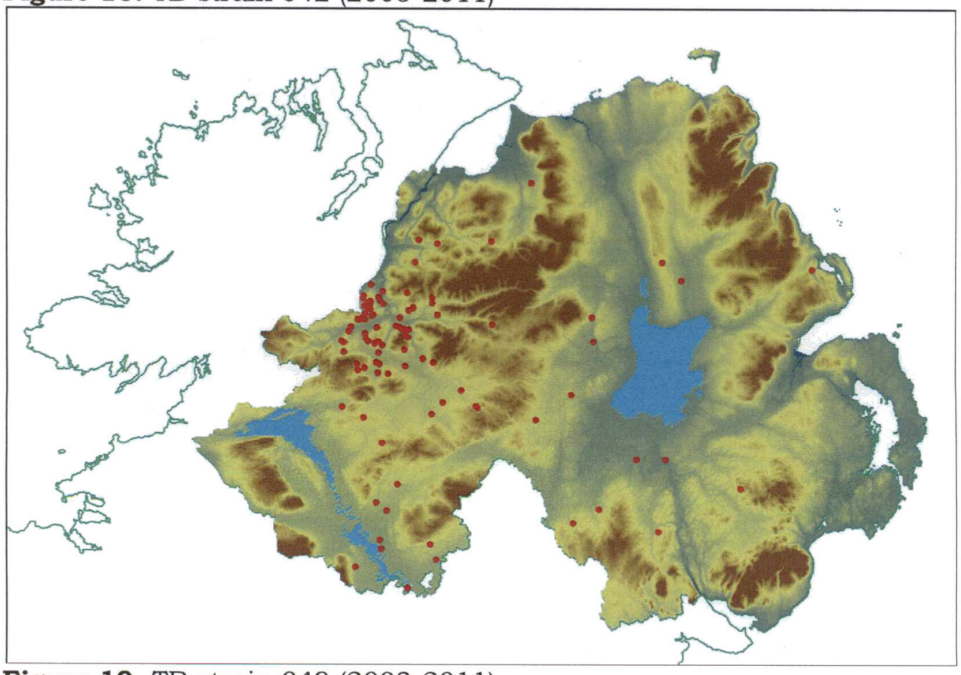


Figure 19. TB strain 049 (2003-2011)

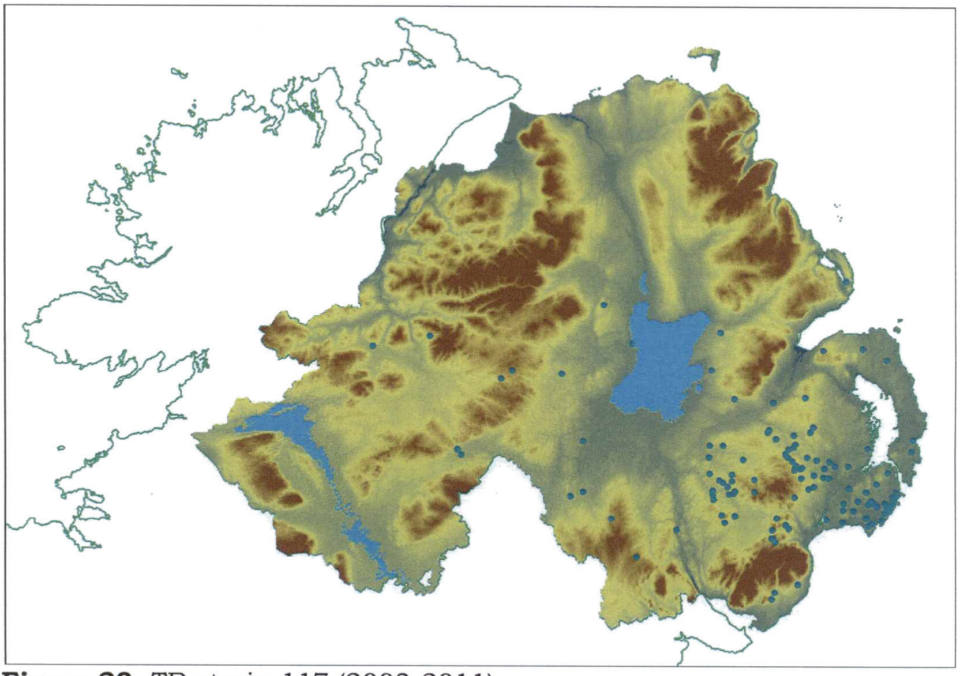


Figure 20. TB strain 117 (2003-2011)

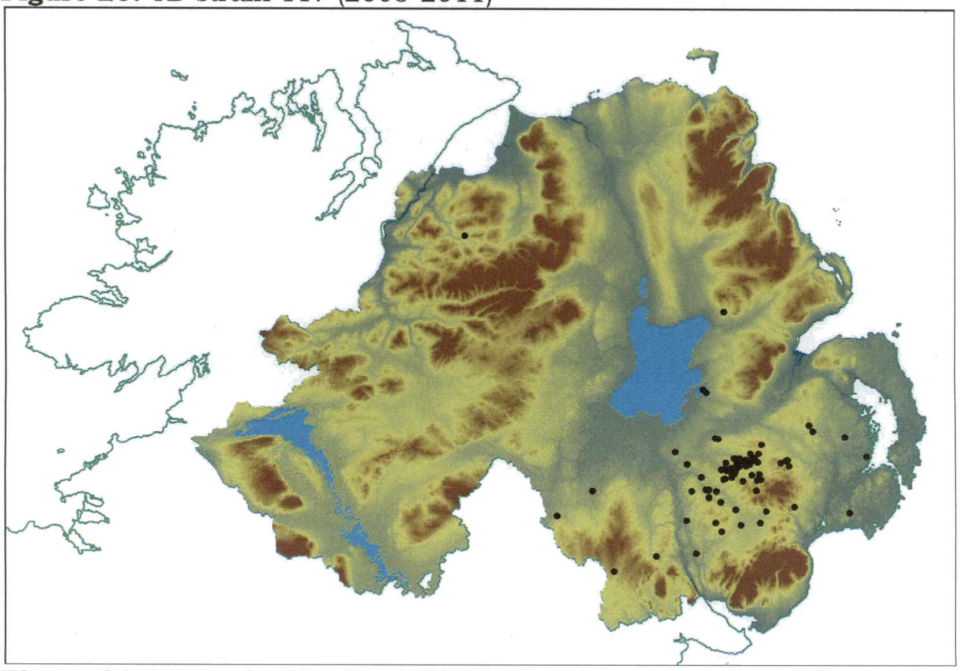


Figure 21. TB strain 122 (2003-2011)

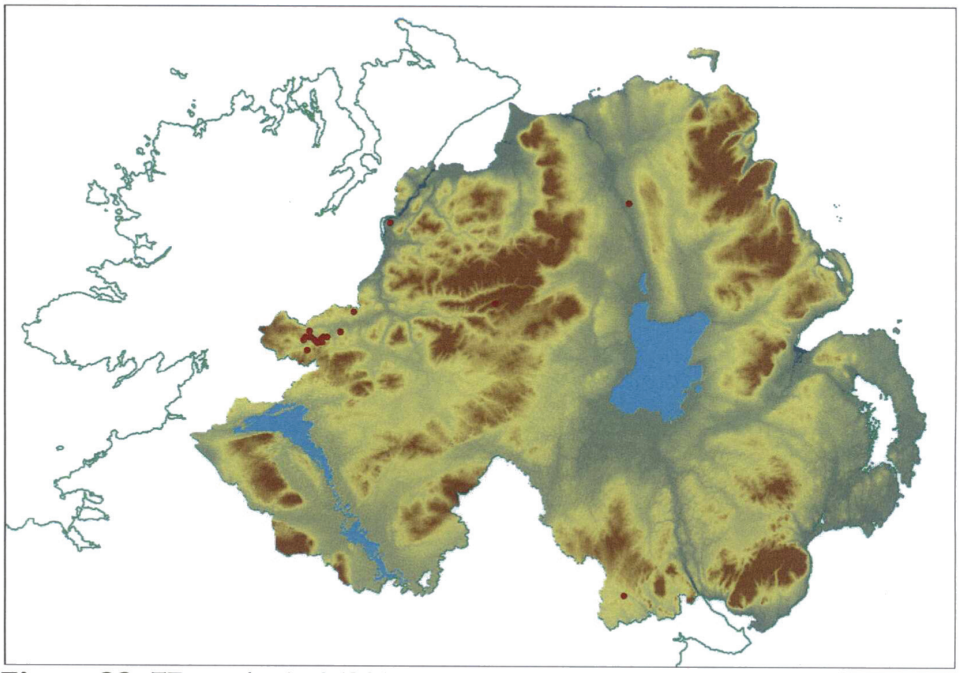


Figure 22. TB strain 146 (2003-2011)

TB strains over time

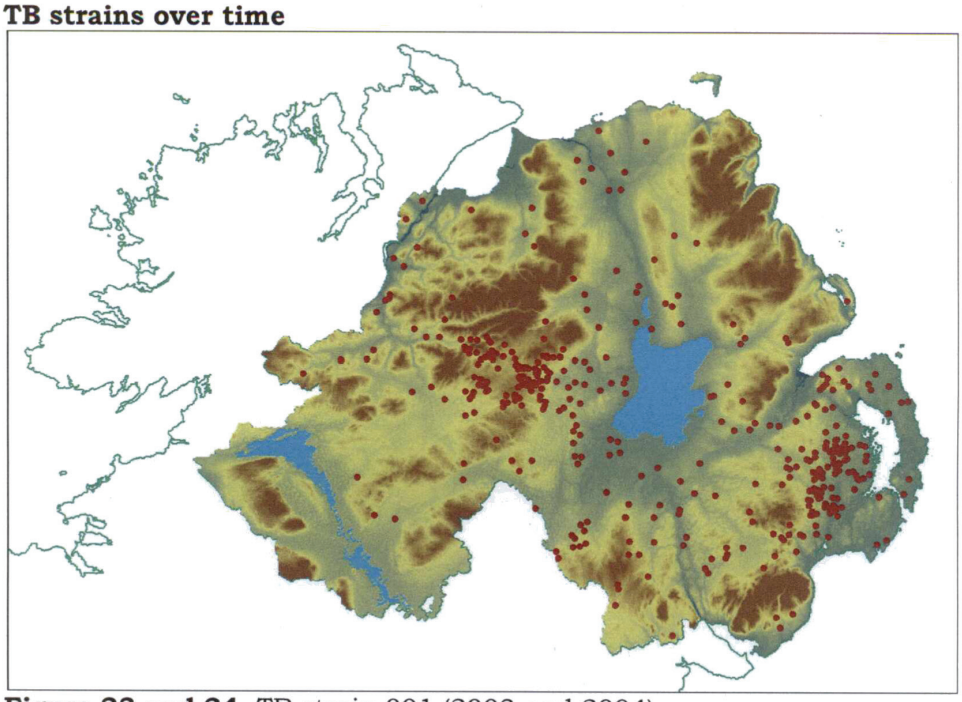
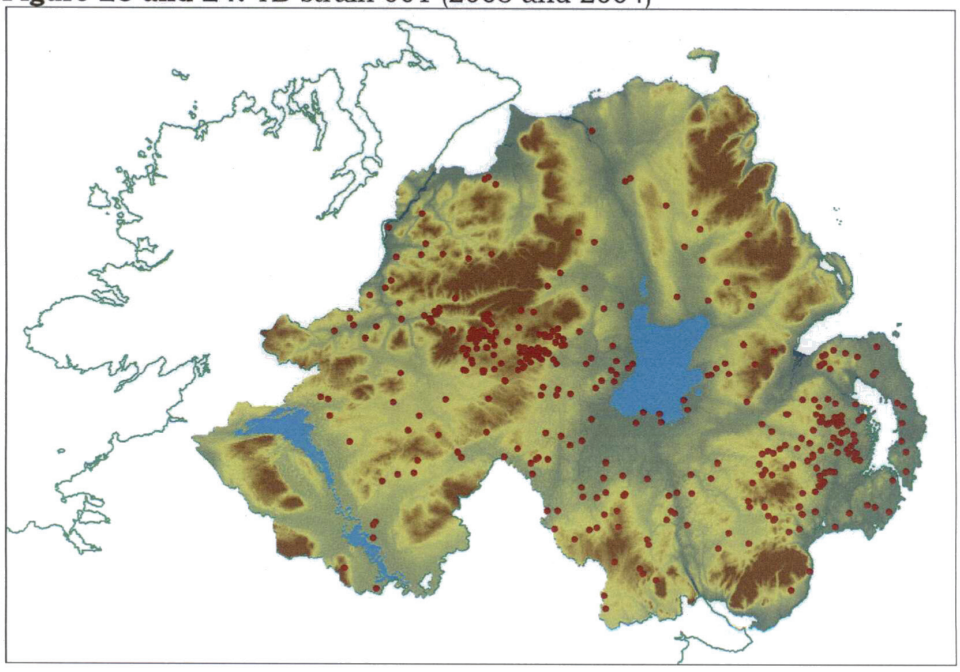


Figure 23 and 24. TB strain 001 (2003 and 2004)



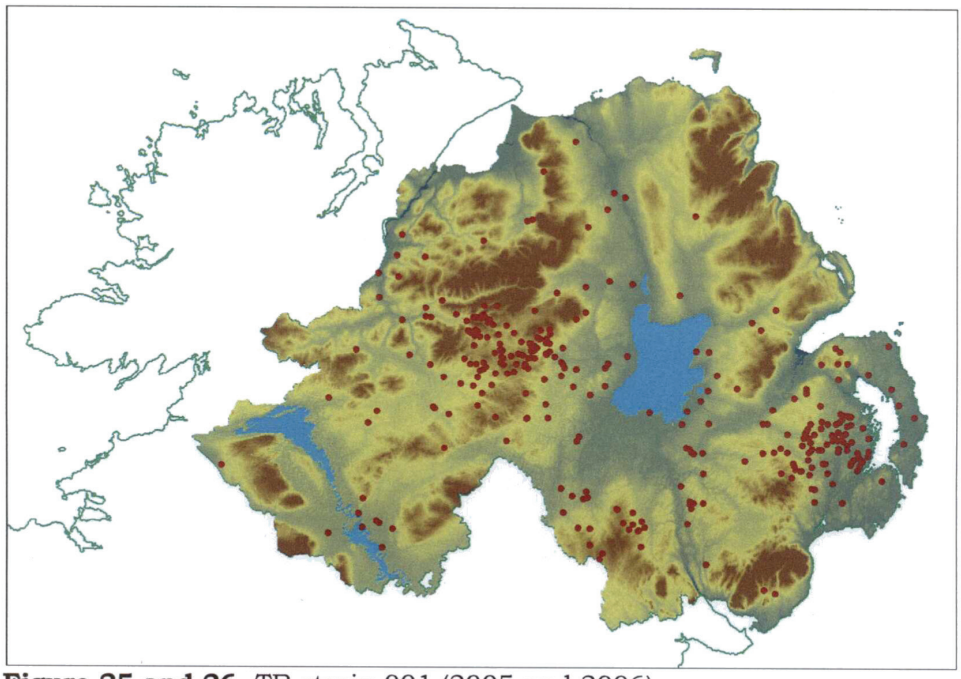
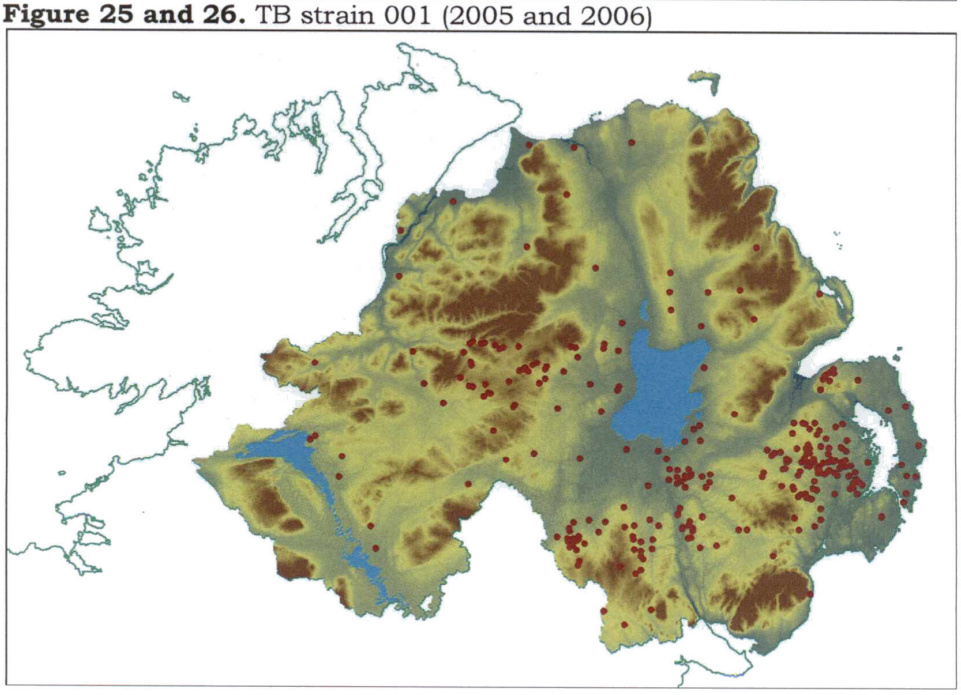


Figure 25 and 26. TB strain 001 (2005 and 2006)



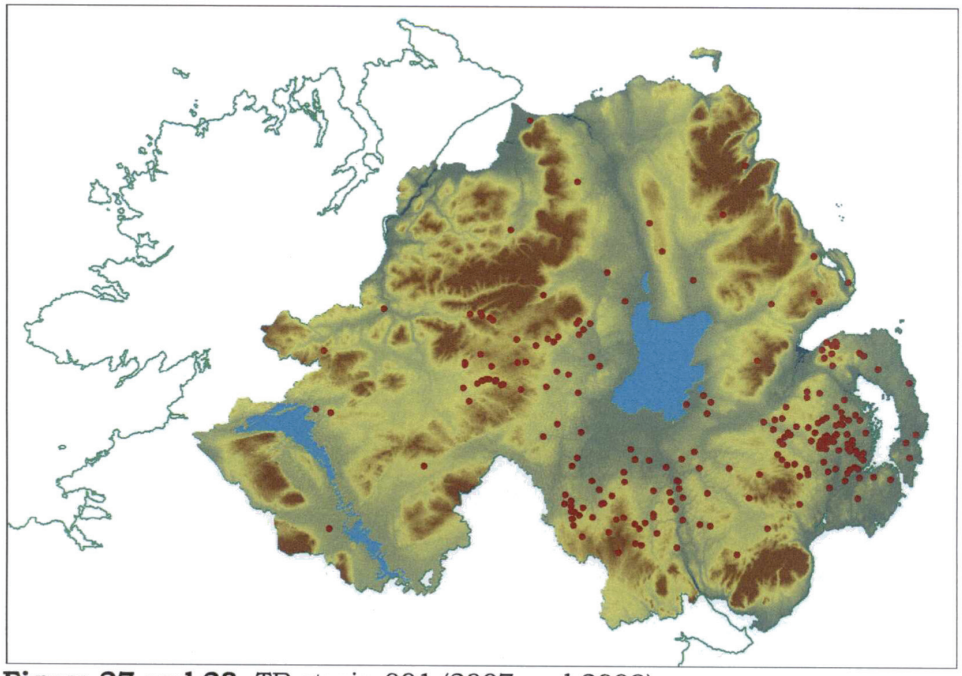
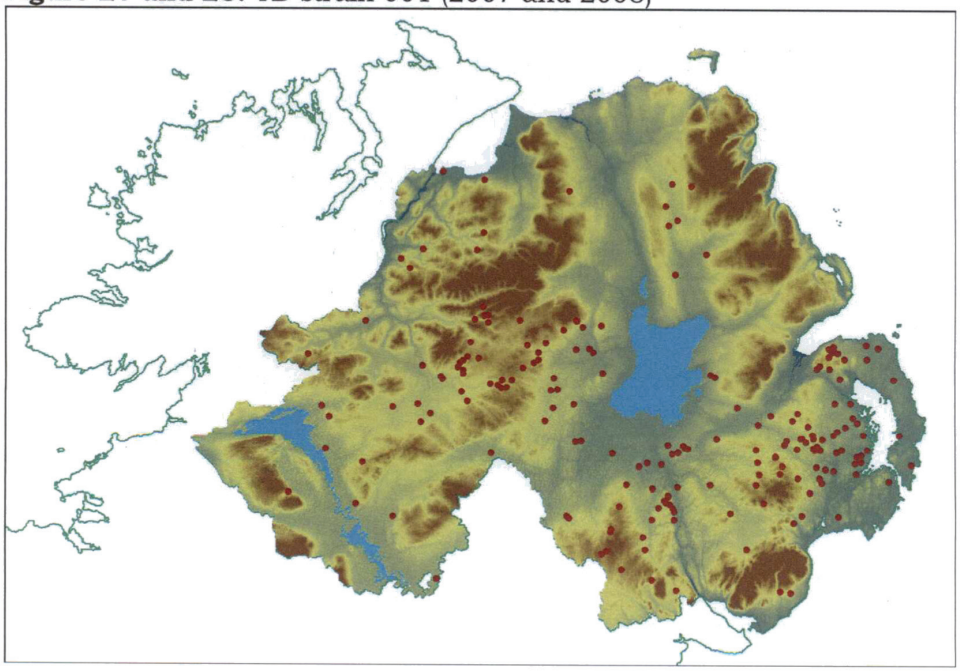


Figure 27 and 28. TB strain 001 (2007 and 2008)



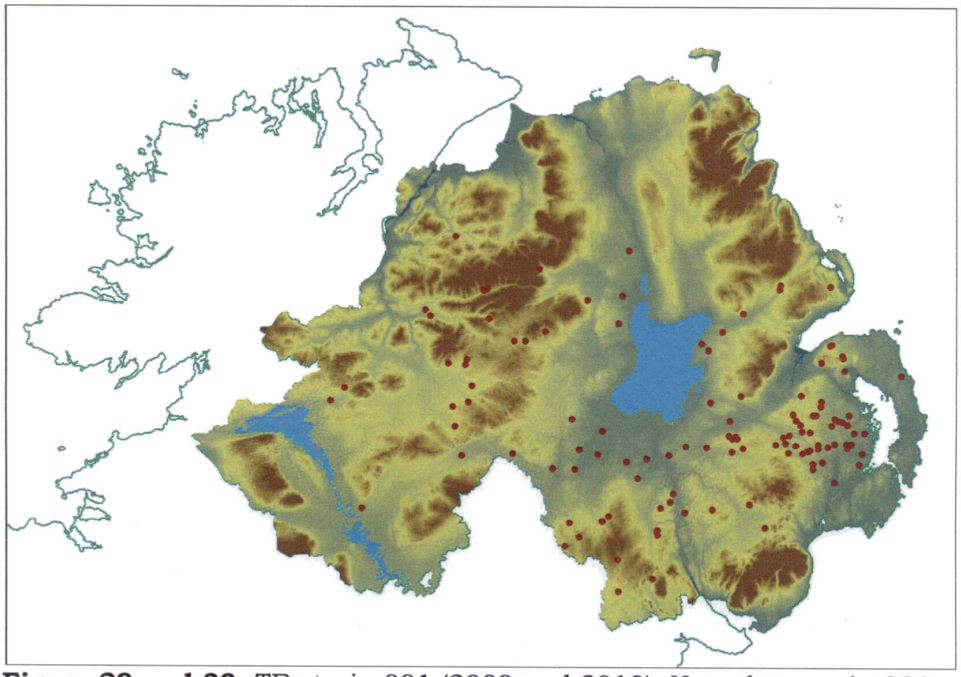
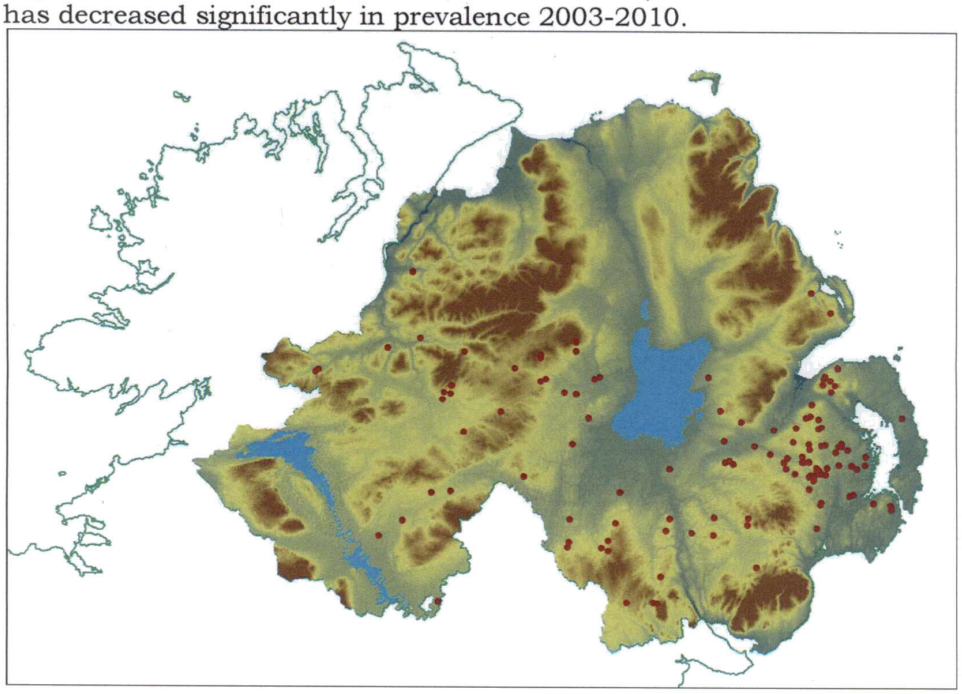


Figure 29 and 30. TB strain 001 (2009 and 2010). Note that strain 001 has decreased significantly in prevalence 2003-2010.



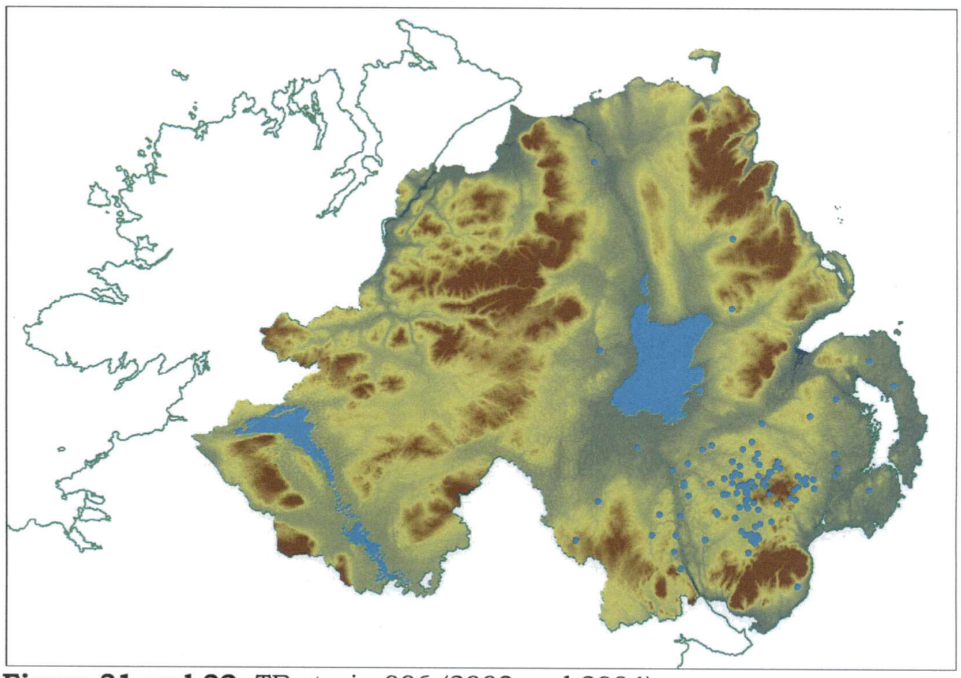
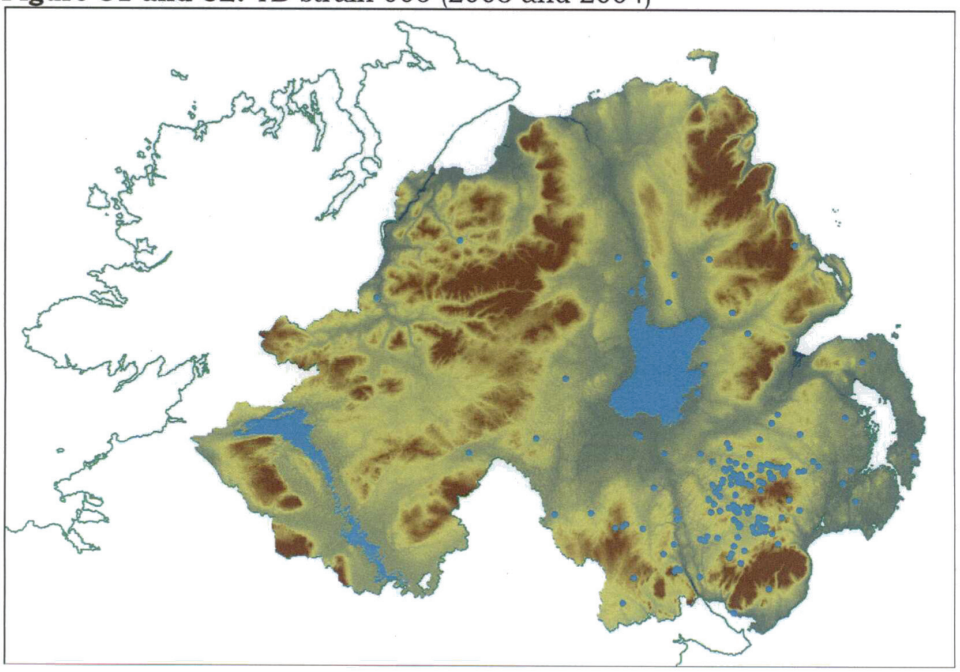


Figure 31 and 32. TB strain 006 (2003 and 2004)



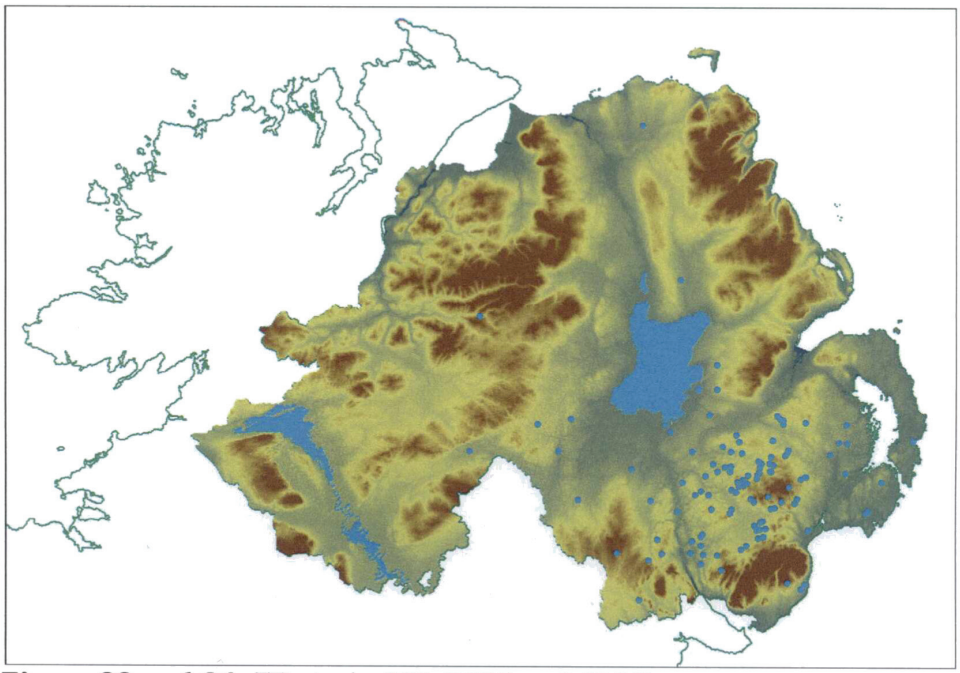
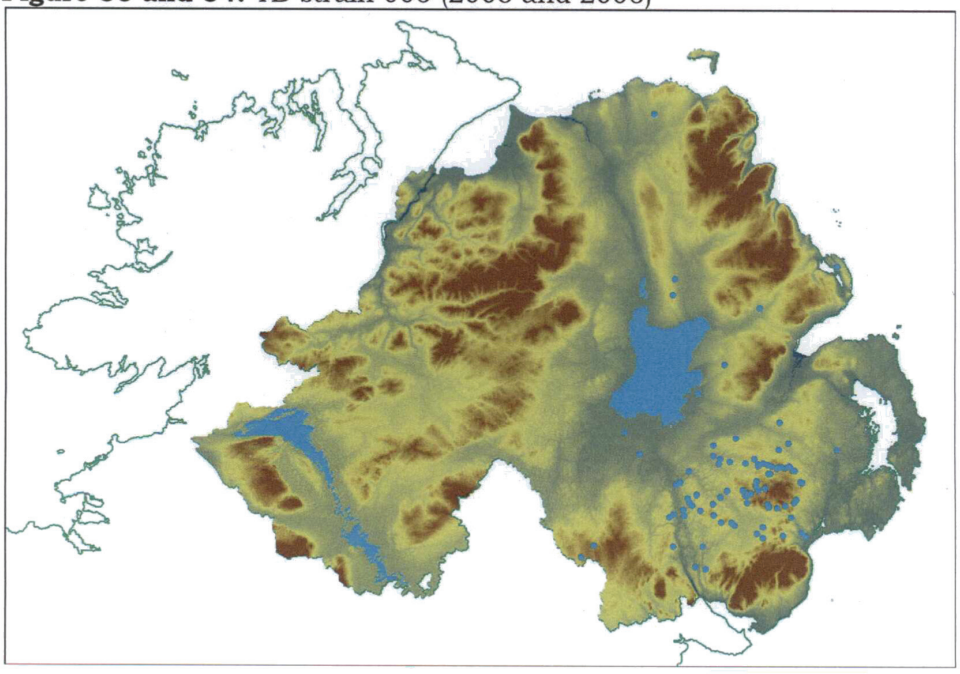


Figure 33 and 34. TB strain 006 (2005 and 2006)



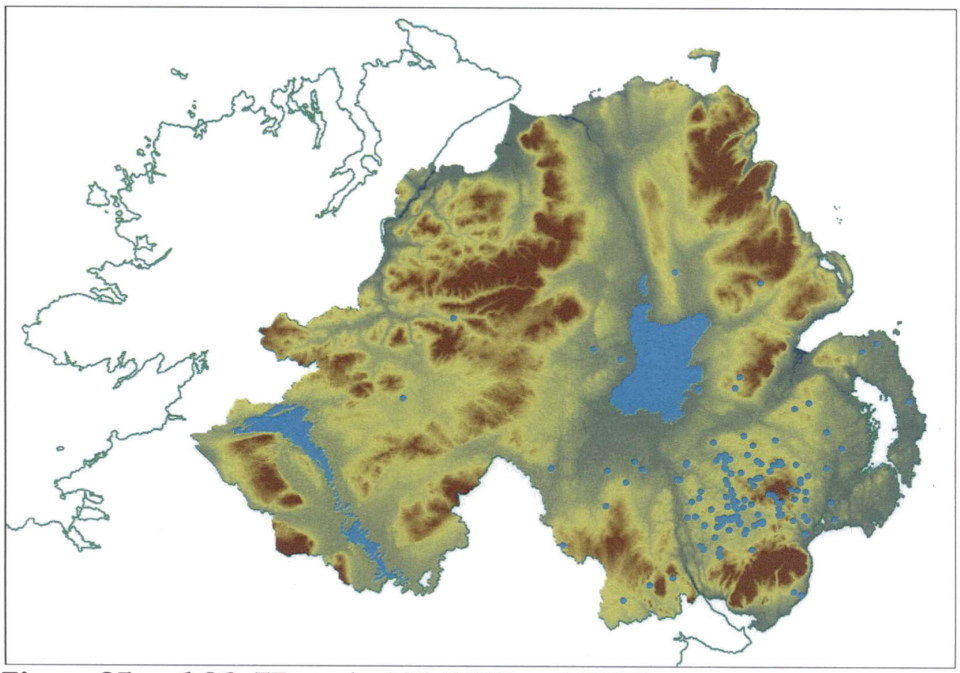
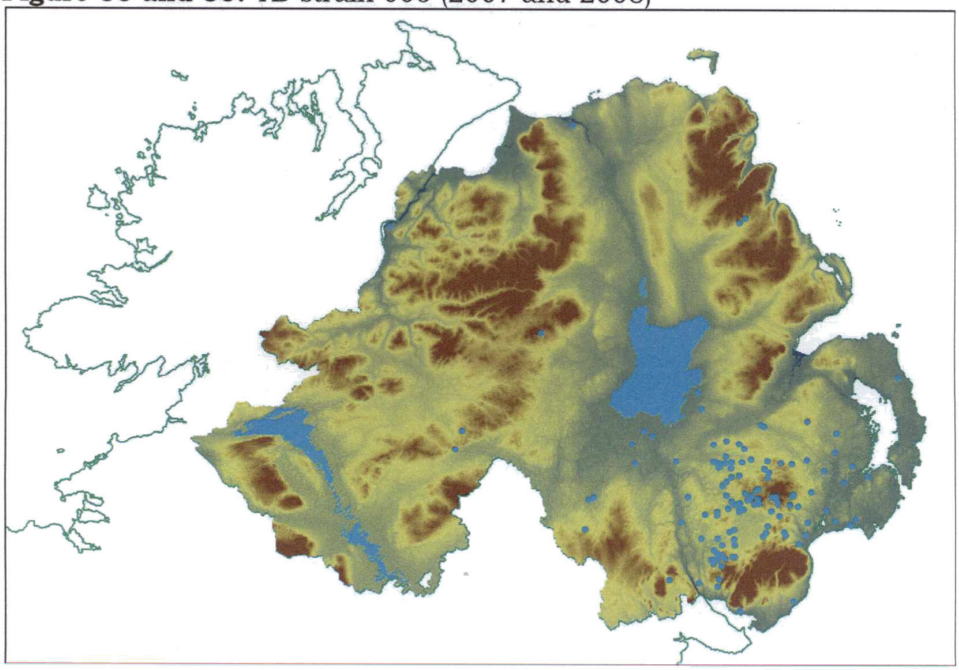


Figure 35 and 36. TB strain 006 (2007 and 2008)



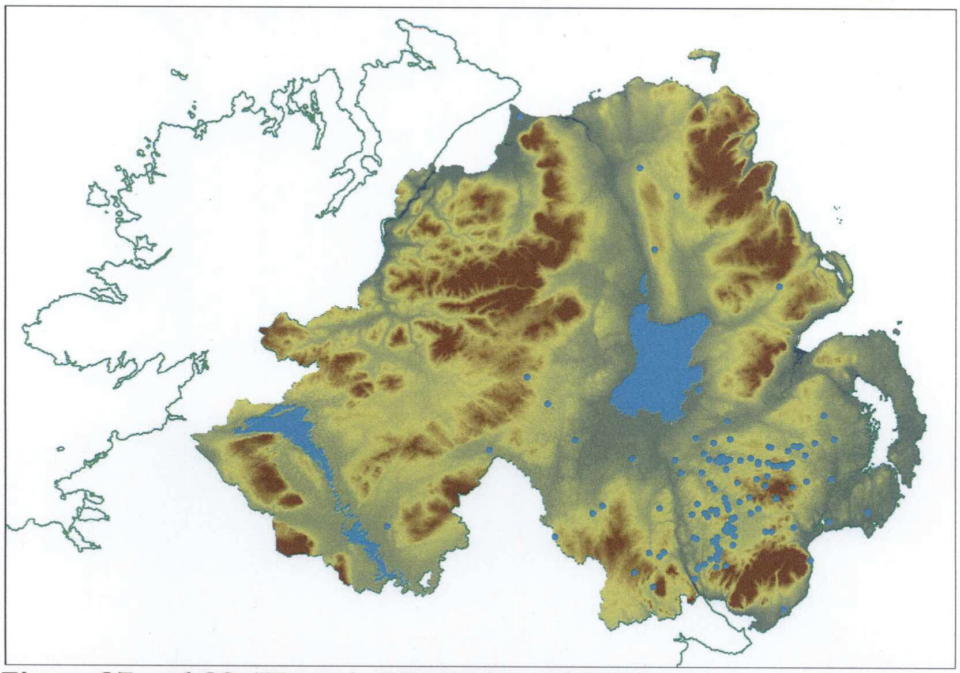
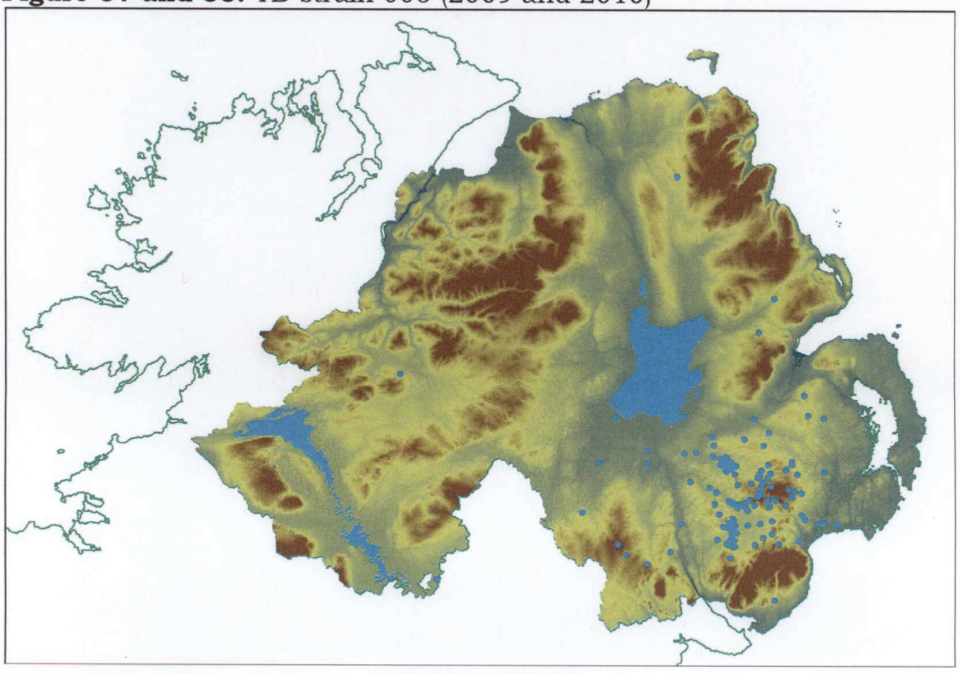


Figure 37 and 38. TB strain 006 (2009 and 2010)



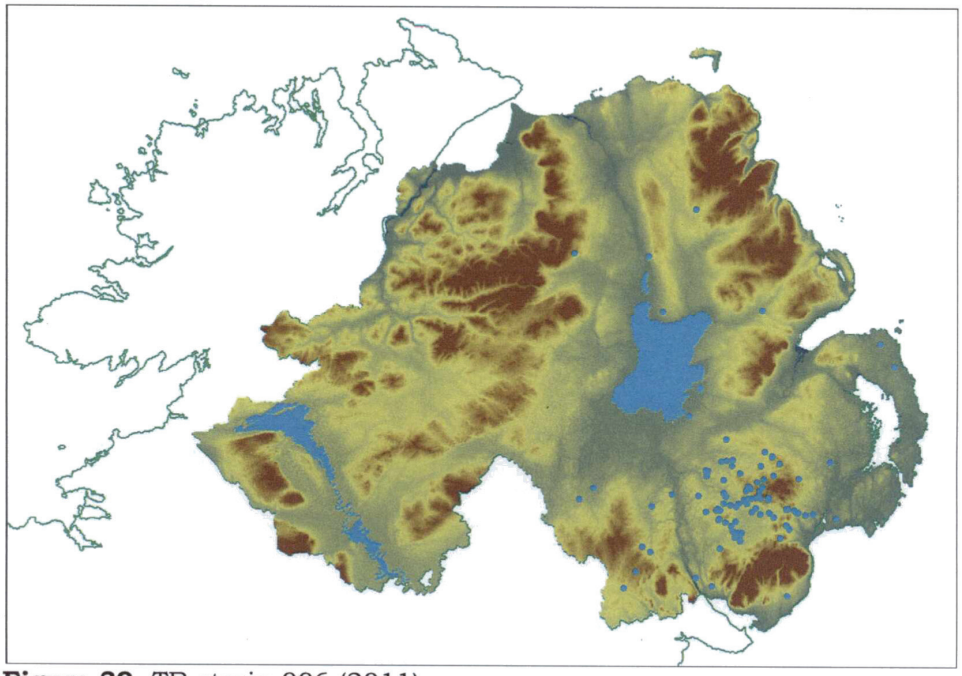


Figure 39. TB strain 006 (2011)

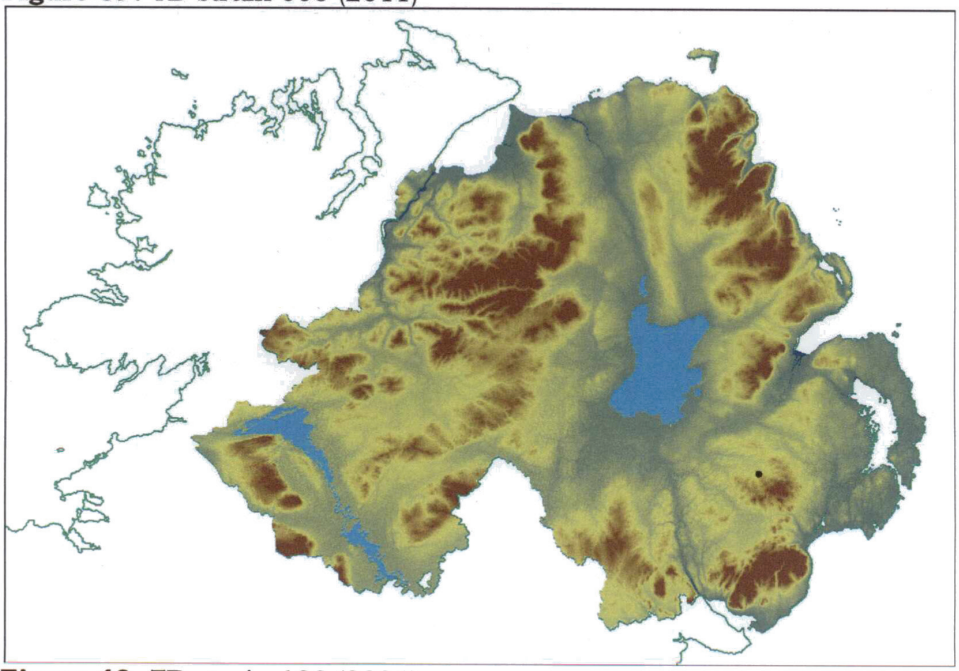


Figure 40. TB strain 122 (2004)

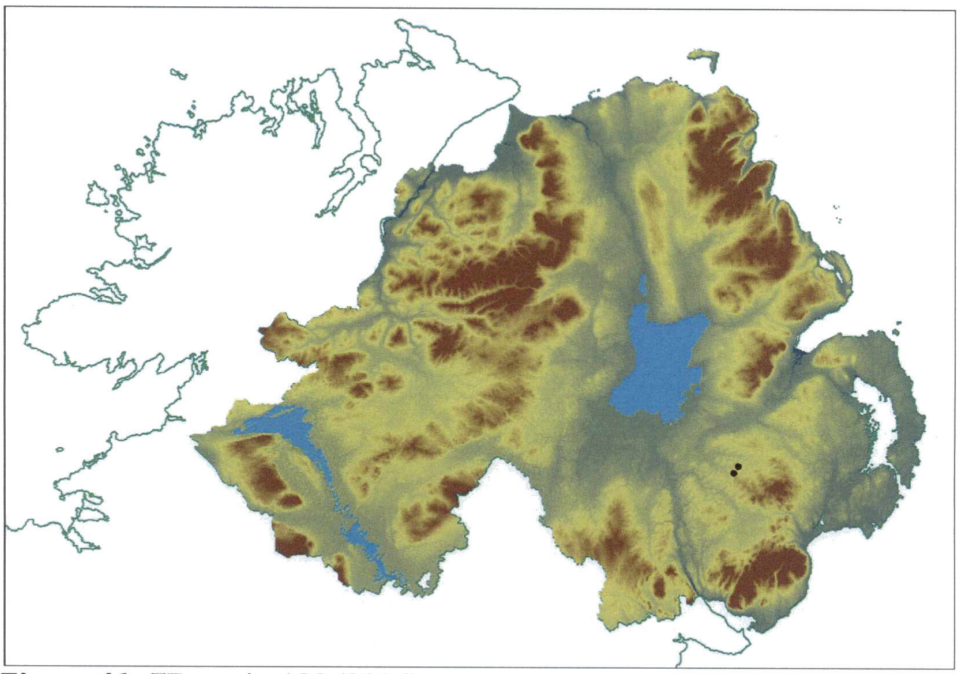


Figure 41. TB strain 122 (2005)

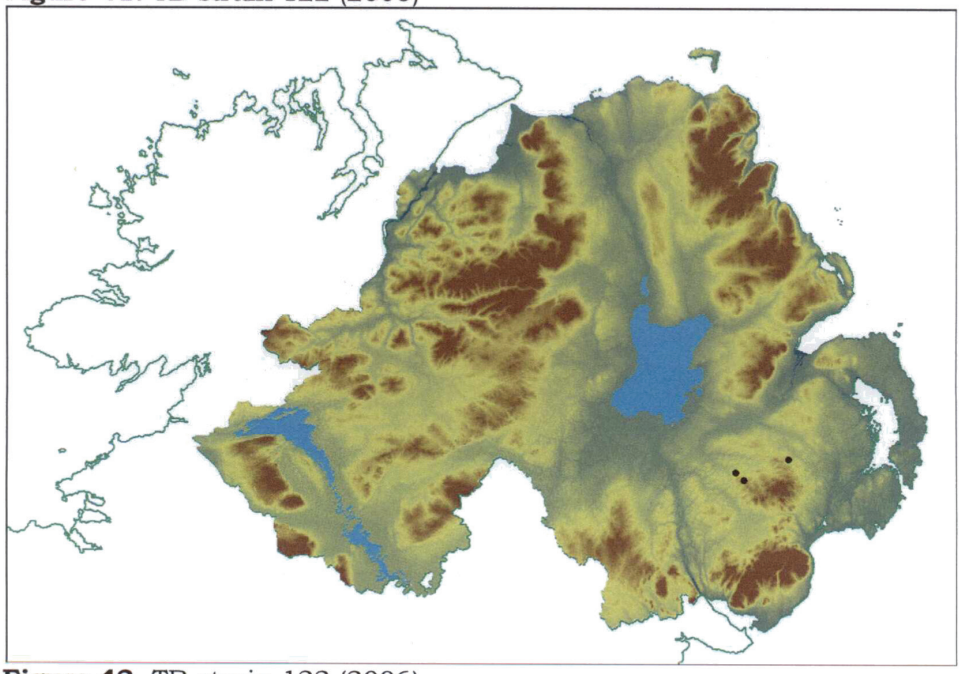


Figure 42. TB strain 122 (2006)

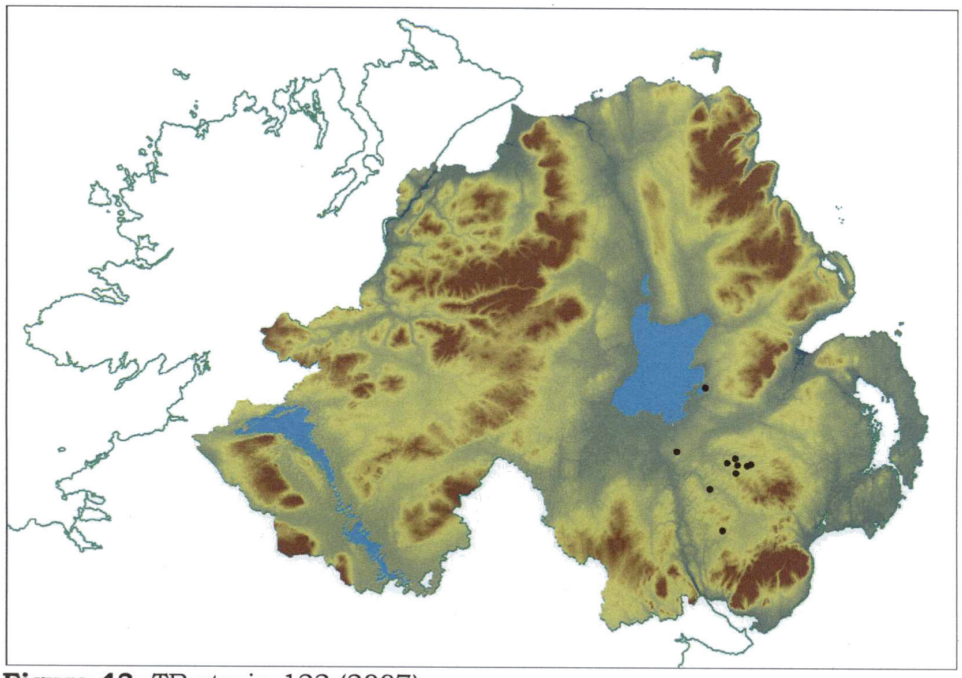


Figure 43. TB strain 122 (2007)

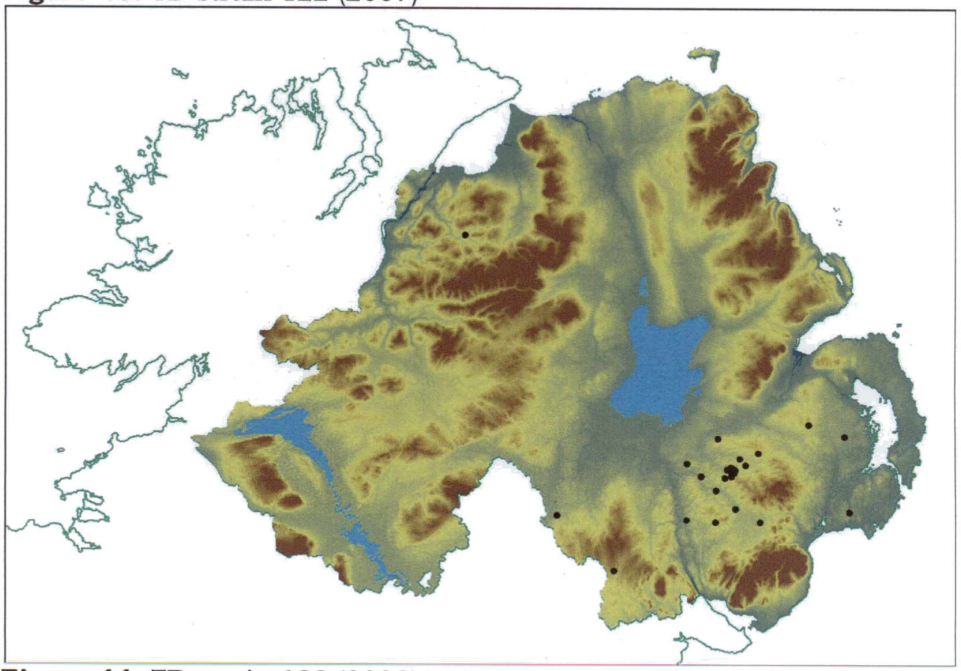


Figure 44. TB strain 122 (2008)

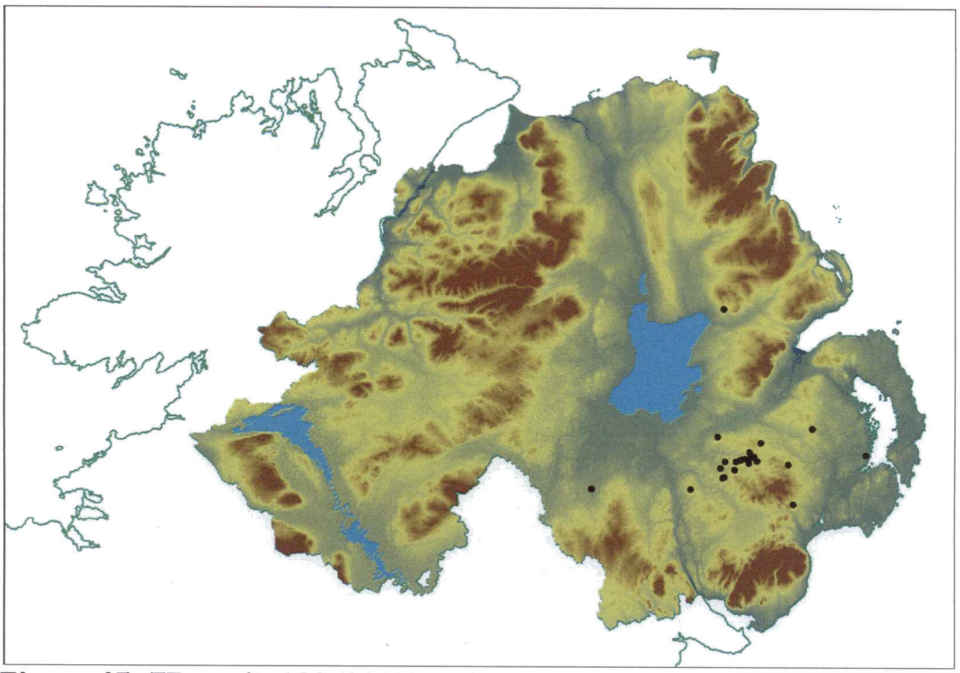


Figure 45. TB strain 122 (2009)

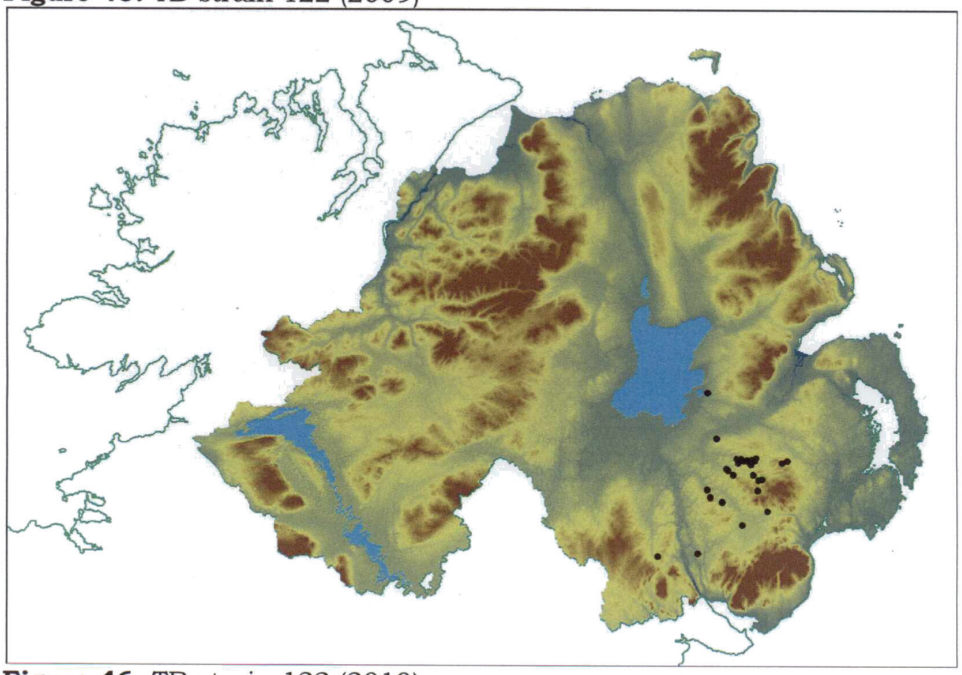


Figure 46. TB strain 122 (2010)

Cattle and badger TB strain association

M. bovis strains in RTA badgers also showed strong geographical clustering to regions, a pattern very similar to that disclosed in cattle herds. The following figures show only those *M. bovis* genotypes shared between home-bred cattle (2003-present, coloured circles) and RTA badgers (1999-present, coloured stars). The same TB strain colour scheme is applied to both cattle and badger isolates. This is indirect evidence of an **association** between TB infections in cattle and badgers.

The observation that bovine TB strains in cattle and badgers were associated is no longer seriously disputed. However, this association does not indicate the direction of transmission, nor the relative importance of badger-to-cattle versus cattle-to-badger transmission in generating this association at any scale. Similar findings and interpretations have now been reported from studies in England and Wales. The statistical analysis required to interpret these data, which is essential in correctly understanding the information which the map conveys, is ongoing.

Badger RTA isolates (stars) are overlaid on cattle TB strains (circles)

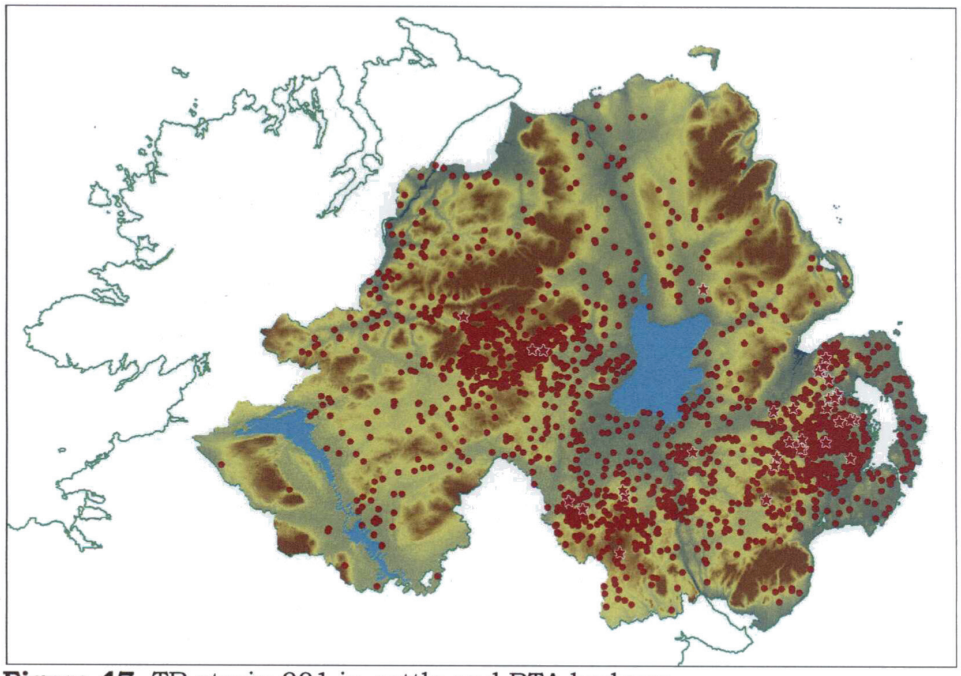


Figure 47. TB strain 001 in cattle and RTA badgers.

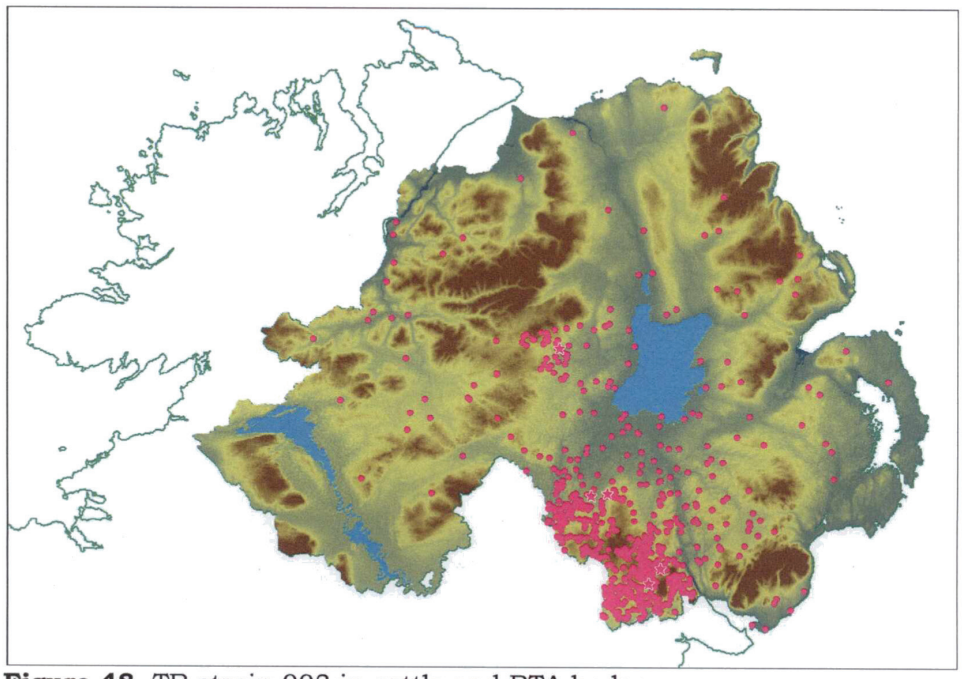


Figure 48. TB strain 003 in cattle and RTA badgers.

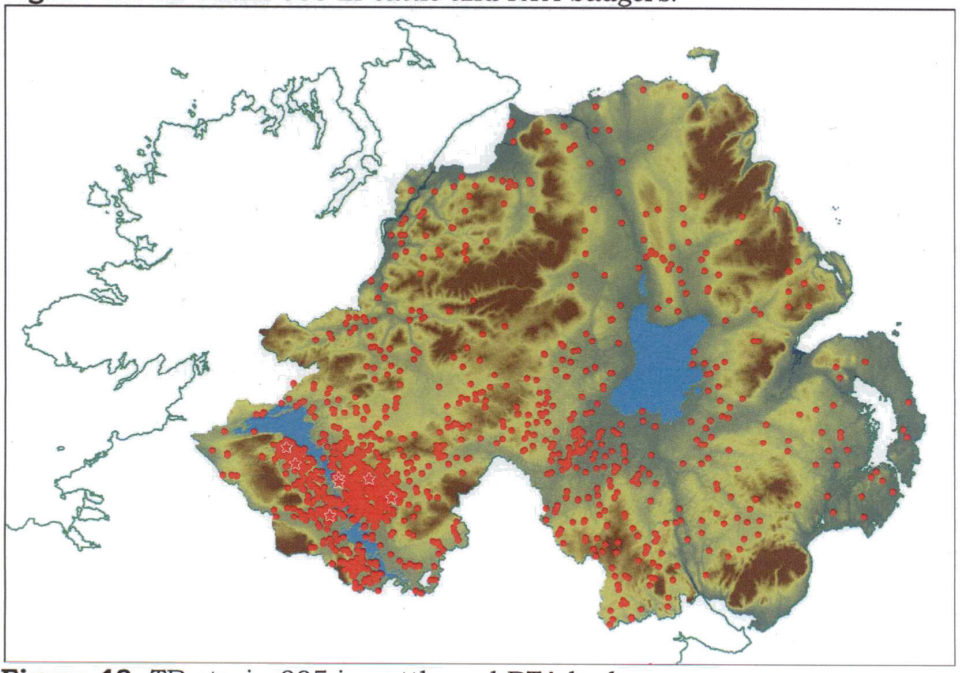


Figure 48. TB strain 005 in cattle and RTA badgers.

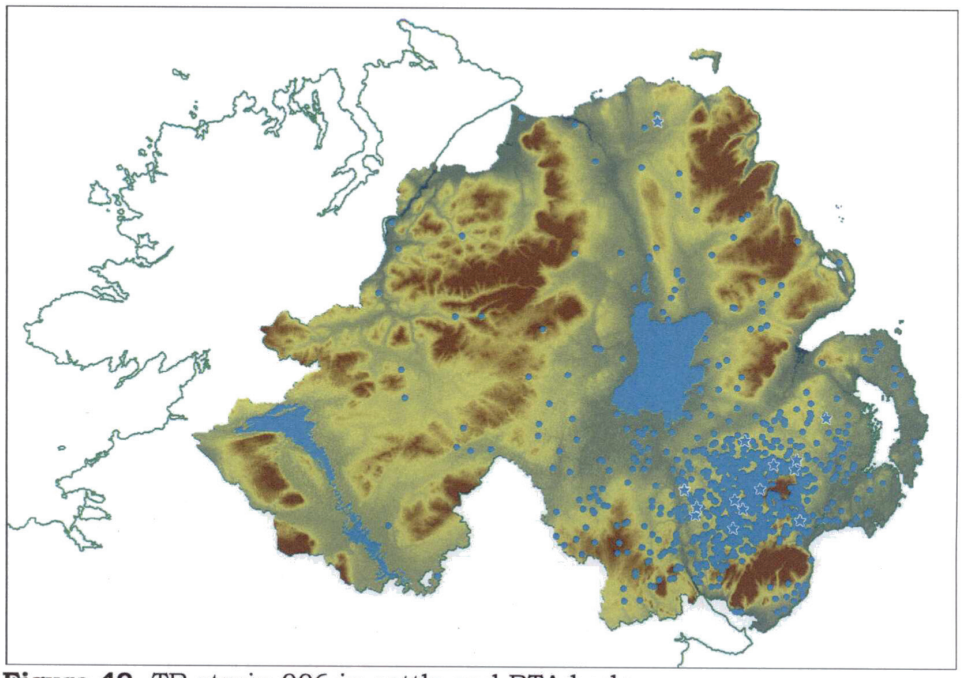


Figure 49. TB strain 006 in cattle and RTA badgers.

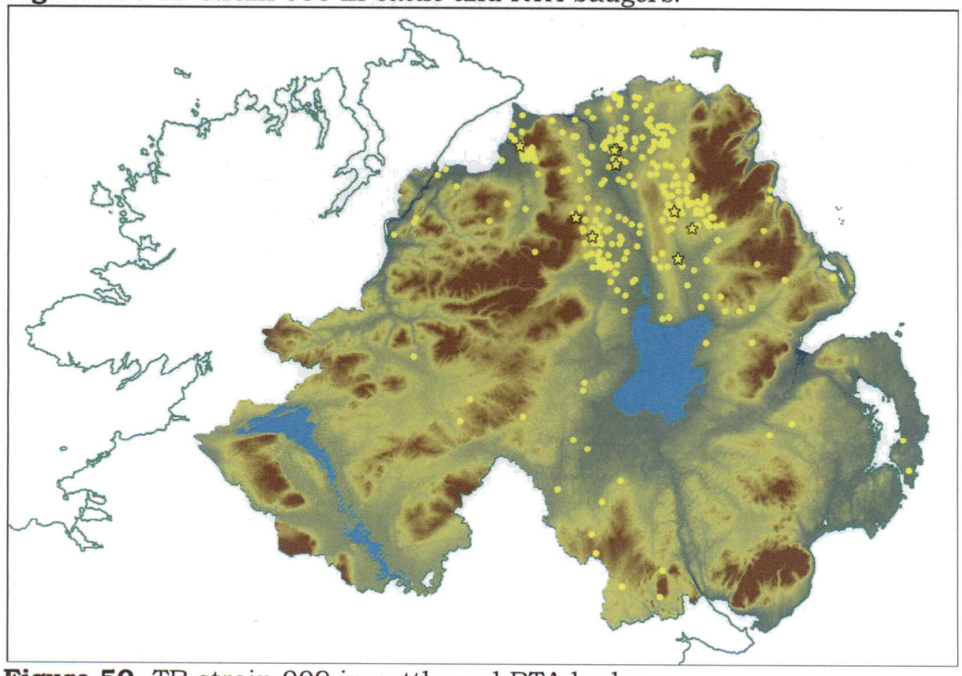


Figure 50. TB strain 009 in cattle and RTA badgers.

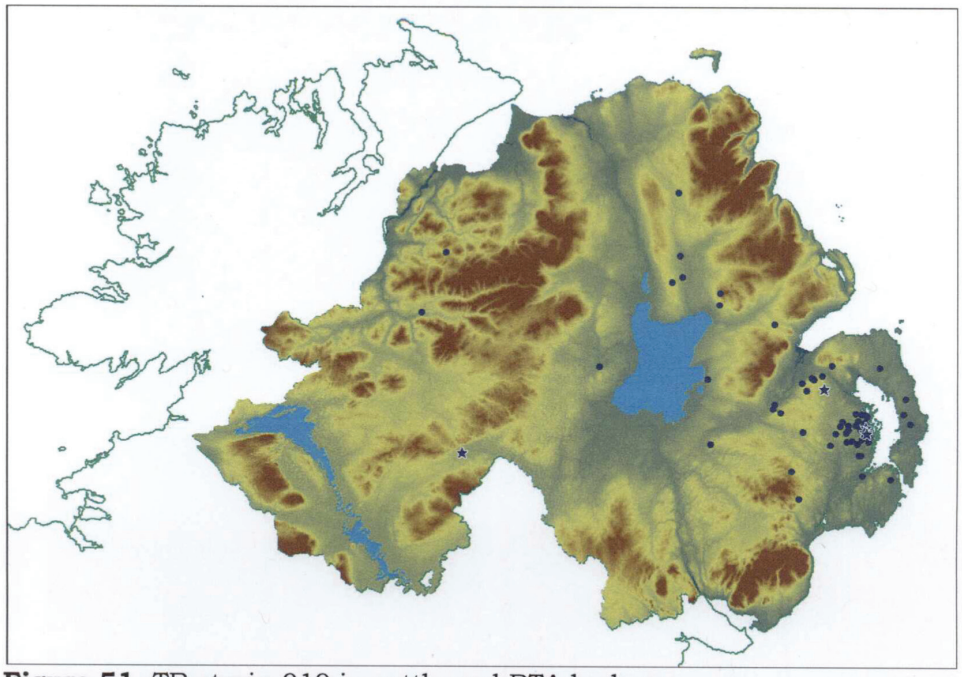


Figure 51. TB strain 010 in cattle and RTA badgers.

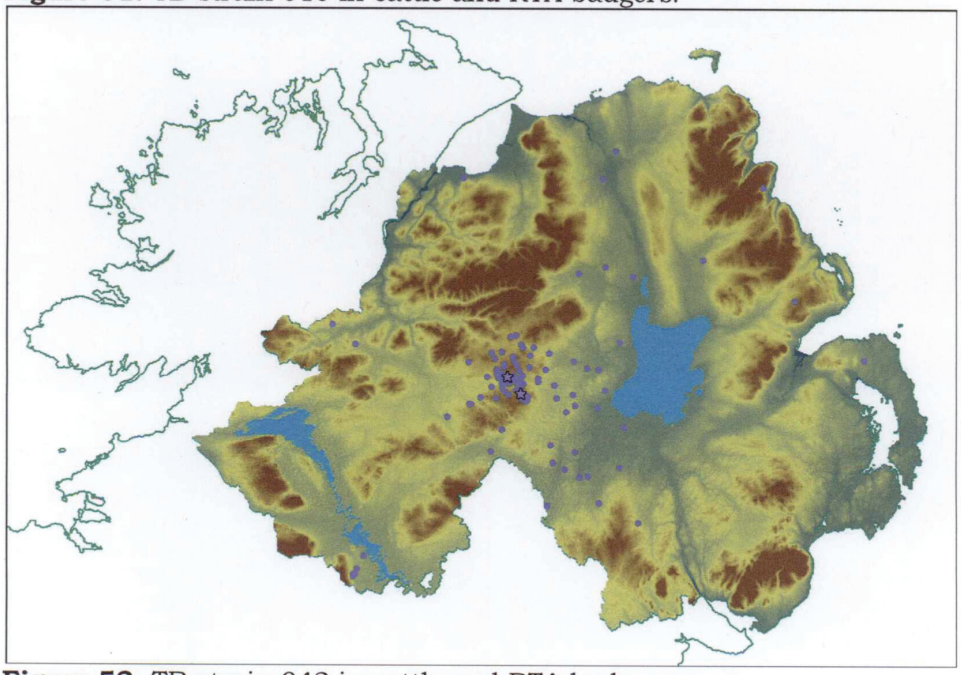


Figure 52. TB strain 042 in cattle and RTA badgers.

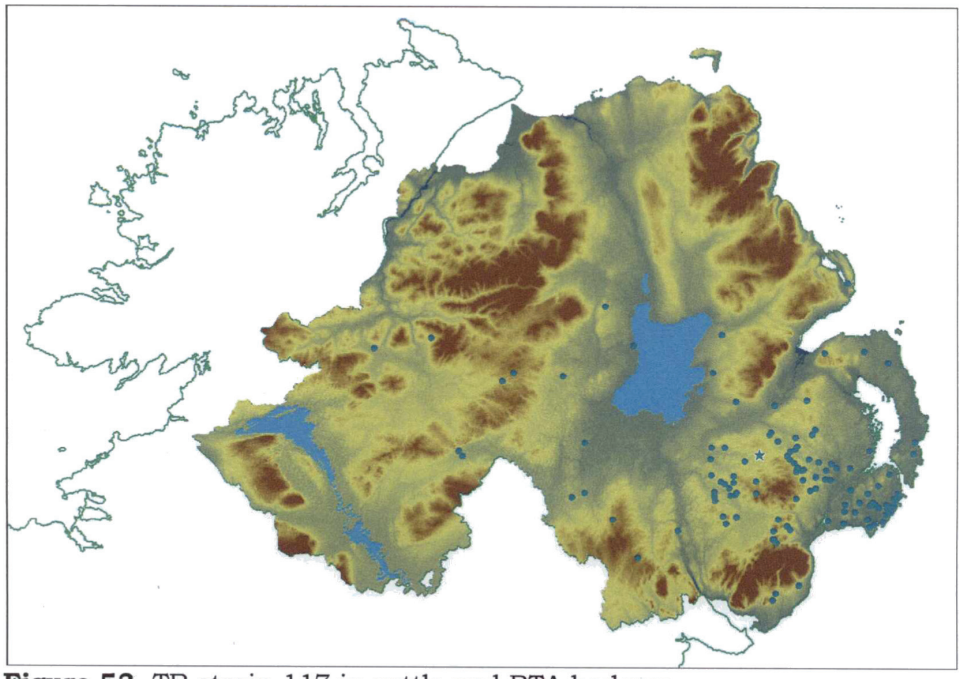


Figure 53. TB strain 117 in cattle and RTA badgers.

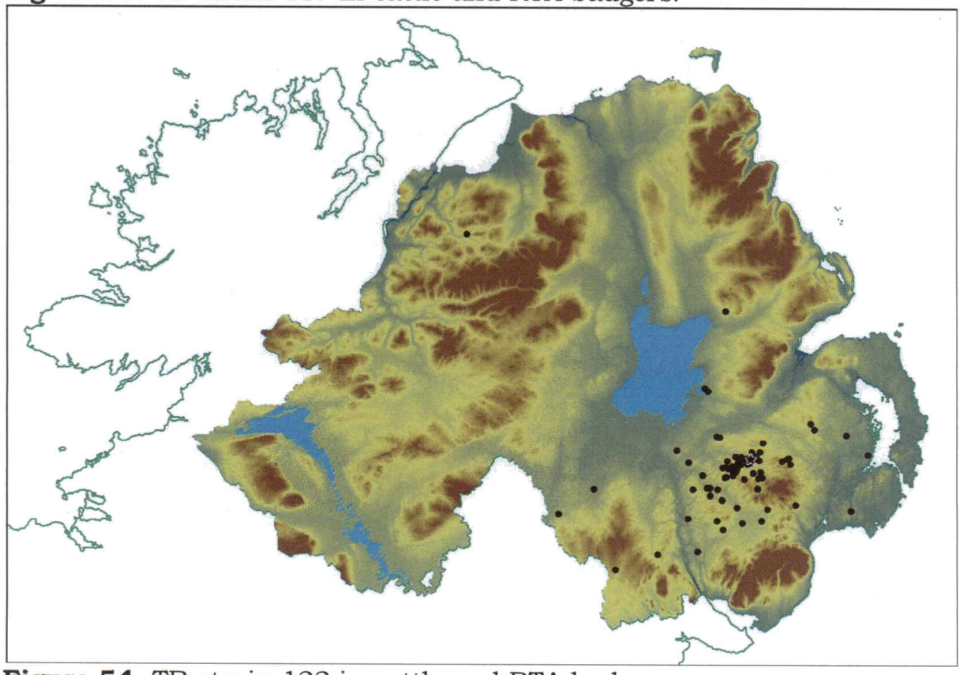


Figure 54. TB strain 122 in cattle and RTA badgers.

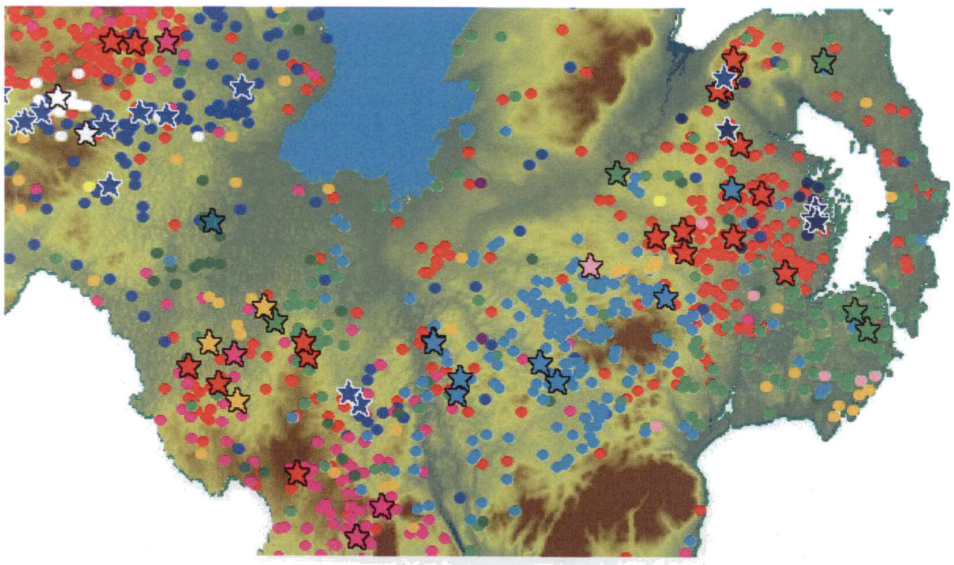
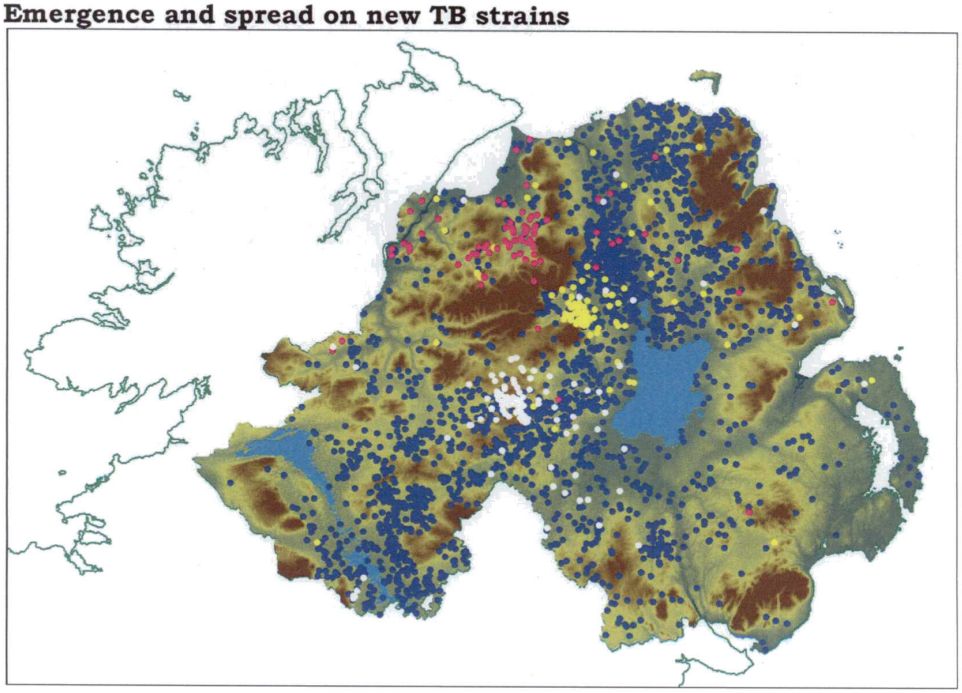


Figure 55. TB strains in cattle and RTA badgers.

Emergence and spread on new TB strains



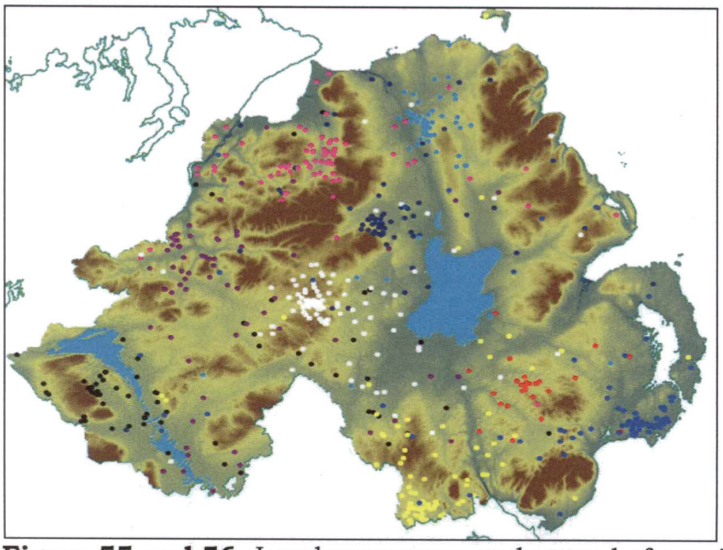


Figure 55 and 56. Local emergence and spread of new TB strains; these are clearly daughters of existing TB strains.

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09 May 2012

Annex C

Papers

Papers

Mycobacterium bovis genotypes in Northern Ireland: herd-level surveillance (2003 to 2008)

R. A. Skuce, T. R. Mallon, C. M. McCormick, S. H. McBride, G. Clarke, A. Thompson, C. Couzens, A. W. Gordon, S. W. J. McDowell

Surveillance genotyping (variable number tandem repeat profiling and spoligotyping) of *Mycobacterium bovis* isolates from culture-confirmed bovine tuberculosis (TB)-affected herds in Northern Ireland is presented for the years 2003 to 2008 inclusive. A total of 175 *M bovis* genotypes were identified in 8630 isolates from 6609 herds. On average, 73 genotypes were identified each year, with 29 genotypes present in all six years. Highly significant differences (P<0.0001) were observed between the relative frequency of some genotypes in the years 2003 to 2008. The spatial distribution of *M bovis* genotypes was not random (P<0.0001). Significant geographical localisation of *M bovis* genotypes was evident, suggesting that sources tended to be local. Despite regions being dominated by geographically localised genotypes, substantial and exploitable local diversity was still evident. Genotypes were also translocated significant distances from their normal geographical location.

BOVINE tuberculosis (TB) is a chronic disease of animals caused by infection with the slow-growing, obligate intracellular bacterium *Mycobacterium bovis* (Bourne 2007). This highly adapted and successful pathogen has a worldwide distribution, and in several countries TB remains a major, costly infectious disease of cattle and other domesticated animals, in addition to certain feral and wildlife populations (Pollock and Neill 2002, Mathews and others 2006). Bovine TB affects cattle health and welfare and impacts on profitability and trade. Its association with productivity has recently been investigated (Boland and others 2009). It also impacts negatively on the welfare of affected farming families (Farm Crisis Network 2009). Transmission to human beings still constitutes a public health risk (Smith and others 2004, de la Rua-Domenech 2006). Consequently, bovine TB is one of the most complex and difficult multispecies endemic diseases currently facing government and the farming industry in the UK and Ireland (More and Good 2006, Reynolds 2006).

The maintenance and spread of infection within and between populations of cattle and populations of wildlife is relatively poorly understood (White and others 2008). Investigations into disease dynamics have been hampered by difficulties in accurately defining epidemiologically linked cases. Cattle movements (Gilbert and others 2005, Fèvre and others 2006), cattle-to-cattle transmission (between- and within-herd), infectious wildlife and undisclosed infection are likely to be important risk factors in the UK and Ireland (Pollock and Neill 2002, Green and Cornell 2005, Johnston and others 2005, Carrique-Mas and others 2008, Green and others 2008, Humblet and others 2009, Ramirez-Villaescusa and others 2009). However, these factors are difficult to quantify, even with large-scale, costly, field-based experimental trials.

Despite sustained and costly implementation of eradication programmes since the 1950s, bovine TB has not been eradicated from either the UK or Ireland. Indeed, there has been a sustained and largely unexplained increase over the past 20 years in parts of the UK (Gilbert and others 2005). In Northern Ireland, which is subject to annual tuberculin testing, the annual herd incidence and animal incidence for 2009 was approximately 5.50 per cent and 0.55 per cent, respectively (Department of Agriculture and Rural Development [DARD] 2009). The historic existence of small, fragmented farms, the strong reliance on rented pasture (conacre), the high level of cattle movements between and within herds, and the reservoir in infectious wildlife are believed to contribute to the maintenance and spread of bovine TB in Northern Ireland (Abernethy and others 2006). The Northern Ireland Bovine TB Programme is administered through 10 local Divisional Veterinary Offices (DVOs) (Fig 1).

M bovis is a member of the closely related *Mycobacterium tuberculosis* complex, members of which have recently been shown to have shared ancestry (Brosch and others 2002) and also to have evolved marked host preferences, although these may not be entirely exclusive (Smith and others 2006a, 2009, Wirth and others 2008). On a global scale, the *M tuberculosis* complex can now be subdivided into discrete lineages, which show strong phylogeographical localisation to regions (Gagneux and Small 2007, Hershberg and others 2008, Wirth and others 2008, Müller and others 2009), with significant implications for control. A number of different classes of genetic marker, which discriminate and inform on different evolutionary scales and are suited to particular applications, have been identified recently in sequenced *M tuberculosis* complex genomes (Comas and others 2009). Genotyping of slowly mutating genetic markers (genome deletions and point mutations) is suitable for inferring the evolutionary history (phylogeny) of these clonal pathogens, whereas genotyping based on rapidly evolving genetic markers, such as tan-

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Provenance: not commissioned; externally peer reviewed

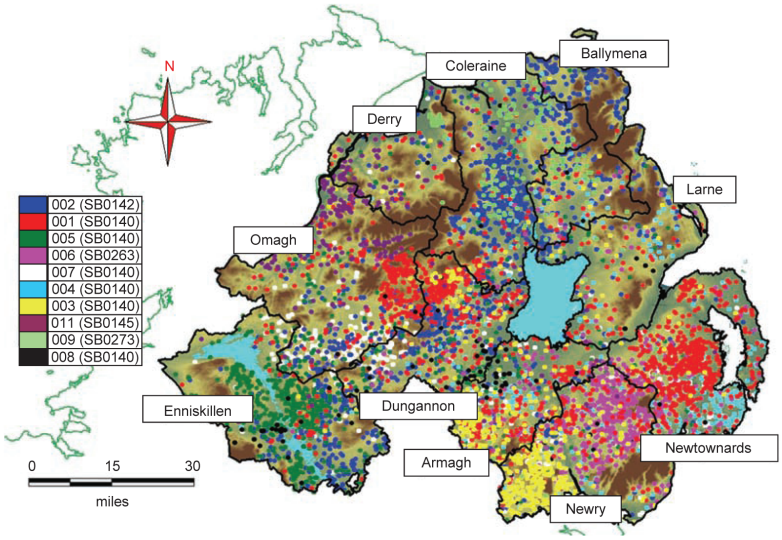

FIG 1: Non-random distribution and georeferencing of the 10 most common *Mycobacterium bovis* genotypes. The 10 DARD Divisional Veterinary Office management regions are labelled

dem repeats, is well suited to tracing transmission and for investigations of outbreaks. The recent development and validation of highly discriminating and high-throughput PCR-based *M bovis* molecular typing schemes, such as variable number tandem repeat (VNTR) profiling (Skuce and others 2005, Allix and others 2006, Smith and others 2006b) offers high-performance tools for investigating the spread of *M bovis*. VNTR profiling is a genotyping technique based on determining the copy number of a series of short, simple DNA repeats, which were originally identified by genome analysis (Skuce and others 2005, Hewinson and others 2006). Systematic application of these methods, in conjunction with tracing of cattle movements and wildlife surveillance, can be expected to provide valuable insights into disease source and spread.

Previously, the configuration from first principles of a multi-locus VNTR assay based on evaluating the performance characteristics (discriminatory power) of a larger panel of VNTRs was described by Skuce and others (2005). Subsequently, seven VNTRs were shortlisted, on the basis of their ability to discriminate a representative panel of *M bovis* isolates rationally and systematically sampled from the Northern Ireland *M bovis* population. This assay had maximal discrimination and was subsequently evaluated in conjunction with the less discriminating spoligotyping technique (Kamerbeek and others 1997). A practical convention was adopted, whereby spoligotype defined 'clone' (a group of closely related strains) and VNTR profile defined 'strain' (Smith and others 2006b). Here, the results of herd-level surveillance and mapping of Northern Ireland cattle *M bovis* genotypes for 2003 to 2008 inclusive, using this assay, are reported. Surveillance results were used to investigate the structure of the current *M bovis* population, to inform retrospective, current and prospective TB outbreak investigations and to provide comprehensive herd-level genotype data to allow investigation of detailed epidemiological questions of policy relevance.

Materials and methods

Survey

Culture-confirmed bovine TB herd incidents were enlisted on a rolling 365-day period. For a given herd, isolation of *M bovis* outside this period was considered as a new TB herd incident. *M bovis* was isolated and confirmed using standard procedures (Skuce and others 2005) in tissues submitted by the abattoir from tuberculin skin test reactor cattle and from tuberculous lesions identified at routine abattoir inspection (lesions at routine slaughter [LRS]), for the period 2003 to 2008 inclusive. The first (disclosing) *M bovis* isolate from all bovine TB herd incidents was subjected to genotyping (seven-VNTRs and spoligotyping convention). Animal-level data (movement and test records) were derived from the Animal and Public Health Information System (APHIS) (Houston 2001). Cattle were classified as homebred or purchased on the basis of their APHIS records.

Molecular methods

Heat-inactivated cell lysates were used directly as PCR-ready templates. VNTR profiling, spoligotyping, nomenclature, reference isolates and quality control were as described by Skuce and others (2005). The inferred tandem repeat copy number at each VNTR locus was used to produce a concatenated multi-locus VNTR profile (a string of integers), which was then simplified to a number indicating the prevalence of the pattern. The VNTR loci used were as follows: VNTR2163b-VNTR4052-VNTR2461-VNTR1895-VNTR2165-VNTR2163a-VNTR3232, in order of their increasing discriminatory power (left to right) (Skuce and others 2005). For example, genotype 001 (SB0140), with a spoligotype of SB0140, was the most prevalent in Northern Ireland when surveyed in 1999 to 2003 (Skuce and others 2005). Spoligotypes were named according to an agreed international convention (www.mbovis.org).

A systematic sample (n=500, year 2005) of *M bovis* isolates was profiled at a total of 23 VNTRs (standard seven VNTRs plus 16 additional) to investigate whether additional VNTRs increased the discriminatory power of the standard assay. The additional VNTRs profiled were VNTR0424, VNTR0577, VNTR0580, VNTR0802, VNTR0960, VNTR1644, VNTR1895, VNTR1955, VNTR2401, VNTR2687, VNTR2996, VNTR3192, VNTR3336, VNTR3690, VNTR4052 and VNTR4156 (Supply and others 2006).

Analysis

The discriminatory power, or Hunter-Gaston diversity index (D, range 0.00-1.00; van Belkum and others 2007) is the probability of assigning a different genotype to two randomly sampled isolates. D was calculated using the V-DICE (VNTR diversity and confidence extractor) programme in the Health Protection Agency (HPA) Bioinformatics online tools (www.hpa.org.uk). Six-digit Ordnance Survey coordinates were used to georeference *M bovis* isolates to their final herd using MapInfo Professional v7.5 (Pitney Bowes). Potential differences between the frequency of genotypes in the years 2003 to 2008, for the population sample and by DVO, were investigated using chi-squared tests (Pearson's chi-squared test, StatXact v8.0, Cytel,) and by trend analysis (Trend Test of Ordered Poisson Rates, StatXact v8.0). Due to low genotype numbers in some cells, probability values were calculated using Monte Carlo simulation. Similarly, to investigate potential associations between genotype and location (DVO), unordered R x C contingency tables were analysed by chi-squared analyses for all cattle and then separately for homebred and purchased cattle. Probability values were calculated by means of Monte Carlo simulation.

Results

Structured surveillance of the disclosing *M bovis* isolate in culture-confirmed bovine TB-affected herds in Northern Ireland, for the peri-

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TABLE 1: Relative frequency of the 10 most common *Mycobacterium bovis* genotypes in Northern Ireland, 2003 to 2008

Genotype	Year						Total	P value	
	2003	2004	2005	2006	2007	2008		Independence*	Trend†
002 (SB0142) (%)	334 (21.0)	473 (26.5)	317 (21.4)	267 (19.7)	275 (21.9)	258 (22.2)	1924 (22.3)	0.0017	0.2842
001 (SB0140) (%)	407 (25.6)	335 (18.8)	289 (19.5)	259 (19.1)	201 (16.0)	162 (13.9)	1653 (19.2)	<0.0001	<0.0001
005 (SB0140) (%)	168 (10.6)	187 (10.5)	150 (10.1)	139 (10.3)	122 (9.7)	122 (10.5)	888 (10.3)	0.9816	0.6950
006 (SB0263) (%)	108 (6.8)	146 (8.2)	101 (6.8)	80 (5.9)	124 (9.9)	115 (9.9)	674 (7.8)	0.0001	0.0036
007 (SB0140) (%)	56 (3.5)	96 (5.4)	86 (5.8)	131 (9.7)	108 (8.6)	86 (7.4)	563 (6.5)	<0.0001	<0.0001
004 (SB0140) (%)	104 (6.5)	119 (6.7)	102 (6.9)	69 (5.1)	70 (5.6)	98 (8.4)	562 (6.0)	0.0301	0.5941
003 (SB0140) (%)	89 (5.6)	90 (5.0)	97 (6.5)	107 (7.9)	94 (7.5)	43 (3.7)	520 (2.6)	<0.0001	0.7522
011 (SB0145) (%)	38 (2.4)	51 (2.9)	37 (2.5)	29 (2.1)	29 (2.3)	40 (3.4)	224 (2.3)	0.3712	0.4845
009 (SB0273) (%)	34 (2.1)	36 (2.0)	45 (3.0)	43 (3.2)	16 (1.3)	23 (2.0)	197 (1.3)	0.0105	0.5568
008 (SB0140) (%)	27 (1.7)	23 (1.3)	19 (1.3)	20 (1.5)	17 (1.4)	9 (0.8)	115 (1.2)	0.4772	0.1279

* P value: Chi-squared test for independence, 99 per cent confidence interval
† P value: Test of trend in Poisson rates, Monte-Carlo estimates, 99 per cent level of confidence

od 2003 to 2008, yielded 8630 isolates from 6609 herds. The median age of the cattle was 56.4 months (range 1.7 to 155.5 months); 73.1 per cent of animals were female, and 56.8 per cent were purchased; 68.2 per cent of isolates derived from tuberculin skin test reactor cattle, 95.4 per cent of which were from cattle with visible lesions at slaughter; 31.4 per cent were isolated and confirmed from abattoir cases (LRS cattle), with the remainder (0.4 per cent) classified as tuberculin skin test inconclusive.

The seven-VNTRs (spoligotype) convention was used to define *M bovis* genotypes (Skuce and others 2005, Smith and others 2006b). A total of 8630 isolates were resolved into 175 different genotypes, with discriminatory power D=0.883 (95 per cent confidence interval [CI] 0.881 to 0.884). The most common genotype was 002 (SB0142), at 22.3 per cent. The 10 most common genotypes constituted 84.8 per cent of isolates in this survey (Table 1). On average, 73 *M bovis* genotypes were isolated each year, with only 29 genotypes isolated in all six years; 88 *M bovis* genotypes were seen only in single years, 82 of which were only ever isolated from one herd. Of the 16 additional VNTRs profiled in a subsample of the current survey, only locus VNTR1955 (*Mtub21*) (Le Fleche and others 2002) improved the discriminatory power of the existing seven-VNTR assay, resolving one previous VNTR profile into two profiles, both of which were geographically localised. Only 34 spoligotypes (D=0.588, 95 per cent CI 0.584 to 0.592) were identified, the most common of which was SB0140 (58.0 per cent). The five most common spoligotypes accounted for 97.8 per cent of the sample; 96.1 per cent were SB0140, or spoligotype patterns readily derived from SB0140 by spacer deletion events.

For the whole survey, highly significant differences (P<0.0001) were observed in the relative frequency of genotypes in years 2003 to 2008. This was particularly evident for some of the more frequent genotypes (Table 1). For example, genotype 001 (SB0140) decreased from 25.6 per cent to 13.9 per cent over this period. Genotype 007 (SB0140) increased from 3.5 per cent in 2003 to 7.4 per cent in 2006. However, the frequency of most of the major genotypes stayed relatively static. The trend was also highly significant (P<0.0001) for some major genotypes (Table 1). Highly significant differences (P<0.0001) were also observed in the overall frequency of genotypes in years 2003 to 2008 at the individual DVO level, with the exception of Larne DVO and Enniskillen DVO.

Table 2 shows the highly non-random distribution (P<0.0001) of the 10 most common *M bovis* genotypes. Fig 1 shows the georeferencing and geographical localisation of those genotypes. For example, 23.7 per cent of isolates in Armagh DVO were genotype 001 (SB0140) and 57.6 per cent of isolates in Ballymena DVO were genotype 002 (SB0142). Conversely, 61.7 per cent of 005 (SB0140) isolates were located in Enniskillen DVO, and 63.6 per cent of 006 (SB0140) isolates were located in Newry DVO. The association between genotype and DVO was investigated for homebred and purchased cattle separately. Although the chi-squared statistic was slightly greater for homebred cattle (Pearson chi-squared statistic = 8001) than for purchased cattle (Pearson chi-squared statistic = 7085), both were highly significant (P<0.0001 in both instances). When mapping all isolates (from homebred and purchased cattle), *M bovis* genotypes were also clearly translocated substantial distances from their proposed geographical range (Fig 1). Although each DVO was dominated by a particular *M bovis* genotype(s) (Table 2), a large number of other genotypes were also isolated. Genotype diversity by DVO ranged from 0.861 to 0.320 (Table 3, Fig 2).

Discussion

Structured population sampling and the systematic analysis of the performance of VNTRs (Skuce and others 2005) has resulted in the development of a highly discriminating genotyping assay for *M bovis*, at least in Northern Ireland. A large number of distinct *M bovis* genotypes were identified in this 2003 to 2008 survey. The geographical area of Northern Ireland is approximately 13,000 km^2, only slightly larger than the area of Yorkshire. Substantial 'strain' diversity was disclosed in six years of sampling, although the diversity at 'clone' level, as indicated by spoligotyping, remained highly restricted (Smith and others 2006b). Hence, spoligotyping alone would probably lack discrimination in the outbreak investigation setting.

The rank-order frequency of genotypes is overall somewhat different between the previous retrospective survey (Skuce and others 2005), which was based on culture-confirmed abattoir cases, and the present study, where the majority of isolates were from lesioned tuberculin reactor cattle. Either the genotypes were genuinely different in these two phenotypes or the *M bovis* population has not remained entirely static. The latter assumption is supported by statistical analysis of the current survey, showing that differences between the frequencies of several genotypes in the years 2003 to 2008 were highly significant against a backdrop of decreasing over-

TABLE 2: Non-random association of the 10 most common *Mycobacterium bovis* genotypes with regions (Divisional Veterinary Office [DVO]) and their geographical localisation

Genotype	DVO										
	Armagh	Ballymena	Coleraine	Derry	Dungannon	Enniskillen	Larne	Newry	Newtownards	Omagh	Total
002 (SB0142) (%)	63 (7.7)	247 (57.6)	608 (59.3)	32 (13.7)	342 (33.1)	280 (25.0)	80 (25.3)	78 (5.9)	28 (2.2)	166 (15.8)	1924
001 (SB0140) (%)	193 (23.7)	29 (6.8)	77 (7.5)	26 (11.1)	264 (25.6)	40 (3.6)	56 (17.7)	140 (10.6)	547 (42.6)	281 (26.8)	1653
005 (SB0140) (%)	60 (7.4)	6 (1.4)	17 (1.7)	20 (8.5)	76 (7.4)	547 (48.9)	17 (5.4)	37 (2.8)	17 (1.3)	90 (8.6)	888
006 (SB0263) (%)	41 (5.0)	12 (2.8)	7 (0.7)	1 (0.4)	12 (1.2)	0 (0.0)	16 (5.1)	429 (32.5)	151 (11.8)	5 (0.5)	674
007 (SB0140) (%)	52 (6.4)	4 (0.9)	12 (1.2)	10 (4.3)	85 (8.2)	50 (4.5)	17 (5.4)	63 (4.8)	95 (7.4)	175 (16.7)	563
004 (SB0140) (%)	91 (11.2)	23 (5.4)	11 (1.1)	2 (0.9)	13 (1.3)	4 (0.4)	41 (13.0)	85 (6.4)	289 (22.5)	3 (0.3)	562
003 (SB0140) (%)	145 (17.8)	7 (1.6)	7 (0.7)	2 (0.9)	44 (4.3)	2 (0.2)	11 (3.5)	281 (21.3)	11 (0.9)	10 (1.0)	520
011 (SB0145) (%)	4 (0.5)	3 (0.7)	10 (1.0)	48 (20.5)	7 (0.7)	6 (0.5)	3 (0.9)	2 (0.2)	1 (0.1)	140 (13.4)	224
009 (SB0273) (%)	3 (0.4)	42 (9.8)	115 (11.2)	19 (8.1)	4 (0.4)	0 (0.0)	8 (2.5)	2 (0.2)	2 (0.2)	2 (0.2)	197
008 (SB0140) (%)	24 (2.9)	2 (0.5)	4 (0.4)	1 (0.4)	31 (3.0)	24 (2.1)	8 (2.5)	14 (1.1)	2 (0.2)	5 (0.5)	115

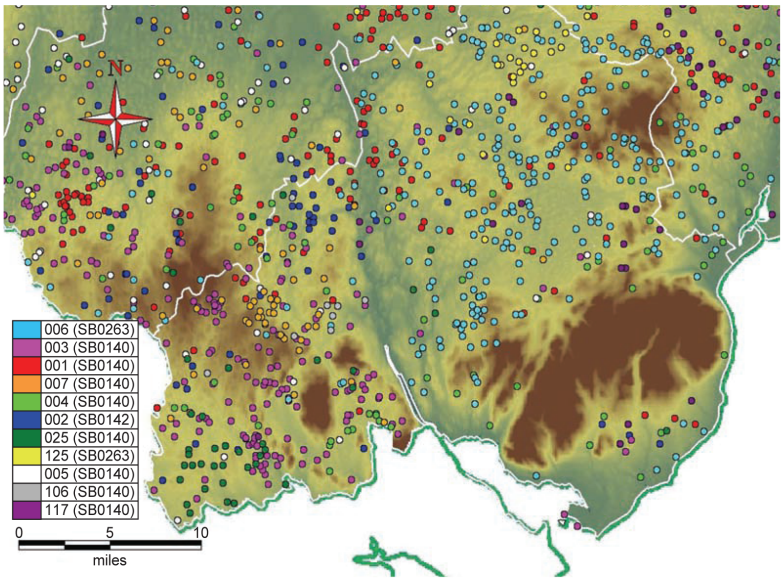

FIG 2: Georeferencing of the 11 most prevalent of 58 *Mycobacterium bovis* genotypes identified in South Armagh and Newry Divisional Veterinary Offices (2006 to 2008 only)

all herd prevalence at the Northern Ireland scale (9.56 per cent in 2003, 5.57 per cent in 2008 [DARD 2009]). This probably reflects the expansion and contraction of genotypes in different locations in response to the efficacy of local control measures, the transmission dynamics of the various genotypes and other undefined factors. Genotype 002 (SB0142) has replaced 001 (SB0140) as the most common genotype since surveyed in 1999 to 2003 and has a different geographical range. The relative frequency of 002 (SB0142) has increased from 17.0 per cent (1999 to 2003) to 22.3 per cent (2003 to 2008). The frequency of genotype 001 (SB0140) has decreased in both of its recognised hot spots (Fig 1) over the current survey period. Significant differences in the relative frequency of some common genotypes and the emergence, expansion and extinction of what are clearly new variant *M bovis* genotypes (R. A. Skuce, unpublished data) indicate that the *M bovis* population is not entirely stable over time, as predicated by population genetics theory (Smith and others 2009).

The Northern Ireland *M bovis* population was dominated by spoligotype SB0140 (known in Great Britain as VLA9) and progeny thereof. SB0140 was well resolved into geographically localised genotypes by VNTR profiling. This SB0140 'clonal complex' comprised 96.1 per cent of the Northern Ireland dataset, 85 per cent of the Great Britain dataset and is also highly prevalent in the Ireland (Smith and others 2006b) The authors investigated whether, and to what extent, the VNTR profiles of isolates of apparently the same clonal complex were shared within the British Isles (N. H. Smith, R. A. Skuce, E. Costello, unpublished data). This has implications for countries trading live animals (Milian-Suazo and others 2008).

The sampled population showed strong geographical structure, with highly significant non-random distribution of *M bovis* genotypes (Table 2, Fig 1). This suggested that sources of infection tended to be local. Each genotype could be considered as responsible for its own separate, small epidemic (Fig 1) and was effectively a separate 'experiment'. The observed geographical localisation implied a group of local epidemics (Smith and others 2003). The chi-squared statistic was only slightly greater for genotypes isolated from homebred cattle than for those from purchased cattle, indicating that genotypes from purchased cattle were slightly more dispersed (less clustered) than those from homebred cattle. The non-random distribution was, however, highly significant for both groups. Purposive sampling and genotyping of stored isolates (1986 to present) indicated that the spatial segregation of genotypes was largely, but not entirely, preserved over time (data not shown). This indicated that sources tended to be local and relatively stable.

Although regions appeared to be dominated by particular genotypes, which may have reached local fixation, there remained substantial and exploitable (in outbreak analysis) genotype diversity within regions (Table 2, Fig 2). Isolates had a genetic signature characteristic of their geographical origin. When deployed in the outbreak investigation setting, and in conjunction with cattle movement databases and wildlife surveillance, this is likely to be a powerful means of investigating the source, maintenance and spread of bovine TB. Depending on their movement history and the *M bovis* genotype that was isolated, infected cattle were either included in, or excluded from, particular clusters (Fig 2). Where *M bovis* genotypes were recovered at some distance from even a rudimentary definition of their normal geographical location, this demonstrated a role (as yet unquantified) for cattle movement in the dispersal of bovine TB in Northern Ireland. To the layperson, the *M bovis* population appears 'more clustered than expected', given perceptions about the extent of cattle movements over time. Hence, it will be very important to investigate the extent to which local and longer-range cattle movements and cattle social networks in Northern Ireland could explain the observed geographical localisation of *M bovis* genotypes (Gilbert and others 2005, Smith and others 2006b, Green and others 2008).

The biogeographical localisation of genotypes at different evolutionary scales is also a common and significant finding for human-adapted *M tuberculosis* (Gagneux and Small 2007, Wirth and others 2008) with important implications for human TB control and the rational development and deployment of diagnostic tests and candidate vaccines (Gagneux and Small 2007, Cohen and others 2008), implications that may not have been adequately appreciated (Comas and Gagneux 2009). Hence, the pathogen represents an important source of genetic variation, which may influence the outcome of infection and the efficacy of control measures (Caws and others 2008). For *M bovis*, this is supported by experimental data indicating that metabolic fingerprints and genotypes were highly congruent (Winder and others 2006). Genotyping datasets are only now sufficiently powered to investigate potential associations between genotype and phenotype, including skin test outcomes, in genetic association studies.

Marked geographical localisation of *M bovis* genotypes has also been reported in Great Britain (Smith and others 2006b) and confirmed by type-specific probability mapping (Diggle and others 2005). The Great Britain epidemic is best described as a series of 'clonal expansions' of particular genotypes, potentially due to the spread of a favourable mutation, or to a founder effect, the invasion of a new region, or possibly a new host (Smith and others 2003). Potential explanations for the geographical localisation phenomenon have been considered (Hewinson and others 2006). The clonal population structure of *M bovis* (the lack of recombination with other bacterial cells) would tend towards clustering of the same or related genotypes. The natural and imposed movement of cattle and the local and national efficacy of disease control measures would be covariables, as would the extent to which subsections (compartments) of the cattle population were actually structured and managed separately. The possibility

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TABLE 3: Number of *Mycobacterium bovis* isolates, the number of distinct genotypes and the genotype diversity index per Divisional Veterinary Office (DVO) in Northern Ireland

DVO	Number of isolates 2003-2008	Number of genotypes	Discriminatory power (Diversity index [95% CI])
Omagh	1100	50	0.861 (0.858-0.865)
Dungannon	1071	66	0.836 (0.831-0.841)
Newry	1397	67	0.826 (0.820-0.832)
Armagh	853	62	0.808 (0.801-0.816)
Newtownards	1319	48	0.760 (0.752-0.767)
Enniskillen	1156	58	0.757 (0.749-0.765)
Coleraine	1077	45	0.725 (0.716-0.734)
Ballymena	447	37	0.508 (0.495-0.522)
Larne	326	40	0.415 (0.399-0.431)
Derry	247	22	0.320 (0.304-0.335)

CI Confidence interval

that geographical localisation reflects the underlying spatial segregation of the disease in wildlife (Kelly and others 2009), or that the environment is directly contaminated (Courtenay and others 2007) with potentially viable mycobacteria (Ghosh and others 2009), cannot be currently excluded.

Current Northern Ireland and Great Britain *M bovis* genotyping surveys overlap at only two VNTRs (ETR-A and ETR-B). Hence, they are not directly comparable. The importance of standardising *M bovis* genotyping, at least on the UK and Ireland scale, has been recognised (N. H. Smith, R. A. Skuce, E. Costello, unpublished data). As has been achieved for *M tuberculosis* (Allix-Beguec and others 2008), *M bovis* genotyping is now highly discriminating, highly reproducible and a high-throughput and portable (digital) technology. It offers a powerful and practical 'decision support' tool for investigating the maintenance and spread of bovine TB and should more accurately identify clusters and unsuspected transmission events, particularly where the breakdown index case can be identified as an 'out of normal home range' cattle movement. This provides a unique opportunity to monitor and quantify the extent, if any, of secondary (cattle-to-cattle) spread within and between herds, and any spillover/spillback involving local wildlife. The *M bovis* population structure is particularly, maybe even uniquely, amenable to this approach, and molecular typing has the performance characteristics to support its use as a surveillance and investigative tool, in order to monitor the efficacy of current control programmes and future interventions. It has the potential to refine the modelling and analysis of detailed epidemiological questions of direct policy relevance. The application of molecular typing to epidemiological and evolutionary studies provides unique and valuable insights into the current bovine TB epidemic.

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References

ABERNETHY, D. A., DENNY, G. O., MENZIES, F. D., MCGUCKIAN, P., HONHOLD, N. & ROBERTS, A. R. (2006) The Northern Ireland programme for the control and eradication of *Mycobacterium bovis*. *Veterinary Microbiology* **112**, 231-237

ALLIX, C., WALRAVENS, K., SAEGERMAN, C., GODFROID, J., SUPPLY, P. & FAUVILLE-DUFAUX, M. (2006) Evaluation of the epidemiological relevance of variable-number tandem-repeat genotyping of *Mycobacterium bovis* and comparison of the method with IS6110 restriction fragment length polymorphism analysis and spoligotyping. *Journal of Clinical Microbiology* **44**, 1951-1962

ALLIX-BEGUEC, C., HARMSEN, D., WENIGER, T., SUPPLY, P. & NIEMANN, S. (2008) Evaluation and strategy for use of MIRU-VNTRplus. A multifunctional database for online analysis of genotyping data and phylogenetic identification of *Mycobacterium tuberculosis* complex isolates. *Journal of Clinical Microbiology* **46**, 2692-2699

BOLAND, F., KELLY, G. E., GOOD, M. & MORE, S. J. (2010) Bovine tuberculosis and milk production in infected dairy herds in Ireland. *Preventive Veterinary Medicine* **93**, 153-161

BOURNE, F. J. (2007) Bovine TB: The Scientific Evidence. Final Report of the Independent Scientific Group on Cattle TB. Defra

BROSCH, R., GORDON, S. V., MARMIESSE, M., BRODIN, P., BUCHRIESER, C., EIGLMEIER, K. & OTHERS (2002) A new evolutionary scenario for the *Mycobacterium tuberculosis* complex. *Proceedings of the National Academy of Sciences of the United States of America* **99**, 3684-3689

CARRIQUE-MAS, J. J., MEDLEY, G. F. & GREEN, L. E. (2008) Risks for bovine tuberculosis in British cattle farms restocked after the foot and mouth disease epidemic of 2001. *Preventive Veterinary Medicine* **84**, 85-93

CAWS, M., THWAITES, G., DUNSTAN, S., HAWN, T. R., LAN, N. T., THUONG, N. T. & OTHERS (2008) The influence of host and bacterial genotype on the development of disseminated disease with *Mycobacterium tuberculosis*. *PLoS Pathogens* **4**, e1000034

COHEN, T., COLIJN, C. & MURRAY, M. (2008) Modeling the effects of strain diversity and mechanisms of strain competition on the potential performance of new tuberculosis vaccines. *Proceedings of the National Academy of Sciences of the United States of America* **105**, 16302-16307

COMAS, I. & GAGNEUX, S. (2009) The past and future of tuberculosis research. *PLoS Pathogens* **5**, e1000600

COMAS, I., HOMOLKA, S., NIEMANN, S. & GAGNEUX, S. (2009) Genotyping of genetically monomorphic bacteria: DNA sequencing in *Mycobacterium tuberculosis* highlights the limitations of current methodologies. *PLoS One* **4**, e7815

COURTENAY, O., REILLY, L. A., SWEENEY, F. P., MACDONALD, D. W., DELAHAY, R. J., WILSON, G. J., CHEESEMAN, C. L., KEELING, M. J. & WELLINGTON, E. M. (2007) Performance of an environmental test to detect *Mycobacterium bovis* infection in badger social groups. *Veterinary Record* **161**, 817-818

DARD (2009). Tuberculosis disease statistics in Northern Ireland – September 2009. www.dardni.gov.uk/index/publications/pubs-dard-statistics/pubs-tb-stats-sept-2009.htm. Accessed September 1, 2009

DE LA RUA-DOMENECH, R. (2006) Human *Mycobacterium bovis* infection in the UK: incidence, risks, control measures and review of the zoonotic aspects of bovine tuberculosis. *Tuberculosis* **86**, 77-109

DIGGLE, P., ZHENG, P. & DURR, P. (2005) Nonparametric estimation of spatial segregation in a multivariate point process: bovine tuberculosis in Cornwall, UK. *Applied Statistics* **54**, 645-658

FARM CRISIS NETWORK (2009) Stress and loss: a report on the impact of bovine TB on farming families. www.farmcrisisnetwork.org.uk. Accessed September 1, 2009

FÈVRE, E. M., BRONSVOORT, B. M., HAMILTON, K. A. & CLEAVELAND, S. (2006) Animal movements and the spread of infectious diseases. *Trends in Microbiology* **14**, 125-131

GAGNEUX, S. & SMALL, P. M. (2007) Global phylogeography of *Mycobacterium tuberculosis* and implications for tuberculosis product development. *Lancet Infectious Diseases* **7**, 328-337

GHOSH, J., LARSSON, P., SINGH, B., PETTERSSON, B. M., ISLAM, N. M., SARKAR, S. N., DASGUPTA, S. & KIRSEBOM, L. A. (2009) Sporulation in mycobacteria. *Proceedings of the National Academy of Sciences of the United States of America* **106**, 10781-10786

GILBERT, M., MITCHELL, A., BOURN, D., MAWDSLEY, J., CLIFTON-HADLEY, R. & WINT, W. (2005) Cattle movements and bovine tuberculosis in Great Britain. *Nature* **435**, 491-496

GREEN, D. M., KISS, I. Z., MITCHELL, A. P. & KAO, R. R. (2008) Estimates for local and movement-based transmission of bovine tuberculosis in British cattle. *Proceedings of the Royal Society B: Biological Sciences* **275**, 1001-1005

GREEN, L. E. & CORNELL, S. J. (2005) Investigations of cattle herd breakdowns with bovine tuberculosis in four counties of England and Wales using VETNET data. *Preventive Veterinary Medicine* **70**, 293-311

HERSHBERG, R., LIPATOV, M., SMALL, P. M., SHEFFER, H., NIEMANN, S., HOMOLKA, S., ROACH, J. C., KREMER, K., PETROV, D. A., FELDMAN, M. W. & GAGNEUX, S. (2008) High functional diversity in *Mycobacterium tuberculosis* driven by genetic drift and human demography. *PLoS Biology* **6**, e311

HEWINSON, R. G., VORDERMEIER, H. M., SMITH, N. H. & GORDON, S. V. (2006) Recent advances in our knowledge of *Mycobacterium bovis*: a feeling for the organism. *Veterinary Microbiology* **112**, 127-139

HOUSTON, R. (2001) A computerised database system for bovine traceability. *Revue Scientifique et Technique – Office International des Epizooties* **20**, 652-661

HUMBLET, M. F., BOSCHIROLI, M. L. & SAEGERMAN, C. (2009) Classification of worldwide bovine tuberculosis risk factors in cattle: a stratified approach. *Veterinary Research* **40**, 50

JOHNSTON, W. T., GETTINBY, G., COX, D. R., DONNELLY, C. A., BOURNE, J., CLIFTON-HADLEY, R., LE FEVRE, A. M., MCINERNEY, J. P., MITCHELL, A., MORRISON, W. I. & WOODROFFE, R. (2005) Herd-level risk factors associated with tuberculosis breakdowns among cattle herds in England before the 2001 foot-and-mouth disease epidemic. *Biology Letters* **1**, 53-56

KAMERBEEK, J., SCHOULS, L., KOLK, A., VAN AGTERVELD, M., VAN SOOLINGEN, D., KUIJPER, S., BUNSCHOTEN, A., MOLHUIZEN, H., SHAW, R., GOYAL, M. & VAN EMBDEN, J. (1997) Simultaneous detection and strain differentiation of *Mycobacterium tuberculosis* for diagnosis and epidemiology. *Journal of Clinical Microbiology* **35**, 907-914

KELLY, G. E., MCGRATH, G. E. & MORE, S. J. (2009) Estimating the extent of spatial association of *Mycobacterium bovis* infection in badgers in Ireland. *Epidemiology and Infection* **138**, 270-279

LE FLECHE, P., FABRE, M., DENOEUD, F., KOECK, J-L. & VERGNAUD, G. (2002) High-resolution, on-line identification of strains from the *Mycobacterium tuberculosis* complex based on tandem repeat typing. *BMC Microbiology* **2**, 37

MATHEWS, F., MACDONALD, D. W., TAYLOR, G. M., GELLING, M., NORMAN, R. A., HONESS, P. E. & OTHERS (2006) Bovine tuberculosis (*Mycobacterium bovis*) in British farmland wildlife: the importance to agriculture. *Proceedings of the Royal Society B: Biological Sciences* **273**, 357-365

MILIAN-SUAZO, F., HARRIS, B., ARRIAGA DÍAZ, C., ROMERO TORRES, C.,

Papers

STUBER, T., ALVAREZ OJEDA, G., MORALES LOREDO, A., PEREZ SORIA, M. & PAYEUR, J. B. (2008) Molecular epidemiology of *Mycobacterium bovis*: usefulness in international trade. *Preventive Veterinary Medicine* **87**, 261-271

MORE, S. J. & GOOD, M. (2006) The tuberculosis eradication programme in Ireland: a review of scientific and policy advances since 1988. *Veterinary Microbiology* **112**, 239-251

MÜLLER, B., HILTY, M., BERG, S., GARCIA-PELAYO, M. C., DALE, J., BOSCHIROLI, M. L. & OTHERS (2009) African 1, an epidemiologically important clonal complex of *Mycobacterium bovis* dominant in Mali, Nigeria, Cameroon, and Chad. *Journal of Bacteriology* **191**, 1951-1960

POLLOCK, J. M. & NEILL, S. D. (2002) *Mycobacterium bovis* infection and tuberculosis in cattle. *Veterinary Journal* **163**, 115-127

RAMÍREZ-VILLAESCUSA, A. M., MEDLEY, G. F., MASON, S. & GREEN, L. E. (2009) Herd and individual animal risks associated with bovine tuberculosis skin test positivity in cattle in herds in south west England. *Preventive Veterinary Medicine* **92**, 188-198

REYNOLDS, D. (2006) A review of tuberculosis science and policy in Great Britain. *Veterinary Microbiology* **112**, 119-126

SKUCE, R. A., MCDOWELL, S. W., MALLON, T. R., LUKE, B., BREADON, E. L., LAGAN, P. L., MCCORMICK, C. M., MCBRIDE, S. H. & POLLOCK, J. M. (2005) Discrimination of isolates of *Mycobacterium bovis* in Northern Ireland on the basis of variable numbers of tandem repeats (VNTRs). *Veterinary Record* **157**, 501-504

SMITH, N. H., DALE, J., INWALD, J., PALMER, S., GORDON, S. V., HEWINSON, R. G. & SMITH, J. M. (2003) The population structure of *Mycobacterium bovis* in Great Britain: clonal expansion. *Proceedings of the National Academy of Sciences of the United States of America* **100**, 15271-15275

SMITH, N. H., GORDON, S. V., DE LA RUA-DOMENECH, R., CLIFTON-HADLEY, R. S. & HEWINSON, R. G. (2006b) Bottlenecks and broomsticks: the molecular evolution of *Mycobacterium bovis*. *Nature Reviews Microbiology* **4**, 670-681

SMITH, N. H., HEWINSON, R. G., KREMER, K., BROSCH, R. & GORDON, S. V. (2009) Myths and misconceptions: the origin and evolution of *Mycobacterium tuberculosis*. *Nature Reviews Microbiology* **7**, 537-544

SMITH, N. H., KREMER, K., INWALD, J., DALE, J., DRISCOLL, J. R., GORDON, S. V., VAN SOOLINGEN, D., HEWINSON, R. G. & SMITH, J. M. (2006a) Ecotypes of the *Mycobacterium tuberculosis* complex. *Journal of Theoretical Biology* **239**, 220-225

SMITH, R. M., DROBNIEWSKI, F., GIBSON, A., MONTAGUE, J. D., LOGAN, M. N., HUNT, D., HEWINSON, G., SALMON, R. L. & O'NEILL, B. (2004) *Mycobacterium bovis* infection, United Kingdom. *Emerging Infectious Diseases* **10**, 539-541

SUPPLY, P., ALLIX, C., LESJEAN, S., CARDOSO-OELEMANN, M., RÜSCH-GERDES, S., WILLERY, E. & OTHERS (2006) Proposal for standardization of optimized mycobacterial interspersed repetitive unit-variable-number tandem repeat typing of *Mycobacterium tuberculosis*. *Journal of Clinical Microbiology* **44**, 4498-4510

VAN BELKUM, A., TASSIOS, P. T., DIJKSHOORN, L., HAEGGMAN, S., COOKSON, B., FRY, N. K., FUSSING, V., GREEN, J., FEIL, E., GERNER-SMIDT, P., BRISSE, S. & STRUELENS, M. (2007) Guidelines for the validation and application of typing methods for use in bacterial epidemiology. *Clinical Microbiology and Infectious Diseases* **13** (Suppl 3), 1-46

WHITE, P. C., BÖHM, M., MARION, G. & HUTCHINGS, M. R. (2008) Control of bovine tuberculosis in British livestock: there is no 'silver bullet'. *Trends in Microbiology* **16**, 420-427

WINDER, C. L., GORDON, S. V., DALE, J., HEWINSON, R. G. & GOODACRE, R. (2006) Metabolic fingerprints of *Mycobacterium bovis* cluster with molecular type: implications for genotype-phenotype links. *Microbiology* **152**, 2757-2765

WIRTH, T., HILDEBRAND, F., ALLIX-BÉGUEC, C., WÖLBELING, F., KUBICA, T., KREMER, K. & OTHERS (2008) Origin, spread and demography of the *Mycobacterium tuberculosis* complex. *PLoS Pathogens* **4**, e1000160

Annex D

Compensation payments by DVO

The table below shows the compensation payments for TB for the period 1 April 2009 to 31 March 2012 along with herd demographics and TB incidence across the ten Divisional Veterinary Offices (DVO).

TB compensation payments by Divisional Veterinary Office (DVO) - 01/04/09 to 31/03/12

DVO	Number of TB compensated animals	Total compensation paid	Average compensation paid	Number of herds with one or more TB reactor	TB reactors on more than 2 occasions	TB reactors on more than 5 occasions	Number of herds with payments of over £50,000	Number of herds^	Number of cattle^	Average herd size	Annual TB herd incidence (2011)	Annual TB animal incidence (2011)
Armagh	2594	3423525	1320	372	50	8	11	2519	151986	60	6.06	0.481
Ballymena	757	842201	1113	202	16	1	2	1547	110181	71	5.05	0.253
Coleraine	2333	2858051	1225	515	59	4	8	2847	206982	73	6.51	0.274
Dungannon	2005	2323932	1159	377	67	12	6	3129	180185	58	4.28	0.307
Enniskillen	3563	3866302	1085	509	70	3	9	3302	152664	46	5.54	0.567
Mallusk	995	1115860	1121	185	18	2	4	1864	136309	73	3.35	0.122
L'Derry	422	470105	1114	129	13	0	1	996	62226	62	5.68	0.187
Newry	5797	7608955	1313	690	156	26	32	4059	203415	50	6.97	0.880
Nt'Ards	4276	4853740	1135	460	82	9	20	2056	162481	79	8.91	0.982
Omagh	3508	4075095	1162	525	56	2	11	3381	199360	59	6.74	0.449
Total	26250	31437766	1198	3964	587	67	104	25700	1565790	61	6.01	0.506

^ Based on cattle presented at TB herd tests over last four years

The figures show that higher disease incidence divisions incur higher compensation costs. However, as well as disease levels, there are many variables that will influence the pattern and amount of compensation payments. For example

- The number of herds and animals in an area.
- The nature of farm businesses
  - Average compensation payment per animal is influenced by factors such as animal type (young/old, dairy/suckler/fattener/pedigree) which will vary from area to area.
  - The number of animals purchased because of TB is related to herd size and TB incidence as well as the degree of dissemination of TB within a herd.
- There can be some large breakdowns which have a significant effect on the data. The timing of such events and the market values prevailing at the time can also affect the figures.

Should further clarification or information be required on this matter the contact is Roly Harwood (roly.harwood@dardni.gov.uk or 90520920 (20920))

Annex E

TB Testing in N. Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons

As requested the methodology used in the statistical analysis is set out below:

Statistical Analysis - Materials & Methods

All TB tests between 1 January 1990 and 31 December 2011 were extracted from APHIS and manipulated in a customised MS Access database. The other variables under consideration were test reason which consisted of three levels ((a) routine - which included testing of cattle in the absence of any underlying disease exposure; (b) risk - where cattle were tested outside their normal test regime due to putative exposure; and (c) restricted - applied to cattle in herds with disclosed infection); type of test (herd level or individual) and divisional veterinary office. The main dependent variable measured was the test status of a herd as recorded at each visit by the tester. This was recorded as either negative, positive or inconclusive. A second dependent variable of interest was the number of positive tests at each visit. As a consequence the total number of tests and whether they were positive, negative or inconclusive was recorded for each visit. For the purposes of analysis, the response variables were dichotomised by treating inconclusive as if they were positive.

The method of statistical analysis used was to fit a generalized linear mixed model to the data employing the method of Schall[1] and using the GLMM procedure in GenStat[2]. As the response variable was binary in nature a logit model was chosen as the model of choice treating divisional veterinary office as a random effect and all other variables as fixed effects.

The output is in the form of odds ratios and associated 95% confidence intervals.

The project was carried out in collaboration between DARD's Veterinary Epidemiology Unit and AFBI Biometrics Division. The statistical analyses for this project were carried out by Alan Gordon, ABFI Biometrics Branch (alan.gordon@afbi.gov.uk). The methodology was scrutinised by Dr Peter Cripps (University of Liverpool) on request by the Association of Veterinary Surgeons Practising in Northern Ireland (AVSPNI). A copy of his report has been attached, with permission from the AVSPNI.

1 Schall, R. (1991). Estimation in generalized linear models with random effects. Biometrika, 78, 719-727.

2 GenStat for Windows (2008). 11th Edition. VSN International Ltd., Hemel Hempstead, UK.

Annex F

TB Testing in N. Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons:

Expert epidemiological opinion on the Draft Report

Summary:

I have considered the above report, Dated March 2009 which refers to APHIS data collected between 1990 and 2007. The "Outcome of Interest" is a reactor at a Tuberculin test. The report presents the results of a statistical analysis which suggests that "government vets were significantly more likely to detect reactors or ICs than were private veterinary surgeons." It also claims that this difference remains after allowing for the different 'type' of test (Routine, Risk or Restricted). It is clear that DARD wishes to use this result to conclude that private veterinary surgeons are not performing the Tuberculin Test as well as government testers.

I have a few reservations about the statistical analysis but I am confident that it was done in a generally correct way and the figures produced are basically correct: that – based on the data available in APHIS – private practitioners (PVPs) were less likely to diagnose a reactor than were government veterinarians. However I have very strong reservations about the conclusions that can be drawn from this result.

1. There is strong possibility that even within test type (Routine / Risk / Restricted) PVPs were allocated tests with a different risk of being positive than were government vets. DARD performed an 'informal' survey and found that DVOs said that there was no differential allocation according to test risk, but this study was not subject to rigorous scientific appraisal and was not nearly detailed enough to ascertain whether there was biased allocation of tests.

2. The report fails to discuss another very dramatic result – that there is a statistically significant difference between the adjusted proportion of reactors found by the 2 types of government veterinarian. In most years the proportion of reactors identified by Veterinary Officers (VOs) is significantly higher than for "testing" Veterinary Officers (VOTs). This means that there are actually 3 different groups of testers who are giving different results.

   As stated above there is inadequate evidence to conclude that there is no relationship between the risk of being truly positive and the type of tester. But if DARD were correct and tests were indeed allocated to different groups of tester without bias, then it is clear that at least one group of government vets (VO or VOT) must be testing differently. It is not valid to conclude that PVPs are testing wrongly – the only valid conclusion that can be drawn is that there were 3 different groups which had different probabilities of diagnosing a positive result. It would be necessary to perform more detailed studies to ascertain which group was 'correct' and which ones were in error.

3. It is clear that DARD needs to investigate the reasons that the 3 different groups are giving different proportions of TB reactors. Once they have done this they will be in a position to correct any possible differences in the testing procedures used by the different groups.

   a. It is possible to think of ways that different individuals could produce systematic differences in the probability of finding a reactor and these would need to be investigated.

b. The intradermal tuberculin test has a number of subjective elements (e.g., how hard one presses the calipers when taking measurements, and one's personal 'digit preference'). In order to minimise the effects factors like these and to ensure comparability between groups of testers it would be necessary to ensure that all TB testers are given the same, detailed training. It would appear the moment this does not happen.

   Until such a time as there is a detailed standardised training to all TB testers any differences between testers cannot automatically be blamed on one group doing the test "wrong": it is equally possible that differences are due to the test being done correctly but with different protocols.

4. In conclusion, DARD's report highlights differences in the proportion of TB reactors found by PVPs, VOTs and VOs. It has exposed an urgent need to investigate why this difference exists and to do this it would first be necessary to do a detailed investigation of how different tests are allocated to different groups of tester. If it turns out that the differences are indeed due to the way that different testers perform then it will be necessary to determine which group is giving the 'correct' answer and ensuring that all 3 types of tester are standardised to this.

Peter J Cripps 01/November/2009

More Detailed Observations and Conclusions

Introduction

The Draft Project Report by DARD is called "TB Testing in N. Ireland: Comparison of Test Results for Different Groups of Veterinary Surgeons" and is dated March 2009. I have been asked by Mr Michael Woodside on behalf of the AVSPNI to give my expert opinion of this report and I am doing so as a veterinary epidemiologist and statistician. I am grateful for the helpful information provided by Mr D. Abernethy (the writer of the report at DARD) and Mr A Gordon (the statististician at AFBI).

Data

The data for this study came from APHIS and give the results of TB tests between 1990 and 2007. The type of test was divided into Routine, Risk and Restricted, and the tester was coded as Private Veterinary Practitioner (PVP), Veterinary Officer (VO) or "testing" Veterinary Officer (VOT). There was also information on the Divisional Offices from which the test was commissioned. My understanding is that although the identity of the individual veterinarian performing a TB test may have been available this information was not used in any of the analyses.

The dataset was large and contained around 823,000 useable records.

Results and Conclusion:

The results are divided into 4 parts: Preliminary Analysis, Possible Bias due to test allocation, Statistical Analysis and Overall Conclusion.

1. Preliminary Analysis.

This provided basic descriptive statistics which included the percentage of different types of test done by the different testing groups and differences between years.

The main conclusion was that there was a tendency for PVPs to be less likely to detect reactors than either VOs or VOTs.

My Comment:

This was described as a preliminary study and I have no objections to the way it was performed and analysed. It was used to provide hypotheses for a more detailed study.

2. Possible Bias through Test Allocation

The researchers were fully aware of the possibility that tests might be allocated to different groups of testers in a non-random way. For instance, even within a specified test type it was possible that the higher risk tests might have been allocated to government vets rather than PVPs.

Therefore a "brief, informal questionnaire was sent to all divisional offices. DVOs were asked to describe the policy of allocating tests…" [From further enquiries I understand that in some cases the questionnaire was supplemented by telephone interviews].

The results of this were used to conclude that DVOs did not differentially allocate tests "on the probability of reactors" and that test allocation was unlikely to introduce bias.

My Comment:

I am not satisfied that this part of the study was able satisfactorily to find out whether biased allocation occurred. I am prepared to accept that DVOs said that it did not occur but I do not accept that this means that there was no bias. Even if the DVOs did not deliberately allocate tests in a biased way there is no guarantee that this unbiased approach was continued through the administration as far as determining who actually did the testing.

In order to rule out bias it would be necessary to perform a much more detailed study and one that compared the characteristics of the herds allocated to the different testing groups rather than just asking what the DVOs said that they did. It would be necessary to look at other characteristics of the herds as well as perceived probability of reactors – herd size, distance from the Divisional Office, handling facilities etc., since all these might be confounded with the true probability of reactors.

3. Detailed Statistical Analysis

This performed a rather more sophisticated investigation of the data using logistic regression and including the veterinary office as a random effect. Positive was defined as being a Reactor or an Inconclusive Reactor. Two separate analyses were performed, one with the outcome being the probability of an individual animal being positive ("Animal Level") and one for the probability of an individual test being positive ("Test Level"). Explanatory variables were i) test Reason (Routine, Risk or Restricted), ii) group of tester (PVP / VO / VOT), iii) Year, and iv) Divisional Office. The model also checked the interactions between year and the other fixed effects.

The report suggests that the analysis includes effects for individual practitioner ("…a time by veterinary practitioner interaction was also included to look at how the response for each veterinary practitioner differed over time.") However from a discussion with A Gordon and from outputs of the analysis it appears that this is not actually the case: there was no attempt to account for the effect of individual tester although interactions between tester type (PVP / VO / VOT) and year were examined.

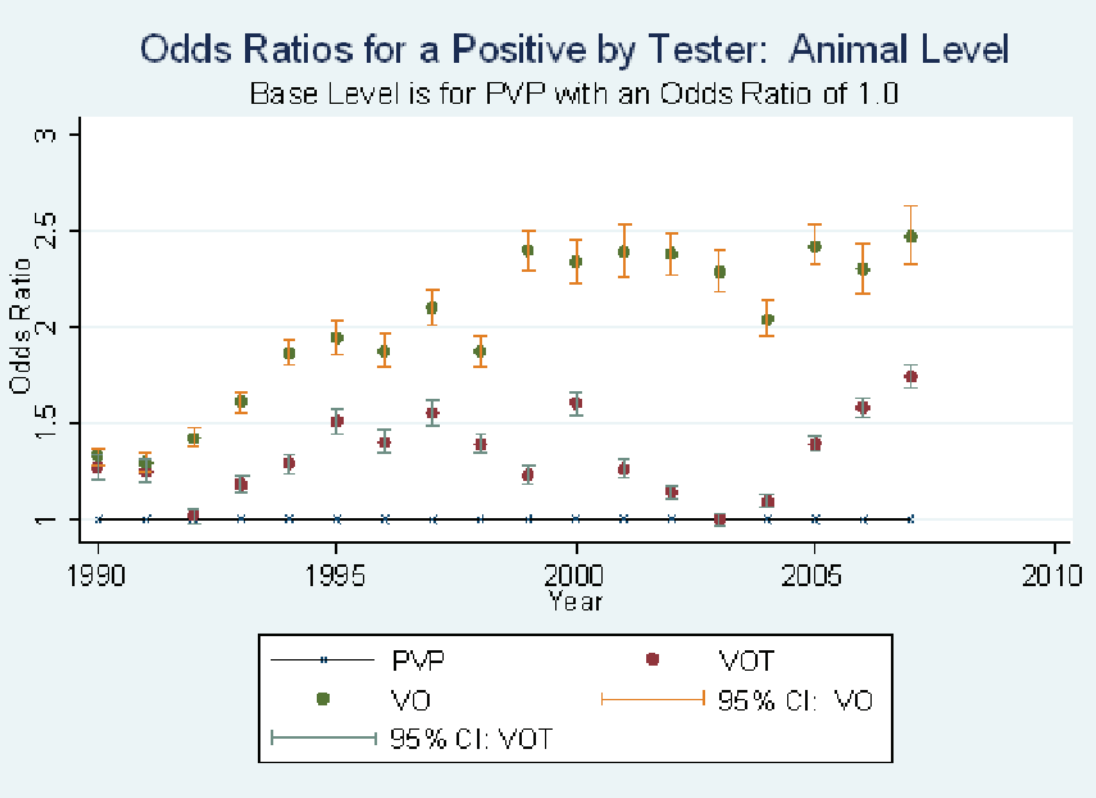
The analysis confirmed the result of the basic analyses: for most years and particularly for periods after 2000, after adjustment there is a clear difference between tester groups in the proportion of test positive results, with government veterinarians being more likely to diagnose a positive. The tables express this as odds rations and graphs of these are shown below, both for Animal Level results and for Test Level Results:

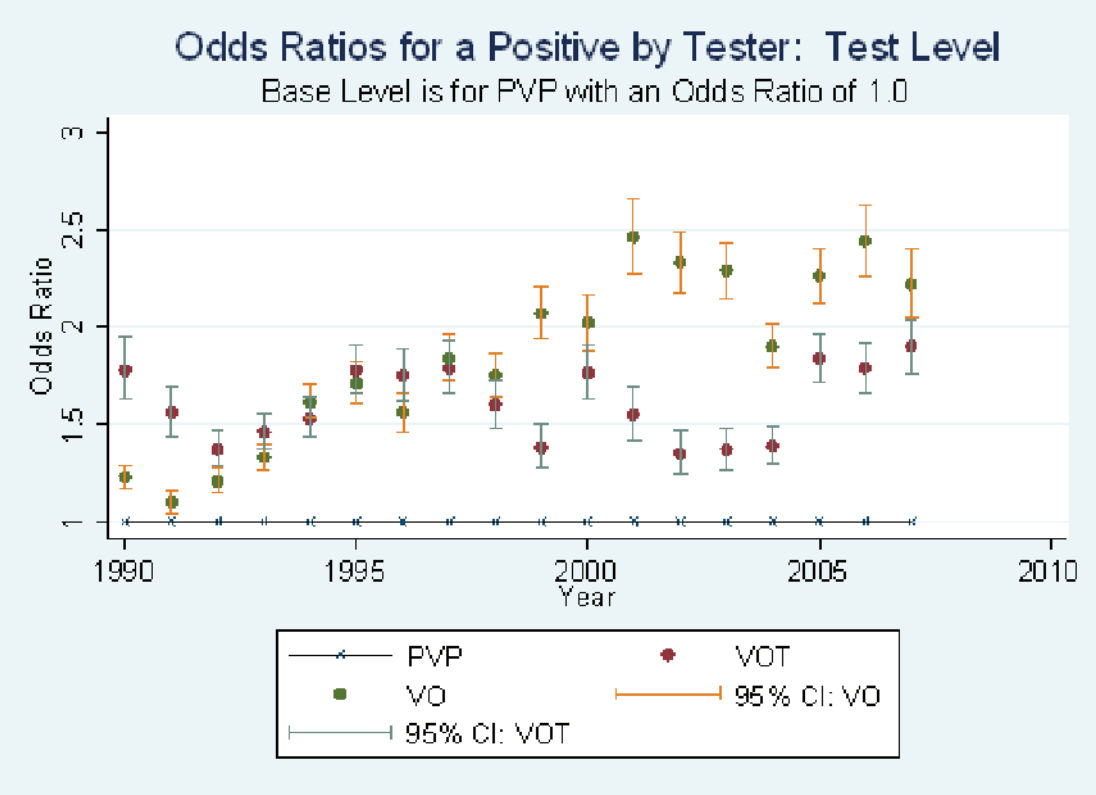
Odds Ratios and for the probability of Finding a Reactor: Animal Level and Test Level

From tables in the DARD report. Graphs produced in STATA 10.

Odds Ratios for VOs and TVOs are given against the baseline of the result for PVPs: the greater the odds ratio indicates the greater probability of being positive.

Bars show 95% Confidence Intervals





My Comment:

The critical probability has not been stated but in view of the use of 95% confidence intervals I assume that it has been set to P = 0.05. Although the data analysis includes Divisional Office as a random effect it does not account for any clustering that might occur because many individual veterinarians will have performed more than one tuberculin test. As a result it is likely that the standard errors of the estimates are actually larger than those reported. However this is a very large dataset and I am reasonably certain that the results would remain statistically significant. I am therefore satisfied that government testers are more likely to diagnose a reactor than are PVPs.

The analysis grouped Inconclusive Reactors together with Reactors. It is possible that a very different result would be found if Inconclusive had been grouped with non-reactors and certainly this should be checked in any seriously future attempt to investigate differences between tester groups.

The results show another very important finding that is not mentioned in the report. In almost every year there is a statistically significant difference between the performance of the government testing groups: VOs are more likely to find a reactor than are VOTs. This is well illustrated in the graphs and is particularly dramatic for Animal Level Tests and for the years after 1999.

4. Overall Conclusion

This basically says that PVPs are less likely than VOs and VOTs to disclose standard or inconclusive reactors, and that **"…the disparity was still evident after these differences were accounted for in the modelling process."**

My Comment:

i) I accept that in literal terms this statement is probably true. But I would emphasise that the modeling merely showed that accounting for test types did not remove the differences; it tells us nothing about possible biases in the allocation of tests. As discussed in part 2) above the evidence produced by DARD is not good enough to rule out this bias.

ii) The conclusion relates only to comparing non-reactors with standard or inconclusive reactors when these 2 latter categories are condensed into one.

iii) As pointed out in 3) above the report makes no comments on the differences between VOs and VOTs: but this difference is crucial if any global conclusions are to be made from the data. If – as the report claims – there is no bias in the allocation of tests, then it follows that the differences between PVPs, VOs and VOTs must be because all 3 of these groups are doing the test differently from each other. However the sheds no light on which group is doing the testing more "correctly" than the others: it is possible that PVPs are "correct" and that both groups of government veterinarian are doing it wrong.

Other General Comments

a) The Intradermal Tuberculin test is carried out on live animals in conditions that are often suboptimal, and it requires the tester to perform a number of tasks that can be done in a number of ways. For instance, observers are required to use calipers to measure the skin thickness: this can be done with variable strength of "squeeze", and once a measurement has been made it has to be interpreted (which introduces the possibility of bias due to digit preference).

b) DARD's report has identified apparent inconsistencies between the results of different testing groups. As discussed above there is a need to do considerably more research to identify the reason for these differences – or indeed whether they are merely due to biases in test allocation. But if they do identify true differences (and once they decide

how the test should be done "correctly") the next stage might be to ensure that all testers are given an identical training: my information is that at the moment this does not happen. Standardised training of operators is certainly a very basic part of carrying out surveys where one wishes to minimize between-observer bias.

Letter from USPCA re. Bovine TB

USPCA
Head Office
Unit 6 Carnbane Industrial Estate
Newry
BT35 6QH

RE: Review of Bovine Tuberculosis.

The Ulster Society Prevention of Cruelty to Animals (USPCA) is a charity founded in 1836.

For the past 176 years it has remained true to its founding principles "The prevention cruelty to animals and the relief of suffering". The USPCA defines cruelty as causing an animal unnecessary suffering.

The USPCA does not restrict its activities to specific breeds, it seeks to protect and assist ALL animals.

We work closely with other stakeholders on issues that impact adversely on animal welfare and we fully endorse the comprehensive and well researched document placed, by the NI Badger Group, before the Committee.

The incidence of Bovine Tuberculosis is clearly a major concern to the farming community and has a detrimental impact on health status of herds and the public purse. It is in all our interests to see it eradicated.

However the USPCA regards the proposed culling of badgers as a short sighted attempt at a solution already been tried by the Republic of Ireland with thousands killed over an eight year period, a needless slaughter that failed to make a meaningful impact on disease levels.

Since the topic of badger culling came to the fore the USPCA has witnessed a significant increase in badger persecution in the province. This vile and illegal activity causes unspeakable suffering to both the badgers and to the dogs used.

It is clear gangs of men and dogs roaming the countryside as they travel between setts break every rule in terms of bio-security, a priority issue within farming.

The USPCA feel the solution is based in science rather than in slaughter and we regard the development of an effective Bovine TB vaccine to be administered to herds could eradicate the disease and leave our native badgers undisturbed in their habitat.

David Wilson

Information Officer
USPCA

MOB: 07739948512

DALO Letter to Clerk re. Bovine TB

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

Corporate and European Services Division
Central Management Branch
Dundonald House
Ballymiscaw
Upper Newtownards Road
Belfast BT4 3SB

Tel: 028 9052 4331
Fax: 028 9052 4884
Email: joe.cassells@dardni.gov.uk

Our Ref:
Your Ref:
Stella McArdle
Acting Clerk to the Committee for Agriculture and Rural Development
Room 243
Parliament Buildings
Ballymiscaw
Belfast
BT4 3XX

Date: 31 May 2012

Dear Stella

Committee Meeting – 15 MAY 2012

AOB – Cost of compensation payments for bovine tuberculosis infections in the 2011/12 financial year

The attached spreadsheets at Annex A detail the information requested. Personal details of those receiving payments including names and herd numbers have been removed following advice on data protection issues. A summary spreadsheet showing payments by geographical area is also attached at Annex B.

I would be grateful if you would bring the above/attached to the attention of the Committee.

Yours sincerely

Joe Cassells
Departmental Assembly Liaison Officer

Annex A

Compensation Paid Regarding TB Reactors and Negative in Contacts with a Disease Test in 2011/12

Each herd has been given an identifier no for the purpose of this exercise to demonstrate where data for 1 herd begins and ends. Data for the The first 2 herds where this is relevant has been highlighted for reference.

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1	TB	11/17/2011	12/12/2011	£4,000.00	£4,000.00	Mallusk
2	TB	4/21/2011	5/17/2011	£1,000.00	£1,000.00	Mallusk
3	TB	11/17/2011	12/12/2011	£1,300.00	£1,300.00	Mallusk
4	TB	11/10/2011	11/29/2011	£2,650.00	£2,650.00	Mallusk
5	TB	6/3/2011	6/23/2011	£1,400.00	£1,400.00	Mallusk
6	TB	4/23/2011	5/17/2011	£1,800.00	£1,800.00	Mallusk
7	TB	1/9/2012	2/9/2012	£2,800.00	£2,800.00	Mallusk
8	TB	1/27/2012	2/21/2012	£800.00	£800.00	Mallusk
9	TB	3/30/2012	4/18/2012	£1,480.00	£1,480.00	Mallusk
10	TB	5/6/2011	5/24/2011	£740.00	£740.00	Mallusk
11	TB	4/7/2011	5/3/2011	£1,900.00	£1,900.00	Mallusk
12	TB	1/9/2012	2/9/2012	£900.00	£900.00	Mallusk
13	TB	3/23/2012	4/11/2012	£1,600.00	£1,600.00	Mallusk
14	TB	9/8/2011	10/4/2011	£750.00	£750.00	Mallusk
15	TB	2/16/2012	3/9/2012	£7,105.00	£7,105.00	Mallusk
16	TB	1/12/2012	2/9/2012	£850.00	£850.00	Mallusk
17	TB	12/30/2011	1/25/2012	£800.00	£800.00	Mallusk
18	TB	1/20/2012	2/14/2012	£900.00	£900.00	Mallusk
19	TB	1/13/2012	2/9/2012	£850.00	£5,630.00	Mallusk
		3/29/2012	4/18/2012	£4,780.00		Mallusk
20	TB	8/19/2011	9/15/2011	£1,700.00	£1,700.00	Mallusk
21	TB	1/20/2012	2/21/2012	£6,190.00	£11,690.00	Mallusk
		3/22/2012	4/11/2012	£5,500.00		Mallusk
22	TB	2/16/2012	3/2/2012	£1,800.00	£1,800.00	Mallusk
23	TB	12/15/2011	1/18/2012	£19,590.00	£33,390.00	Mallusk
		12/15/2011	2/9/2012	£300.00		Mallusk
		2/23/2012	3/14/2012	£13,500.00		Mallusk
24	TB	1/27/2012	2/21/2012	£1,490.00	£1,490.00	Mallusk
25	TB	3/2/2012	4/3/2012	£4,000.00	£4,000.00	Mallusk
26	TB	5/6/2011	5/31/2011	£1,300.00	£1,300.00	Mallusk
27	TB	2/10/2012	3/2/2012	£1,300.00	£1,300.00	Mallusk

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
28	TB	6/24/2011	7/8/2011	£5,000.00	£14,830.00	Mallusk
		8/25/2011	9/29/2011	£2,500.00		Mallusk
		8/25/2011	10/19/2011	£1,800.00		Mallusk
		2/24/2012	3/14/2012	£1,300.00		Mallusk
		3/16/2012	4/11/2012	£4,230.00		Mallusk
29	TB	3/23/2012	4/11/2012	£1,800.00	£1,800.00	Mallusk
30	TB	1/13/2012	2/9/2012	£1,000.00	£1,000.00	Mallusk
						Mallusk
31	TB	2/10/2012	3/9/2012	£4,450.00	£4,450.00	Mallusk
32	TB	1/23/2012	2/21/2012	£1,250.00	£1,250.00	Mallusk
33	TB	3/23/2012	4/11/2012	£1,400.00	£1,400.00	Mallusk
34	TB	12/23/2011	1/25/2012	£700.00	£700.00	Mallusk
35	TB	12/23/2011	1/25/2012	£6,700.00	£6,700.00	Mallusk
36	TB	4/11/2011	8/24/2011	£1,100.00	£1,100.00	Mallusk
37	TB	10/6/2011	11/7/2011	£2,100.00	£26,880.00	Mallusk
		12/9/2011	1/10/2012	£13,100.00		Mallusk
		12/9/2011	2/2/2012	£1,480.00		Mallusk
		2/10/2012	3/2/2012	£8,000.00		Mallusk
		2/10/2012	3/14/2012	£2,200.00		Mallusk
38	TB	10/27/2011	11/21/2011	£18,050.00	£49,650.00	Mallusk
		1/13/2012	2/9/2012	£21,750.00		Mallusk
		1/13/2012	2/9/2012	£3,400.00		Mallusk
		3/15/2012	4/11/2012	£6,450.00		Mallusk
39	TB	3/30/2012	5/9/2012	£1,150.00	£1,150.00	Mallusk
40	TB	12/23/2011	1/25/2012	£600.00	£600.00	Mallusk
41	TB	3/22/2012	4/11/2012	£1,050.00	£1,050.00	Mallusk
42	TB	11/25/2011	12/29/2011	£4,700.00	£7,100.00	Mallusk
		1/14/2012	2/9/2012	£2,400.00		Mallusk
43	TB	11/11/2011	12/2/2011	£3,230.00	£3,230.00	Mallusk
44	TB	2/10/2012	3/2/2012	£1,600.00	£1,600.00	Mallusk
45	TB	3/15/2012	4/4/2012	£30,320.00	£30,320.00	Mallusk
46	TB	1/6/2012	1/25/2012	£1,050.00	£1,050.00	Mallusk
47	TB	12/16/2011	1/18/2012	£1,900.00	£1,900.00	Mallusk
48	TB	11/12/2011	12/2/2011	£900.00	£900.00	Mallusk
49	TB	4/16/2011	5/17/2011	£900.00	£900.00	Mallusk
50	TB	3/8/2012	4/3/2012	£2,300.00	£2,300.00	Mallusk
51	TB	11/25/2011	12/29/2011	£1,050.00	£1,050.00	Mallusk
52	TB	1/13/2012	2/9/2012	£750.00	£750.00	Mallusk

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
53	TB	11/10/2011	12/12/2011	£4,300.00	£4,300.00	Mallusk
54	TB	3/2/2012	4/11/2012	£2,950.00	£2,950.00	Mallusk
55	TB	8/19/2011	9/7/2011	£1,450.00	£1,450.00	Mallusk
56	TB	2/4/2012	3/9/2012	£1,250.00	£1,250.00	Mallusk
57	TB	12/8/2011	1/11/2012	£3,100.00	£3,100.00	Mallusk
58	TB	3/16/2012	4/11/2012	£3,100.00	£3,100.00	Mallusk
59	TB	4/29/2011	5/17/2011	£4,550.00	£4,550.00	Mallusk
60	TB	4/8/2011	5/3/2011	£3,100.00	£29,050.00	Mallusk
		4/8/2011	5/3/2011	£250.00		Mallusk
		5/10/2011	5/10/2011	£25,700.00		Mallusk
61	TB	12/15/2011	1/17/2012	£1,100.00	£1,100.00	Mallusk
62	TB	3/1/2012	3/20/2012	£1,575.00	£1,575.00	Mallusk
63	TB	10/28/2011	11/21/2011	£16,950.00	£23,580.00	Mallusk
		10/28/2011	12/9/2011	£200.00		Mallusk
		1/6/2012	1/25/2012	£4,980.00		Mallusk
		3/9/2012	4/11/2012	£1,450.00		Mallusk
64	TB	5/12/2011	6/8/2011	£950.00	£1,550.00	Mallusk
		5/12/2011	6/23/2011	£600.00		Mallusk
65	TB	12/8/2011	12/29/2011	£1,500.00	£1,500.00	Mallusk
66	TB	1/19/2012	2/15/2012	£800.00	£800.00	Mallusk
67	TB	2/2/2012	3/2/2012	£1,400.00	£1,400.00	Mallusk
68	TB	2/12/2012	3/6/2012	£6,450.00	£6,450.00	Mallusk
69	TB	12/24/2011	1/25/2012	£13,950.00	£41,030.00	Mallusk
		3/8/2012	4/11/2012	£27,080.00		Mallusk
70	TB	2/23/2012	3/20/2012	£850.00	£850.00	Mallusk
71	TB	2/20/2012	3/9/2012	£1,700.00	£1,700.00	Mallusk
72	TB	3/30/2012	5/17/2012	£1,900.00	£1,900.00	Mallusk
73	TB	4/29/2011	5/17/2011	£1,350.00	£1,350.00	Mallusk
74	TB	12/1/2011	12/29/2011	£1,800.00	£1,800.00	Mallusk
75	TB	2/17/2012	3/9/2012	£700.00	£700.00	Mallusk
76	TB	12/9/2011	1/3/2012	£5,500.00	£7,100.00	Mallusk
		2/9/2012	3/14/2012	£1,600.00		Mallusk
77	TB	6/9/2011	7/1/2011	£2,850.00	£2,850.00	Ballymena
78	TB	4/1/2011	5/3/2011	£55,500.00	£59,200.00	Ballymena
		1/7/2012	1/26/2012	£2,250.00		Ballymena
		1/7/2012	2/9/2012	£1,450.00		Ballymena
79	TB	8/4/2011	8/24/2011	£525.00	£525.00	Ballymena
80	TB	3/8/2012	4/3/2012	£1,450.00	£1,450.00	Ballymena

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
81	TB	6/9/2011	6/23/2011	£1,000.00	£1,000.00	Ballymena
82	TB	3/8/2012	4/3/2012	£1,600.00	£5,800.00	Ballymena
		3/8/2012	4/18/2012	£4,200.00		Ballymena
83	TB	1/26/2012	2/21/2012	£1,200.00	£1,200.00	Ballymena
84	TB	7/30/2011	8/24/2011	£7,280.00	£7,280.00	Ballymena
85	TB	11/4/2011	11/29/2011	£1,450.00	£1,450.00	Ballymena
86	TB	11/18/2011	12/12/2011	£1,400.00	£1,400.00	Ballymena
87	TB	3/8/2012	4/11/2012	£900.00	£900.00	Ballymena
88	TB	12/10/2011	1/10/2012	£5,400.00	£6,880.00	Ballymena
		12/10/2011	1/25/2012	£1,480.00		Ballymena
89	TB	2/9/2012	2/28/2012	£2,000.00	£2,000.00	Ballymena
90	TB	12/2/2011	12/29/2011	£675.00	£675.00	Ballymena
91	TB	4/22/2011	5/24/2011	£1,300.00	£1,300.00	Ballymena
92	TB	1/20/2012	2/13/2012	£6,200.00	£8,050.00	Ballymena
		1/20/2012	2/15/2012	£1,850.00		Ballymena
93	TB	5/6/2011	5/31/2011	£1,750.00	£1,750.00	Ballymena
94	TB	1/20/2012	2/13/2012	£875.00	£875.00	Ballymena
95	TB	12/15/2011	1/10/2012	£1,080.00	£1,080.00	Ballymena
96	TB	11/10/2011	12/12/2011	£5,450.00	£28,950.00	Ballymena
		3/3/2012	3/20/2012	£23,500.00		Ballymena
97	TB	7/22/2011	8/10/2011	£1,300.00	£7,275.00	Ballymena
		12/16/2011	1/10/2012	£5,975.00		Ballymena
98	TB	12/1/2011	1/9/2012	£1,700.00	£1,700.00	Ballymena
99	TB	1/13/2012	2/9/2012	£650.00	£650.00	Ballymena
100	TB	4/15/2011	5/10/2011	£1,000.00	£1,000.00	Ballymena
101	TB	12/15/2011	1/17/2012	£1,475.00	£1,475.00	Ballymena
102	TB	5/7/2011	5/31/2011	£10,575.00	£11,150.00	Ballymena
		5/7/2011	6/8/2011	£575.00		Ballymena
103	TB	11/3/2011	11/22/2011	£775.00	£775.00	Ballymena
104	TB	11/3/2011	11/22/2011	£5,750.00	£5,750.00	Ballymena
105	TB	2/3/2012	3/2/2012	£1,550.00	£1,550.00	Ballymena
106	TB	4/16/2011	5/10/2011	£4,750.00	£5,650.00	Ballymena
		12/1/2011	3/14/2012	£900.00		Ballymena
107	TB	4/8/2011	5/10/2011	£630.00	£630.00	Ballymena
108	TB	1/27/2012	2/28/2012	£1,250.00	£1,250.00	Ballymena
109	TB	12/1/2011	12/29/2011	£1,200.00	£1,200.00	Ballymena
110	TB	3/8/2012	4/3/2012	£1,300.00	£1,300.00	Ballymena
111	TB	7/14/2011	8/10/2011	£1,100.00	£1,100.00	Ballymena

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
112	TB	2/16/2012	3/14/2012	£1,100.00	£1,100.00	Ballymena
113	TB	2/23/2012	3/14/2012	£1,150.00	£1,150.00	Ballymena
114	TB	5/20/2011	6/17/2011	£1,000.00	£1,000.00	Ballymena
115	TB	6/16/2011	7/7/2011	£1,200.00	£1,200.00	Ballymena
116	TB	11/24/2011	12/29/2011	£4,700.00	£4,700.00	Ballymena
117	TB	11/26/2011	12/29/2011	£1,550.00	£3,030.00	Ballymena
		11/26/2011	1/10/2012	£1,480.00		Ballymena
118	TB	5/27/2011	6/17/2011	£1,300.00	£3,200.00	Ballymena
		8/4/2011	8/24/2011	£1,900.00		Ballymena
119	TB	3/30/2012	4/18/2012	£1,050.00	£1,050.00	Ballymena
120	TB	12/22/2011	1/25/2012	£1,250.00	£1,250.00	Ballymena
121	TB	11/18/2011	12/12/2011	£1,250.00	£5,950.00	Ballymena
		11/18/2011	12/29/2011	£3,300.00		Ballymena
		1/20/2012	2/21/2012	£1,400.00		Ballymena
122	TB	6/30/2011	7/21/2011	£1,050.00	£1,050.00	Ballymena
123	TB	11/24/2011	12/29/2011	£2,700.00	£2,700.00	Ballymena
124	TB	12/22/2011	1/17/2012	£2,100.00	£2,100.00	Ballymena
125	TB	2/10/2012	3/6/2012	£1,250.00	£1,250.00	Ballymena
126	TB	12/15/2011	1/10/2012	£2,300.00	£3,300.00	Ballymena
		2/17/2012	3/14/2012	£1,000.00		Ballymena
127	TB	8/22/2011	9/29/2011	£2,411.00	£2,411.00	Ballymena
128	TB	10/7/2011	11/3/2011	£1,020.00	£1,020.00	Ballymena
129	TB	11/10/2011	11/22/2011	£1,300.00	£1,300.00	Ballymena
130	TB	12/16/2011	1/10/2012	£2,650.00	£3,900.00	Ballymena
		3/1/2012	3/20/2012	£1,250.00		Ballymena
131	TB	3/23/2012	4/11/2012	£1,700.00	£1,700.00	Ballymena
132	TB	1/27/2012	2/21/2012	£4,825.00	£6,465.00	Ballymena
		3/30/2012	4/18/2012	£1,640.00		Ballymena
133	TB	6/24/2011	7/15/2011	£480.00	£2,730.00	Coleraine
		11/11/2011	11/30/2011	£2,250.00		Coleraine
134	TB	5/20/2011	6/8/2011	£650.00	£14,000.00	Coleraine
		10/7/2011	11/8/2011	£10,050.00		Coleraine
		12/9/2011	1/11/2012	£3,300.00		Coleraine
135	TB	12/23/2011	1/17/2012	£2,150.00	£2,150.00	Coleraine
136	TB	2/9/2012	3/6/2012	£3,880.00	£3,880.00	Coleraine
137	TB	10/20/2011	11/8/2011	£2,000.00	£3,150.00	Coleraine
		10/20/2011	12/12/2011	£1,150.00		Coleraine
138	TB	9/1/2011	9/29/2011	£6,080.00	£6,080.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
139	TB	1/27/2012	2/28/2012	£1,750.00	£1,750.00	Coleraine
140	TB	1/5/2012	1/31/2012	£1,200.00	£1,200.00	Coleraine
141	TB	2/24/2012	3/9/2012	£1,400.00	£1,400.00	Coleraine
142	TB	5/6/2011	5/26/2011	£1,350.00	£4,550.00	Coleraine
		10/20/2011	11/8/2011	£3,200.00		Coleraine
143	TB	9/23/2011	10/19/2011	£3,150.00	£21,000.00	Coleraine
		11/25/2011	1/3/2012	£16,850.00		Coleraine
		1/27/2012	2/24/2012	£1,000.00		Coleraine
144	TB	7/9/2011	7/29/2011	£2,700.00	£9,450.00	Coleraine
		9/30/2011	10/25/2011	£3,100.00		Coleraine
		12/10/2011	1/10/2012	£3,650.00		Coleraine
145	TB	4/15/2011	5/10/2011	£1,400.00	£1,400.00	Coleraine
146	TB	6/23/2011	7/7/2011	£1,000.00	£1,000.00	Coleraine
147	TB	4/22/2011	5/11/2011	£1,250.00	£1,250.00	Coleraine
148	TB	9/22/2011	10/11/2011	£1,150.00	£1,150.00	Coleraine
149	TB	3/29/2012	4/11/2012	£1,300.00	£1,300.00	Coleraine
150	TB	1/5/2012	2/21/2012	£1,750.00	£1,750.00	Coleraine
151	TB	12/10/2011	1/18/2012	£1,120.00	£1,120.00	Coleraine
152	TB	6/2/2011	6/23/2011	£5,700.00	£5,700.00	Coleraine
153	TB	11/10/2011	11/29/2011	£1,700.00	£1,700.00	Coleraine
154	TB	11/25/2011	12/21/2011	£17,000.00	£20,600.00	Coleraine
		2/23/2012	3/12/2012	£3,600.00		Coleraine
155	TB	11/18/2011	12/12/2011	£2,300.00	£2,300.00	Coleraine
156	TB	6/17/2011	7/1/2011	£500.00	£1,550.00	Coleraine
		10/27/2011	11/28/2011	£1,050.00		Coleraine
157	TB	9/17/2011	10/19/2011	£2,300.00	£10,600.00	Coleraine
		11/24/2011	12/12/2011	£8,300.00		Coleraine
158	TB	11/3/2011	11/21/2011	£1,300.00	£1,300.00	Coleraine
159	TB	12/22/2011	1/17/2012	£500.00	£500.00	Coleraine
160	TB	12/15/2011	1/11/2012	£900.00	£900.00	Coleraine
161	TB	3/15/2012	4/4/2012	£1,100.00	£1,100.00	Coleraine
162	TB	8/11/2011	8/30/2011	£1,700.00	£1,700.00	Coleraine
163	TB	12/8/2011	1/10/2012	£5,000.00	£5,000.00	Coleraine
164	TB	1/13/2012	2/9/2012	£8,450.00	£9,750.00	Coleraine
		3/15/2012	4/11/2012	£1,300.00		Coleraine
165	TB	2/23/2012	3/23/2012	£1,100.00	£1,100.00	Coleraine
166	TB	1/19/2012	2/15/2012	£980.00	£980.00	Coleraine
167	TB	7/29/2011	8/10/2011	£1,250.00	£1,250.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
168	TB	10/20/2011	11/8/2011	£650.00	£650.00	Coleraine
169	TB	11/10/2011	11/29/2011	£850.00	£850.00	Coleraine
170	TB	11/3/2011	11/21/2011	£2,200.00	£2,200.00	Coleraine
171	TB	7/7/2011	8/4/2011	£780.00	£1,680.00	Coleraine
		10/1/2011	10/27/2011	£900.00		Coleraine
172	TB	1/26/2012	2/28/2012	£5,000.00	£5,000.00	Coleraine
173	TB	3/15/2012	4/11/2012	£2,000.00	£2,000.00	Coleraine
174	TB	12/15/2011	1/11/2012	£6,000.00	£7,900.00	Coleraine
		2/17/2012	3/20/2012	£1,900.00		Coleraine
175	TB	1/27/2012	2/24/2012	£12,150.00	£12,150.00	Coleraine
176	TB	4/8/2011	5/3/2011	£3,400.00	£3,400.00	Coleraine
177	TB	3/9/2012	4/4/2012	£5,500.00	£5,500.00	Coleraine
178	TB	3/9/2012	4/4/2012	£1,450.00	£1,450.00	Coleraine
179	TB	7/21/2011	8/22/2011	£980.00	£980.00	Coleraine
180	TB	1/27/2012	2/28/2012	£1,325.00	£2,650.00	Coleraine
		1/27/2012	3/9/2012	£1,325.00		Coleraine
181	TB	12/22/2011	1/17/2012	£1,300.00	£1,300.00	Coleraine
182	TB	6/23/2011	7/15/2011	£900.00	£900.00	Coleraine
183	TB	1/7/2012	1/31/2012	£1,250.00	£1,250.00	Coleraine
184	TB	9/15/2011	10/6/2011	£21,950.00	£86,150.00	Coleraine
		9/15/2011	10/11/2011	£2,400.00		Coleraine
		11/24/2011	12/14/2011	£37,850.00		Coleraine
		2/2/2012	3/2/2012	£23,950.00		Coleraine
185	TB	2/24/2012	3/9/2012	£1,650.00	£1,650.00	Coleraine
186	TB	4/1/2011	5/10/2011	£1,400.00	£2,850.00	Coleraine
		1/19/2012	2/21/2012	£1,450.00		Coleraine
187	TB	2/3/2012	2/28/2012	£1,250.00	£1,250.00	Coleraine
188	TB	11/4/2011	11/23/2011	£900.00	£1,880.00	Coleraine
		2/2/2012	2/28/2012	£980.00		Coleraine
189	TB	12/23/2011	1/17/2012	£1,425.00	£4,025.00	Coleraine
		12/23/2011	1/31/2012	£1,250.00		Coleraine
		3/1/2012	3/23/2012	£1,350.00		Coleraine
190	TB	8/5/2011	8/24/2011	£2,900.00	£17,260.00	Coleraine
		12/8/2011	1/10/2012	£11,100.00		Coleraine
		12/8/2011	1/26/2012	£1,780.00		Coleraine
		2/16/2012	3/6/2012	£1,480.00		Coleraine
191	TB	2/24/2012	3/9/2012	£1,200.00	£1,200.00	Coleraine
192	TB	10/22/2011	11/8/2011	£4,450.00	£4,450.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
193	TB	10/31/2011	11/30/2011	£4,250.00	£4,250.00	Coleraine
194	TB	3/8/2012	4/4/2012	£780.00	£780.00	Ballymena
195	TB	9/29/2011	10/27/2011	£1,900.00	£1,900.00	Ballymena
196	TB	4/23/2011	5/24/2011	£6,825.00	£6,825.00	Ballymena
197	TB	9/15/2011	10/6/2011	£1,260.00	£1,260.00	Ballymena
198	TB	6/9/2011	6/23/2011	£10,810.00	£15,060.00	Ballymena
		10/6/2011	11/8/2011	£4,250.00		Ballymena
199	TB	12/1/2011	12/29/2011	£750.00	£750.00	Ballymena
200	TB	5/19/2011	6/8/2011	£1,450.00	£1,450.00	Ballymena
201	TB	1/12/2012	2/9/2012	£1,300.00	£1,300.00	Ballymena
202	TB	10/6/2011	10/27/2011	£2,000.00	£2,000.00	Ballymena
203	TB	3/23/2012	4/11/2012	£850.00	£850.00	Ballymena
204	TB	2/10/2012	3/6/2012	£500.00	£500.00	Ballymena
205	TB	6/30/2011	7/21/2011	£825.00	£825.00	Ballymena
206	TB	9/8/2011	9/29/2011	£475.00	£475.00	Ballymena
207	TB	6/24/2011	7/18/2011	£4,400.00	£4,400.00	Ballymena
208	TB	2/9/2012	3/14/2012	£2,800.00	£2,800.00	Ballymena
209	TB	5/19/2011	6/8/2011	£900.00	£900.00	Ballymena
210	TB	12/17/2011	1/25/2012	£1,800.00	£1,800.00	Ballymena
211	TB	10/6/2011	10/27/2011	£1,125.00	£1,695.00	Ballymena
		12/31/2011	1/31/2012	£570.00		Ballymena
212	TB	2/2/2012	2/28/2012	£850.00	£850.00	Ballymena
213	TB	1/19/2012	2/13/2012	£1,100.00	£1,100.00	Ballymena
214	TB	12/1/2011	12/29/2011	£3,500.00	£3,500.00	Ballymena
215	TB	10/7/2011	10/27/2011	£1,400.00	£1,400.00	Armagh
216	TB	10/27/2011	11/21/2011	£1,150.00	£1,150.00	Armagh
217	TB	2/17/2012	3/12/2012	£1,850.00	£1,850.00	Armagh
218	TB	5/6/2011	5/31/2011	£2,000.00	£2,000.00	Armagh
219	TB	9/29/2011	10/27/2011	£11,850.00	£50,500.00	Armagh
		9/29/2011	10/28/2011	£3,600.00		Armagh
		12/10/2011	1/10/2012	£30,950.00		Armagh
		2/18/2012	3/12/2012	£4,100.00		Armagh
220	TB	11/5/2011	11/23/2011	£1,600.00	£1,600.00	Armagh
221	TB	4/14/2011	5/9/2011	£2,000.00	£12,400.00	Armagh
		6/16/2011	7/7/2011	£2,000.00		Armagh
		9/1/2011	9/29/2011	£4,000.00		Armagh
		11/10/2011	12/2/2011	£4,400.00		Armagh
222	TB	11/26/2011	12/14/2011	£980.00	£980.00	Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
223	TB	11/11/2011	12/12/2011	£760.00	£1,560.00	Armagh
		2/10/2012	2/28/2012	£800.00		Armagh
224	TB	4/22/2011	5/17/2011	£1,450.00	£1,450.00	Armagh
225	TB	10/20/2011	11/7/2011	£3,150.00	£3,150.00	Armagh
226	TB	6/3/2011	6/23/2011	£6,700.00	£6,700.00	Armagh
227	TB	9/30/2011	10/21/2011	£1,480.00	£1,480.00	Armagh
228	TB	12/22/2011	1/18/2012	£2,600.00	£2,600.00	Armagh
229	TB	11/4/2011	11/21/2011	£1,480.00	£1,480.00	Armagh
230	TB	9/29/2011	10/21/2011	£600.00	£600.00	Armagh
231	TB	12/16/2011	1/10/2012	£950.00	£950.00	Armagh
232	TB	4/18/2011	5/9/2011	£950.00	£950.00	Armagh
233	TB	10/13/2011	10/28/2011	£950.00	£950.00	Armagh
234	TB	3/8/2012	4/3/2012	£750.00	£750.00	Armagh
235	TB	5/20/2011	6/14/2011	£1,800.00	£1,800.00	Armagh
236	TB	2/24/2012	3/12/2012	£1,125.00	£1,125.00	Armagh
237	TB	6/9/2011	7/4/2011	£850.00	£850.00	Armagh
238	TB	4/29/2011	5/31/2011	£2,400.00	£2,400.00	Armagh
239	TB	11/17/2011	12/14/2011	£480.00	£1,130.00	Armagh
		2/24/2012	3/20/2012	£650.00		Armagh
240	TB	3/24/2012	4/18/2012	£1,950.00	£3,000.00	Armagh
		3/24/2012	5/17/2012	£1,050.00		Armagh
241	TB	7/7/2011	8/8/2011	£4,500.00	£4,500.00	Armagh
242	TB	9/10/2011	10/4/2011	£3,200.00	£4,150.00	Armagh
		11/24/2011	12/12/2011	£950.00		Armagh
243	TB	9/15/2011	10/6/2011	£1,800.00	£1,800.00	Armagh
244	TB	3/8/2012	4/3/2012	£3,700.00	£3,700.00	Armagh
245	TB	4/14/2011	5/9/2011	£1,280.00	£1,280.00	Armagh
246	TB	12/1/2011	1/10/2012	£1,480.00	£1,480.00	Armagh
247	TB	11/25/2011	1/3/2012	£15,100.00	£20,100.00	Armagh
		2/4/2012	3/2/2012	£5,000.00		Armagh
248	TB	4/8/2011	5/9/2011	£2,400.00	£8,725.00	Armagh
		7/21/2011	8/10/2011	£3,375.00		Armagh
		2/23/2012	3/14/2012	£2,950.00		Armagh
249	TB	8/8/2011	9/5/2011	£3,050.00	£3,050.00	Armagh
250	TB	9/15/2011	10/6/2011	£1,250.00	£1,250.00	Armagh
251	TB	4/7/2011	5/3/2011	£1,300.00	£2,250.00	Armagh
		5/13/2011	6/23/2011	£950.00		Armagh
252	TB	11/3/2011	11/29/2011	£4,600.00	£4,600.00	Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
253	TB	11/19/2011	12/14/2011	£7,250.00	£7,250.00	Armagh
254	TB	1/13/2012	2/9/2012	£1,000.00	£1,000.00	Armagh
255	TB	5/14/2011	6/8/2011	£3,520.00	£3,520.00	Armagh
256	TB	8/6/2011	8/24/2011	£3,625.00	£3,625.00	Armagh
257	TB	11/24/2011	12/12/2011	£2,250.00	£2,250.00	Armagh
258	TB	2/2/2012	2/21/2012	£5,000.00	£5,000.00	Armagh
259	TB	9/15/2011	10/6/2011	£2,700.00	£2,700.00	Armagh
260	TB	8/12/2011	9/5/2011	£2,600.00	£4,090.00	Armagh
		10/21/2011	11/7/2011	£1,490.00		Armagh
261	TB	4/21/2011	5/19/2011	£1,150.00	£1,150.00	Armagh
262	TB	2/3/2012	2/28/2012	£900.00	£900.00	Armagh
263	TB	9/9/2011	10/6/2011	£2,510.00	£7,260.00	Armagh
		1/16/2012	2/13/2012	£4,750.00		Armagh
264	TB	11/19/2011	12/14/2011	£800.00	£800.00	Armagh
265	TB	5/5/2011	6/14/2011	£20,250.00	£148,630.00	Armagh
		7/7/2011	8/8/2011	£3,500.00		Armagh
		9/23/2011	10/27/2011	£75,730.00		Armagh
		11/24/2011	1/3/2012	£36,150.00		Armagh
		1/28/2012	2/24/2012	£13,000.00		Armagh
266	TB	12/16/2011	1/17/2012	£1,100.00	£1,100.00	Armagh
267	TB	2/11/2012	2/28/2012	£2,000.00	£2,000.00	Armagh
268	TB	3/22/2012	4/3/2012	£1,955.00	£1,955.00	Armagh
269	TB	7/8/2011	7/29/2011	£3,750.00	£3,750.00	Armagh
270	TB	7/28/2011	8/15/2011	£2,700.00	£3,800.00	Armagh
		11/11/2011	12/12/2011	£1,100.00		Armagh
271	TB	1/26/2012	2/21/2012	£3,900.00	£3,900.00	Armagh
272	TB	5/20/2011	6/8/2011	£1,100.00	£1,100.00	Armagh
273	TB	10/14/2011	11/16/2011	£1,100.00	£1,100.00	Armagh
274	TB	8/8/2011	8/30/2011	£3,375.00	£11,205.00	Armagh
		10/13/2011	11/23/2011	£5,430.00		Armagh
		3/2/2012	3/23/2012	£2,400.00		Armagh
275	TB	8/5/2011	8/30/2011	£21,000.00	£42,300.00	Armagh
		8/5/2011	10/6/2011	£1,100.00		Armagh
		10/20/2011	11/16/2011	£20,200.00		Armagh
276	TB	11/11/2011	12/12/2011	£2,850.00	£2,850.00	Armagh
277	TB	7/7/2011	7/29/2011	£2,150.00	£2,150.00	Armagh
278	TB	9/22/2011	10/13/2011	£3,700.00	£3,700.00	Armagh
279	TB	6/17/2011	7/4/2011	£600.00	£600.00	Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
280	TB	4/21/2011	5/17/2011	£1,100.00	£1,700.00	Armagh
		5/12/2011	5/31/2011	£600.00		Armagh
281	TB	11/4/2011	11/29/2011	£950.00	£950.00	Armagh
282	TB	9/29/2011	10/21/2011	£1,200.00	£1,200.00	Armagh
283	TB	12/10/2011	1/10/2012	£4,000.00	£4,000.00	Armagh
284	TB	6/4/2011	6/23/2011	£875.00	£875.00	Armagh
285	TB	6/30/2011	7/21/2011	£1,300.00	£1,300.00	Armagh
286	TB	4/21/2011	5/19/2011	£700.00	£700.00	Armagh
287	TB	8/26/2011	9/15/2011	£2,425.00	£2,425.00	Armagh
288	TB	2/2/2012	2/21/2012	£3,800.00	£3,800.00	Armagh
289	TB	6/4/2011	7/18/2011	£12,800.00	£12,800.00	Armagh
290	TB	4/21/2011	5/19/2011	£575.00	£575.00	Armagh
291	TB	4/1/2011	5/3/2011	£350.00	£350.00	Armagh
292	TB	2/2/2012	2/28/2012	£1,100.00	£1,100.00	Armagh
293	TB	6/10/2011	6/23/2011	£1,250.00	£1,250.00	Armagh
294	TB	1/26/2012	2/28/2012	£2,000.00	£2,000.00	Armagh
295	TB	7/21/2011	8/15/2011	£2,250.00	£5,150.00	Armagh
		3/31/2012	4/18/2012	£2,900.00		Armagh
296	TB	12/16/2011	1/17/2012	£3,700.00	£3,700.00	Armagh
297	TB	1/12/2012	2/9/2012	£1,100.00	£1,100.00	Armagh
298	TB	3/31/2012	4/18/2012	£1,325.00	£1,325.00	Armagh
299	TB	11/4/2011	11/29/2011	£3,900.00	£3,900.00	Armagh
300	TB	1/14/2012	2/2/2012	£2,050.00	£2,050.00	Armagh
301	TB	7/7/2011	7/29/2011	£800.00	£800.00	Armagh
302	TB	12/8/2011	1/10/2012	£1,950.00	£2,700.00	Armagh
		2/16/2012	3/12/2012	£750.00		Armagh
303	TB	12/18/2011	1/18/2012	£5,200.00	£8,800.00	Armagh
		3/18/2012	4/18/2012	£3,600.00		Armagh
304	TB	10/7/2011	10/28/2011	£3,100.00	£3,100.00	Armagh
305	TB	1/6/2012	1/25/2012	£2,475.00	£2,475.00	Armagh
306	TB	4/7/2011	5/3/2011	£1,150.00	£13,050.00	Armagh
		7/29/2011	8/24/2011	£2,800.00		Armagh
		9/29/2011	10/28/2011	£6,800.00		Armagh
		9/29/2011	11/7/2011	£2,300.00		Armagh
307	TB	6/23/2011	7/29/2011	£3,050.00	£3,050.00	Armagh
308	TB	5/26/2011	6/14/2011	£1,400.00	£1,400.00	Armagh
309	TB	9/16/2011	10/6/2011	£740.00	£740.00	Armagh
310	TB	11/26/2011	12/12/2011	£750.00	£750.00	Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
311	TB	4/1/2011	5/3/2011	£1,750.00	£1,750.00	Armagh
312	TB	4/15/2011	5/24/2011	£9,230.00	£9,230.00	Armagh
313	TB	3/22/2012	4/18/2012	£2,300.00	£2,300.00	Armagh
314	TB	12/23/2011	1/10/2012	£600.00	£600.00	Armagh
315	TB	6/23/2011	7/18/2011	£800.00	£800.00	Armagh
316	TB	4/28/2011	5/31/2011	£1,650.00	£4,350.00	Armagh
		7/2/2011	7/21/2011	£2,700.00		Armagh
317	TB	6/23/2011	7/7/2011	£1,100.00	£4,650.00	Armagh
		12/2/2011	1/3/2012	£3,550.00		Armagh
318	TB	4/21/2011	5/19/2011	£450.00	£450.00	Armagh
319	TB	1/13/2012	2/2/2012	£950.00	£950.00	Armagh
320	TB	4/1/2011	4/21/2011	£3,600.00	£12,550.00	Armagh
		7/2/2011	7/21/2011	£8,950.00		Armagh
321	TB	6/23/2011	7/29/2011	£7,550.00	£7,550.00	Armagh
322	TB	9/2/2011	10/4/2011	£1,775.00	£2,975.00	Armagh
		11/5/2011	12/2/2011	£1,200.00		Armagh
	TB	2/24/2012	3/20/2012	£950.00	£950.00	Armagh
323	TB	6/28/2011	7/21/2011	£2,000.00	£2,000.00	Armagh
324	TB	11/14/2011	12/12/2011	£8,475.00	£10,295.00	Armagh
		11/14/2011	1/10/2012	£1,820.00		Armagh
325	TB	3/8/2012	4/3/2012	£880.00	£880.00	Armagh
326	TB	5/6/2011	5/31/2011	£1,700.00	£6,300.00	Armagh
		8/18/2011	9/15/2011	£4,600.00		Armagh
327	TB	10/21/2011	11/7/2011	£5,840.00	£5,840.00	Armagh
328	TB	4/29/2011	5/31/2011	£2,150.00	£2,150.00	Armagh
329	TB	3/20/2012	4/3/2012	£1,100.00	£1,100.00	Armagh
330	TB	9/2/2011	10/4/2011	£925.00	£925.00	Armagh
331	TB	10/28/2011	12/2/2011	£1,230.00	£1,230.00	Armagh
332	TB	1/14/2012	2/2/2012	£600.00	£600.00	Armagh
333	TB	11/25/2011	12/29/2011	£725.00	£725.00	Armagh
334	TB	10/13/2011	11/7/2011	£1,600.00	£1,600.00	Armagh
335	TB	4/1/2011	5/3/2011	£1,000.00	£1,000.00	Armagh
336	TB	3/30/2012	4/18/2012	£2,500.00	£2,500.00	Armagh
337	TB	8/20/2011	9/15/2011	£4,650.00	£7,890.00	Armagh
		11/5/2011	12/2/2011	£3,240.00		Armagh
338	TB	1/13/2012	2/9/2012	£1,490.00	£7,390.00	Armagh
		3/16/2012	4/4/2012	£5,900.00		Armagh
339	TB	7/8/2011	8/8/2011	£1,000.00	£1,000.00	Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
340	TB	2/10/2012	3/2/2012	£2,900.00	£2,900.00	Armagh
341	TB	1/12/2012	2/2/2012	£1,300.00	£1,300.00	Armagh
342	TB	8/12/2011	8/30/2011	£800.00	£800.00	Armagh
343	TB	3/29/2012	4/18/2012	£2,350.00	£2,350.00	Armagh
344	TB	10/27/2011	11/16/2011	£1,150.00	£1,150.00	Armagh
345	TB	1/10/2012	2/2/2012	£1,450.00	£1,450.00	Armagh
346	TB	8/4/2011	8/30/2011	£800.00	£800.00	Armagh
347	TB	2/4/2012	2/28/2012	£7,750.00	£7,750.00	Armagh
348	TB	3/23/2012	4/11/2012	£3,550.00	£3,550.00	Armagh
349	TB	9/15/2011	10/4/2011	£1,250.00	£1,250.00	Armagh
350	TB	11/10/2011	12/9/2011	£5,670.00	£6,670.00	Newry
		11/10/2011	12/14/2011	£1,000.00		Newry
351	TB	11/18/2011	12/2/2011	£2,080.00	£2,080.00	Newry
352	TB	11/3/2011	11/24/2011	£3,300.00	£3,300.00	Newry
353	TB	11/3/2011	12/12/2011	£7,180.00	£7,180.00	Newry
354	TB	5/13/2011	5/31/2011	£1,300.00	£12,775.00	Newry
		9/23/2011	10/27/2011	£6,625.00		Newry
		2/10/2012	3/6/2012	£4,850.00		Newry
355	TB	5/20/2011	6/8/2011	£1,400.00	£3,150.00	Newry
		2/3/2012	3/2/2012	£1,750.00		Newry
356	TB	6/16/2011	7/1/2011	£3,700.00	£3,700.00	Newry
357	TB	6/23/2011	8/4/2011	£5,600.00	£5,600.00	Newry
358	TB	9/24/2011	10/19/2011	£1,400.00	£1,400.00	Newry
359	TB	3/30/2012	4/18/2012	£750.00	£750.00	Newry
360	TB	6/17/2011	7/4/2011	£930.00	£930.00	Newry
361	TB	12/17/2011	1/18/2012	£1,780.00	£1,780.00	Newry
362	TB	9/29/2011	10/25/2011	£1,370.00	£1,370.00	Newry
363	TB	4/23/2011	5/17/2011	£1,300.00	£6,300.00	Newry
		7/16/2011	8/8/2011	£5,000.00		Newry
364	TB	5/19/2011	6/6/2011	£2,700.00	£2,700.00	Newry
365	TB	7/9/2011	8/10/2011	£22,340.00	£22,340.00	Newry
366	TB	10/15/2011	11/16/2011	£20,800.00	£20,800.00	Newry
367	TB	4/14/2011	5/27/2011	£32,630.00	£48,920.00	Newry
		9/30/2011	11/3/2011	£16,290.00		Newry
368	TB	2/25/2012	3/14/2012	£8,180.00	£8,180.00	Newry
369	TB	9/8/2011	9/29/2011	£1,300.00	£1,300.00	Newry
370	TB	5/19/2011	6/17/2011	£6,000.00	£6,930.00	Newry
		5/19/2011	7/18/2011	£930.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
371	TB	3/29/2012	4/18/2012	£600.00	£600.00	Newry
372	TB	5/27/2011	6/17/2011	£1,100.00	£1,100.00	Newry
373	TB	6/20/2011	7/4/2011	£1,350.00	£4,530.00	Newry
		10/14/2011	11/8/2011	£1,200.00		Newry
		10/14/2011	12/14/2011	£1,000.00		Newry
		2/9/2012	3/2/2012	£980.00		Newry
374	TB	11/17/2011	12/12/2011	£1,500.00	£1,500.00	Newry
375	TB	2/4/2012	3/2/2012	£10,400.00	£10,400.00	Newry
376	TB	11/18/2011	12/2/2011	£2,990.00	£2,990.00	Newry
377	TB	3/29/2012	4/18/2012	£3,580.00	£3,580.00	Newry
378	TB	12/10/2011	1/10/2012	£1,250.00	£2,550.00	Newry
		12/10/2011	1/25/2012	£1,300.00		Newry
379	TB	5/14/2011	8/4/2011	£7,050.00	£31,250.00	Newry
		11/10/2011	12/12/2011	£3,900.00		Newry
		3/19/2012	4/4/2012	£20,300.00		Newry
380	TB	6/16/2011	7/1/2011	£8,890.00	£13,490.00	Newry
		8/20/2011	9/28/2011	£4,600.00		Newry
381	TB	12/23/2011	1/25/2012	£18,140.00	£18,140.00	Newry
382	TB	6/9/2011	6/23/2011	£3,290.00	£39,640.00	Newry
		9/1/2011	9/28/2011	£600.00		Newry
		12/2/2011	1/10/2012	£1,200.00		Newry
		2/4/2012	3/9/2012	£32,250.00		Newry
		2/4/2012	4/3/2012	£2,300.00		Newry
383	TB	6/11/2011	7/1/2011	£6,600.00	£6,600.00	Newry
384	TB	8/25/2011	9/15/2011	£1,480.00	£1,480.00	Newry
385	TB	1/6/2012	1/31/2012	£980.00	£3,160.00	Newry
		1/6/2012	2/23/2012	£2,180.00		Newry
386	TB	7/7/2011	7/29/2011	£1,400.00	£3,100.00	Newry
		2/2/2012	2/23/2012	£1,700.00		Newry
387	TB	5/16/2011	5/31/2011	£1,400.00	£1,400.00	Newry
388	TB	7/22/2011	8/10/2011	£1,300.00	£12,430.00	Newry
		1/13/2012	2/9/2012	£9,830.00		Newry
		1/13/2012	2/14/2012	£1,300.00		Newry
389	TB	9/3/2011	10/6/2011	£6,700.00	£9,790.00	Newry
		1/21/2012	2/9/2012	£3,090.00		Newry
390	TB	9/23/2011	10/13/2011	£1,000.00	£6,800.00	Newry
		12/9/2011	1/10/2012	£4,400.00		Newry
		3/3/2012	4/3/2012	£1,400.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
391	TB	9/17/2011	10/25/2011	£6,400.00	£8,700.00	Newry
		9/17/2011	11/7/2011	£2,300.00		Newry
392	TB	3/2/2012	3/20/2012	£2,000.00	£2,000.00	Newry
393	TB	5/12/2011	6/6/2011	£2,150.00	£2,150.00	Newry
394	TB	4/23/2011	5/31/2011	£1,300.00	£1,300.00	Newry
395	TB	4/8/2011	5/9/2011	£13,410.00	£59,360.00	Newry
		6/11/2011	7/7/2011	£6,490.00		Newry
		8/26/2011	9/15/2011	£5,130.00		Newry
		8/26/2011	9/26/2011	£1,450.00		Newry
		10/28/2011	11/21/2011	£14,950.00		Newry
		10/28/2011	11/28/2011	£900.00		Newry
		1/26/2012	2/21/2012	£9,980.00		Newry
		3/29/2012	5/9/2012	£7,050.00		Newry
396	TB	9/22/2011	10/27/2011	£3,350.00	£53,450.00	Newry
		9/22/2011	11/8/2011	£9,000.00		Newry
		9/22/2011	12/29/2011	£15,000.00		Newry
		3/15/2012	4/4/2012	£26,100.00		Newry
397	TB	4/15/2011	5/10/2011	£9,470.00	£20,270.00	Newry
		4/15/2011	5/17/2011	£10,800.00		Newry
398	TB	3/10/2012	4/3/2012	£1,200.00	£1,200.00	Newry
399	TB	2/9/2012	3/6/2012	£1,050.00	£1,050.00	Newry
400	TB	7/9/2011	8/8/2011	£11,160.00	£11,160.00	Newry
401	TB	12/17/2011	1/23/2012	£1,600.00	£1,600.00	Newry
402	TB	5/19/2011	6/6/2011	£3,750.00	£9,250.00	Newry
		7/25/2011	8/15/2011	£5,500.00		Newry
403	TB	4/9/2011	5/3/2011	£7,650.00	£8,750.00	Newry
		4/9/2011	5/9/2011	£1,100.00		Newry
404	TB	8/11/2011	8/30/2011	£4,000.00	£4,000.00	Newry
405	TB	9/9/2011	10/6/2011	£11,290.00	£11,290.00	Newry
406	TB	5/27/2011	7/18/2011	£7,060.00	£7,060.00	Newry
407	TB	5/7/2011	6/6/2011	£45,050.00	£195,850.00	Newry
		5/7/2011	6/23/2011	£3,200.00		Newry
		8/4/2011	10/14/2011	£68,950.00		Newry
		9/1/2011	10/4/2011	£70,150.00		Newry
		9/1/2011	10/6/2011	£8,500.00		Newry
408	TB	1/20/2012	2/13/2012	£2,680.00	£2,680.00	Newry
409	TB	8/13/2011	9/7/2011	£6,900.00	£6,900.00	Newry
410	TB	1/12/2012	1/31/2012	£1,330.00	£2,630.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		3/22/2012	4/11/2012	£1,300.00		Newry
411	TB	10/14/2011	11/16/2011	£23,070.00	£32,120.00	Newry
		12/23/2011	1/25/2012	£6,950.00		Newry
		3/9/2012	4/3/2012	£2,100.00		Newry
412	TB	4/14/2011	5/3/2011	£1,000.00	£4,350.00	Newry
		5/13/2011	6/6/2011	£3,350.00		Newry
413	TB	2/4/2012	3/2/2012	£7,400.00	£7,400.00	Newry
414	TB	1/27/2012	3/9/2012	£7,600.00	£7,600.00	Newry
415	TB	9/3/2011	10/14/2011	£1,490.00	£1,490.00	Newry
416	TB	4/22/2011	5/24/2011	£1,250.00	£1,250.00	Newry
417	TB	12/15/2011	1/17/2012	£670.00	£670.00	Newry
418	TB	4/8/2011	5/3/2011	£3,050.00	£5,250.00	Newry
		7/26/2011	8/15/2011	£2,200.00		Newry
419	TB	9/3/2011	9/28/2011	£1,250.00	£1,250.00	Newry
420	TB	4/21/2011	6/8/2011	£7,050.00	£9,750.00	Newry
		8/25/2011	9/15/2011	£2,700.00		Newry
421	TB	2/18/2012	3/14/2012	£12,900.00	£12,900.00	Newry
422	TB	5/21/2011	6/17/2011	£7,800.00	£69,090.00	Newry
		7/30/2011	8/24/2011	£19,080.00		Newry
		10/1/2011	11/7/2011	£10,210.00		Newry
		12/9/2011	1/10/2012	£9,440.00		Newry
		12/9/2011	1/23/2012	£6,860.00		Newry
		2/17/2012	3/12/2012	£13,900.00		Newry
		2/17/2012	3/20/2012	£1,800.00		Newry
423	TB	6/25/2011	7/21/2011	£1,300.00	£1,300.00	Newry
424	TB	6/10/2011	7/29/2011	£8,700.00	£126,050.00	Newry
		9/8/2011	10/13/2011	£40,100.00		Newry
		9/20/2011	10/13/2011	£40,100.00		Newry
		12/1/2011	1/10/2012	£19,850.00		Newry
		2/2/2012	2/28/2012	£17,300.00		Newry
425	TB	9/3/2011	10/14/2011	£6,510.00	£8,810.00	Newry
		12/1/2011	12/21/2011	£2,300.00		Newry
426	TB	5/7/2011	5/31/2011	£7,890.00	£9,290.00	Newry
		7/12/2011	8/8/2011	£1,400.00		Newry
427	TB	4/21/2011	5/17/2011	£16,420.00	£24,740.00	Newry
		4/21/2011	5/24/2011	£150.00		Newry
		9/3/2011	10/4/2011	£6,720.00		Newry
		2/2/2012	3/2/2012	£1,450.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
428	TB	9/16/2011	10/4/2011	£1,080.00	£1,080.00	Newry
429	TB	9/29/2011	10/25/2011	£5,400.00	£6,450.00	Newry
		1/14/2012	2/6/2012	£1,050.00		Newry
430	TB	5/20/2011	6/14/2011	£3,200.00	£3,200.00	Newry
431	TB	11/12/2011	12/2/2011	£29,700.00	£29,700.00	Newry
432	TB	2/9/2012	2/28/2012	£1,350.00	£1,350.00	Newry
433	TB	11/4/2011	11/24/2011	£1,450.00	£1,450.00	Newry
434	TB	10/21/2011	11/21/2011	£1,250.00	£12,730.00	Newry
		10/21/2011	11/21/2011	£11,480.00		Newry
435	TB	9/23/2011	10/13/2011	£1,450.00	£1,450.00	Newry
436	TB	5/19/2011	6/6/2011	£3,400.00	£4,500.00	Newry
		7/25/2011	8/15/2011	£1,100.00		Newry
437	TB	3/15/2012	4/3/2012	£1,400.00	£1,400.00	Newry
438	TB	6/17/2011	7/4/2011	£4,250.00	£9,150.00	Newry
		11/3/2011	12/12/2011	£4,900.00		Newry
439	TB	5/6/2011	5/31/2011	£1,350.00	£1,350.00	Newry
440	TB	8/18/2011	9/15/2011	£1,200.00	£1,200.00	Newry
441	TB	11/18/2011	12/12/2011	£1,080.00	£2,850.00	Newry
		11/18/2011	12/14/2011	£1,770.00		Newry
442	TB	9/3/2011	9/28/2011	£890.00	£890.00	Newry
443	TB	1/20/2012	2/13/2012	£4,330.00	£4,330.00	Newry
444	TB	10/6/2011	11/7/2011	£25,770.00	£94,390.00	Newry
		10/6/2011	11/21/2011	£1,600.00		Newry
		12/16/2011	1/11/2012	£36,750.00		Newry
		12/16/2011	1/23/2012	£2,000.00		Newry
		2/17/2012	3/20/2012	£28,270.00		Newry
445	TB	5/23/2011	6/8/2011	£4,300.00	£4,300.00	Newry
446	TB	6/16/2011	7/7/2011	£400.00	£980.00	Newry
		9/19/2011	10/6/2011	£580.00		Newry
447	TB	9/3/2011	10/6/2011	£5,130.00	£12,340.00	Newry
		12/1/2011	12/21/2011	£5,130.00		Newry
		3/19/2012	4/18/2012	£2,080.00		Newry
448	TB	12/1/2011	12/21/2011	£7,500.00	£29,500.00	Newry
		2/25/2012	3/20/2012	£22,000.00		Newry
449	TB	1/24/2012	2/9/2012	£3,700.00	£6,230.00	Newry
		3/31/2012	4/18/2012	£2,530.00		Newry
450	TB	2/18/2012	3/14/2012	£2,270.00	£3,260.00	Newry
		2/18/2012	4/3/2012	£990.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
451	TB	6/9/2011	7/1/2011	£3,500.00	£14,250.00	Newry
		10/24/2011	11/21/2011	£6,450.00		Newry
		2/20/2012	3/9/2012	£4,300.00		Newry
452	TB	8/11/2011	8/30/2011	£1,400.00	£1,400.00	Newry
453	TB	2/24/2012	3/20/2012	£900.00	£900.00	Newry
454	TB	10/29/2011	11/22/2011	£21,430.00	£21,430.00	Newry
455	TB	5/12/2011	7/1/2011	£7,000.00	£33,560.00	Newry
		5/12/2011	7/21/2011	£700.00		Newry
		8/13/2011	9/7/2011	£24,910.00		Newry
		8/13/2011	9/29/2011	£950.00		Newry
456	TB	3/19/2012	4/11/2012	£11,430.00	£11,430.00	Newry
457	TB	1/12/2012	1/31/2012	£2,280.00	£2,280.00	Newry
458	TB	6/23/2011	7/21/2011	£1,050.00	£1,050.00	Newry
459	TB	5/7/2011	5/31/2011	£3,950.00	£4,950.00	Newry
		7/12/2011	8/8/2011	£1,000.00		Newry
460	TB	8/5/2011	8/24/2011	£1,380.00	£1,380.00	Newry
461	TB	6/10/2011	7/29/2011	£6,400.00	£50,900.00	Newry
		9/8/2011	10/13/2011	£17,400.00		Newry
		9/8/2011	10/28/2011	£4,500.00		Newry
		12/1/2011	1/10/2012	£20,300.00		Newry
		2/2/2012	2/28/2012	£2,300.00		Newry
462	TB	5/20/2011	6/8/2011	£3,850.00	£3,850.00	Newry
463	TB	12/1/2011	12/21/2011	£7,300.00	£16,300.00	Newry
		2/25/2012	3/20/2012	£9,000.00		Newry
464	TB	9/2/2011	9/28/2011	£2,650.00	£2,650.00	Newry
465	TB	9/16/2011	10/21/2011	£1,450.00	£1,450.00	Newry
466	TB	7/2/2011	7/29/2011	£1,150.00	£1,150.00	Newry
467	TB	8/13/2011	10/6/2011	£1,150.00	£2,050.00	Newry
		8/13/2011	1/23/2012	£900.00		Newry
468	TB	11/18/2011	12/12/2011	£1,100.00	£1,100.00	Newry
469	TB	5/16/2011	6/6/2011	£2,850.00	£2,850.00	Newry
470	TB	10/21/2011	11/16/2011	£1,850.00	£1,850.00	Newry
471	TB	5/7/2011	5/31/2011	£3,200.00	£10,380.00	Newry
		7/12/2011	8/8/2011	£7,180.00		Newry
472	TB	3/19/2012	4/18/2012	£2,930.00	£2,930.00	Newry
473	TB	5/21/2011	6/23/2011	£2,000.00	£8,030.00	Newry
		7/30/2011	8/22/2011	£2,490.00		Newry
		10/1/2011	10/25/2011	£3,540.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
474	TB	5/6/2011	5/31/2011	£5,440.00	£5,440.00	Newry
475	TB	3/19/2012	4/11/2012	£5,200.00	£5,200.00	Newry
476	TB	6/16/2011	7/21/2011	£4,450.00	£6,900.00	Newry
		6/16/2011	7/29/2011	£2,450.00		Newry
477	TB	4/21/2011	5/11/2011	£2,550.00	£8,410.00	Newry
		4/21/2011	5/24/2011	£950.00		Newry
		8/18/2011	9/15/2011	£900.00		Newry
		11/4/2011	12/2/2011	£2,230.00		Newry
		1/6/2012	1/31/2012	£1,780.00		Newry
478	TB	5/7/2011	6/8/2011	£5,640.00	£12,290.00	Newry
		3/26/2012	4/26/2012	£6,650.00		Newry
479	TB	4/15/2011	5/17/2011	£2,400.00	£2,400.00	Newry
480	TB	4/8/2011	5/3/2011	£2,230.00	£2,230.00	Newry
481	TB	2/20/2012	3/12/2012	£11,560.00	£11,560.00	Newry
482	TB	1/6/2012	1/31/2012	£950.00	£950.00	Newry
483	TB	9/23/2011	10/13/2011	£4,380.00	£4,380.00	Newry
484	TB	1/12/2012	1/31/2012	£1,250.00	£2,500.00	Newry
		3/22/2012	4/11/2012	£1,250.00		Newry
485	TB	3/15/2012	4/3/2012	£850.00	£850.00	Newry
486	TB	4/1/2011	5/3/2011	£900.00	£900.00	Armagh
487	TB	3/1/2012	3/20/2012	£1,900.00	£1,900.00	Armagh
488	TB	3/15/2012	4/3/2012	£2,000.00	£2,000.00	Armagh
489	TB	1/26/2012	3/2/2012	£2,450.00	£2,450.00	Armagh
490	TB	4/14/2011	5/11/2011	£6,950.00	£30,750.00	Armagh
		11/12/2011	12/12/2011	£23,800.00		Armagh
491	TB	11/11/2011	12/2/2011	£950.00	£2,150.00	Armagh
		3/8/2012	4/11/2012	£1,200.00		Armagh
492	TB	9/22/2011	10/13/2011	£850.00	£850.00	Armagh
493	TB	4/7/2011	5/3/2011	£1,000.00	£1,000.00	Armagh
494	TB	1/21/2012	2/13/2012	£1,800.00	£1,800.00	Armagh
495	TB	10/24/2011	11/16/2011	£7,400.00	£9,000.00	Armagh
		10/24/2011	11/23/2011	£1,600.00		Armagh
496	TB	12/31/2011	1/17/2012	£1,050.00	£1,050.00	Armagh
497	TB	8/1/2011	8/24/2011	£30,600.00	£404,940.00	Armagh
		12/10/2011	1/18/2012	£295,390.00		Armagh
		12/10/2011	1/25/2012	£1,600.00		Armagh
		12/10/2011	4/24/2012	£350.00		Armagh
		1/30/2012	2/24/2012	£45,400.00		Armagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		3/31/2012	4/18/2012	£31,600.00		Armagh
498	TB	10/10/2011	10/25/2011	£7,100.00	£7,100.00	Armagh
499	TB	1/7/2012	2/2/2012	£2,900.00	£2,900.00	Armagh
500	TB	11/12/2011	12/12/2011	£2,450.00	£2,450.00	Armagh
501	TB	4/29/2011	5/19/2011	£73,700.00	£83,100.00	Armagh
		4/29/2011	5/24/2011	£800.00		Armagh
		6/24/2011	7/29/2011	£4,200.00		Armagh
		9/1/2011	9/22/2011	£4,400.00		Armagh
502	TB	12/31/2011	1/17/2012	£1,050.00	£1,050.00	Armagh
503	TB	8/5/2011	9/5/2011	£31,630.00	£57,140.00	Newry
		12/3/2011	1/17/2012	£17,940.00		Newry
		12/3/2011	1/18/2012	£2,450.00		Newry
		3/17/2012	4/11/2012	£2,840.00		Newry
		3/17/2012	5/9/2012	£2,280.00		Newry
504	TB	3/29/2012	4/18/2012	£1,200.00	£1,200.00	Newry
505	TB	11/3/2011	12/12/2011	£1,200.00	£1,200.00	Newry
506	TB	10/20/2011	11/16/2011	£5,100.00	£10,800.00	Newry
		12/30/2011	1/25/2012	£5,700.00		Newry
507	TB	5/16/2011	6/6/2011	£11,100.00	£38,110.00	Newry
		5/16/2011	6/23/2011	£1,400.00		Newry
		9/16/2011	10/19/2011	£23,760.00		Newry
		12/9/2011	1/10/2012	£1,850.00		Newry
508	TB	6/10/2011	7/1/2011	£1,750.00	£1,750.00	Newry
509	TB	4/8/2011	5/3/2011	£4,200.00	£7,050.00	Newry
		3/8/2012	4/3/2012	£2,850.00		Newry
510	TB	9/16/2011	10/19/2011	£21,900.00	£30,550.00	Newry
		11/17/2011	12/12/2011	£4,550.00		Newry
		1/13/2012	2/6/2012	£4,100.00		Newry
511	TB	4/16/2011	6/8/2011	£5,350.00	£22,830.00	Newry
		10/13/2011	11/8/2011	£950.00		Newry
		12/17/2011	1/31/2012	£16,530.00		Newry
512	TB	5/6/2011	5/31/2011	£17,825.00	£81,505.00	Newry
		11/18/2011	12/14/2011	£36,480.00		Newry
		3/30/2012	4/26/2012	£27,200.00		Newry
513	TB	10/7/2011	11/16/2011	£5,300.00	£5,300.00	Newry
514	TB	5/7/2011	5/31/2011	£2,100.00	£11,650.00	Newry
		7/14/2011	8/10/2011	£5,950.00		Newry
		9/15/2011	10/13/2011	£3,600.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
515	TB	2/3/2012	2/23/2012	£1,900.00	£1,900.00	Newry
516	TB	6/17/2011	7/4/2011	£7,030.00	£7,030.00	Newry
517	TB	7/1/2011	7/21/2011	£900.00	£900.00	Newry
518	TB	4/21/2011	5/24/2011	£630.00	£630.00	Newry
519	TB	5/27/2011	6/17/2011	£1,700.00	£1,700.00	Newry
520	TB	5/19/2011	6/23/2011	£1,100.00	£2,700.00	Newry
		7/21/2011	8/8/2011	£1,600.00		Newry
521	TB	11/24/2011	12/14/2011	£1,800.00	£1,800.00	Newry
522	TB	9/16/2011	10/13/2011	£4,005.00	£10,895.00	Newry
		11/25/2011	12/29/2011	£6,890.00		Newry
523	TB	11/18/2011	12/14/2011	£3,850.00	£16,300.00	Newry
		1/26/2012	2/23/2012	£10,850.00		Newry
		1/26/2012	3/12/2012	£1,600.00		Newry
524	TB	5/27/2011	6/17/2011	£2,030.00	£18,810.00	Newry
		3/2/2012	3/23/2012	£15,680.00		Newry
		3/2/2012	4/3/2012	£1,100.00		Newry
525	TB	9/8/2011	10/6/2011	£10,880.00	£13,380.00	Newry
		11/11/2011	11/29/2011	£1,250.00		Newry
		3/29/2012	4/18/2012	£1,250.00		Newry
526	TB	8/22/2011	9/15/2011	£1,250.00	£1,250.00	Newry
527	TB	12/23/2011	1/25/2012	£7,800.00	£7,800.00	Newry
528	TB	5/27/2011	6/17/2011	£1,450.00	£1,450.00	Newry
529	TB	2/23/2012	3/20/2012	£1,000.00	£1,980.00	Newry
		3/13/2012	4/3/2012	£980.00		Newry
530	TB	6/10/2011	7/7/2011	£1,450.00	£1,950.00	Newry
		3/29/2012	4/18/2012	£500.00		Newry
531	TB	1/26/2012	2/23/2012	£2,900.00	£2,900.00	Newry
532	TB	12/8/2011	1/11/2012	£3,300.00	£3,300.00	Newry
533	TB	9/1/2011	9/29/2011	£5,150.00	£5,150.00	Newry
534	TB	6/3/2011	6/23/2011	£900.00	£900.00	Newry
535	TB	1/27/2012	2/23/2012	£1,400.00	£1,400.00	Newry
536	TB	7/23/2011	8/15/2011	£2,330.00	£9,170.00	Newry
		11/18/2011	12/12/2011	£2,110.00		Newry
		3/23/2012	4/11/2012	£4,730.00		Newry
537	TB	5/6/2011	6/6/2011	£1,600.00	£11,050.00	Newry
		7/22/2011	8/10/2011	£6,850.00		Newry
		11/5/2011	12/12/2011	£2,600.00		Newry
538	TB	3/23/2012	4/18/2012	£1,650.00	£1,650.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
539	TB	12/16/2011	1/17/2012	£1,950.00	£1,950.00	Newry
540	TB	2/16/2012	3/9/2012	£20,900.00	£20,900.00	Newry
541	TB	2/6/2012	2/23/2012	£2,000.00	£2,000.00	Newry
542	TB	7/22/2011	8/10/2011	£730.00	£730.00	Newry
543	TB	4/9/2011	5/9/2011	£930.00	£3,330.00	Newry
		6/21/2011	7/18/2011	£2,400.00		Newry
544	TB	1/26/2012	2/23/2012	£2,950.00	£2,950.00	Newry
545	TB	8/22/2011	9/15/2011	£2,300.00	£3,470.00	Newry
		2/4/2012	2/28/2012	£1,170.00		Newry
546	TB	2/4/2012	3/6/2012	£5,180.00	£5,180.00	Newry
547	TB	4/15/2011	5/17/2011	£4,300.00	£5,100.00	Newry
		6/30/2011	7/29/2011	£800.00		Newry
548	TB	5/19/2011	6/14/2011	£23,680.00	£50,160.00	Newry
		6/3/2011	6/23/2011	£4,600.00		Newry
		8/12/2011	9/15/2011	£9,400.00		Newry
		11/4/2011	11/29/2011	£1,900.00		Newry
		3/15/2012	4/11/2012	£10,580.00		Newry
549	TB	5/19/2011	6/8/2011	£1,900.00	£12,100.00	Newry
		10/27/2011	12/12/2011	£10,200.00		Newry
550	TB	8/26/2011	9/28/2011	£800.00	£1,600.00	Newry
		10/29/2011	11/24/2011	£800.00		Newry
551	TB	9/30/2011	10/27/2011	£3,450.00	£5,150.00	Newry
		1/5/2012	2/1/2012	£1,700.00		Newry
552	TB	8/6/2011	8/24/2011	£450.00	£450.00	Newry
553	TB	5/20/2011	6/17/2011	£630.00	£630.00	Newry
554	TB	11/26/2011	12/21/2011	£2,400.00	£6,050.00	Newry
		1/28/2012	2/23/2012	£3,650.00		Newry
555	TB	8/12/2011	9/5/2011	£1,650.00	£1,650.00	Newry
556	TB	1/12/2012	2/6/2012	£1,480.00	£1,480.00	Newry
557	TB	12/9/2011	1/9/2012	£7,500.00	£11,880.00	Newry
		2/27/2012	3/12/2012	£4,380.00		Newry
558	TB	5/26/2011	6/23/2011	£1,200.00	£2,300.00	Newry
		7/29/2011	8/24/2011	£1,100.00		Newry
559	TB	2/23/2012	3/20/2012	£1,450.00	£1,450.00	Newry
560	TB	3/23/2012	4/11/2012	£11,710.00	£12,990.00	Newry
		3/23/2012	5/1/2012	£1,280.00		Newry
561	TB	6/23/2011	7/29/2011	£1,900.00	£10,540.00	Newry
		12/3/2011	1/10/2012	£4,290.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		2/11/2012	3/9/2012	£4,350.00		Newry
562	TB	12/8/2011	1/25/2012	£24,500.00	£37,580.00	Newry
		3/2/2012	3/29/2012	£13,080.00		Newry
563	TB	4/2/2011	4/21/2011	£1,200.00	£1,200.00	Newry
564	TB	5/12/2011	6/6/2011	£980.00	£980.00	Newry
565	TB	5/6/2011	6/6/2011	£7,080.00	£7,810.00	Newry
		8/16/2011	9/7/2011	£730.00		Newry
566	TB	5/7/2011	6/6/2011	£2,850.00	£9,140.00	Newry
		7/9/2011	8/10/2011	£3,260.00		Newry
		9/17/2011	10/11/2011	£2,080.00		Newry
		12/22/2011	1/18/2012	£950.00		Newry
567	TB	3/22/2012	4/11/2012	£1,800.00	£1,800.00	Newry
568	TB	10/28/2011	11/22/2011	£2,500.00	£2,500.00	Newry
569	TB	1/6/2012	2/1/2012	£1,050.00	£1,950.00	Newry
		3/10/2012	4/3/2012	£900.00		Newry
570	TB	9/29/2011	10/27/2011	£4,800.00	£4,800.00	Newry
571	TB	5/20/2011	6/14/2011	£4,210.00	£4,210.00	Newry
572	TB	11/26/2011	12/21/2011	£2,930.00	£2,930.00	Newry
573	TB	11/11/2011	12/12/2011	£1,495.00	£1,495.00	Newry
574	TB	9/29/2011	10/25/2011	£850.00	£4,000.00	Newry
		12/22/2011	1/25/2012	£3,150.00		Newry
575	TB	5/13/2011	5/31/2011	£1,450.00	£2,900.00	Newry
		5/16/2011	5/31/2011	£1,450.00		Newry
576	TB	1/13/2012	2/6/2012	£1,150.00	£3,400.00	Newry
		1/31/2012	2/23/2012	£2,250.00		Newry
577	TB	8/29/2011	10/6/2011	£950.00	£950.00	Newry
578	TB	10/27/2011	11/21/2011	£2,400.00	£2,400.00	Newry
579	TB	6/2/2011	6/23/2011	£2,040.00	£23,840.00	Newry
		8/5/2011	8/24/2011	£9,100.00		Newry
		10/8/2011	11/8/2011	£11,800.00		Newry
		12/1/2011	1/10/2012	£900.00		Newry
580	TB	5/14/2011	6/6/2011	£3,600.00	£8,480.00	Newry
		5/14/2011	6/23/2011	£2,500.00		Newry
		10/15/2011	11/22/2011	£2,380.00		Newry
581	TB	11/17/2011	12/12/2011	£7,900.00	£9,800.00	Newry
		3/22/2012	4/11/2012	£1,900.00		Newry
582	TB	7/29/2011	8/24/2011	£1,100.00	£1,100.00	Newry
583	TB	11/3/2011	11/29/2011	£3,500.00	£14,680.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		2/17/2012	3/12/2012	£11,180.00		Newry
584	TB	7/22/2011	8/17/2011	£3,300.00	£6,980.00	Newry
		9/24/2011	10/19/2011	£3,680.00		Newry
585	TB	7/18/2011	8/8/2011	£950.00	£950.00	Newry
586	TB	5/26/2011	6/17/2011	£1,600.00	£1,600.00	Newry
587	TB	12/30/2011	2/1/2012	£4,100.00	£4,100.00	Newry
588	TB	10/7/2011	11/8/2011	£3,400.00	£3,400.00	Newry
589	TB	7/29/2011	8/24/2011	£1,100.00	£1,100.00	Newry
590	TB	4/7/2011	5/3/2011	£5,730.00	£5,730.00	Newry
591	TB	8/26/2011	9/28/2011	£3,070.00	£3,690.00	Newry
		10/28/2011	11/22/2011	£620.00		Newry
592	TB	10/27/2011	12/21/2011	£6,680.00	£7,430.00	Newry
		1/14/2012	2/1/2012	£750.00		Newry
593	TB	3/9/2012	4/3/2012	£1,300.00	£1,300.00	Newry
594	TB	9/16/2011	10/13/2011	£1,150.00	£4,350.00	Newry
		11/17/2011	12/14/2011	£3,200.00		Newry
595	TB	10/6/2011	10/25/2011	£900.00	£900.00	Newry
596	TB	10/20/2011	11/21/2011	£1,870.00	£1,870.00	Newry
597	TB	6/2/2011	6/23/2011	£1,400.00	£1,400.00	Newry
598	TB	9/15/2011	10/13/2011	£870.00	£870.00	Newry
599	TB	8/15/2011	9/5/2011	£1,490.00	£1,490.00	Newry
600	TB	8/18/2011	9/15/2011	£3,050.00	£3,050.00	Newry
601	TB	3/9/2012	4/3/2012	£1,650.00	£1,650.00	Newry
602	TB	7/2/2011	7/29/2011	£600.00	£1,420.00	Newry
		9/8/2011	9/29/2011	£820.00		Newry
603	TB	7/30/2011	8/24/2011	£675.00	£1,925.00	Newry
		8/16/2011	9/7/2011	£1,250.00		Newry
604	TB	9/12/2011	10/21/2011	£2,280.00	£2,280.00	Newry
605	TB	2/23/2012	3/20/2012	£620.00	£620.00	Newry
606	TB	7/7/2011	8/8/2011	£950.00	£19,580.00	Newry
		12/5/2011	1/9/2012	£16,180.00		Newry
		2/23/2012	3/20/2012	£2,450.00		Newry
607	TB	12/16/2011	1/25/2012	£13,800.00	£21,600.00	Newry
		12/16/2011	1/26/2012	£1,900.00		Newry
		12/16/2011	2/6/2012	£3,900.00		Newry
		2/24/2012	3/20/2012	£2,000.00		Newry
608	TB	12/1/2011	12/29/2011	£4,260.00	£4,260.00	Newry
609	TB	5/12/2011	6/14/2011	£2,100.00	£22,890.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		8/5/2011	8/31/2011	£16,300.00		Newry
		10/7/2011	11/3/2011	£4,490.00		Newry
610	TB	3/1/2012	3/29/2012	£5,770.00	£5,770.00	Newry
611	TB	4/9/2011	5/9/2011	£1,930.00	£1,930.00	Newry
612	TB	1/19/2012	2/2/2012	£1,800.00	£1,800.00	Newry
613	TB	9/16/2011	10/13/2011	£950.00	£950.00	Newry
614	TB	4/2/2011	4/21/2011	£600.00	£600.00	Newry
615	TB	4/8/2011	5/3/2011	£2,400.00	£2,400.00	Newry
616	TB	1/7/2012	2/1/2012	£6,000.00	£11,000.00	Newry
		1/7/2012	2/28/2012	£5,000.00		Newry
617	TB	3/1/2012	3/20/2012	£880.00	£880.00	Newry
618	TB	3/30/2012	5/1/2012	£4,000.00	£4,000.00	Newry
619	TB	9/15/2011	10/13/2011	£1,150.00	£5,730.00	Newry
		11/25/2011	12/14/2011	£4,580.00		Newry
620	TB	5/12/2011	6/6/2011	£1,900.00	£6,330.00	Newry
		10/13/2011	11/16/2011	£4,430.00		Newry
621	TB	11/18/2011	1/3/2012	£6,250.00	£23,500.00	Newry
		3/2/2012	4/3/2012	£17,250.00		Newry
622	TB	3/15/2012	4/11/2012	£1,100.00	£1,100.00	Newry
623	TB	4/5/2011	5/3/2011	£1,075.00	£1,075.00	Newry
624	TB	10/27/2011	11/16/2011	£900.00	£900.00	Newry
625	TB	4/7/2011	5/3/2011	£5,250.00	£9,250.00	Newry
		7/28/2011	8/12/2011	£4,000.00		Newry
626	TB	4/21/2011	5/24/2011	£26,580.00	£125,630.00	Newry
		4/21/2011	6/8/2011	£1,100.00		Newry
		7/21/2011	8/10/2011	£21,750.00		Newry
		11/17/2011	12/14/2011	£31,000.00		Newry
		3/2/2012	4/4/2012	£43,900.00		Newry
		3/2/2012	4/18/2012	£1,300.00		Newry
627	TB	11/26/2011	1/9/2012	£1,300.00	£1,300.00	Newry
628	TB	8/15/2011	9/15/2011	£1,200.00	£1,200.00	Newry
629	TB	6/2/2011	7/21/2011	£26,360.00	£39,960.00	Newry
		9/1/2011	9/28/2011	£13,600.00		Newry
630	TB	10/28/2011	11/22/2011	£6,100.00	£7,100.00	Newry
		2/10/2012	3/9/2012	£1,000.00		Newry
631	TB	4/21/2011	5/19/2011	£2,680.00	£2,680.00	Newry
632	TB	2/24/2012	3/20/2012	£1,200.00	£1,200.00	Newry
633	TB	5/6/2011	5/31/2011	£2,225.00	£15,115.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		11/18/2011	12/12/2011	£3,950.00		Newry
		3/30/2012	4/18/2012	£8,290.00		Newry
		3/30/2012	4/24/2012	£650.00		Newry
634	TB	11/18/2011	12/12/2011	£550.00	£550.00	Newry
635	TB	11/19/2011	12/21/2011	£8,530.00	£23,430.00	Newry
		1/28/2012	2/28/2012	£14,900.00		Newry
636	TB	9/12/2011	9/29/2011	£1,400.00	£9,665.00	Newry
		10/27/2011	11/29/2011	£8,265.00		Newry
637	TB	12/24/2011	1/25/2012	£900.00	£900.00	Newry
638	TB	9/1/2011	9/28/2011	£950.00	£950.00	Newry
639	TB	2/18/2012	3/9/2012	£1,250.00	£1,250.00	Newry
640	TB	10/6/2011	10/25/2011	£900.00	£2,800.00	Newry
		12/24/2011	1/25/2012	£1,900.00		Newry
641	TB	7/7/2011	7/21/2011	£750.00	£4,400.00	Newry
		10/25/2011	11/21/2011	£2,900.00		Newry
		10/25/2011	11/22/2011	£750.00		Newry
642	TB	12/8/2011	1/31/2012	£780.00	£780.00	Newry
643	TB	2/9/2012	2/28/2012	£1,350.00	£1,350.00	Newry
644	TB	7/7/2011	8/8/2011	£1,450.00	£6,830.00	Newry
		12/5/2011	1/10/2012	£3,900.00		Newry
		2/23/2012	3/20/2012	£1,480.00		Newry
645	TB	12/23/2011	1/25/2012	£8,370.00	£8,370.00	Newry
646	TB	7/8/2011	7/21/2011	£5,700.00	£5,700.00	Newry
647	TB	11/11/2011	12/2/2011	£1,100.00	£1,100.00	Newry
648	TB	8/8/2011	8/30/2011	£1,950.00	£1,950.00	Newry
649	TB	3/9/2012	4/4/2012	£1,400.00	£1,400.00	Newry
650	TB	3/31/2012	4/18/2012	£9,300.00	£9,300.00	Newry
651	TB	10/27/2011	11/29/2011	£1,400.00	£10,200.00	Newry
		10/27/2011	12/21/2011	£8,050.00		Newry
		1/14/2012	2/1/2012	£750.00		Newry
652	TB	5/7/2011	5/31/2011	£10,360.00	£10,360.00	Newry
653	TB	2/24/2012	3/20/2012	£2,650.00	£2,650.00	Newry
654	TB	7/4/2011	7/29/2011	£6,250.00	£6,250.00	Newry
655	TB	5/5/2011	5/26/2011	£1,300.00	£1,300.00	Newry
656	TB	3/29/2012	4/18/2012	£1,050.00	£1,050.00	Newry
657	TB	7/28/2011	8/24/2011	£800.00	£800.00	Newry
658	TB	10/1/2011	10/27/2011	£5,505.00	£9,635.00	Newry
		12/17/2011	1/17/2012	£1,650.00		Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		12/17/2011	1/18/2012	£2,480.00		Newry
659	TB	8/4/2011	8/24/2011	£1,850.00	£3,450.00	Newry
		11/25/2011	12/29/2011	£1,600.00		Newry
660	TB	4/29/2011	5/24/2011	£850.00	£850.00	Newry
661	TB	6/3/2011	6/23/2011	£1,350.00	£34,490.00	Newry
		8/5/2011	9/26/2011	£10,900.00		Newry
		10/15/2011	11/16/2011	£9,150.00		Newry
		1/19/2012	2/9/2012	£13,090.00		Newry
662	TB	7/23/2011	8/24/2011	£14,730.00	£14,730.00	Newry
663	TB	3/24/2012	4/18/2012	£550.00	£550.00	Newry
664	TB	10/15/2011	11/16/2011	£2,700.00	£2,700.00	Newry
665	TB	8/19/2011	9/15/2011	£2,070.00	£2,070.00	Newry
666	TB	4/8/2011	5/9/2011	£1,000.00	£1,000.00	Newry
667	TB	1/26/2012	2/23/2012	£23,000.00	£23,000.00	Newry
668	TB	10/20/2011	11/16/2011	£900.00	£900.00	Newry
669	TB	2/16/2012	3/12/2012	£850.00	£850.00	Newry
670	TB	6/18/2011	7/18/2011	£4,040.00	£6,490.00	Newry
		9/2/2011	9/28/2011	£1,200.00		Newry
		12/3/2011	12/29/2011	£1,250.00		Newry
671	TB	9/8/2011	10/6/2011	£950.00	£950.00	Newry
672	TB	3/1/2012	3/20/2012	£2,700.00	£2,700.00	Newry
673	TB	7/29/2011	8/24/2011	£3,000.00	£3,000.00	Armagh
674	TB	12/6/2011	2/2/2012	£25,290.00	£42,090.00	Armagh
		2/25/2012	3/27/2012	£16,800.00		Armagh
675	TB	12/16/2011	1/17/2012	£1,800.00	£1,800.00	Armagh
676	TB	8/9/2011	9/15/2011	£1,300.00	£1,300.00	Armagh
677	TB	6/17/2011	7/18/2011	£1,490.00	£1,490.00	Armagh
678	TB	4/22/2011	5/19/2011	£2,000.00	£2,000.00	Armagh
679	TB	11/18/2011	12/21/2011	£6,000.00	£6,000.00	Armagh
680	TB	11/25/2011	1/10/2012	£1,100.00	£1,100.00	Armagh
681	TB	4/29/2011	5/24/2011	£8,060.00	£13,360.00	Newtownards
		7/12/2011	8/10/2011	£3,850.00		Newtownards
		10/7/2011	10/27/2011	£1,450.00		Newtownards
682	TB	8/25/2011	9/15/2011	£1,400.00	£1,400.00	Newtownards
683	TB	5/7/2011	5/24/2011	£900.00	£36,590.00	Newtownards
		9/8/2011	9/29/2011	£26,990.00		Newtownards
		9/8/2011	10/25/2011	£1,600.00		Newtownards
		9/8/2011	10/27/2011	£4,700.00		Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		11/10/2011	11/29/2011	£2,400.00		Newtownards
684	TB	1/20/2012	2/9/2012	£850.00	£850.00	Newtownards
685	TB	12/22/2011	2/2/2012	£3,850.00	£3,850.00	Newtownards
686	TB	2/11/2012	3/2/2012	£1,200.00	£1,200.00	Newtownards
687	TB	7/28/2011	8/15/2011	£5,000.00	£13,700.00	Newtownards
		10/20/2011	11/16/2011	£8,700.00		Newtownards
688	TB	3/29/2012	4/18/2012	£5,760.00	£5,760.00	Newtownards
689	TB	4/30/2011	5/19/2011	£4,520.00	£5,770.00	Newtownards
		11/24/2011	12/21/2011	£1,250.00		Newtownards
690	TB	3/9/2012	4/3/2012	£2,000.00	£2,000.00	Newtownards
691	TB	11/11/2011	12/12/2011	£3,800.00	£3,800.00	Newtownards
692	TB	8/26/2011	9/15/2011	£1,250.00	£1,250.00	Newtownards
693	TB	1/23/2012	2/9/2012	£1,450.00	£1,450.00	Newtownards
694	TB	1/12/2012	1/31/2012	£1,600.00	£1,600.00	Newtownards
695	TB	8/25/2011	9/15/2011	£3,300.00	£5,850.00	Newtownards
		11/18/2011	12/12/2011	£2,550.00		Newtownards
696	TB	11/17/2011	12/12/2011	£1,300.00	£1,300.00	Newtownards
697	TB	11/24/2011	12/21/2011	£5,300.00	£5,300.00	Newtownards
698	TB	8/18/2011	9/5/2011	£1,300.00	£1,300.00	Newtownards
699	TB	2/16/2012	3/6/2012	£1,500.00	£1,500.00	Newtownards
700	TB	10/14/2011	10/31/2011	£1,850.00	£3,600.00	Newtownards
		12/31/2011	1/18/2012	£1,750.00		Newtownards
701	TB	9/12/2011	10/11/2011	£1,125.00	£1,125.00	Newtownards
702	TB	11/18/2011	12/14/2011	£4,500.00	£13,400.00	Newtownards
		2/11/2012	3/6/2012	£8,900.00		Newtownards
703	TB	5/5/2011	5/24/2011	£82,380.00	£114,630.00	Newtownards
		5/5/2011	5/31/2011	£3,550.00		Newtownards
		7/7/2011	8/4/2011	£17,450.00		Newtownards
		9/8/2011	9/29/2011	£9,800.00		Newtownards
		9/8/2011	9/29/2011	£1,450.00		Newtownards
704	TB	8/27/2011	9/22/2011	£94,400.00	£94,400.00	Newtownards
705	TB	4/1/2011	5/3/2011	£2,850.00	£2,850.00	Newtownards
706	TB	1/23/2012	2/9/2012	£3,250.00	£3,250.00	Newtownards
707	TB	1/12/2012	2/15/2012	£1,400.00	£1,400.00	Newtownards
708	TB	8/11/2011	9/7/2011	£15,760.00	£42,240.00	Newtownards
		10/22/2011	11/22/2011	£26,480.00		Newtownards
709	TB	10/14/2011	10/28/2011	£4,000.00	£29,050.00	Newtownards
		10/14/2011	11/3/2011	£3,300.00		Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		2/3/2012	2/24/2012	£20,100.00		Newtownards
		2/13/2012	3/6/2012	£1,650.00		Newtownards
710	TB	6/17/2011	7/4/2011	£4,600.00	£6,080.00	Newtownards
		9/3/2011	9/29/2011	£1,480.00		Newtownards
711	TB	10/15/2011	11/7/2011	£1,275.00	£1,275.00	Newtownards
712	TB	1/6/2012	1/31/2012	£880.00	£880.00	Newtownards
713	TB	10/3/2011	10/19/2011	£1,000.00	£1,000.00	Newtownards
714	TB	4/15/2011	5/10/2011	£2,050.00	£2,050.00	Newtownards
715	TB	1/13/2012	2/9/2012	£1,100.00	£1,100.00	Newtownards
716	TB	7/30/2011	8/15/2011	£3,200.00	£15,855.00	Newtownards
		10/14/2011	11/7/2011	£9,305.00		Newtownards
		12/24/2011	1/31/2012	£3,350.00		Newtownards
717	TB	6/25/2011	7/29/2011	£5,050.00	£28,330.00	Newtownards
		8/27/2011	9/29/2011	£23,280.00		Newtownards
718	TB	10/6/2011	10/27/2011	£1,300.00	£1,300.00	Newtownards
719	TB	2/3/2012	2/24/2012	£2,900.00	£2,900.00	Newtownards
720	TB	8/22/2011	9/5/2011	£1,600.00	£1,600.00	Newtownards
721	TB	3/23/2012	4/11/2012	£1,600.00	£1,600.00	Newtownards
722	TB	9/16/2011	10/11/2011	£2,900.00	£2,900.00	Newtownards
723	TB	7/21/2011	8/10/2011	£1,050.00	£1,050.00	Newtownards
724	TB	12/8/2011	1/10/2012	£1,900.00	£1,900.00	Newtownards
725	TB	9/26/2011	10/19/2011	£280.00	£280.00	Newtownards
726	TB	9/1/2011	9/29/2011	£9,650.00	£9,650.00	Newtownards
727	TB	1/20/2012	2/9/2012	£2,010.00	£2,010.00	Newtownards
728	TB	6/16/2011	7/7/2011	£680.00	£680.00	Newtownards
729	TB	9/30/2011	10/21/2011	£1,600.00	£1,600.00	Newtownards
730	TB	3/31/2012	4/18/2012	£3,200.00	£3,200.00	Newtownards
731	TB	10/6/2011	10/27/2011	£3,350.00	£3,350.00	Newtownards
732	TB	10/21/2011	11/8/2011	£9,320.00	£29,370.00	Newtownards
		1/27/2012	2/21/2012	£17,450.00		Newtownards
		1/27/2012	3/12/2012	£2,600.00		Newtownards
733	TB	4/8/2011	7/15/2011	£5,000.00	£9,200.00	Newtownards
		8/26/2011	9/20/2011	£3,400.00		Newtownards
		8/26/2011	10/27/2011	£800.00		Newtownards
734	TB	1/19/2012	2/9/2012	£950.00	£950.00	Newtownards
735	TB	10/28/2011	11/21/2011	£4,530.00	£4,530.00	Newtownards
736	TB	4/21/2011	5/10/2011	£1,100.00	£1,100.00	Newtownards
737	TB	3/15/2012	4/11/2012	£5,200.00	£5,200.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
738	TB	6/9/2011	6/23/2011	£4,200.00	£5,900.00	Newtownards
		8/12/2011	9/5/2011	£1,700.00		Newtownards
739	TB	8/12/2011	9/6/2011	£64,250.00	£80,830.00	Newtownards
		10/14/2011	11/16/2011	£11,880.00		Newtownards
		12/16/2011	2/2/2012	£4,700.00		Newtownards
740	TB	9/10/2011	9/29/2011	£900.00	£2,250.00	Newtownards
		11/19/2011	12/12/2011	£1,350.00		Newtownards
741	TB	1/27/2012	2/13/2012	£3,350.00	£3,350.00	Newtownards
742	TB	5/23/2011	6/17/2011	£1,400.00	£7,850.00	Newtownards
		8/5/2011	8/24/2011	£6,450.00		Newtownards
743	TB	4/22/2011	5/19/2011	£11,900.00	£46,700.00	Newtownards
		7/1/2011	7/29/2011	£29,800.00		Newtownards
		7/1/2011	8/4/2011	£1,900.00		Newtownards
		3/1/2012	3/23/2012	£3,100.00		Newtownards
744	TB	1/26/2012	3/27/2012	£775.00	£775.00	Newtownards
745	TB	8/18/2011	9/20/2011	£56,400.00	£60,700.00	Newtownards
		12/1/2011	12/29/2011	£4,300.00		Newtownards
746	TB	7/18/2011	8/10/2011	£1,300.00	£1,300.00	Newtownards
747	TB	11/12/2011	12/21/2011	£5,150.00	£5,150.00	Newtownards
748	TB	9/28/2011	10/25/2011	£2,320.00	£2,320.00	Newtownards
749	TB	11/17/2011	12/12/2011	£1,100.00	£2,250.00	Newtownards
		2/23/2012	3/12/2012	£1,150.00		Newtownards
750	TB	4/29/2011	5/24/2011	£5,400.00	£5,400.00	Newtownards
751	TB	10/23/2011	11/21/2011	£19,050.00	£19,050.00	Newtownards
752	TB	4/23/2011	5/19/2011	£16,300.00	£46,580.00	Newtownards
		7/8/2011	8/10/2011	£12,350.00		Newtownards
		1/21/2012	2/13/2012	£12,330.00		Newtownards
		3/23/2012	4/24/2012	£5,600.00		Newtownards
753	TB	6/17/2011	7/8/2011	£6,050.00	£10,100.00	Newtownards
		10/27/2011	11/28/2011	£4,050.00		Newtownards
754	TB	10/6/2011	10/21/2011	£480.00	£480.00	Newtownards
755	TB	11/5/2011	11/29/2011	£8,440.00	£17,390.00	Newtownards
		12/7/2011	12/29/2011	£8,950.00		Newtownards
756	TB	6/16/2011	7/7/2011	£840.00	£840.00	Newtownards
757	TB	3/16/2012	4/18/2012	£1,900.00	£1,900.00	Newtownards
758	TB	4/22/2011	5/26/2011	£7,500.00	£10,050.00	Newtownards
		12/15/2011	1/10/2012	£2,550.00		Newtownards
759	TB	12/16/2011	1/18/2012	£1,750.00	£1,750.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
760	TB	8/22/2011	9/7/2011	£1,200.00	£1,200.00	Newtownards
761	TB	1/26/2012	3/2/2012	£15,050.00	£15,050.00	Newtownards
762	TB	10/13/2011	11/7/2011	£2,825.00	£2,825.00	Newtownards
763	TB	7/8/2011	7/29/2011	£16,550.00	£252,050.00	Newtownards
		10/28/2011	11/29/2011	£118,650.00		Newtownards
		12/31/2011	2/9/2012	£44,300.00		Newtownards
		12/31/2011	2/9/2012	£55,250.00		Newtownards
		12/31/2011	2/15/2012	£2,250.00		Newtownards
		12/31/2011	2/24/2012	£2,300.00		Newtownards
		3/8/2012	4/3/2012	£12,750.00		Newtownards
764	TB	5/28/2011	6/23/2011	£1,050.00	£1,050.00	Newtownards
765	TB	2/3/2012	2/28/2012	£1,180.00	£1,180.00	Newtownards
766	TB	12/3/2011	1/3/2012	£1,190.00	£1,190.00	Newtownards
767	TB	4/14/2011	5/10/2011	£600.00	£600.00	Newtownards
768	TB	12/1/2011	12/21/2011	£3,200.00	£39,925.00	Newtownards
		12/1/2011	1/17/2012	£5,425.00		Newtownards
		12/23/2011	1/23/2012	£25,100.00		Newtownards
		12/23/2011	1/25/2012	£800.00		Newtownards
		2/23/2012	3/12/2012	£5,400.00		Newtownards
769	TB	7/29/2011	8/24/2011	£100.00	£100.00	Newtownards
770	TB	4/16/2011	5/11/2011	£6,210.00	£6,210.00	Newtownards
771	TB	5/26/2011	7/29/2011	£925.00	£4,875.00	Newtownards
		10/27/2011	11/22/2011	£2,150.00		Newtownards
		1/28/2012	2/24/2012	£1,800.00		Newtownards
772	TB	8/13/2011	9/5/2011	£1,300.00	£3,120.00	Newtownards
		1/14/2012	2/9/2012	£1,820.00		Newtownards
773	TB	3/30/2012	4/23/2012	£1,800.00	£1,800.00	Newtownards
774	TB	3/1/2012	3/23/2012	£3,400.00	£3,400.00	Newtownards
775	TB	2/18/2012	3/6/2012	£950.00	£950.00	Newtownards
776	TB	11/18/2011	1/31/2012	£3,360.00	£5,260.00	Newtownards
		3/2/2012	3/23/2012	£1,900.00		Newtownards
777	TB	3/22/2012	4/11/2012	£1,150.00	£1,150.00	Newtownards
778	TB	5/13/2011	6/6/2011	£7,075.00	£9,975.00	Newtownards
		5/13/2011	6/8/2011	£650.00		Newtownards
		8/20/2011	9/28/2011	£2,250.00		Newtownards
779	TB	4/7/2011	5/3/2011	£735.00	£735.00	Newtownards
780	TB	7/22/2011	8/10/2011	£880.00	£880.00	Newtownards
781	TB	2/3/2012	3/2/2012	£2,050.00	£2,050.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
782	TB	11/10/2011	11/29/2011	£2,000.00	£2,000.00	Newtownards
783	TB	10/6/2011	10/27/2011	£5,200.00	£5,200.00	Newtownards
784	TB	1/12/2012	2/9/2012	£1,000.00	£1,000.00	Newtownards
785	TB	7/22/2011	8/10/2011	£7,000.00	£9,330.00	Newtownards
		11/4/2011	11/29/2011	£980.00		Newtownards
		1/28/2012	2/21/2012	£1,350.00		Newtownards
786	TB	10/28/2011	11/29/2011	£1,300.00	£1,300.00	Newtownards
787	TB	1/9/2012	1/31/2012	£850.00	£850.00	Newtownards
788	TB	1/20/2012	2/13/2012	£1,200.00	£1,200.00	Newtownards
789	TB	9/17/2011	10/13/2011	£1,100.00	£1,100.00	Newtownards
790	TB	7/14/2011	8/8/2011	£4,550.00	£4,550.00	Newtownards
791	TB	10/27/2011	11/23/2011	£4,720.00	£32,570.00	Newtownards
		10/27/2011	11/24/2011	£9,100.00		Newtownards
		12/30/2011	1/18/2012	£17,150.00		Newtownards
		12/30/2011	1/31/2012	£1,600.00		Newtownards
792	TB	11/25/2011	12/21/2011	£1,700.00	£1,700.00	Newtownards
793	TB	4/1/2011	4/21/2011	£775.00	£11,325.00	Newtownards
		10/28/2011	11/22/2011	£5,750.00		Newtownards
		1/27/2012	2/13/2012	£4,800.00		Newtownards
794	TB	6/6/2011	6/23/2011	£2,150.00	£3,550.00	Newtownards
		12/8/2011	1/18/2012	£1,400.00		Newtownards
795	TB	3/1/2012	4/3/2012	£22,950.00	£22,950.00	Newtownards
796	TB	11/11/2011	12/2/2011	£4,500.00	£17,400.00	Newtownards
		1/13/2012	2/9/2012	£12,900.00		Newtownards
797	TB	4/15/2011	5/10/2011	£1,600.00	£3,000.00	Newtownards
		9/29/2011	10/19/2011	£1,400.00		Newtownards
798	TB	9/3/2011	10/4/2011	£29,925.00	£45,145.00	Newtownards
		9/3/2011	10/11/2011	£3,750.00		Newtownards
		11/11/2011	12/2/2011	£11,470.00		Newtownards
799	TB	11/3/2011	11/28/2011	£1,150.00	£1,150.00	Newtownards
800	TB	8/18/2011	9/7/2011	£650.00	£4,725.00	Newtownards
		12/9/2011	1/10/2012	£4,075.00		Newtownards
801	TB	9/1/2011	9/28/2011	£1,650.00	£1,650.00	Newtownards
802	TB	2/2/2012	2/21/2012	£6,350.00	£6,350.00	Newtownards
803	TB	6/10/2011	7/1/2011	£850.00	£7,550.00	Newtownards
		12/24/2011	1/25/2012	£6,700.00		Newtownards
804	TB	1/20/2012	2/13/2012	£3,900.00	£3,900.00	Newtownards
805	TB	1/25/2012	3/27/2012	£600.00	£600.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
806	TB	12/22/2011	1/18/2012	£1,000.00	£1,000.00	Newtownards
807	TB	6/16/2011	7/7/2011	£2,195.00	£2,195.00	Newtownards
808	TB	11/24/2011	12/29/2011	£1,275.00	£1,275.00	Newtownards
809	TB	5/28/2011	6/23/2011	£3,850.00	£12,925.00	Newtownards
		8/6/2011	8/24/2011	£5,000.00		Newtownards
		10/8/2011	10/28/2011	£4,075.00		Newtownards
810	TB	4/14/2011	5/10/2011	£950.00	£950.00	Newtownards
811	TB	3/23/2012	4/11/2012	£4,400.00	£4,400.00	Newtownards
812	TB	5/14/2011	5/31/2011	£2,395.00	£5,520.00	Newtownards
		7/23/2011	8/15/2011	£2,050.00		Newtownards
		10/15/2011	11/3/2011	£1,075.00		Newtownards
813	TB	3/15/2012	4/3/2012	£1,180.00	£1,180.00	Newtownards
814	TB	11/5/2011	11/28/2011	£4,900.00	£4,900.00	Newtownards
815	TB	1/14/2012	1/31/2012	£2,300.00	£2,300.00	Newtownards
816	TB	12/16/2011	1/18/2012	£28,150.00	£36,050.00	Newtownards
		3/3/2012	4/3/2012	£7,900.00		Newtownards
817	TB	10/28/2011	11/22/2011	£12,200.00	£12,200.00	Newtownards
818	TB	9/15/2011	10/11/2011	£800.00	£800.00	Newtownards
819	TB	12/31/2011	1/31/2012	£5,450.00	£5,450.00	Newtownards
820	TB	11/14/2011	12/2/2011	£4,900.00	£12,700.00	Newtownards
		1/19/2012	2/9/2012	£7,800.00		Newtownards
821	TB	12/23/2011	1/18/2012	£2,300.00	£6,500.00	Newtownards
		3/9/2012	4/4/2012	£4,200.00		Newtownards
822	TB	5/28/2011	6/14/2011	£6,850.00	£9,270.00	Newtownards
		8/13/2011	9/5/2011	£600.00		Newtownards
		11/25/2011	12/21/2011	£1,820.00		Newtownards
823	TB	2/2/2012	2/24/2012	£1,200.00	£1,200.00	Newtownards
824	TB	11/4/2011	11/29/2011	£1,225.00	£3,650.00	Newtownards
		1/19/2012	2/13/2012	£2,425.00		Newtownards
825	TB	2/18/2012	3/6/2012	£1,200.00	£1,200.00	Newtownards
826	TB	1/20/2012	2/15/2012	£14,450.00	£15,800.00	Newtownards
		1/20/2012	2/24/2012	£1,350.00		Newtownards
827	TB	2/16/2012	3/6/2012	£2,000.00	£2,000.00	Newtownards
828	TB	8/26/2011	10/6/2011	£80,960.00	£99,660.00	Newtownards
		11/19/2011	12/14/2011	£18,700.00		Newtownards
829	TB	7/22/2011	8/10/2011	£1,000.00	£1,000.00	Newtownards
830	TB	11/3/2011	12/2/2011	£9,010.00	£9,010.00	Newtownards
831	TB	4/15/2011	5/10/2011	£900.00	£900.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
832	TB	3/31/2012	4/18/2012	£6,900.00	£6,900.00	Newtownards
833	TB	1/21/2012	2/15/2012	£6,300.00	£6,300.00	Newtownards
834	TB	6/16/2011	7/1/2011	£5,300.00	£24,430.00	Newtownards
		9/1/2011	10/13/2011	£17,730.00		Newtownards
		11/17/2011	12/14/2011	£1,400.00		Newtownards
835	TB	2/12/2012	3/27/2012	£9,375.00	£9,375.00	Newtownards
836	TB	2/4/2012	2/28/2012	£1,000.00	£1,000.00	Newtownards
837	TB	5/6/2011	5/26/2011	£400.00	£400.00	Newtownards
838	TB	11/12/2011	11/30/2011	£300.00	£300.00	Newtownards
839	TB	5/7/2011	7/4/2011	£6,800.00	£51,665.00	Newtownards
		7/11/2011	8/4/2011	£4,840.00		Newtownards
		7/11/2011	8/10/2011	£2,400.00		Newtownards
		9/16/2011	10/11/2011	£15,440.00		Newtownards
		9/16/2011	10/21/2011	£9,785.00		Newtownards
		1/6/2012	1/23/2012	£8,550.00		Newtownards
		3/8/2012	3/29/2012	£3,850.00		Newtownards
840	TB	9/16/2011	10/13/2011	£15,130.00	£15,130.00	Newtownards
841	TB	10/22/2011	11/21/2011	£13,350.00	£13,350.00	Newtownards
842	TB	11/24/2011	12/14/2011	£7,300.00	£7,300.00	Newtownards
843	TB	9/1/2011	9/26/2011	£9,500.00	£11,000.00	Newtownards
		12/10/2011	1/10/2012	£1,500.00		Newtownards
844	TB	10/22/2011	11/7/2011	£2,960.00	£2,960.00	Newtownards
845	TB	5/6/2011	5/26/2011	£1,200.00	£1,200.00	Newtownards
846	TB	1/6/2012	1/31/2012	£2,480.00	£2,480.00	Newtownards
847	TB	1/12/2012	1/31/2012	£1,200.00	£1,200.00	Newtownards
848	TB	3/1/2012	3/23/2012	£6,450.00	£6,450.00	Newtownards
849	TB	2/4/2012	2/21/2012	£1,350.00	£1,350.00	Newtownards
850	TB	1/6/2012	1/31/2012	£5,650.00	£5,650.00	Newtownards
851	TB	2/23/2012	3/14/2012	£14,130.00	£14,130.00	Newtownards
852	TB	8/8/2011	8/24/2011	£7,500.00	£10,500.00	Newtownards
		10/7/2011	10/28/2011	£3,000.00		Newtownards
853	TB	11/10/2011	11/29/2011	£3,500.00	£3,500.00	Newtownards
854	TB	3/26/2012	4/11/2012	£6,350.00	£6,350.00	Newtownards
855	TB	7/8/2011	8/10/2011	£5,900.00	£5,900.00	Newtownards
856	TB	1/6/2012	1/31/2012	£9,750.00	£10,050.00	Newtownards
		1/6/2012	2/23/2012	£300.00		Newtownards
857	TB	4/22/2011	5/19/2011	£1,400.00	£42,630.00	Newtownards
		6/25/2011	7/7/2011	£9,480.00		Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		8/25/2011	9/28/2011	£27,550.00		Newtownards
		8/25/2011	10/19/2011	£2,000.00		Newtownards
		10/20/2011	11/8/2011	£2,200.00		Newtownards
858	TB	6/3/2011	6/23/2011	£750.00	£750.00	Newtownards
859	TB	6/2/2011	6/23/2011	£4,230.00	£4,230.00	Newtownards
860	TB	8/11/2011	9/5/2011	£1,350.00	£1,350.00	Newtownards
861	TB	7/22/2011	8/10/2011	£3,240.00	£3,240.00	Newtownards
862	TB	11/18/2011	12/14/2011	£2,000.00	£2,000.00	Newtownards
863	TB	1/21/2012	2/15/2012	£7,700.00	£7,700.00	Newtownards
864	TB	4/15/2011	5/10/2011	£2,600.00	£2,600.00	Newtownards
865	TB	7/8/2011	7/29/2011	£540.00	£540.00	Newtownards
866	TB	4/9/2011	5/10/2011	£5,650.00	£14,250.00	Newtownards
		12/2/2011	12/21/2011	£6,700.00		Newtownards
		12/2/2011	1/17/2012	£1,900.00		Newtownards
867	TB	5/7/2011	5/26/2011	£1,930.00	£6,650.00	Newtownards
		5/7/2011	6/6/2011	£1,070.00		Newtownards
		8/20/2011	9/7/2011	£1,200.00		Newtownards
		11/26/2011	12/29/2011	£2,450.00		Newtownards
868	TB	9/22/2011	10/19/2011	£13,050.00	£13,050.00	Newtownards
869	TB	3/29/2012	4/18/2012	£2,200.00	£4,400.00	Newtownards
		3/29/2012	5/3/2012	£2,200.00		Newtownards
870	TB	2/3/2012	2/24/2012	£5,950.00	£5,950.00	Newtownards
871	TB	6/30/2011	7/29/2011	£650.00	£4,250.00	Newtownards
		11/11/2011	12/2/2011	£3,600.00		Newtownards
872	TB	3/23/2012	4/11/2012	£550.00	£550.00	Newtownards
873	TB	9/26/2011	10/13/2011	£200.00	£200.00	Newtownards
874	TB	1/21/2012	2/21/2012	£4,800.00	£16,880.00	Newtownards
		3/22/2012	4/4/2012	£10,880.00		Newtownards
		3/22/2012	4/11/2012	£1,200.00		Newtownards
875	TB	12/13/2011	1/31/2012	£1,900.00	£1,900.00	Newtownards
876	TB	7/26/2011	8/10/2011	£2,200.00	£9,800.00	Newtownards
		3/15/2012	4/11/2012	£7,600.00		Newtownards
877	TB	3/24/2012	4/11/2012	£1,300.00	£1,300.00	Newtownards
878	TB	4/23/2011	5/24/2011	£3,025.00	£5,750.00	Newtownards
		7/9/2011	8/15/2011	£2,725.00		Newtownards
879	TB	3/2/2012	3/23/2012	£98,600.00	£98,600.00	Newtownards
880	TB	4/16/2011	5/17/2011	£2,350.00	£2,350.00	Newtownards
881	TB	12/10/2011	1/10/2012	£5,100.00	£5,100.00	Newtownards

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
882	TB	9/17/2011	10/13/2011	£1,900.00	£1,900.00	Newtownards
883	TB	7/22/2011	8/10/2011	£1,900.00	£1,900.00	Newtownards
884	TB	4/8/2011	5/3/2011	£1,280.00	£1,280.00	Newtownards
885	TB	4/21/2011	5/17/2011	£3,900.00	£6,400.00	Newtownards
		4/21/2011	7/29/2011	£2,500.00		Newtownards
886	TB	11/17/2011	12/14/2011	£3,800.00	£10,770.00	Newtownards
		2/2/2012	2/28/2012	£6,970.00		Newtownards
887	TB	7/14/2011	8/10/2011	£1,150.00	£1,150.00	Newtownards
888	TB	4/7/2011	5/9/2011	£500.00	£500.00	Newtownards
889	TB	8/1/2011	9/5/2011	£1,000.00	£11,600.00	Newtownards
		10/8/2011	10/25/2011	£3,800.00		Newtownards
		12/17/2011	1/18/2012	£6,800.00		Newtownards
890	TB	5/27/2011	6/23/2011	£17,350.00	£17,350.00	Newtownards
891	TB	7/9/2011	8/4/2011	£1,250.00	£2,350.00	Newtownards
		9/10/2011	9/29/2011	£1,100.00		Newtownards
892	TB	4/14/2011	5/11/2011	£2,500.00	£5,125.00	Newtownards
		5/6/2011	5/26/2011	£2,625.00		Newtownards
893	TB	7/7/2011	7/29/2011	£900.00	£900.00	Newtownards
894	TB	3/24/2012	4/18/2012	£2,250.00	£2,250.00	Newtownards
895	TB	5/20/2011	6/23/2011	£2,775.00	£2,775.00	Newtownards
896	TB	1/14/2012	2/9/2012	£2,600.00	£2,600.00	Newtownards
897	TB	4/1/2011	5/9/2011	£5,750.00	£16,800.00	Newtownards
		4/1/2011	5/19/2011	£1,450.00		Newtownards
		6/3/2011	6/23/2011	£1,400.00		Newtownards
		6/3/2011	7/7/2011	£8,200.00		Newtownards
898	TB	4/21/2011	5/31/2011	£9,200.00	£26,650.00	Newtownards
		7/14/2011	9/20/2011	£8,950.00		Newtownards
		12/1/2011	1/10/2012	£8,500.00		Newtownards
899	TB	11/24/2011	12/29/2011	£950.00	£950.00	Newtownards
900	TB	7/14/2011	8/10/2011	£5,800.00	£9,600.00	Newtownards
		2/9/2012	2/28/2012	£3,800.00		Newtownards
901	TB	1/12/2012	2/9/2012	£1,600.00	£1,600.00	Newtownards
902	TB	11/18/2011	12/14/2011	£1,120.00	£1,120.00	Newtownards
903	TB	3/29/2012	4/18/2012	£980.00	£980.00	Newtownards
904	TB	1/14/2012	2/13/2012	£2,950.00	£2,950.00	Newtownards
905	TB	3/2/2012	3/23/2012	£1,300.00	£1,300.00	Newry
906	TB	6/30/2011	8/4/2011	£1,550.00	£1,550.00	Newry
907	TB	1/26/2012	2/15/2012	£1,800.00	£1,800.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
908	TB	5/12/2011	6/6/2011	£1,200.00	£1,200.00	Newry
909	TB	2/9/2012	2/28/2012	£750.00	£750.00	Newry
910	TB	4/21/2011	5/24/2011	£1,600.00	£2,600.00	Newry
		11/10/2011	12/12/2011	£1,000.00		Newry
911	TB	9/30/2011	10/27/2011	£4,800.00	£4,800.00	Newry
912	TB	2/2/2012	2/28/2012	£1,000.00	£1,000.00	Newry
913	TB	3/15/2012	4/4/2012	£1,150.00	£1,150.00	Newry
914	TB	9/2/2011	9/28/2011	£1,600.00	£1,600.00	Newry
915	TB	3/9/2012	3/29/2012	£2,500.00	£2,500.00	Newry
916	TB	3/1/2012	3/23/2012	£1,100.00	£1,100.00	Newry
917	TB	4/14/2011	5/3/2011	£800.00	£800.00	Newry
918	TB	3/29/2012	4/18/2012	£1,040.00	£1,040.00	Newry
919	TB	7/28/2011	8/24/2011	£960.00	£960.00	Newry
920	TB	3/15/2012	4/11/2012	£2,950.00	£2,950.00	Newry
921	TB	11/3/2011	11/29/2011	£6,280.00	£6,280.00	Newry
922	TB	7/21/2011	8/12/2011	£1,100.00	£1,100.00	Newry
923	TB	11/3/2011	11/29/2011	£1,000.00	£1,000.00	Newry
924	TB	1/12/2012	2/9/2012	£5,350.00	£5,350.00	Newry
925	TB	10/13/2011	10/28/2011	£500.00	£500.00	Newry
926	TB	1/26/2012	3/23/2012	£750.00	£750.00	Newry
927	TB	7/9/2011	8/4/2011	£950.00	£950.00	Newry
928	TB	6/4/2011	6/23/2011	£11,500.00	£11,500.00	Newry
929	TB	4/23/2011	5/17/2011	£2,800.00	£14,625.00	Newry
		6/25/2011	7/29/2011	£950.00		Newry
		8/20/2011	9/15/2011	£975.00		Newry
		10/20/2011	11/8/2011	£4,700.00		Newry
		1/4/2012	1/31/2012	£5,200.00		Newry
930	TB	9/23/2011	10/19/2011	£1,380.00	£3,480.00	Newry
		1/27/2012	2/28/2012	£2,100.00		Newry
931	TB	7/28/2011	8/17/2011	£19,910.00	£88,130.00	Newry
		11/10/2011	12/12/2011	£63,520.00		Newry
		11/10/2011	12/21/2011	£1,900.00		Newry
		2/16/2012	3/9/2012	£2,800.00		Newry
932	TB	5/31/2011	6/14/2011	£1,180.00	£1,180.00	Newry
933	TB	10/13/2011	11/8/2011	£1,930.00	£10,880.00	Newry
		12/23/2011	1/31/2012	£8,200.00		Newry
		2/27/2012	3/14/2012	£750.00		Newry
934	TB	8/25/2011	9/15/2011	£5,230.00	£5,230.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
935	TB	7/1/2011	7/29/2011	£800.00	£2,180.00	Newry
		9/3/2011	9/28/2011	£1,380.00		Newry
936	TB	7/2/2011	7/21/2011	£4,250.00	£15,730.00	Newry
		9/12/2011	10/6/2011	£11,480.00		Newry
937	TB	9/8/2011	9/29/2011	£1,000.00	£1,000.00	Newry
938	TB	9/30/2011	10/28/2011	£575.00	£575.00	Newry
939	TB	12/10/2011	1/9/2012	£7,280.00	£10,150.00	Newry
		2/22/2012	3/12/2012	£2,870.00		Newry
940	TB	4/14/2011	5/9/2011	£2,600.00	£2,600.00	Newry
941	TB	5/21/2011	6/14/2011	£3,690.00	£9,270.00	Newry
		9/24/2011	10/21/2011	£1,700.00		Newry
		12/3/2011	1/11/2012	£3,880.00		Newry
942	TB	12/1/2011	12/29/2011	£1,000.00	£1,000.00	Newry
943	TB	1/20/2012	2/6/2012	£6,050.00	£6,050.00	Newry
944	TB	3/16/2012	4/11/2012	£5,600.00	£5,600.00	Newry
945	TB	5/19/2011	6/8/2011	£2,600.00	£2,600.00	Newry
946	TB	11/18/2011	12/12/2011	£3,000.00	£3,000.00	Newry
947	TB	2/9/2012	3/6/2012	£1,350.00	£1,350.00	Newry
948	TB	10/28/2011	11/21/2011	£2,700.00	£22,100.00	Newry
		2/18/2012	3/12/2012	£19,400.00		Newry
949	TB	4/6/2011	5/3/2011	£1,780.00	£1,780.00	Newry
950	TB	12/16/2011	1/18/2012	£12,780.00	£12,780.00	Newry
951	TB	3/8/2012	4/11/2012	£1,000.00	£1,000.00	Newry
952	TB	10/8/2011	11/3/2011	£6,860.00	£9,860.00	Newry
		1/7/2012	1/31/2012	£3,000.00		Newry
953	TB	3/15/2012	4/11/2012	£1,300.00	£1,300.00	Newry
954	TB	7/29/2011	8/17/2011	£2,250.00	£2,250.00	Newry
955	TB	12/23/2011	2/1/2012	£2,780.00	£2,780.00	Newry
956	TB	10/20/2011	11/16/2011	£970.00	£3,170.00	Newry
		2/11/2012	3/6/2012	£2,200.00		Newry
957	TB	4/2/2011	5/3/2011	£1,300.00	£1,300.00	Newry
958	TB	2/3/2012	3/2/2012	£2,750.00	£2,750.00	Newry
959	TB	3/30/2012	4/18/2012	£750.00	£750.00	Newry
960	TB	1/6/2012	1/31/2012	£1,450.00	£1,450.00	Newry
961	TB	2/22/2012	3/12/2012	£730.00	£730.00	Newry
962	TB	1/27/2012	2/15/2012	£1,050.00	£1,050.00	Newry
963	TB	3/23/2012	4/18/2012	£5,360.00	£5,360.00	Newry
964	TB	1/6/2012	1/31/2012	£925.00	£925.00	Newry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
965	TB	3/1/2012	4/3/2012	£10,400.00	£11,650.00	Newry
		3/1/2012	4/11/2012	£1,250.00		Newry
966	TB	9/30/2011	10/31/2011	£1,050.00	£1,050.00	Newry
967	TB	8/13/2011	9/5/2011	£8,710.00	£17,420.00	Newry
		8/18/2011	9/5/2011	£8,710.00		Newry
968	TB	3/1/2012	3/27/2012	£1,550.00	£1,550.00	Enniskillen
969	TB	1/6/2012	2/2/2012	£6,380.00	£6,380.00	Enniskillen
970	TB	3/9/2012	4/3/2012	£6,800.00	£6,800.00	Enniskillen
971	TB	2/11/2012	3/6/2012	£6,000.00	£6,000.00	Enniskillen
972	TB	8/26/2011	9/15/2011	£13,400.00	£15,700.00	Enniskillen
		8/26/2011	9/29/2011	£2,300.00		Enniskillen
973	TB	10/20/2011	11/16/2011	£1,300.00	£1,300.00	Enniskillen
974	TB	1/12/2012	2/13/2012	£1,350.00	£1,350.00	Enniskillen
975	TB	4/8/2011	5/10/2011	£13,805.00	£14,055.00	Enniskillen
		4/8/2011	5/17/2011	£250.00		Enniskillen
976	TB	3/30/2012	4/23/2012	£27,050.00	£27,050.00	Enniskillen
977	TB	9/16/2011	10/11/2011	£3,250.00	£3,250.00	Enniskillen
978	TB	11/17/2011	12/21/2011	£3,600.00	£3,600.00	Enniskillen
979	TB	11/17/2011	12/14/2011	£2,250.00	£2,250.00	Enniskillen
980	TB	4/8/2011	5/3/2011	£900.00	£2,840.00	Enniskillen
		6/10/2011	7/1/2011	£980.00		Enniskillen
		8/20/2011	9/28/2011	£960.00		Enniskillen
981	TB	10/7/2011	10/25/2011	£12,100.00	£12,100.00	Enniskillen
982	TB	1/27/2012	2/24/2012	£3,350.00	£3,350.00	Enniskillen
983	TB	2/18/2012	3/9/2012	£1,200.00	£1,200.00	Enniskillen
984	TB	11/18/2011	12/29/2011	£10,450.00	£10,450.00	Enniskillen
985	TB	10/21/2011	11/16/2011	£1,150.00	£1,150.00	Enniskillen
986	TB	11/10/2011	11/23/2011	£500.00	£500.00	Enniskillen
987	TB	7/1/2011	7/21/2011	£750.00	£750.00	Enniskillen
988	TB	2/9/2012	3/9/2012	£1,350.00	£1,350.00	Enniskillen
989	TB	9/26/2011	10/19/2011	£900.00	£900.00	Enniskillen
990	TB	4/4/2011	4/21/2011	£2,400.00	£2,400.00	Enniskillen
991	TB	1/13/2012	2/13/2012	£1,400.00	£1,400.00	Enniskillen
992	TB	3/18/2012	4/3/2012	£2,000.00	£2,000.00	Enniskillen
993	TB	5/19/2011	6/8/2011	£2,150.00	£2,150.00	Enniskillen
994	TB	5/20/2011	6/8/2011	£1,100.00	£8,790.00	Enniskillen
		7/28/2011	8/15/2011	£1,475.00		Enniskillen
		10/6/2011	10/25/2011	£2,050.00		Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		1/7/2012	2/2/2012	£825.00		Enniskillen
		3/8/2012	3/29/2012	£600.00		Enniskillen
		3/8/2012	4/3/2012	£2,740.00		Enniskillen
995	TB	12/1/2011	1/3/2012	£17,810.00	£33,260.00	Enniskillen
		2/16/2012	3/14/2012	£15,450.00		Enniskillen
996	TB	4/15/2011	5/11/2011	£6,980.00	£11,890.00	Enniskillen
		7/22/2011	8/10/2011	£1,800.00		Enniskillen
		11/17/2011	12/12/2011	£3,110.00		Enniskillen
997	TB	10/28/2011	11/23/2011	£11,850.00	£32,350.00	Enniskillen
		1/13/2012	2/15/2012	£19,350.00		Enniskillen
		1/13/2012	2/24/2012	£1,150.00		Enniskillen
998	TB	11/21/2011	12/14/2011	£1,725.00	£1,725.00	Enniskillen
999	TB	11/5/2011	11/29/2011	£3,000.00	£3,000.00	Enniskillen
1000	TB	2/3/2012	2/24/2012	£1,800.00	£1,800.00	Enniskillen
1001	TB	1/19/2012	2/13/2012	£3,925.00	£3,925.00	Enniskillen
1002	TB	12/2/2011	12/21/2011	£2,700.00	£2,700.00	Enniskillen
1003	TB	9/12/2011	9/29/2011	£4,200.00	£4,200.00	Enniskillen
1004	TB	9/8/2011	10/4/2011	£900.00	£900.00	Enniskillen
1005	TB	4/29/2011	5/17/2011	£2,900.00	£14,550.00	Enniskillen
		7/8/2011	9/15/2011	£1,700.00		Enniskillen
		11/3/2011	12/12/2011	£8,400.00		Enniskillen
		1/26/2012	2/28/2012	£1,550.00		Enniskillen
1006	TB	7/29/2011	8/15/2011	£2,500.00	£4,175.00	Enniskillen
		10/8/2011	10/27/2011	£425.00		Enniskillen
		12/23/2011	2/2/2012	£1,250.00		Enniskillen
1007	TB	11/3/2011	11/29/2011	£1,750.00	£1,750.00	Enniskillen
1008	TB	12/16/2011	1/10/2012	£950.00	£2,080.00	Enniskillen
		2/18/2012	3/12/2012	£1,130.00		Enniskillen
1009	TB	7/1/2011	7/21/2011	£900.00	£900.00	Enniskillen
1010	TB	12/16/2011	1/25/2012	£1,250.00	£1,250.00	Enniskillen
1011	TB	3/8/2012	4/3/2012	£4,000.00	£6,900.00	Enniskillen
		3/8/2012	5/17/2012	£2,900.00		Enniskillen
1012	TB	2/4/2012	2/24/2012	£820.00	£820.00	Enniskillen
1013	TB	9/1/2011	9/28/2011	£1,430.00	£1,430.00	Enniskillen
1014	TB	11/4/2011	11/23/2011	£1,025.00	£1,025.00	Enniskillen
1015	TB	4/14/2011	5/11/2011	£7,850.00	£7,850.00	Enniskillen
1016	TB	11/1/2011	11/23/2011	£800.00	£800.00	Enniskillen
1017	TB	7/22/2011	8/10/2011	£850.00	£7,325.00	Enniskillen

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		9/22/2011	10/19/2011	£6,475.00		Enniskillen
1018	TB	1/26/2012	2/13/2012	£1,200.00	£1,200.00	Enniskillen
1019	TB	1/26/2012	2/24/2012	£950.00	£950.00	Enniskillen
1020	TB	5/19/2011	6/8/2011	£2,180.00	£2,180.00	Enniskillen
1021	TB	7/28/2011	8/24/2011	£17,470.00	£21,990.00	Enniskillen
		10/6/2011	10/25/2011	£4,520.00		Enniskillen
1022	TB	12/15/2011	1/10/2012	£2,900.00	£2,900.00	Enniskillen
1023	TB	1/6/2012	2/2/2012	£700.00	£700.00	Enniskillen
1024	TB	12/15/2011	1/10/2012	£7,000.00	£11,180.00	Enniskillen
		2/17/2012	3/12/2012	£4,180.00		Enniskillen
1025	TB	9/16/2011	10/4/2011	£1,250.00	£3,850.00	Enniskillen
		11/24/2011	12/21/2011	£2,600.00		Enniskillen
1026	TB	7/14/2011	8/10/2011	£4,450.00	£5,450.00	Enniskillen
		3/22/2012	4/18/2012	£1,000.00		Enniskillen
1027	TB	7/21/2011	8/15/2011	£4,925.00	£17,200.00	Enniskillen
		11/24/2011	12/21/2011	£7,100.00		Enniskillen
		1/28/2012	2/28/2012	£5,175.00		Enniskillen
1028	TB	7/1/2011	7/18/2011	£19,970.00	£19,970.00	Enniskillen
1029	TB	5/27/2011	6/14/2011	£4,950.00	£14,150.00	Enniskillen
		8/12/2011	9/5/2011	£3,700.00		Enniskillen
		10/14/2011	11/16/2011	£800.00		Enniskillen
		12/15/2011	1/18/2012	£4,700.00		Enniskillen
1030	TB	6/27/2011	7/18/2011	£4,070.00	£6,710.00	Enniskillen
		9/5/2011	9/29/2011	£2,640.00		Enniskillen
1031	TB	6/3/2011	7/1/2011	£1,250.00	£4,200.00	Enniskillen
		9/1/2011	9/15/2011	£2,950.00		Enniskillen
1032	TB	2/17/2012	3/12/2012	£2,010.00	£2,010.00	Enniskillen
1033	TB	12/19/2011	1/18/2012	£7,275.00	£14,545.00	Enniskillen
		2/23/2012	3/14/2012	£7,170.00		Enniskillen
		2/23/2012	4/4/2012	£100.00		Enniskillen
1034	TB	10/7/2011	11/3/2011	£3,200.00	£7,300.00	Enniskillen
		12/10/2011	1/10/2012	£4,100.00		Enniskillen
1035	TB	9/23/2011	10/25/2011	£1,400.00	£1,400.00	Enniskillen
1036	TB	12/9/2011	1/10/2012	£2,100.00	£2,100.00	Enniskillen
1037	TB	10/9/2011	11/16/2011	£1,300.00	£1,300.00	Enniskillen
1038	TB	12/15/2011	1/10/2012	£11,750.00	£15,890.00	Enniskillen
		2/18/2012	3/14/2012	£4,140.00		Enniskillen
1039	TB	9/23/2011	10/19/2011	£2,000.00	£2,000.00	Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1040	TB	7/29/2011	8/22/2011	£1,500.00	£2,470.00	Enniskillen
		12/23/2011	2/2/2012	£970.00		Enniskillen
1041	TB	1/12/2012	2/9/2012	£33,375.00	£62,845.00	Enniskillen
		3/23/2012	4/18/2012	£29,470.00		Enniskillen
1042	TB	11/17/2011	12/12/2011	£4,675.00	£14,085.00	Enniskillen
		1/19/2012	2/15/2012	£9,410.00		Enniskillen
1043	TB	2/24/2012	3/20/2012	£7,700.00	£7,700.00	Enniskillen
1044	TB	5/21/2011	6/8/2011	£1,400.00	£1,400.00	Enniskillen
1045	TB	1/27/2012	2/24/2012	£1,060.00	£1,060.00	Enniskillen
1046	TB	6/2/2011	6/24/2011	£10,900.00	£10,900.00	Enniskillen
1047	TB	1/27/2012	2/24/2012	£8,400.00	£8,400.00	Enniskillen
1048	TB	11/11/2011	12/12/2011	£2,600.00	£2,600.00	Enniskillen
1049	TB	2/9/2012	3/6/2012	£925.00	£925.00	Enniskillen
1050	TB	10/28/2011	11/22/2011	£4,500.00	£7,400.00	Enniskillen
		1/12/2012	2/13/2012	£2,900.00		Enniskillen
1051	TB	9/15/2011	10/4/2011	£2,800.00	£2,800.00	Enniskillen
1052	TB	2/9/2012	3/6/2012	£1,480.00	£1,480.00	Enniskillen
1053	TB	1/13/2012	2/9/2012	£2,100.00	£2,100.00	Enniskillen
1054	TB	4/8/2011	5/9/2011	£24,500.00	£27,500.00	Enniskillen
		4/8/2011	5/10/2011	£3,000.00		Enniskillen
1055	TB	1/20/2012	2/28/2012	£1,200.00	£1,200.00	Enniskillen
1056	TB	12/1/2011	12/21/2011	£2,000.00	£3,200.00	Enniskillen
		2/2/2012	3/6/2012	£1,200.00		Enniskillen
1057	TB	10/7/2011	10/27/2011	£1,725.00	£12,975.00	Enniskillen
		12/23/2011	1/18/2012	£4,500.00		Enniskillen
		3/2/2012	3/20/2012	£6,750.00		Enniskillen
1058	TB	2/2/2012	2/24/2012	£2,100.00	£2,100.00	Enniskillen
1059	TB	2/23/2012	3/14/2012	£800.00	£800.00	Enniskillen
1060	TB	5/6/2011	5/24/2011	£800.00	£800.00	Enniskillen
1061	TB	2/24/2012	3/20/2012	£3,300.00	£3,300.00	Enniskillen
1062	TB	12/23/2011	1/25/2012	£19,765.00	£27,125.00	Enniskillen
		3/10/2012	4/3/2012	£7,360.00		Enniskillen
1063	TB	1/26/2012	2/24/2012	£3,500.00	£3,500.00	Enniskillen
1064	TB	12/15/2011	1/10/2012	£4,800.00	£4,800.00	Enniskillen
1065	TB	6/27/2011	7/21/2011	£12,345.00	£21,930.00	Enniskillen
		9/5/2011	10/13/2011	£9,585.00		Enniskillen
1066	TB	6/27/2011	7/18/2011	£9,455.00	£14,170.00	Enniskillen
		9/5/2011	9/29/2011	£4,715.00		Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1067	TB	9/8/2011	10/4/2011	£5,000.00	£5,000.00	Enniskillen
1068	TB	9/26/2011	10/19/2011	£4,000.00	£4,000.00	Enniskillen
1069	TB	5/26/2011	6/14/2011	£1,200.00	£4,000.00	Enniskillen
		8/12/2011	9/5/2011	£2,800.00		Enniskillen
1070	TB	1/23/2012	2/28/2012	£1,300.00	£1,300.00	Enniskillen
1071	TB	1/13/2012	2/15/2012	£1,200.00	£1,200.00	Enniskillen
1072	TB	12/2/2011	12/29/2011	£1,200.00	£1,200.00	Enniskillen
1073	TB	12/2/2011	12/21/2011	£1,200.00	£1,200.00	Enniskillen
1074	TB	2/3/2012	2/28/2012	£3,450.00	£3,450.00	Enniskillen
1075	TB	2/2/2012	4/3/2012	£3,200.00	£4,550.00	Enniskillen
		2/2/2012	4/11/2012	£1,350.00		Enniskillen
1076	TB	2/11/2012	3/20/2012	£4,280.00	£4,280.00	Enniskillen
1077	TB	4/22/2011	5/26/2011	£1,100.00	£1,100.00	Enniskillen
1078	TB	11/25/2011	12/21/2011	£1,250.00	£1,250.00	Enniskillen
1079	TB	4/21/2011	5/19/2011	£3,200.00	£27,400.00	Enniskillen
		7/21/2011	8/10/2011	£5,100.00		Enniskillen
		11/10/2011	11/29/2011	£12,350.00		Enniskillen
		1/19/2012	2/13/2012	£6,750.00		Enniskillen
1080	TB	4/15/2011	5/11/2011	£6,250.00	£17,900.00	Enniskillen
		6/17/2011	7/1/2011	£10,900.00		Enniskillen
		8/25/2011	9/28/2011	£750.00		Enniskillen
1081	TB	3/16/2012	4/11/2012	£2,700.00	£2,700.00	Enniskillen
1082	TB	3/16/2012	4/3/2012	£850.00	£850.00	Enniskillen
1083	TB	4/21/2011	5/11/2011	£4,200.00	£4,200.00	Enniskillen
1084	TB	12/16/2011	1/10/2012	£900.00	£900.00	Enniskillen
1085	TB	9/15/2011	10/21/2011	£900.00	£900.00	Enniskillen
1086	TB	3/29/2012	4/18/2012	£1,250.00	£1,250.00	Enniskillen
1087	TB	10/14/2011	1/3/2012	£300.00	£300.00	Enniskillen
1088	TB	6/3/2011	6/24/2011	£1,800.00	£1,800.00	Enniskillen
1089	TB	12/2/2011	1/10/2012	£9,400.00	£9,400.00	Enniskillen
1090	TB	8/26/2011	9/28/2011	£900.00	£1,850.00	Enniskillen
		12/16/2011	1/10/2012	£950.00		Enniskillen
1091	TB	12/2/2011	1/3/2012	£4,500.00	£5,800.00	Enniskillen
		12/2/2011	1/10/2012	£1,300.00		Enniskillen
1092	TB	11/7/2011	11/29/2011	£3,500.00	£3,500.00	Enniskillen
1093	TB	11/4/2011	11/23/2011	£1,250.00	£1,250.00	Enniskillen
1094	TB	1/19/2012	5/17/2012	£1,625.00	£1,625.00	Enniskillen
1095	TB	6/16/2011	7/29/2011	£800.00	£800.00	Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1096	TB	9/15/2011	10/6/2011	£1,300.00	£1,300.00	Enniskillen
1097	TB	1/13/2012	2/13/2012	£1,200.00	£1,200.00	Enniskillen
1098	TB	3/9/2012	4/4/2012	£1,000.00	£1,000.00	Enniskillen
1099	TB	1/13/2012	2/13/2012	£2,100.00	£2,100.00	Enniskillen
1100	TB	5/6/2011	5/26/2011	£2,200.00	£2,200.00	Enniskillen
1101	TB	1/27/2012	2/13/2012	£2,400.00	£2,400.00	Enniskillen
1102	TB	2/24/2012	3/20/2012	£1,250.00	£1,250.00	Enniskillen
1103	TB	10/14/2011	11/23/2011	£1,150.00	£3,950.00	Enniskillen
		12/16/2011	1/10/2012	£1,800.00		Enniskillen
		12/16/2011	2/9/2012	£1,000.00		Enniskillen
1104	TB	12/2/2011	1/10/2012	£4,600.00	£4,600.00	Enniskillen
1105	TB	8/11/2011	9/5/2011	£1,400.00	£1,400.00	Enniskillen
1106	TB	2/24/2012	3/20/2012	£3,850.00	£3,850.00	Enniskillen
1107	TB	5/20/2011	6/14/2011	£1,225.00	£1,225.00	Enniskillen
1108	TB	4/21/2011	5/17/2011	£2,780.00	£2,780.00	Enniskillen
1109	TB	12/16/2011	1/10/2012	£2,200.00	£4,650.00	Enniskillen
		2/16/2012	3/6/2012	£2,450.00		Enniskillen
1110	TB	12/23/2011	1/17/2012	£650.00	£650.00	Enniskillen
1111	TB	11/11/2011	12/12/2011	£1,650.00	£1,650.00	Enniskillen
1112	TB	7/1/2011	7/18/2011	£4,155.00	£4,155.00	Enniskillen
1113	TB	9/30/2011	11/7/2011	£6,600.00	£8,800.00	Enniskillen
		9/30/2011	11/16/2011	£2,200.00		Enniskillen
1114	TB	10/21/2011	11/22/2011	£1,350.00	£20,790.00	Enniskillen
		1/5/2012	2/2/2012	£17,560.00		Enniskillen
		3/23/2012	4/18/2012	£1,880.00		Enniskillen
1115	TB	9/8/2011	10/4/2011	£34,300.00	£34,300.00	Enniskillen
1116	TB	4/1/2011	4/21/2011	£1,680.00	£1,680.00	Enniskillen
1117	TB	4/23/2011	5/17/2011	£4,000.00	£13,975.00	Enniskillen
		7/22/2011	8/17/2011	£7,075.00		Enniskillen
		10/20/2011	11/8/2011	£2,900.00		Enniskillen
1118	TB	12/16/2011	1/17/2012	£1,675.00	£1,675.00	Enniskillen
1119	TB	2/10/2012	3/6/2012	£2,400.00	£2,400.00	Enniskillen
1120	TB	6/17/2011	7/4/2011	£2,000.00	£2,000.00	Enniskillen
1121	TB	4/28/2011	5/17/2011	£1,400.00	£1,400.00	Enniskillen
1122	TB	1/7/2012	2/13/2012	£15,175.00	£15,175.00	Enniskillen
1123	TB	4/29/2011	5/17/2011	£2,600.00	£2,600.00	Enniskillen
1124	TB	12/23/2011	1/17/2012	£700.00	£40,900.00	Enniskillen
		2/24/2012	3/14/2012	£33,400.00		Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		2/24/2012	3/29/2012	£6,800.00		Enniskillen
1125	TB	1/9/2012	2/2/2012	£1,450.00	£1,450.00	Enniskillen
1126	TB	12/15/2011	1/10/2012	£3,700.00	£9,380.00	Enniskillen
		12/15/2011	1/11/2012	£1,600.00		Enniskillen
		2/17/2012	3/12/2012	£4,080.00		Enniskillen
1127	TB	2/9/2012	2/28/2012	£1,000.00	£1,000.00	Enniskillen
1128	TB	10/13/2011	11/3/2011	£2,400.00	£2,400.00	Enniskillen
1129	TB	11/17/2011	12/2/2011	£17,380.00	£28,205.00	Enniskillen
		1/20/2012	2/15/2012	£10,825.00		Enniskillen
1130	TB	10/27/2011	11/22/2011	£630.00	£630.00	Enniskillen
1131	TB	10/28/2011	11/23/2011	£4,630.00	£4,630.00	Enniskillen
1132	TB	4/7/2011	5/3/2011	£800.00	£800.00	Enniskillen
1133	TB	8/26/2011	9/15/2011	£1,900.00	£3,450.00	Enniskillen
		2/9/2012	2/28/2012	£1,550.00		Enniskillen
1134	TB	6/9/2011	7/1/2011	£1,100.00	£1,100.00	Enniskillen
1135	TB	3/8/2012	4/3/2012	£1,100.00	£1,100.00	Enniskillen
1136	TB	1/26/2012	2/13/2012	£1,100.00	£1,100.00	Enniskillen
1137	TB	6/23/2011	7/18/2011	£4,000.00	£4,000.00	Enniskillen
1138	TB	2/2/2012	3/2/2012	£28,300.00	£28,300.00	Enniskillen
1139	TB	11/18/2011	12/12/2011	£3,400.00	£3,400.00	Enniskillen
1140	TB	2/4/2012	3/2/2012	£5,300.00	£5,300.00	Enniskillen
1141	TB	5/19/2011	6/6/2011	£1,325.00	£2,305.00	Enniskillen
		8/25/2011	9/15/2011	£980.00		Enniskillen
1142	TB	7/30/2011	8/17/2011	£4,200.00	£4,200.00	Enniskillen
1143	TB	1/26/2012	2/21/2012	£1,400.00	£1,400.00	Enniskillen
1144	TB	10/28/2011	12/12/2011	£1,400.00	£1,400.00	Enniskillen
1145	TB	1/26/2012	2/23/2012	£5,660.00	£8,360.00	Enniskillen
		3/29/2012	4/18/2012	£2,700.00		Enniskillen
1146	TB	5/14/2011	5/26/2011	£2,480.00	£2,480.00	Enniskillen
1147	TB	12/15/2011	1/10/2012	£10,550.00	£12,350.00	Enniskillen
		2/17/2012	3/6/2012	£1,800.00		Enniskillen
1148	TB	3/10/2012	4/3/2012	£11,450.00	£11,550.00	Enniskillen
		3/10/2012	4/11/2012	£100.00		Enniskillen
1149	TB	11/25/2011	1/3/2012	£2,800.00	£11,575.00	Enniskillen
		2/2/2012	3/2/2012	£8,775.00		Enniskillen
1150	TB	12/8/2011	1/9/2012	£800.00	£800.00	Enniskillen
1151	TB	12/15/2011	1/10/2012	£2,450.00	£2,450.00	Enniskillen
1152	TB	8/11/2011	8/30/2011	£4,675.00	£6,145.00	Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		10/22/2011	11/22/2011	£1,470.00		Enniskillen
1153	TB	10/13/2011	11/3/2011	£1,100.00	£5,050.00	Enniskillen
		12/22/2011	1/17/2012	£3,950.00		Enniskillen
1154	TB	11/18/2011	12/12/2011	£6,260.00	£9,160.00	Enniskillen
		1/27/2012	2/28/2012	£2,900.00		Enniskillen
1155	TB	1/27/2012	2/28/2012	£7,580.00	£7,580.00	Enniskillen
1156	TB	2/17/2012	3/6/2012	£800.00	£800.00	Enniskillen
1157	TB	1/6/2012	2/9/2012	£8,640.00	£16,065.00	Enniskillen
		1/6/2012	2/28/2012	£625.00		Enniskillen
		3/8/2012	4/4/2012	£6,800.00		Enniskillen
1158	TB	5/27/2011	6/14/2011	£900.00	£900.00	Enniskillen
1159	TB	9/16/2011	10/4/2011	£1,050.00	£1,050.00	Enniskillen
1160	TB	2/3/2012	2/28/2012	£10,600.00	£10,600.00	Enniskillen
1161	TB	2/3/2012	2/28/2012	£3,900.00	£3,900.00	Enniskillen
1162	TB	1/12/2012	2/2/2012	£700.00	£700.00	Enniskillen
1163	TB	11/17/2011	12/14/2011	£5,650.00	£5,650.00	Enniskillen
1164	TB	3/1/2012	3/29/2012	£12,100.00	£12,100.00	Enniskillen
1165	TB	10/10/2011	11/3/2011	£850.00	£850.00	Enniskillen
1166	TB	1/12/2012	2/9/2012	£800.00	£2,000.00	Enniskillen
		3/16/2012	4/11/2012	£1,200.00		Enniskillen
1167	TB	5/27/2011	6/17/2011	£1,350.00	£1,350.00	Enniskillen
1168	TB	9/29/2011	10/19/2011	£1,350.00	£1,350.00	Enniskillen
1169	TB	3/31/2012	4/24/2012	£1,480.00	£1,480.00	Enniskillen
1170	TB	2/23/2012	3/12/2012	£1,300.00	£1,300.00	Enniskillen
1171	TB	9/30/2011	10/31/2011	£6,250.00	£16,650.00	Enniskillen
		9/30/2011	11/3/2011	£2,350.00		Enniskillen
		12/2/2011	1/9/2012	£8,050.00		Enniskillen
1172	TB	8/19/2011	9/5/2011	£9,080.00	£13,390.00	Enniskillen
		10/27/2011	11/22/2011	£4,310.00		Enniskillen
1173	TB	1/9/2012	2/2/2012	£1,780.00	£1,780.00	Enniskillen
1174	TB	12/2/2011	1/3/2012	£2,960.00	£9,660.00	Enniskillen
		2/16/2012	3/6/2012	£6,700.00		Enniskillen
1175	TB	1/19/2012	2/13/2012	£1,450.00	£1,450.00	Enniskillen
1176	TB	11/10/2011	11/29/2011	£1,100.00	£5,342.00	Enniskillen
		11/10/2011	1/3/2012	£82.00		Enniskillen
		1/12/2012	2/9/2012	£4,160.00		Enniskillen
1177	TB	2/24/2012	4/11/2012	£40,800.00	£40,800.00	Enniskillen
1178	TB	10/7/2011	10/28/2011	£2,275.00	£2,275.00	Enniskillen

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1179	TB	1/27/2012	2/28/2012	£7,400.00	£7,400.00	Enniskillen
1180	TB	11/18/2011	12/12/2011	£1,550.00	£1,550.00	Enniskillen
1181	TB	7/1/2011	7/21/2011	£6,355.00	£12,410.00	Enniskillen
		9/2/2011	9/22/2011	£4,130.00		Enniskillen
		11/4/2011	11/29/2011	£1,925.00		Enniskillen
1182	TB	11/4/2011	11/22/2011	£10,050.00	£10,050.00	Enniskillen
1183	TB	12/2/2011	1/9/2012	£1,650.00	£1,650.00	Enniskillen
1184	TB	5/6/2011	5/26/2011	£4,250.00	£24,250.00	Enniskillen
		3/22/2012	4/18/2012	£20,000.00		Enniskillen
1185	TB	11/17/2011	12/2/2011	£1,100.00	£2,000.00	Enniskillen
		1/20/2012	2/15/2012	£900.00		Enniskillen
1186	TB	1/13/2012	2/9/2012	£7,050.00	£19,400.00	Enniskillen
		1/13/2012	2/9/2012	£1,800.00		Enniskillen
		3/16/2012	4/11/2012	£10,550.00		Enniskillen
1187	TB	6/27/2011	7/21/2011	£8,800.00	£14,260.00	Enniskillen
		9/5/2011	9/28/2011	£2,010.00		Enniskillen
		9/5/2011	9/29/2011	£3,450.00		Enniskillen
1188	TB	1/20/2012	2/9/2012	£4,650.00	£5,950.00	Enniskillen
		3/29/2012	4/18/2012	£1,300.00		Enniskillen
1189	TB	8/12/2011	8/30/2011	£2,000.00	£2,000.00	Enniskillen
1190	TB	9/16/2011	10/11/2011	£8,680.00	£82,155.00	Enniskillen
		12/8/2011	1/10/2012	£38,725.00		Enniskillen
		2/9/2012	3/2/2012	£34,750.00		Enniskillen
1191	TB	9/29/2011	10/25/2011	£980.00	£980.00	Enniskillen
1192	TB	12/9/2011	1/10/2012	£23,245.00	£36,175.00	Enniskillen
		12/9/2011	1/17/2012	£1,200.00		Enniskillen
		12/9/2011	1/31/2012	£575.00		Enniskillen
		12/9/2011	2/2/2012	£6,655.00		Enniskillen
		1/27/2012	2/15/2012	£1,150.00		Enniskillen
		3/15/2012	4/3/2012	£2,450.00		Enniskillen
		3/15/2012	4/11/2012	£900.00		Enniskillen
1193	TB	6/23/2011	7/18/2011	£900.00	£900.00	Enniskillen
1194	TB	4/23/2011	5/11/2011	£11,650.00	£25,500.00	Coleraine
		6/30/2011	7/18/2011	£13,850.00		Coleraine
1195	TB	4/7/2011	5/3/2011	£1,700.00	£1,700.00	Coleraine
1196	TB	4/16/2011	5/10/2011	£650.00	£1,270.00	Coleraine
		3/9/2012	4/4/2012	£620.00		Coleraine
1197	TB	1/6/2012	1/25/2012	£3,000.00	£8,575.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		3/8/2012	4/4/2012	£5,575.00		Coleraine
1198	TB	12/23/2011	1/17/2012	£950.00	£950.00	Coleraine
1199	TB	11/3/2011	11/21/2011	£725.00	£725.00	Coleraine
1200	TB	11/3/2011	11/22/2011	£9,250.00	£11,250.00	Coleraine
		1/6/2012	1/31/2012	£2,000.00		Coleraine
1201	TB	9/22/2011	10/19/2011	£975.00	£975.00	Coleraine
1202	TB	1/20/2012	2/21/2012	£2,400.00	£3,800.00	Coleraine
		1/20/2012	2/28/2012	£1,400.00		Coleraine
1203	TB	7/1/2011	7/18/2011	£6,830.00	£14,530.00	Coleraine
		9/3/2011	9/22/2011	£3,600.00		Coleraine
		11/10/2011	11/29/2011	£4,100.00		Coleraine
1204	TB	2/24/2012	3/9/2012	£950.00	£950.00	Coleraine
1205	TB	1/7/2012	1/31/2012	£1,400.00	£6,400.00	Coleraine
		3/9/2012	4/4/2012	£5,000.00		Coleraine
1206	TB	6/30/2011	7/18/2011	£575.00	£575.00	Coleraine
1207	TB	3/1/2012	3/20/2012	£2,000.00	£2,000.00	Coleraine
1208	TB	2/24/2012	3/20/2012	£10,000.00	£10,000.00	Coleraine
1209	TB	3/17/2012	4/4/2012	£1,600.00	£1,600.00	Coleraine
1210	TB	9/9/2011	9/29/2011	£875.00	£875.00	Coleraine
1211	TB	4/21/2011	5/10/2011	£900.00	£900.00	Coleraine
1212	TB	6/17/2011	7/1/2011	£3,050.00	£4,650.00	Coleraine
		11/11/2011	11/29/2011	£1,600.00		Coleraine
1213	TB	10/21/2011	11/8/2011	£1,475.00	£3,775.00	Coleraine
		12/23/2011	1/17/2012	£800.00		Coleraine
		3/1/2012	4/3/2012	£1,500.00		Coleraine
1214	TB	9/2/2011	9/22/2011	£2,750.00	£2,750.00	Coleraine
1215	TB	12/1/2011	1/10/2012	£1,000.00	£1,000.00	Coleraine
1216	TB	7/23/2011	8/24/2011	£2,000.00	£2,000.00	Coleraine
1217	TB	4/1/2011	5/3/2011	£1,050.00	£1,050.00	Coleraine
1218	TB	12/10/2011	1/17/2012	£1,100.00	£1,100.00	Coleraine
1219	TB	12/9/2011	1/10/2012	£450.00	£1,100.00	Coleraine
		2/17/2012	3/9/2012	£650.00		Coleraine
1220	TB	1/13/2012	2/13/2012	£725.00	£725.00	Coleraine
1221	TB	2/4/2012	3/6/2012	£1,150.00	£1,150.00	Coleraine
1222	TB	1/6/2012	1/25/2012	£820.00	£820.00	Coleraine
1223	TB	8/26/2011	9/15/2011	£1,700.00	£4,080.00	Coleraine
		11/3/2011	11/22/2011	£900.00		Coleraine
		1/7/2012	1/31/2012	£1,480.00		Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1224	TB	11/25/2011	12/21/2011	£875.00	£875.00	Coleraine
1225	TB	3/15/2012	4/4/2012	£1,750.00	£1,750.00	Coleraine
1226	TB	3/29/2012	4/11/2012	£1,480.00	£1,480.00	Coleraine
1227	TB	10/8/2011	11/16/2011	£9,721.00	£11,146.00	Coleraine
		12/9/2011	1/10/2012	£1,425.00		Coleraine
1228	TB	6/23/2011	7/18/2011	£2,350.00	£3,250.00	Coleraine
		9/29/2011	10/19/2011	£900.00		Coleraine
1229	TB	7/8/2011	7/29/2011	£2,925.00	£2,925.00	Coleraine
1230	TB	2/9/2012	3/6/2012	£1,400.00	£1,400.00	Coleraine
1231	TB	1/19/2012	2/21/2012	£7,400.00	£10,650.00	Coleraine
		3/29/2012	4/18/2012	£3,250.00		Coleraine
1232	TB	11/12/2011	11/30/2011	£920.00	£920.00	Coleraine
1233	TB	2/24/2012	3/9/2012	£2,200.00	£2,200.00	Coleraine
1234	TB	1/12/2012	2/9/2012	£1,075.00	£1,075.00	Coleraine
1235	TB	11/18/2011	12/9/2011	£1,250.00	£1,250.00	Coleraine
1236	TB	12/30/2011	1/17/2012	£1,350.00	£2,800.00	Coleraine
		3/1/2012	3/27/2012	£1,450.00		Coleraine
1237	TB	5/13/2011	6/23/2011	£6,300.00	£6,300.00	Coleraine
1238	TB	9/15/2011	10/14/2011	£1,000.00	£1,000.00	Coleraine
1239	TB	10/29/2011	11/21/2011	£2,325.00	£2,325.00	Coleraine
1240	TB	4/9/2011	5/3/2011	£3,100.00	£3,100.00	Coleraine
1241	TB	4/15/2011	5/9/2011	£920.00	£2,170.00	Coleraine
		7/15/2011	8/4/2011	£1,250.00		Coleraine
1242	TB	5/6/2011	5/24/2011	£900.00	£900.00	Coleraine
1243	TB	12/3/2011	1/3/2012	£1,710.00	£1,710.00	Coleraine
1244	TB	10/7/2011	10/21/2011	£1,175.00	£1,175.00	Coleraine
1245	TB	12/2/2011	12/21/2011	£1,000.00	£1,000.00	Coleraine
1246	TB	9/9/2011	10/6/2011	£1,375.00	£1,375.00	Coleraine
1247	TB	4/1/2011	5/3/2011	£975.00	£2,250.00	Coleraine
		3/2/2012	3/20/2012	£1,275.00		Coleraine
1248	TB	7/29/2011	8/10/2011	£915.00	£915.00	Coleraine
1249	TB	7/1/2011	7/18/2011	£1,400.00	£1,400.00	Coleraine
1250	TB	3/2/2012	3/23/2012	£11,500.00	£11,500.00	Coleraine
1251	TB	3/5/2012	3/20/2012	£575.00	£575.00	Coleraine
1252	TB	4/1/2011	4/21/2011	£1,050.00	£2,500.00	Coleraine
		8/5/2011	8/15/2011	£1,450.00		Coleraine
1253	TB	12/8/2011	1/10/2012	£1,050.00	£1,050.00	Coleraine
1254	TB	4/21/2011	5/11/2011	£10,250.00	£12,050.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		7/8/2011	7/29/2011	£1,800.00		Coleraine
1255	TB	5/6/2011	5/26/2011	£950.00	£2,550.00	Coleraine
		1/20/2012	2/21/2012	£1,300.00		Coleraine
		1/20/2012	3/20/2012	£300.00		Coleraine
1256	TB	3/8/2012	4/3/2012	£3,350.00	£3,350.00	Coleraine
1257	TB	1/21/2012	2/15/2012	£1,600.00	£2,350.00	Coleraine
		1/21/2012	3/6/2012	£750.00		Coleraine
1258	TB	6/3/2011	6/23/2011	£1,100.00	£1,100.00	Coleraine
1259	TB	6/9/2011	7/1/2011	£1,380.00	£2,800.00	Coleraine
		11/17/2011	12/9/2011	£1,420.00		Coleraine
1260	TB	12/9/2011	1/9/2012	£2,100.00	£2,100.00	Londonderry
1261	TB	12/22/2011	1/23/2012	£950.00	£2,150.00	Londonderry
		2/24/2012	3/14/2012	£1,200.00		Londonderry
1262	TB	1/12/2012	2/2/2012	£1,300.00	£1,300.00	Londonderry
1263	TB	2/16/2012	3/12/2012	£2,100.00	£2,100.00	Londonderry
1264	TB	1/20/2012	2/23/2012	£5,250.00	£6,600.00	Londonderry
		1/20/2012	3/2/2012	£1,350.00		Londonderry
1265	TB	4/21/2011	5/31/2011	£2,100.00	£2,100.00	Londonderry
1266	TB	3/16/2012	4/11/2012	£1,450.00	£1,450.00	Londonderry
1267	TB	12/23/2011	1/23/2012	£18,700.00	£26,875.00	Londonderry
		12/23/2011	3/2/2012	£2,100.00		Londonderry
		3/1/2012	3/14/2012	£6,075.00		Londonderry
1268	TB	6/9/2011	7/1/2011	£1,600.00	£1,600.00	Londonderry
1269	TB	11/11/2011	11/29/2011	£1,050.00	£1,050.00	Londonderry
1270	TB	3/2/2012	3/14/2012	£2,000.00	£2,000.00	Londonderry
1271	TB	6/10/2011	7/1/2011	£700.00	£700.00	Londonderry
1272	TB	11/1/2011	1/10/2012	£700.00	£700.00	Londonderry
1273	TB	12/15/2011	1/10/2012	£1,400.00	£1,400.00	Londonderry
1274	TB	2/3/2012	3/6/2012	£1,400.00	£1,400.00	Londonderry
1275	TB	3/15/2012	4/4/2012	£7,900.00	£7,900.00	Londonderry
1276	TB	3/31/2012	4/24/2012	£2,150.00	£2,150.00	Londonderry
1277	TB	3/15/2012	5/3/2012	£3,000.00	£3,000.00	Londonderry
1278	TB	3/16/2012	4/4/2012	£1,325.00	£1,325.00	Londonderry
1279	TB	12/16/2011	1/10/2012	£1,000.00	£1,000.00	Londonderry
1280	TB	1/12/2012	4/11/2012	£1,400.00	£1,400.00	Londonderry
1281	TB	5/20/2011	6/6/2011	£550.00	£550.00	Londonderry
1282	TB	2/4/2012	3/2/2012	£1,800.00	£1,800.00	Londonderry
1283	TB	11/18/2011	12/12/2011	£1,300.00	£1,300.00	Londonderry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1284	TB	7/14/2011	7/29/2011	£2,225.00	£3,425.00	Londonderry
		12/2/2011	12/29/2011	£1,200.00		Londonderry
1285	TB	11/11/2011	11/29/2011	£1,900.00	£1,900.00	Londonderry
1286	TB	12/15/2011	1/10/2012	£2,050.00	£5,250.00	Londonderry
		2/16/2012	3/12/2012	£3,200.00		Londonderry
1287	TB	4/21/2011	5/10/2011	£1,200.00	£1,200.00	Londonderry
1288	TB	2/24/2012	3/12/2012	£4,565.00	£6,165.00	Londonderry
		2/24/2012	3/23/2012	£1,600.00		Londonderry
1289	TB	6/3/2011	6/17/2011	£3,150.00	£3,150.00	Londonderry
1290	TB	10/13/2011	11/28/2011	£1,375.00	£1,375.00	Londonderry
1291	TB	12/1/2011	12/29/2011	£1,080.00	£1,080.00	Londonderry
1292	TB	12/29/2011	1/25/2012	£1,300.00	£1,300.00	Londonderry
1293	TB	11/24/2011	12/21/2011	£1,450.00	£1,450.00	Londonderry
1294	TB	2/11/2012	3/9/2012	£5,500.00	£5,500.00	Londonderry
1295	TB	11/24/2011	12/12/2011	£950.00	£950.00	Londonderry
1296	TB	11/24/2011	12/12/2011	£2,750.00	£2,750.00	Londonderry
1297	TB	11/11/2011	12/12/2011	£900.00	£900.00	Londonderry
1298	TB	10/13/2011	10/28/2011	£2,340.00	£2,340.00	Londonderry
1299	TB	5/20/2011	6/6/2011	£140.00	£140.00	Londonderry
1300	TB	4/29/2011	5/27/2011	£1,300.00	£1,300.00	Londonderry
1301	TB	1/20/2012	2/13/2012	£2,350.00	£2,350.00	Londonderry
1302	TB	8/25/2011	9/15/2011	£775.00	£775.00	Londonderry
1303	TB	10/27/2011	11/16/2011	£8,100.00	£14,650.00	Londonderry
		1/6/2012	2/2/2012	£6,550.00		Londonderry
1304	TB	9/8/2011	10/14/2011	£250.00	£250.00	Londonderry
1305	TB	7/7/2011	7/29/2011	£750.00	£750.00	Londonderry
1306	TB	4/15/2011	5/10/2011	£6,000.00	£6,000.00	Londonderry
1307	TB	7/9/2011	8/8/2011	£1,100.00	£1,100.00	Londonderry
1308	TB	2/16/2012	3/6/2012	£800.00	£800.00	Londonderry
1309	TB	9/29/2011	10/19/2011	£1,450.00	£1,450.00	Londonderry
1310	TB	2/3/2012	3/6/2012	£800.00	£800.00	Londonderry
1311	TB	1/26/2012	2/21/2012	£1,170.00	£1,170.00	Londonderry
1312	TB	12/1/2011	12/29/2011	£2,300.00	£2,300.00	Londonderry
1313	TB	8/15/2011	9/5/2011	£785.00	£785.00	Londonderry
1314	TB	1/12/2012	2/13/2012	£2,800.00	£2,800.00	Londonderry
1315	TB	11/11/2011	12/12/2011	£1,050.00	£1,050.00	Londonderry
1316	TB	3/1/2012	4/4/2012	£3,250.00	£3,250.00	Londonderry
1317	TB	9/23/2011	10/13/2011	£750.00	£750.00	Londonderry

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1318	TB	2/16/2012	3/6/2012	£870.00	£870.00	Londonderry
1319	TB	1/19/2012	2/9/2012	£5,360.00	£8,790.00	Coleraine
		3/22/2012	4/11/2012	£3,430.00		Coleraine
1320	TB	1/19/2012	2/14/2012	£28,750.00	£34,250.00	Coleraine
		1/19/2012	2/21/2012	£2,400.00		Coleraine
		3/23/2012	4/11/2012	£3,100.00		Coleraine
1321	TB	11/12/2011	12/12/2011	£1,200.00	£1,200.00	Coleraine
1322	TB	9/15/2011	10/6/2011	£1,000.00	£1,000.00	Coleraine
1323	TB	12/9/2011	1/10/2012	£1,800.00	£1,800.00	Coleraine
1324	TB	3/16/2012	4/3/2012	£1,480.00	£1,480.00	Coleraine
1325	TB	10/28/2011	11/21/2011	£1,400.00	£1,400.00	Coleraine
1326	TB	6/30/2011	7/18/2011	£1,850.00	£1,850.00	Coleraine
1327	TB	4/15/2011	5/9/2011	£950.00	£2,400.00	Coleraine
		4/15/2011	5/10/2011	£1,450.00		Coleraine
1328	TB	12/22/2011	1/17/2012	£8,175.00	£8,175.00	Coleraine
1329	TB	10/24/2011	11/8/2011	£2,620.00	£2,620.00	Coleraine
1330	TB	11/18/2011	12/12/2011	£2,000.00	£2,000.00	Coleraine
1331	TB	3/16/2012	4/4/2012	£1,050.00	£1,050.00	Coleraine
1332	TB	4/15/2011	5/9/2011	£1,400.00	£1,400.00	Coleraine
1333	TB	10/10/2011	11/3/2011	£1,850.00	£3,700.00	Coleraine
		10/10/2011	11/21/2011	£1,300.00		Coleraine
		12/9/2011	1/10/2012	£550.00		Coleraine
1334	TB	4/30/2011	5/17/2011	£6,400.00	£22,000.00	Coleraine
		7/7/2011	8/4/2011	£10,000.00		Coleraine
		7/7/2011	8/12/2011	£2,350.00		Coleraine
		9/8/2011	9/29/2011	£3,250.00		Coleraine
1335	TB	4/30/2011	5/11/2011	£3,280.00	£5,230.00	Coleraine
		4/30/2011	5/26/2011	£1,200.00		Coleraine
		7/7/2011	8/4/2011	£750.00		Coleraine
1336	TB	2/11/2012	3/14/2012	£675.00	£675.00	Coleraine
1337	TB	10/28/2011	11/21/2011	£3,325.00	£5,625.00	Coleraine
		2/9/2012	3/6/2012	£2,300.00		Coleraine
1338	TB	6/16/2011	7/1/2011	£1,050.00	£1,050.00	Coleraine
1339	TB	2/3/2012	3/6/2012	£88,030.00	£88,030.00	Coleraine
1340	TB	2/24/2012	3/14/2012	£775.00	£775.00	Coleraine
1341	TB	4/21/2011	5/10/2011	£1,050.00	£1,050.00	Coleraine
1342	TB	7/29/2011	8/10/2011	£1,300.00	£1,300.00	Coleraine
1343	TB	4/24/2011	5/17/2011	£700.00	£700.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1344	TB	1/6/2012	1/31/2012	£1,450.00	£1,450.00	Coleraine
1345	TB	4/22/2011	5/17/2011	£1,950.00	£1,950.00	Coleraine
1346	TB	12/8/2011	1/17/2012	£1,550.00	£1,550.00	Coleraine
1347	TB	1/12/2012	1/31/2012	£1,450.00	£1,450.00	Coleraine
1348	TB	1/12/2012	1/31/2012	£2,140.00	£2,140.00	Coleraine
1349	TB	10/21/2011	11/8/2011	£2,050.00	£2,050.00	Coleraine
1350	TB	7/22/2011	8/8/2011	£1,500.00	£6,550.00	Coleraine
		2/24/2012	3/20/2012	£5,050.00		Coleraine
1351	TB	5/6/2011	5/24/2011	£1,300.00	£1,300.00	Coleraine
1352	TB	2/25/2012	3/12/2012	£1,300.00	£1,300.00	Coleraine
1353	TB	11/5/2011	11/22/2011	£750.00	£750.00	Coleraine
1354	TB	4/1/2011	4/14/2011	£2,500.00	£2,500.00	Coleraine
1355	TB	5/26/2011	6/17/2011	£2,355.00	£4,705.00	Coleraine
		5/26/2011	7/1/2011	£2,350.00		Coleraine
1356	TB	1/27/2012	3/2/2012	£4,300.00	£4,300.00	Coleraine
1357	TB	8/29/2011	9/22/2011	£7,300.00	£9,250.00	Coleraine
		11/18/2011	12/29/2011	£600.00		Coleraine
		3/12/2012	4/11/2012	£1,350.00		Coleraine
1358	TB	9/19/2011	10/6/2011	£800.00	£4,050.00	Coleraine
		10/7/2011	11/3/2011	£950.00		Coleraine
		1/13/2012	2/9/2012	£2,300.00		Coleraine
1359	TB	5/5/2011	5/31/2011	£26,900.00	£97,400.00	Coleraine
		5/5/2011	7/8/2011	£1,750.00		Coleraine
		7/16/2011	8/4/2011	£18,450.00		Coleraine
		7/16/2011	9/15/2011	£10,700.00		Coleraine
		9/17/2011	10/6/2011	£6,200.00		Coleraine
		2/2/2012	3/12/2012	£25,400.00		Coleraine
		2/2/2012	3/20/2012	£8,000.00		Coleraine
1360	TB	10/28/2011	11/21/2011	£1,150.00	£1,150.00	Coleraine
1361	TB	1/12/2012	2/13/2012	£1,650.00	£1,650.00	Coleraine
1362	TB	12/5/2011	1/3/2012	£1,350.00	£1,350.00	Coleraine
1363	TB	3/9/2012	4/3/2012	£1,050.00	£1,050.00	Coleraine
1364	TB	4/21/2011	5/11/2011	£2,000.00	£2,000.00	Coleraine
1365	TB	11/17/2011	12/9/2011	£950.00	£950.00	Coleraine
1366	TB	1/12/2012	2/13/2012	£1,150.00	£1,150.00	Coleraine
1367	TB	2/23/2012	3/9/2012	£11,070.00	£11,070.00	Coleraine
1368	TB	5/26/2011	6/17/2011	£1,225.00	£1,225.00	Coleraine
1369	TB	5/13/2011	5/26/2011	£1,150.00	£14,475.00	Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		8/26/2011	9/7/2011	£3,050.00		Coleraine
		10/14/2011	11/8/2011	£8,525.00		Coleraine
		11/17/2011	12/12/2011	£1,750.00		Coleraine
1370	TB	2/3/2012	2/24/2012	£2,900.00	£2,900.00	Coleraine
1371	TB	2/23/2012	3/12/2012	£5,900.00	£5,900.00	Coleraine
1372	TB	11/27/2011	12/29/2011	£1,200.00	£1,200.00	Coleraine
1373	TB	3/23/2012	4/4/2012	£3,000.00	£3,000.00	Coleraine
1374	TB	11/4/2011	11/22/2011	£3,700.00	£5,000.00	Coleraine
		1/28/2012	3/6/2012	£1,300.00		Coleraine
1375	TB	11/4/2011	12/2/2011	£2,100.00	£2,100.00	Coleraine
1376	TB	10/6/2011	11/2/2011	£1,200.00	£1,200.00	Coleraine
1377	TB	12/23/2011	1/17/2012	£950.00	£950.00	Coleraine
1378	TB	12/22/2011	1/17/2012	£1,050.00	£1,050.00	Coleraine
1379	TB	4/1/2011	4/21/2011	£1,075.00	£1,075.00	Coleraine
1380	TB	8/5/2011	8/22/2011	£1,200.00	£1,200.00	Coleraine
1381	TB	5/19/2011	6/6/2011	£600.00	£600.00	Coleraine
1382	TB	4/15/2011	5/9/2011	£900.00	£3,700.00	Coleraine
		7/28/2011	8/15/2011	£2,800.00		Coleraine
1383	TB	5/23/2011	6/8/2011	£3,450.00	£4,100.00	Coleraine
		10/13/2011	11/8/2011	£650.00		Coleraine
1384	TB	12/9/2011	1/10/2012	£3,450.00	£3,450.00	Coleraine
1385	TB	12/16/2011	1/10/2012	£640.00	£640.00	Coleraine
1386	TB	3/1/2012	3/20/2012	£23,200.00	£25,350.00	Coleraine
		3/1/2012	4/3/2012	£2,150.00		Coleraine
1387	TB	3/16/2012	4/18/2012	£1,350.00	£1,350.00	Coleraine
1388	TB	1/20/2012	2/28/2012	£1,850.00	£1,850.00	Coleraine
1389	TB	5/19/2011	6/6/2011	£1,450.00	£2,225.00	Coleraine
		2/9/2012	3/2/2012	£775.00		Coleraine
1390	TB	1/12/2012	2/9/2012	£900.00	£900.00	Coleraine
1391	TB	5/6/2011	5/24/2011	£1,250.00	£1,250.00	Coleraine
1392	TB	9/9/2011	9/29/2011	£2,375.00	£2,375.00	Coleraine
1393	TB	12/1/2011	12/29/2011	£890.00	£890.00	Coleraine
1394	TB	6/10/2011	7/1/2011	£3,000.00	£8,150.00	Coleraine
		2/17/2012	3/9/2012	£2,200.00		Coleraine
		2/17/2012	3/20/2012	£2,950.00		Coleraine
1395	TB	2/3/2012	2/28/2012	£1,000.00	£1,000.00	Coleraine
1396	TB	1/13/2012	2/13/2012	£1,925.00	£3,275.00	Coleraine
		1/13/2012	2/28/2012	£1,350.00		Coleraine

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1397	TB	12/15/2011	1/10/2012	£5,225.00	£6,600.00	Coleraine
		2/17/2012	3/14/2012	£1,375.00		Coleraine
1398	TB	12/23/2011	1/17/2012	£650.00	£650.00	Coleraine
1399	TB	8/26/2011	9/22/2011	£1,500.00	£4,900.00	Coleraine
		10/14/2011	11/3/2011	£1,800.00		Coleraine
		12/30/2011	1/25/2012	£1,600.00		Coleraine
1400	TB	8/18/2011	9/5/2011	£1,250.00	£1,250.00	Coleraine
1401	TB	9/2/2011	9/29/2011	£2,050.00	£2,050.00	Coleraine
1402	TB	1/26/2012	2/24/2012	£1,000.00	£1,000.00	Coleraine
1403	TB	9/17/2011	10/6/2011	£1,800.00	£1,800.00	Coleraine
1404	TB	5/5/2011	5/26/2011	£800.00	£800.00	Coleraine
1405	TB	11/25/2011	12/21/2011	£15,900.00	£18,150.00	Coleraine
		1/28/2012	2/28/2012	£2,250.00		Coleraine
1406	TB	5/26/2011	6/17/2011	£575.00	£575.00	Coleraine
1407	TB	1/27/2012	2/21/2012	£975.00	£975.00	Coleraine
1408	TB	10/7/2011	10/31/2011	£49,900.00	£61,050.00	Omagh
		11/7/2011	11/22/2011	£1,300.00		Omagh
		12/19/2011	1/11/2012	£5,550.00		Omagh
		12/19/2011	1/18/2012	£300.00		Omagh
		12/19/2011	2/2/2012	£4,000.00		Omagh
1409	TB	5/6/2011	5/24/2011	£6,500.00	£13,800.00	Omagh
		7/23/2011	8/10/2011	£2,000.00		Omagh
		9/30/2011	10/21/2011	£3,400.00		Omagh
		9/30/2011	10/25/2011	£1,900.00		Omagh
1410	TB	11/4/2011	11/22/2011	£1,400.00	£1,400.00	Omagh
1411	TB	1/24/2012	2/21/2012	£3,450.00	£3,450.00	Omagh
1412	TB	3/29/2012	4/18/2012	£2,200.00	£2,200.00	Omagh
1413	TB	8/5/2011	8/24/2011	£7,800.00	£17,000.00	Omagh
		10/6/2011	10/25/2011	£9,200.00		Omagh
1414	TB	12/9/2011	1/10/2012	£1,700.00	£1,700.00	Omagh
1415	TB	5/7/2011	5/19/2011	£15,200.00	£145,850.00	Omagh
		7/16/2011	8/4/2011	£4,000.00		Omagh
		9/24/2011	10/13/2011	£122,900.00		Omagh
		9/24/2011	10/19/2011	£3,750.00		Omagh
1416	TB	1/13/2012	2/9/2012	£1,350.00	£7,050.00	Omagh
		3/16/2012	4/4/2012	£5,700.00		Omagh
1417	TB	4/30/2011	5/31/2011	£16,600.00	£16,600.00	Omagh
1418	TB	6/9/2011	7/1/2011	£1,450.00	£14,900.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		8/25/2011	9/15/2011	£5,700.00		Omagh
		10/28/2011	11/22/2011	£6,100.00		Omagh
		1/21/2012	2/21/2012	£1,650.00		Omagh
1419	TB	10/20/2011	11/8/2011	£4,250.00	£4,250.00	Omagh
1420	TB	10/14/2011	11/8/2011	£9,250.00	£9,850.00	Omagh
		2/24/2012	3/12/2012	£600.00		Omagh
1421	TB	1/9/2012	2/1/2012	£4,150.00	£4,150.00	Omagh
1422	TB	1/6/2012	2/1/2012	£1,000.00	£5,250.00	Omagh
		3/23/2012	4/11/2012	£4,250.00		Omagh
1423	TB	11/25/2011	12/21/2011	£500.00	£500.00	Omagh
1424	TB	9/23/2011	10/21/2011	£8,150.00	£8,150.00	Omagh
1425	TB	3/26/2012	4/11/2012	£5,250.00	£5,250.00	Omagh
1426	TB	12/1/2011	12/29/2011	£2,100.00	£2,100.00	Omagh
1427	TB	3/3/2012	3/23/2012	£22,360.00	£22,360.00	Omagh
1428	TB	12/22/2011	1/25/2012	£1,250.00	£1,250.00	Omagh
1429	TB	3/23/2012	4/11/2012	£975.00	£975.00	Omagh
1430	TB	10/21/2011	11/8/2011	£1,200.00	£3,000.00	Omagh
		1/9/2012	2/1/2012	£1,800.00		Omagh
1431	TB	11/17/2011	12/12/2011	£2,450.00	£2,450.00	Omagh
1432	TB	6/23/2011	7/18/2011	£2,300.00	£8,900.00	Omagh
		10/21/2011	11/22/2011	£5,300.00		Omagh
		1/5/2012	2/1/2012	£1,300.00		Omagh
1433	TB	10/17/2011	11/8/2011	£975.00	£975.00	Omagh
1434	TB	3/22/2012	4/11/2012	£980.00	£980.00	Omagh
1435	TB	10/20/2011	11/8/2011	£2,580.00	£3,830.00	Omagh
		12/22/2011	1/11/2012	£1,250.00		Omagh
1436	TB	3/30/2012	4/18/2012	£7,300.00	£7,300.00	Omagh
1437	TB	7/7/2011	8/4/2011	£1,600.00	£13,550.00	Omagh
		9/24/2011	10/13/2011	£800.00		Omagh
		11/26/2011	12/29/2011	£2,200.00		Omagh
		2/4/2012	3/9/2012	£8,950.00		Omagh
1438	TB	10/14/2011	11/8/2011	£2,200.00	£2,200.00	Omagh
1439	TB	4/1/2011	4/21/2011	£1,000.00	£1,000.00	Omagh
1440	TB	1/12/2012	2/1/2012	£3,500.00	£3,500.00	Omagh
1441	TB	8/18/2011	9/7/2011	£4,490.00	£7,190.00	Omagh
		8/18/2011	11/8/2011	£2,700.00		Omagh
1442	TB	12/9/2011	1/10/2012	£2,500.00	£2,500.00	Omagh
1443	TB	2/25/2012	3/12/2012	£3,200.00	£3,200.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1444	TB	11/25/2011	12/29/2011	£1,500.00	£1,500.00	Omagh
1445	TB	11/17/2011	12/12/2011	£1,250.00	£1,250.00	Omagh
1446	TB	10/27/2011	11/16/2011	£2,100.00	£2,100.00	Omagh
1447	TB	9/24/2011	10/13/2011	£7,000.00	£8,050.00	Omagh
		11/26/2011	12/29/2011	£1,050.00		Omagh
1448	TB	7/29/2011	8/22/2011	£20,850.00	£43,500.00	Omagh
		10/1/2011	10/21/2011	£22,650.00		Omagh
1449	TB	2/17/2012	3/9/2012	£600.00	£600.00	Omagh
1450	TB	11/11/2011	11/29/2011	£14,600.00	£20,200.00	Omagh
		1/19/2012	2/21/2012	£5,600.00		Omagh
1451	TB	2/18/2012	3/9/2012	£1,350.00	£1,350.00	Omagh
1452	TB	11/25/2011	12/29/2011	£960.00	£2,010.00	Omagh
		1/26/2012	2/21/2012	£1,050.00		Omagh
1453	TB	9/9/2011	9/28/2011	£3,450.00	£10,300.00	Omagh
		11/11/2011	11/29/2011	£2,100.00		Omagh
		11/11/2011	12/2/2011	£3,950.00		Omagh
		2/2/2012	2/21/2012	£800.00		Omagh
1454	TB	11/25/2011	12/29/2011	£1,000.00	£1,000.00	Omagh
1455	TB	12/5/2011	1/10/2012	£1,600.00	£1,600.00	Omagh
1456	TB	10/27/2011	11/16/2011	£8,600.00	£27,350.00	Omagh
		10/27/2011	11/22/2011	£1,400.00		Omagh
		10/27/2011	12/2/2011	£13,750.00		Omagh
		2/17/2012	3/9/2012	£3,600.00		Omagh
1457	TB	1/6/2012	2/1/2012	£3,300.00	£4,700.00	Omagh
		1/6/2012	3/2/2012	£1,400.00		Omagh
1458	TB	6/2/2011	6/24/2011	£700.00	£700.00	Omagh
1459	TB	11/18/2011	12/12/2011	£3,100.00	£3,100.00	Omagh
1460	TB	1/27/2012	2/24/2012	£1,400.00	£1,400.00	Dungannon
1461	TB	1/26/2012	2/24/2012	£3,350.00	£3,350.00	Dungannon
1462	TB	10/21/2011	11/16/2011	£1,150.00	£1,150.00	Dungannon
1463	TB	12/16/2011	1/10/2012	£1,450.00	£1,450.00	Dungannon
1464	TB	7/29/2011	8/15/2011	£720.00	£720.00	Dungannon
1465	TB	7/8/2011	7/29/2011	£1,200.00	£1,200.00	Dungannon
1466	TB	1/26/2012	2/24/2012	£1,550.00	£1,550.00	Dungannon
1467	TB	3/29/2012	4/18/2012	£2,000.00	£2,000.00	Dungannon
1468	TB	1/12/2012	2/6/2012	£1,100.00	£1,100.00	Dungannon
1469	TB	2/24/2012	3/23/2012	£4,750.00	£4,750.00	Dungannon
1470	TB	3/1/2012	3/29/2012	£1,425.00	£1,425.00	Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1471	TB	9/30/2011	10/27/2011	£1,000.00	£1,000.00	Dungannon
1472	TB	5/27/2011	6/17/2011	£1,000.00	£2,000.00	Dungannon
		9/30/2011	10/27/2011	£1,000.00		Dungannon
1473	TB	11/24/2011	12/29/2011	£6,100.00	£6,100.00	Dungannon
1474	TB	9/10/2011	10/4/2011	£2,030.00	£2,800.00	Dungannon
		12/15/2011	1/11/2012	£770.00		Dungannon
1475	TB	4/22/2011	5/24/2011	£1,650.00	£1,650.00	Dungannon
1476	TB	5/12/2011	5/27/2011	£4,950.00	£12,125.00	Dungannon
		5/12/2011	6/8/2011	£1,450.00		Dungannon
		7/23/2011	8/24/2011	£2,025.00		Dungannon
		10/27/2011	11/23/2011	£3,700.00		Dungannon
1477	TB	4/16/2011	5/9/2011	£3,850.00	£8,830.00	Dungannon
		6/18/2011	7/15/2011	£4,980.00		Dungannon
1478	TB	12/15/2011	1/31/2012	£12,150.00	£19,495.00	Dungannon
		12/15/2011	2/6/2012	£350.00		Dungannon
		2/25/2012	3/20/2012	£6,995.00		Dungannon
1479	TB	6/20/2011	7/7/2011	£1,150.00	£1,150.00	Dungannon
1480	TB	6/20/2011	7/15/2011	£1,700.00	£1,700.00	Dungannon
1481	TB	9/9/2011	10/11/2011	£2,580.00	£5,305.00	Dungannon
		1/13/2012	2/9/2012	£1,325.00		Dungannon
		3/30/2012	4/26/2012	£1,400.00		Dungannon
1482	TB	8/18/2011	9/5/2011	£4,850.00	£15,705.00	Dungannon
		10/20/2011	11/16/2011	£6,070.00		Dungannon
		1/14/2012	2/6/2012	£4,785.00		Dungannon
1483	TB	7/8/2011	7/29/2011	£800.00	£800.00	Dungannon
1484	TB	1/26/2012	2/24/2012	£950.00	£950.00	Dungannon
1485	TB	2/3/2012	2/24/2012	£800.00	£800.00	Dungannon
1486	TB	1/6/2012	2/2/2012	£725.00	£725.00	Dungannon
1487	TB	12/23/2011	1/11/2012	£1,150.00	£1,150.00	Dungannon
1488	TB	10/7/2011	10/27/2011	£1,425.00	£1,425.00	Dungannon
1489	TB	9/15/2011	10/11/2011	£750.00	£1,630.00	Dungannon
		12/15/2011	1/11/2012	£880.00		Dungannon
1490	TB	9/9/2011	10/11/2011	£8,230.00	£8,230.00	Dungannon
1491	TB	4/29/2011	5/19/2011	£2,775.00	£2,775.00	Dungannon
1492	TB	6/24/2011	7/18/2011	£700.00	£700.00	Dungannon
1493	TB	12/2/2011	1/10/2012	£1,550.00	£1,550.00	Dungannon
1494	TB	2/16/2012	3/9/2012	£1,000.00	£1,000.00	Dungannon
1495	TB	1/28/2012	2/28/2012	£900.00	£900.00	Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1496	TB	4/7/2011	5/3/2011	£1,100.00	£1,100.00	Dungannon
1497	TB	9/17/2011	10/4/2011	£2,250.00	£2,250.00	Dungannon
1498	TB	4/8/2011	5/3/2011	£1,100.00	£4,625.00	Dungannon
		9/9/2011	10/11/2011	£2,100.00		Dungannon
		1/13/2012	2/6/2012	£1,425.00		Dungannon
1499	TB	9/10/2011	10/4/2011	£850.00	£850.00	Dungannon
1500	TB	1/19/2012	3/2/2012	£4,075.00	£4,075.00	Dungannon
1501	TB	2/9/2012	2/28/2012	£830.00	£830.00	Dungannon
1502	TB	11/4/2011	11/29/2011	£1,780.00	£1,780.00	Dungannon
1503	TB	11/4/2011	11/29/2011	£4,250.00	£4,250.00	Dungannon
1504	TB	5/26/2011	6/17/2011	£5,330.00	£13,975.00	Dungannon
		9/30/2011	10/27/2011	£4,280.00		Dungannon
		1/26/2012	2/21/2012	£4,365.00		Dungannon
1505	TB	4/22/2011	5/24/2011	£3,000.00	£4,450.00	Dungannon
		9/29/2011	10/27/2011	£1,450.00		Dungannon
1506	TB	3/1/2012	3/14/2012	£2,000.00	£2,000.00	Dungannon
1507	TB	4/2/2011	5/3/2011	£10,500.00	£42,850.00	Dungannon
		7/29/2011	8/24/2011	£23,950.00		Dungannon
		9/30/2011	10/25/2011	£1,100.00		Dungannon
		9/30/2011	10/27/2011	£7,300.00		Dungannon
1508	TB	4/9/2011	5/3/2011	£1,000.00	£1,000.00	Dungannon
1509	TB	10/29/2011	11/21/2011	£1,400.00	£4,000.00	Dungannon
		2/11/2012	3/6/2012	£2,600.00		Dungannon
1510	TB	11/25/2011	1/3/2012	£6,750.00	£6,750.00	Dungannon
1511	TB	12/11/2011	1/10/2012	£10,750.00	£19,350.00	Dungannon
		2/23/2012	3/14/2012	£8,600.00		Dungannon
1512	TB	2/24/2012	3/27/2012	£825.00	£825.00	Dungannon
1513	TB	3/23/2012	4/11/2012	£4,000.00	£4,000.00	Dungannon
1514	TB	11/25/2011	1/3/2012	£1,300.00	£4,230.00	Dungannon
		1/27/2012	2/21/2012	£2,930.00		Dungannon
1515	TB	11/3/2011	11/24/2011	£2,950.00	£4,300.00	Dungannon
		2/2/2012	3/6/2012	£1,350.00		Dungannon
1516	TB	4/23/2011	5/26/2011	£9,650.00	£13,950.00	Dungannon
		7/9/2011	8/10/2011	£4,300.00		Dungannon
1517	TB	11/25/2011	12/29/2011	£1,080.00	£1,080.00	Dungannon
1518	TB	3/29/2012	4/18/2012	£2,575.00	£2,575.00	Dungannon
1519	TB	6/3/2011	6/17/2011	£800.00	£800.00	Dungannon
1520	TB	1/19/2012	2/15/2012	£3,625.00	£7,175.00	Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		3/22/2012	4/11/2012	£3,550.00		Dungannon
1521	TB	12/31/2011	1/18/2012	£8,280.00	£15,305.00	Dungannon
		3/8/2012	3/27/2012	£7,025.00		Dungannon
1522	TB	1/13/2012	2/15/2012	£3,750.00	£3,750.00	Dungannon
1523	TB	12/1/2011	1/3/2012	£1,000.00	£1,000.00	Dungannon
1524	TB	10/22/2011	11/8/2011	£1,100.00	£2,350.00	Dungannon
		3/22/2012	4/11/2012	£1,250.00		Dungannon
1525	TB	9/10/2011	9/29/2011	£1,100.00	£1,100.00	Dungannon
1526	TB	3/23/2012	4/18/2012	£2,800.00	£2,800.00	Dungannon
1527	TB	12/31/2011	1/26/2012	£3,300.00	£3,300.00	Dungannon
1528	TB	3/15/2012	4/4/2012	£1,450.00	£1,450.00	Dungannon
1529	TB	5/19/2011	6/8/2011	£1,400.00	£3,900.00	Dungannon
		7/29/2011	8/10/2011	£900.00		Dungannon
		10/1/2011	10/27/2011	£1,600.00		Dungannon
1530	TB	3/9/2012	4/4/2012	£13,500.00	£13,500.00	Dungannon
1531	TB	9/8/2011	10/4/2011	£1,650.00	£10,000.00	Dungannon
		12/22/2011	2/1/2012	£1,650.00		Dungannon
		12/22/2011	2/14/2012	£1,500.00		Dungannon
		3/3/2012	4/4/2012	£5,200.00		Dungannon
1532	TB	3/10/2012	3/27/2012	£1,300.00	£1,300.00	Dungannon
1533	TB	4/21/2011	5/17/2011	£1,100.00	£1,100.00	Dungannon
1534	TB	3/23/2012	4/18/2012	£3,500.00	£3,500.00	Dungannon
1535	TB	11/11/2011	11/29/2011	£1,250.00	£1,250.00	Dungannon
1536	TB	9/22/2011	10/13/2011	£2,075.00	£2,075.00	Dungannon
1537	TB	1/7/2012	2/9/2012	£1,200.00	£1,200.00	Dungannon
1538	TB	4/21/2011	5/17/2011	£10,850.00	£13,150.00	Dungannon
		8/12/2011	8/26/2011	£2,300.00		Dungannon
1539	TB	10/13/2011	11/8/2011	£11,800.00	£16,860.00	Dungannon
		12/15/2011	1/25/2012	£5,060.00		Dungannon
1540	TB	8/12/2011	8/30/2011	£700.00	£5,630.00	Dungannon
		11/24/2011	12/21/2011	£4,930.00		Dungannon
1541	TB	7/4/2011	7/29/2011	£1,250.00	£6,150.00	Dungannon
		9/16/2011	10/13/2011	£4,900.00		Dungannon
1542	TB	4/21/2011	5/17/2011	£2,100.00	£3,400.00	Dungannon
		9/15/2011	10/6/2011	£1,300.00		Dungannon
1543	TB	5/12/2011	6/6/2011	£1,000.00	£4,080.00	Dungannon
		10/6/2011	11/8/2011	£3,080.00		Dungannon
1544	TB	5/6/2011	5/26/2011	£1,300.00	£3,930.00	Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		8/20/2011	9/15/2011	£2,630.00		Dungannon
1545	TB	6/23/2011	7/15/2011	£1,825.00	£5,425.00	Dungannon
		2/10/2012	3/6/2012	£3,600.00		Dungannon
1546	TB	2/2/2012	2/21/2012	£2,250.00	£2,250.00	Dungannon
1547	TB	12/22/2011	2/9/2012	£725.00	£725.00	Dungannon
1548	TB	4/15/2011	5/10/2011	£600.00	£600.00	Dungannon
1549	TB	10/28/2011	12/2/2011	£4,600.00	£4,600.00	Dungannon
1550	TB	7/29/2011	8/24/2011	£1,000.00	£1,000.00	Dungannon
1551	TB	4/30/2011	5/26/2011	£3,200.00	£10,700.00	Dungannon
		10/14/2011	11/8/2011	£1,800.00		Dungannon
		1/28/2012	2/21/2012	£5,700.00		Dungannon
1552	TB	5/28/2011	7/1/2011	£12,500.00	£15,100.00	Dungannon
		8/18/2011	9/15/2011	£1,350.00		Dungannon
		11/24/2011	1/10/2012	£1,250.00		Dungannon
1553	TB	10/27/2011	11/21/2011	£3,500.00	£8,850.00	Dungannon
		1/6/2012	3/6/2012	£1,800.00		Dungannon
		3/9/2012	3/27/2012	£3,550.00		Dungannon
1554	TB	2/9/2012	3/6/2012	£3,200.00	£3,200.00	Dungannon
1555	TB	11/25/2011	12/29/2011	£2,400.00	£2,400.00	Dungannon
1556	TB	4/22/2011	5/19/2011	£11,700.00	£11,700.00	Dungannon
1557	TB	1/19/2012	2/15/2012	£775.00	£775.00	Dungannon
1558	TB	6/16/2011	7/4/2011	£1,150.00	£9,390.00	Dungannon
		10/20/2011	11/21/2011	£6,255.00		Dungannon
		2/2/2012	2/21/2012	£1,985.00		Dungannon
1559	TB	9/29/2011	10/25/2011	£1,400.00	£2,050.00	Dungannon
		12/16/2011	1/18/2012	£650.00		Dungannon
1560	TB	10/15/2011	11/8/2011	£16,350.00	£23,550.00	Dungannon
		12/22/2011	1/18/2012	£7,200.00		Dungannon
1561	TB	5/12/2011	6/6/2011	£2,600.00	£2,600.00	Dungannon
1562	TB	1/26/2012	2/15/2012	£1,200.00	£1,200.00	Dungannon
1563	TB	1/13/2012	2/9/2012	£920.00	£920.00	Dungannon
1564	TB	5/15/2011	10/11/2011	£1,320.00	£4,445.00	Dungannon
		1/19/2012	2/13/2012	£2,150.00		Dungannon
		3/30/2012	4/18/2012	£975.00		Dungannon
1565	TB	2/9/2012	3/6/2012	£1,450.00	£1,450.00	Dungannon
1566	TB	3/1/2012	3/14/2012	£1,150.00	£1,150.00	Dungannon
1567	TB	2/23/2012	3/20/2012	£45,150.00	£45,150.00	Dungannon
1568	TB	3/8/2012	3/27/2012	£800.00	£800.00	Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1569	TB	5/19/2011	6/24/2011	£5,450.00	£13,130.00	Dungannon
		8/18/2011	9/5/2011	£3,480.00		Dungannon
		12/10/2011	1/11/2012	£4,200.00		Dungannon
1570	TB	12/2/2011	1/3/2012	£650.00	£650.00	Dungannon
1571	TB	6/11/2011	7/4/2011	£5,180.00	£8,480.00	Dungannon
		12/22/2011	1/25/2012	£3,300.00		Dungannon
1572	TB	2/17/2012	3/6/2012	£2,300.00	£2,300.00	Dungannon
1573	TB	11/25/2011	12/29/2011	£1,480.00	£1,480.00	Dungannon
1574	TB	4/22/2011	5/17/2011	£2,660.00	£4,990.00	Dungannon
		4/22/2011	5/26/2011	£1,250.00		Dungannon
		8/26/2011	9/15/2011	£1,080.00		Dungannon
1575	TB	1/27/2012	2/15/2012	£2,000.00	£2,000.00	Dungannon
1576	TB	7/28/2011	8/24/2011	£2,000.00	£3,300.00	Dungannon
		12/1/2011	1/10/2012	£1,300.00		Dungannon
1577	TB	11/11/2011	12/14/2011	£4,400.00	£5,800.00	Dungannon
		1/13/2012	2/15/2012	£1,400.00		Dungannon
1578	TB	5/20/2011	6/6/2011	£2,500.00	£3,980.00	Dungannon
		8/12/2011	8/26/2011	£1,480.00		Dungannon
1579	TB	4/7/2011	5/9/2011	£1,650.00	£1,650.00	Dungannon
1580	TB	1/13/2012	2/9/2012	£1,350.00	£1,350.00	Dungannon
1581	TB	11/25/2011	2/24/2012	£1,550.00	£1,550.00	Dungannon
1582	TB	12/8/2011	1/3/2012	£675.00	£675.00	Dungannon
1583	TB	3/8/2012	3/29/2012	£900.00	£900.00	Dungannon
1584	TB	10/28/2011	11/21/2011	£1,470.00	£1,470.00	Dungannon
1585	TB	8/25/2011	9/15/2011	£1,900.00	£1,900.00	Dungannon
1586	TB	10/14/2011	11/3/2011	£3,400.00	£3,400.00	Dungannon
1587	TB	11/24/2011	12/21/2011	£1,500.00	£1,500.00	Dungannon
1588	TB	3/15/2012	4/4/2012	£1,200.00	£1,200.00	Dungannon
1589	TB	3/7/2012	3/29/2012	£680.00	£680.00	Dungannon
1590	TB	3/25/2012	4/18/2012	£1,800.00	£1,800.00	Dungannon
1591	TB	11/17/2011	12/12/2011	£300.00	£2,300.00	Dungannon
		1/21/2012	2/9/2012	£2,000.00		Dungannon
1592	TB	4/15/2011	5/3/2011	£4,000.00	£4,000.00	Dungannon
1593	TB	1/27/2012	2/15/2012	£10,400.00	£10,400.00	Dungannon
1594	TB	6/3/2011	6/23/2011	£10,625.00	£21,960.00	Dungannon
		6/3/2011	7/4/2011	£1,050.00		Dungannon
		8/11/2011	9/15/2011	£8,410.00		Dungannon
		10/14/2011	11/3/2011	£1,875.00		Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1595	TB	11/4/2011	11/23/2011	£585.00	£585.00	Dungannon
1596	TB	2/2/2012	2/15/2012	£1,200.00	£1,200.00	Dungannon
1597	TB	12/1/2011	12/29/2011	£1,125.00	£1,125.00	Dungannon
1598	TB	12/22/2011	1/25/2012	£1,080.00	£1,080.00	Dungannon
1599	TB	1/13/2012	2/9/2012	£2,450.00	£2,450.00	Dungannon
1600	TB	1/20/2012	2/15/2012	£38,150.00	£40,000.00	Dungannon
		1/20/2012	2/28/2012	£1,850.00		Dungannon
1601	TB	3/10/2012	4/4/2012	£3,600.00	£3,600.00	Dungannon
1602	TB	10/21/2011	11/8/2011	£4,130.00	£7,555.00	Dungannon
		1/12/2012	2/9/2012	£1,100.00		Dungannon
		3/29/2012	4/18/2012	£2,325.00		Dungannon
1603	TB	12/16/2011	1/10/2012	£700.00	£700.00	Dungannon
1604	TB	7/21/2011	8/10/2011	£700.00	£700.00	Dungannon
1605	TB	6/30/2011	8/4/2011	£950.00	£2,500.00	Dungannon
		11/3/2011	11/24/2011	£1,000.00		Dungannon
		2/9/2012	3/6/2012	£550.00		Dungannon
1606	TB	12/16/2011	1/11/2012	£730.00	£730.00	Dungannon
1607	TB	9/10/2011	10/4/2011	£880.00	£880.00	Dungannon
1608	TB	2/10/2012	3/9/2012	£1,950.00	£1,950.00	Dungannon
1609	TB	9/24/2011	10/19/2011	£3,370.00	£3,370.00	Dungannon
1610	TB	10/29/2011	11/16/2011	£100.00	£2,900.00	Dungannon
		10/29/2011	11/22/2011	£1,450.00		Dungannon
		2/11/2012	3/6/2012	£1,350.00		Dungannon
1611	TB	4/21/2011	5/17/2011	£920.00	£7,380.00	Dungannon
		11/10/2011	12/12/2011	£2,000.00		Dungannon
		1/21/2012	2/15/2012	£4,460.00		Dungannon
1612	TB	10/21/2011	11/8/2011	£1,200.00	£1,200.00	Dungannon
1613	TB	7/16/2011	8/10/2011	£1,900.00	£7,600.00	Dungannon
		11/19/2011	12/12/2011	£1,700.00		Dungannon
		3/15/2012	4/4/2012	£4,000.00		Dungannon
1614	TB	6/9/2011	7/4/2011	£3,100.00	£3,100.00	Dungannon
1615	TB	4/22/2011	5/24/2011	£1,130.00	£1,130.00	Dungannon
1616	TB	3/29/2012	4/18/2012	£8,350.00	£8,350.00	Dungannon
1617	TB	4/7/2011	6/8/2011	£1,150.00	£1,150.00	Dungannon
1618	TB	3/25/2012	4/18/2012	£6,650.00	£11,300.00	Dungannon
		3/25/2012	4/23/2012	£1,600.00		Dungannon
		3/25/2012	5/9/2012	£2,750.00		Dungannon
		3/25/2012	5/15/2012	£300.00		Dungannon

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1619	TB	2/4/2012	3/6/2012	£880.00	£880.00	Dungannon
1620	TB	4/7/2011	5/9/2011	£3,830.00	£3,830.00	Dungannon
1621	TB	4/7/2011	5/3/2011	£900.00	£4,050.00	Dungannon
		9/2/2011	9/29/2011	£950.00		Dungannon
		1/12/2012	2/9/2012	£2,200.00		Dungannon
1622	TB	10/21/2011	11/8/2011	£900.00	£900.00	Dungannon
1623	TB	3/2/2012	3/23/2012	£4,800.00	£4,800.00	Dungannon
1624	TB	6/2/2011	6/23/2011	£1,800.00	£1,800.00	Dungannon
1625	TB	4/15/2011	5/11/2011	£3,150.00	£3,150.00	Dungannon
1626	TB	4/29/2011	5/24/2011	£5,880.00	£5,880.00	Dungannon
1627	TB	6/10/2011	7/7/2011	£100.00	£1,100.00	Dungannon
		10/14/2011	11/3/2011	£1,000.00		Dungannon
1628	TB	10/21/2011	11/8/2011	£1,200.00	£1,200.00	Dungannon
1629	TB	4/14/2011	5/3/2011	£1,400.00	£15,450.00	Dungannon
		8/25/2011	9/22/2011	£14,050.00		Dungannon
1630	TB	3/15/2012	4/4/2012	£950.00	£950.00	Dungannon
1631	TB	5/27/2011	6/14/2011	£780.00	£780.00	Dungannon
1632	TB	7/22/2011	8/10/2011	£4,100.00	£4,750.00	Dungannon
		12/2/2011	1/3/2012	£650.00		Dungannon
1633	TB	5/26/2011	6/17/2011	£1,400.00	£1,400.00	Dungannon
1634	TB	3/26/2012	4/4/2012	£3,400.00	£3,400.00	Omagh
1635	TB	11/21/2011	12/14/2011	£7,600.00	£12,900.00	Omagh
		1/31/2012	2/24/2012	£5,300.00		Omagh
1636	TB	4/21/2011	5/10/2011	£1,100.00	£1,100.00	Omagh
1637	TB	2/24/2012	3/9/2012	£3,100.00	£3,100.00	Omagh
1638	TB	2/24/2012	3/12/2012	£900.00	£900.00	Omagh
1639	TB	2/11/2012	3/9/2012	£24,150.00	£25,600.00	Omagh
		2/11/2012	4/3/2012	£1,450.00		Omagh
1640	TB	8/25/2011	9/15/2011	£3,550.00	£3,550.00	Omagh
1641	TB	11/4/2011	11/24/2011	£1,450.00	£1,450.00	Omagh
1642	TB	7/29/2011	8/10/2011	£1,450.00	£4,350.00	Omagh
		3/16/2012	4/4/2012	£2,900.00		Omagh
1643	TB	2/23/2012	3/14/2012	£800.00	£800.00	Omagh
1644	TB	11/10/2011	12/2/2011	£44,400.00	£150,650.00	Omagh
		1/12/2012	2/1/2012	£51,550.00		Omagh
		1/12/2012	3/14/2012	£100.00		Omagh
		3/2/2012	3/20/2012	£54,600.00		Omagh
1645	TB	1/5/2012	1/25/2012	£650.00	£5,200.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		3/8/2012	3/29/2012	£4,550.00		Omagh
1646	TB	3/30/2012	4/18/2012	£4,300.00	£4,300.00	Omagh
1647	TB	1/28/2012	2/21/2012	£6,700.00	£9,150.00	Omagh
		3/30/2012	4/18/2012	£2,450.00		Omagh
1648	TB	4/9/2011	5/3/2011	£700.00	£3,350.00	Omagh
		8/27/2011	9/15/2011	£1,700.00		Omagh
		1/21/2012	2/9/2012	£950.00		Omagh
1649	TB	10/7/2011	11/3/2011	£3,200.00	£3,200.00	Omagh
1650	TB	1/26/2012	2/24/2012	£950.00	£950.00	Omagh
1651	TB	1/13/2012	2/1/2012	£1,200.00	£7,050.00	Omagh
		3/29/2012	4/18/2012	£3,550.00		Omagh
		3/29/2012	4/18/2012	£1,000.00		Omagh
		3/29/2012	4/24/2012	£1,300.00		Omagh
1652	TB	2/23/2012	3/9/2012	£2,980.00	£2,980.00	Omagh
1653	TB	2/24/2012	3/29/2012	£2,300.00	£2,300.00	Omagh
1654	TB	2/10/2012	3/9/2012	£1,000.00	£1,000.00	Omagh
1655	TB	3/26/2012	4/11/2012	£1,450.00	£1,450.00	Omagh
1656	TB	2/2/2012	2/24/2012	£3,500.00	£3,500.00	Omagh
1657	TB	1/26/2012	2/24/2012	£1,100.00	£1,100.00	Omagh
1658	TB	2/3/2012	2/24/2012	£850.00	£850.00	Omagh
1659	TB	11/24/2011	12/29/2011	£750.00	£750.00	Omagh
1660	TB	2/11/2012	3/2/2012	£1,800.00	£1,800.00	Omagh
1661	TB	12/23/2011	1/17/2012	£800.00	£4,850.00	Omagh
		3/1/2012	3/29/2012	£2,700.00		Omagh
		3/1/2012	5/3/2012	£1,350.00		Omagh
1662	TB	11/3/2011	11/24/2011	£4,500.00	£4,500.00	Omagh
1663	TB	4/28/2011	5/19/2011	£2,500.00	£5,100.00	Omagh
		8/25/2011	9/15/2011	£2,600.00		Omagh
1664	TB	10/27/2011	11/21/2011	£3,350.00	£3,350.00	Omagh
1665	TB	11/18/2011	12/12/2011	£4,440.00	£4,440.00	Omagh
1666	TB	2/2/2012	2/24/2012	£1,350.00	£1,350.00	Omagh
1667	TB	1/20/2012	2/13/2012	£1,800.00	£1,800.00	Omagh
1668	TB	12/19/2011	1/17/2012	£1,350.00	£1,350.00	Omagh
1669	TB	3/2/2012	4/4/2012	£1,100.00	£1,100.00	Omagh
1670	TB	1/5/2012	2/1/2012	£3,900.00	£13,260.00	Omagh
		3/8/2012	4/4/2012	£9,360.00		Omagh
1671	TB	3/8/2012	3/29/2012	£2,700.00	£2,700.00	Omagh
1672	TB	7/7/2011	8/4/2011	£8,000.00	£13,500.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		9/9/2011	10/11/2011	£2,750.00		Omagh
		9/23/2011	10/11/2011	£2,750.00		Omagh
1673	TB	11/24/2011	12/14/2011	£20,500.00	£21,850.00	Omagh
		2/9/2012	3/2/2012	£1,350.00		Omagh
1674	TB	1/13/2012	2/1/2012	£1,200.00	£1,200.00	Omagh
1675	TB	6/10/2011	7/1/2011	£1,750.00	£1,750.00	Omagh
1676	TB	3/9/2012	3/29/2012	£7,500.00	£7,500.00	Omagh
1677	TB	3/29/2012	5/1/2012	£1,450.00	£1,450.00	Omagh
1678	TB	10/27/2011	11/21/2011	£2,400.00	£12,700.00	Omagh
		1/19/2012	2/9/2012	£10,300.00		Omagh
1679	TB	2/24/2012	3/12/2012	£2,750.00	£2,750.00	Omagh
1680	TB	1/20/2012	2/13/2012	£1,300.00	£1,300.00	Omagh
1681	TB	12/31/2011	1/23/2012	£13,850.00	£24,600.00	Omagh
		12/31/2011	2/2/2012	£3,050.00		Omagh
		3/3/2012	3/29/2012	£7,700.00		Omagh
1682	TB	3/2/2012	3/23/2012	£4,900.00	£4,900.00	Omagh
1683	TB	10/29/2011	11/21/2011	£1,300.00	£1,300.00	Omagh
1684	TB	10/15/2011	11/8/2011	£950.00	£950.00	Omagh
1685	TB	12/16/2011	1/17/2012	£2,760.00	£31,520.00	Omagh
		2/18/2012	3/6/2012	£27,000.00		Omagh
		2/18/2012	3/14/2012	£1,760.00		Omagh
1686	TB	1/16/2012	2/9/2012	£2,500.00	£2,500.00	Omagh
1687	TB	3/15/2012	4/4/2012	£1,300.00	£1,300.00	Omagh
1688	TB	1/27/2012	2/21/2012	£2,100.00	£2,100.00	Omagh
1689	TB	1/13/2012	2/1/2012	£1,250.00	£1,250.00	Omagh
1690	TB	12/20/2011	1/17/2012	£7,550.00	£7,550.00	Omagh
1691	TB	2/11/2012	3/9/2012	£1,350.00	£1,350.00	Omagh
1692	TB	12/22/2011	2/14/2012	£1,000.00	£1,000.00	Omagh
1693	TB	6/2/2011	6/17/2011	£2,600.00	£2,600.00	Omagh
1694	TB	11/7/2011	11/24/2011	£890.00	£890.00	Omagh
1695	TB	11/4/2011	11/22/2011	£830.00	£830.00	Omagh
1696	TB	1/6/2012	1/25/2012	£600.00	£600.00	Omagh
1697	TB	12/10/2011	1/10/2012	£2,600.00	£2,600.00	Omagh
1698	TB	4/29/2011	5/24/2011	£4,250.00	£4,250.00	Omagh
1699	TB	4/8/2011	5/9/2011	£1,850.00	£1,850.00	Omagh
1700	TB	11/4/2011	11/22/2011	£26,775.00	£34,075.00	Omagh
		1/14/2012	2/9/2012	£4,250.00		Omagh
		3/17/2012	4/4/2012	£3,050.00		Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1701	TB	11/11/2011	12/12/2011	£900.00	£900.00	Omagh
1702	TB	2/3/2012	3/2/2012	£6,300.00	£6,300.00	Omagh
1703	TB	4/1/2011	4/21/2011	£1,200.00	£2,400.00	Omagh
		4/4/2011	4/21/2011	£1,200.00		Omagh
1704	TB	3/30/2012	4/18/2012	£5,000.00	£5,200.00	Omagh
		3/30/2012	4/26/2012	£200.00		Omagh
1705	TB	2/10/2012	2/28/2012	£850.00	£850.00	Omagh
1706	TB	8/12/2011	9/5/2011	£1,250.00	£1,800.00	Omagh
		8/15/2011	9/26/2011	£550.00		Omagh
1707	TB	2/9/2012	3/9/2012	£11,300.00	£11,300.00	Omagh
1708	TB	6/17/2011	7/4/2011	£2,300.00	£2,300.00	Omagh
1709	TB	3/22/2012	4/4/2012	£7,430.00	£7,430.00	Omagh
1710	TB	3/9/2012	4/3/2012	£4,950.00	£6,300.00	Omagh
		3/9/2012	5/17/2012	£1,350.00		Omagh
1711	TB	9/16/2011	10/6/2011	£6,525.00	£9,825.00	Omagh
		11/19/2011	12/29/2011	£3,300.00		Omagh
1712	TB	3/2/2012	3/29/2012	£2,600.00	£2,600.00	Omagh
1713	TB	9/30/2011	10/19/2011	£3,090.00	£3,090.00	Omagh
1714	TB	9/16/2011	10/6/2011	£1,410.00	£1,410.00	Omagh
1715	TB	4/8/2011	5/3/2011	£1,100.00	£1,100.00	Omagh
1716	TB	11/10/2011	12/12/2011	£4,000.00	£4,000.00	Omagh
1718	TB	10/29/2011	11/24/2011	£11,150.00	£23,000.00	Omagh
		1/2/2012	2/1/2012	£11,850.00		Omagh
1719	TB	4/8/2011	5/3/2011	£1,100.00	£1,100.00	Omagh
1720	TB	1/19/2012	2/9/2012	£1,480.00	£1,480.00	Omagh
1721	TB	1/20/2012	2/9/2012	£780.00	£780.00	Omagh
1722	TB	2/17/2012	3/9/2012	£4,150.00	£4,150.00	Omagh
1723	TB	3/30/2012	4/18/2012	£900.00	£900.00	Omagh
1724	TB	11/25/2011	12/14/2011	£3,000.00	£3,000.00	Omagh
1725	TB	12/23/2011	1/25/2012	£3,470.00	£3,470.00	Omagh
1726	TB	9/8/2011	9/28/2011	£1,100.00	£1,100.00	Omagh
1727	TB	12/16/2011	1/10/2012	£4,200.00	£4,200.00	Omagh
1728	TB	1/13/2012	2/1/2012	£1,450.00	£1,450.00	Omagh
1729	TB	11/17/2011	12/12/2011	£1,000.00	£1,000.00	Omagh
1730	TB	11/11/2011	11/29/2011	£950.00	£950.00	Omagh
1731	TB	11/24/2011	12/14/2011	£7,750.00	£7,750.00	Omagh
1732	TB	10/29/2011	11/24/2011	£5,800.00	£10,950.00	Omagh
		1/2/2012	2/1/2012	£5,150.00		Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1733	TB	1/27/2012	2/21/2012	£25,000.00	£25,000.00	Omagh
1734	TB	11/24/2011	12/21/2011	£2,450.00	£2,450.00	Omagh
1735	TB	11/18/2011	12/12/2011	£2,600.00	£5,950.00	Omagh
		1/22/2012	2/13/2012	£3,350.00		Omagh
1736	TB	3/16/2012	4/4/2012	£3,000.00	£3,000.00	Omagh
1737	TB	4/15/2011	5/10/2011	£900.00	£900.00	Omagh
1738	TB	1/28/2012	2/21/2012	£2,500.00	£2,500.00	Omagh
1739	TB	3/1/2012	3/20/2012	£2,500.00	£2,500.00	Omagh
1740	TB	9/22/2011	10/6/2011	£1,250.00	£1,250.00	Omagh
1741	TB	3/16/2012	4/4/2012	£9,100.00	£9,100.00	Omagh
1742	TB	12/8/2011	1/3/2012	£1,050.00	£9,800.00	Omagh
		2/10/2012	3/6/2012	£8,750.00		Omagh
1743	TB	9/19/2011	10/6/2011	£1,025.00	£1,025.00	Omagh
1744	TB	2/17/2012	3/9/2012	£1,250.00	£1,250.00	Omagh
1745	TB	12/22/2011	1/18/2012	£1,280.00	£1,280.00	Omagh
1746	TB	9/24/2011	10/19/2011	£2,600.00	£4,050.00	Omagh
		2/11/2012	2/28/2012	£1,450.00		Omagh
1747	TB	3/16/2012	4/4/2012	£1,250.00	£1,250.00	Omagh
1748	TB	12/30/2011	1/25/2012	£4,950.00	£7,720.00	Omagh
		12/30/2011	1/26/2012	£1,370.00		Omagh
		3/3/2012	3/20/2012	£1,400.00		Omagh
1749	TB	6/10/2011	7/18/2011	£6,000.00	£6,000.00	Omagh
1750	TB	11/12/2011	12/12/2011	£3,350.00	£3,350.00	Omagh
1751	TB	11/25/2011	12/14/2011	£1,400.00	£1,400.00	Omagh
1752	TB	11/24/2011	12/14/2011	£3,600.00	£9,050.00	Omagh
		2/11/2012	2/28/2012	£4,000.00		Omagh
		2/11/2012	3/2/2012	£1,450.00		Omagh
1753	TB	2/10/2012	3/2/2012	£2,800.00	£2,800.00	Omagh
1754	TB	12/1/2011	12/29/2011	£4,950.00	£4,950.00	Omagh
1755	TB	10/27/2011	11/16/2011	£3,200.00	£3,200.00	Omagh
1756	TB	11/25/2011	12/14/2011	£10,830.00	£10,830.00	Omagh
1757	TB	6/30/2011	7/29/2011	£750.00	£750.00	Omagh
1758	TB	2/23/2012	3/29/2012	£2,200.00	£2,200.00	Omagh
1759	TB	1/20/2012	2/13/2012	£2,650.00	£2,650.00	Omagh
1760	TB	12/2/2011	12/29/2011	£5,000.00	£5,000.00	Omagh
1761	TB	4/30/2011	5/24/2011	£3,750.00	£5,400.00	Omagh
		10/14/2011	11/29/2011	£1,650.00		Omagh
1762	TB	4/8/2011	5/3/2011	£1,050.00	£3,275.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		2/17/2012	3/14/2012	£2,225.00		Omagh
1763	TB	10/7/2011	11/3/2011	£1,400.00	£1,400.00	Omagh
1764	TB	1/6/2012	1/23/2012	£1,250.00	£2,500.00	Omagh
		1/6/2012	2/2/2012	£1,250.00		Omagh
1765	TB	12/22/2011	1/26/2012	£4,850.00	£4,850.00	Omagh
1766	TB	12/22/2011	1/25/2012	£2,500.00	£2,500.00	Omagh
1767	TB	2/16/2012	3/6/2012	£1,000.00	£1,000.00	Omagh
1768	TB	4/8/2011	5/9/2011	£2,550.00	£3,850.00	Omagh
		11/19/2011	12/12/2011	£1,300.00		Omagh
1769	TB	12/16/2011	1/17/2012	£850.00	£850.00	Omagh
1770	TB	3/26/2012	4/18/2012	£1,450.00	£1,450.00	Omagh
1771	TB	7/7/2011	7/29/2011	£900.00	£900.00	Omagh
1772	TB	2/11/2012	3/2/2012	£1,650.00	£1,650.00	Omagh
1773	TB	5/14/2011	6/6/2011	£10,825.00	£12,175.00	Omagh
		5/14/2011	7/8/2011	£1,350.00		Omagh
1774	TB	12/15/2011	1/11/2012	£33,680.00	£41,580.00	Omagh
		12/15/2011	1/17/2012	£4,000.00		Omagh
		3/2/2012	3/20/2012	£2,500.00		Omagh
		3/2/2012	3/23/2012	£1,400.00		Omagh
1775	TB	10/28/2011	12/9/2011	£1,450.00	£1,450.00	Omagh
1776	TB	11/25/2011	12/21/2011	£16,620.00	£22,270.00	Omagh
		1/26/2012	2/24/2012	£5,650.00		Omagh
1777	TB	12/2/2011	12/21/2011	£8,050.00	£8,050.00	Omagh
1778	TB	1/7/2012	2/1/2012	£1,450.00	£1,450.00	Omagh
1779	TB	1/27/2012	2/21/2012	£2,650.00	£7,750.00	Omagh
		1/27/2012	3/2/2012	£1,650.00		Omagh
		3/29/2012	4/18/2012	£3,450.00		Omagh
1780	TB	9/16/2011	10/6/2011	£3,100.00	£5,350.00	Omagh
		11/19/2011	12/21/2011	£1,750.00		Omagh
		1/20/2012	2/9/2012	£500.00		Omagh
1781	TB	11/11/2011	12/12/2011	£1,480.00	£1,480.00	Omagh
1782	TB	12/1/2011	12/29/2011	£2,940.00	£2,940.00	Omagh
1783	TB	3/2/2012	3/20/2012	£5,700.00	£5,700.00	Omagh
1784	TB	2/17/2012	3/9/2012	£4,985.00	£4,985.00	Omagh
1785	TB	4/16/2011	5/10/2011	£3,100.00	£5,550.00	Omagh
		4/16/2011	5/24/2011	£2,450.00		Omagh
1786	TB	1/27/2012	2/24/2012	£1,480.00	£1,480.00	Omagh
1787	TB	9/15/2011	10/13/2011	£1,400.00	£4,700.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		11/18/2011	12/12/2011	£3,300.00		Omagh
1788	TB	11/18/2011	12/12/2011	£2,460.00	£2,460.00	Omagh
1789	TB	1/27/2012	2/21/2012	£4,440.00	£4,440.00	Omagh
1790	TB	3/16/2012	4/4/2012	£2,550.00	£2,550.00	Omagh
1791	TB	1/19/2012	2/24/2012	£5,000.00	£5,000.00	Omagh
1792	TB	4/16/2011	5/10/2011	£1,285.00	£1,285.00	Omagh
1793	TB	10/27/2011	11/21/2011	£1,925.00	£1,925.00	Omagh
1794	TB	1/16/2012	2/9/2012	£2,450.00	£2,450.00	Omagh
1795	TB	1/23/2012	2/9/2012	£1,450.00	£9,050.00	Omagh
		3/29/2012	4/18/2012	£7,600.00		Omagh
1796	TB	12/22/2011	1/17/2012	£1,000.00	£1,000.00	Omagh
1797	TB	11/3/2011	11/24/2011	£1,350.00	£1,350.00	Omagh
1798	TB	1/26/2012	2/24/2012	£3,000.00	£12,550.00	Omagh
		3/31/2012	4/18/2012	£9,550.00		Omagh
1799	TB	3/22/2012	4/4/2012	£8,890.00	£8,890.00	Omagh
1800	TB	12/2/2011	12/29/2011	£950.00	£950.00	Omagh
1801	TB	2/11/2012	3/6/2012	£19,200.00	£19,200.00	Omagh
1802	TB	3/7/2012	4/3/2012	£5,250.00	£5,250.00	Omagh
1803	TB	9/9/2011	9/28/2011	£2,920.00	£2,920.00	Omagh
1804	TB	10/28/2011	11/23/2011	£6,750.00	£6,750.00	Omagh
1805	TB	12/10/2011	1/10/2012	£800.00	£800.00	Omagh
1806	TB	1/12/2012	2/9/2012	£19,900.00	£21,900.00	Omagh
		3/15/2012	4/4/2012	£2,000.00		Omagh
1807	TB	10/28/2011	11/21/2011	£5,250.00	£15,130.00	Omagh
		1/10/2012	2/1/2012	£4,500.00		Omagh
		3/15/2012	4/3/2012	£5,380.00		Omagh
1808	TB	11/11/2011	12/12/2011	£2,450.00	£2,450.00	Omagh
1809	TB	11/18/2011	12/12/2011	£1,900.00	£1,900.00	Omagh
1810	TB	7/7/2011	8/4/2011	£750.00	£2,450.00	Omagh
		9/9/2011	10/11/2011	£1,700.00		Omagh
1811	TB	2/10/2012	3/6/2012	£1,450.00	£1,450.00	Omagh
1812	TB	11/18/2011	12/12/2011	£1,800.00	£1,800.00	Omagh
1813	TB	7/22/2011	8/10/2011	£1,250.00	£24,800.00	Omagh
		10/28/2011	11/24/2011	£18,600.00		Omagh
		1/13/2012	2/9/2012	£4,950.00		Omagh
1814	TB	2/23/2012	3/12/2012	£1,650.00	£1,650.00	Omagh
1815	TB	5/23/2011	6/8/2011	£1,250.00	£1,250.00	Omagh
1816	TB	4/22/2011	5/24/2011	£3,350.00	£3,350.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
1817	TB	12/1/2011	12/14/2011	£4,100.00	£4,100.00	Omagh
1818	TB	11/3/2011	11/22/2011	£5,400.00	£8,650.00	Omagh
		12/2/2011	1/10/2012	£3,250.00		Omagh
1819	TB	5/27/2011	6/14/2011	£5,800.00	£20,050.00	Omagh
		8/4/2011	8/22/2011	£10,800.00		Omagh
		10/7/2011	11/8/2011	£3,450.00		Omagh
1820	TB	6/3/2011	6/23/2011	£2,200.00	£2,200.00	Omagh
1821	TB	9/29/2011	10/27/2011	£1,400.00	£1,400.00	Omagh
1822	TB	2/23/2012	3/12/2012	£1,450.00	£1,450.00	Omagh
1823	TB	8/16/2011	8/30/2011	£2,400.00	£2,400.00	Omagh
1824	TB	6/23/2011	7/7/2011	£1,450.00	£1,450.00	Omagh
1825	TB	11/10/2011	11/29/2011	£1,250.00	£1,250.00	Omagh
1826	TB	3/2/2012	3/23/2012	£3,450.00	£3,450.00	Omagh
1827	TB	4/23/2011	5/19/2011	£950.00	£5,825.00	Omagh
		6/28/2011	7/21/2011	£4,875.00		Omagh
1828	TB	11/25/2011	12/29/2011	£1,000.00	£1,000.00	Omagh
1829	TB	4/14/2011	5/9/2011	£12,180.00	£14,180.00	Omagh
		7/30/2011	8/10/2011	£2,000.00		Omagh
1830	TB	4/9/2011	5/11/2011	£1,100.00	£9,950.00	Omagh
		3/15/2012	4/4/2012	£8,850.00		Omagh
1831	TB	9/30/2011	10/19/2011	£1,320.00	£1,320.00	Omagh
1832	TB	11/18/2011	12/12/2011	£800.00	£1,600.00	Omagh
		2/17/2012	3/9/2012	£800.00		Omagh
1833	TB	12/9/2011	1/10/2012	£2,640.00	£2,640.00	Omagh
1834	TB	6/10/2011	7/1/2011	£5,400.00	£6,900.00	Omagh
		8/13/2011	9/5/2011	£1,500.00		Omagh
1835	TB	4/11/2011	5/3/2011	£1,250.00	£2,250.00	Omagh
		7/2/2011	7/21/2011	£1,000.00		Omagh
1836	TB	4/2/2011	4/21/2011	£750.00	£2,150.00	Omagh
		6/9/2011	7/1/2011	£1,400.00		Omagh
1837	TB	10/21/2011	11/8/2011	£1,700.00	£2,700.00	Omagh
		12/19/2011	1/17/2012	£1,000.00		Omagh
1838	TB	10/7/2011	10/25/2011	£1,050.00	£1,050.00	Omagh
1839	TB	6/10/2011	7/1/2011	£3,250.00	£3,250.00	Omagh
1840	TB	2/6/2012	3/2/2012	£1,300.00	£1,300.00	Omagh
1841	TB	12/9/2011	1/11/2012	£3,250.00	£4,730.00	Omagh
		2/10/2012	3/2/2012	£1,480.00		Omagh
1842	TB	7/8/2011	8/8/2011	£1,000.00	£4,305.00	Omagh

Identifier	Disease Code	Disease Test Date	Payment Date	Payments	Total Payment	Divisional Veterinary Office
		11/4/2011	11/29/2011	£925.00		Omagh
		3/2/2012	3/23/2012	£2,380.00		Omagh
1843	TB	2/2/2012	2/21/2012	£1,000.00	£1,000.00	Omagh
1844	TB	10/28/2011	11/24/2011	£9,100.00	£9,100.00	Omagh
1845	TB	10/21/2011	11/24/2011	£1,800.00	£1,800.00	Omagh
1846	TB	9/22/2011	10/13/2011	£2,500.00	£2,500.00	Omagh
1847	TB	6/30/2011	7/21/2011	£1,480.00	£2,880.00	Omagh
		11/5/2011	11/22/2011	£1,400.00		Omagh
1848	TB	7/23/2011	8/10/2011	£5,200.00	£9,150.00	Omagh
		9/23/2011	12/2/2011	£2,750.00		Omagh
		11/25/2011	12/14/2011	£1,200.00		Omagh
1849	TB	1/20/2012	2/9/2012	£3,550.00	£5,300.00	Omagh
		1/20/2012	2/13/2012	£1,750.00		Omagh
1850	TB	11/25/2011	12/14/2011	£15,270.00	£15,270.00	Omagh
1851	TB	2/24/2012	3/12/2012	£1,150.00	£1,150.00	Omagh
1852	TB	1/5/2012	1/25/2012	£4,800.00	£9,050.00	Omagh
		3/8/2012	3/29/2012	£4,250.00		Omagh
1853	TB	11/26/2011	1/10/2012	£1,050.00	£1,050.00	Omagh
1854	TB	12/30/2011	1/17/2012	£6,450.00	£6,450.00	Omagh
1855	TB	11/24/2011	1/3/2012	£1,100.00	£4,230.00	Omagh
		2/2/2012	3/2/2012	£3,130.00		Omagh
1856	TB	10/24/2011	11/16/2011	£675.00	£675.00	Omagh
1857	TB	11/10/2011	11/29/2011	£3,600.00	£3,600.00	Omagh
1858	TB	7/21/2011	9/5/2011	£1,950.00	£1,950.00	Omagh
1859	TB	6/23/2011	7/8/2011	£1,175.00	£2,175.00	Omagh
		12/9/2011	1/10/2012	£1,000.00		Omagh
1860	TB	9/22/2011	10/13/2011	£1,200.00	£1,200.00	Omagh

Annex B

Summary

Compensation Paid Regarding TB Reactors And Negative In Contacts With A Disease Test In 2011/12

Divisional Veterinary Office	No of Herds Paid	Total Paid	Average Total Payment Per Herd
Armagh	161	£1,260,490	£7,829
Ballymena	77	£278,916	£3,622
Coleraine	216	£1,048,851	£4,856
Dungannon	174	£822,070	£4,725
Enniskillen	226	£1,552,592	£6,870
Londonderry	59	£156,025	£2,644
Mallusk	76	£402,870	£5,301
Newry	369	£3,235,170	£8,767
Newtownards	224	£2,291,725	£10,231
Omagh	278	£1,808,370	£6,505
Total	**1860**	**£12,857,079**	**£6,912**

DALO Letter to Clerk re. Bovine TB

Corporate and European Services Division
Central Management Branch
Dundonald House
Ballymiscaw
Upper Newtownards Road
Belfast BT4 3SB

Tel: 028 9052 4331
Fax: 028 9052 4884
Email: joe.cassells@dardni.gov.uk

Our Ref:
Your Ref:

Stella McArdle
Acting Clerk to the Committee for Agriculture and Rural Development
Room 243
Parliament Buildings
Ballymiscaw
Belfast
BT4 3XX

Date: 7 June 2012

Dear Stella

Committee Meeting – 22 MAY 2012

Oral Briefing Vet NI – Review of Bovine TB

The veterinary associations helpfully offered, as a short term measure for the winter of 2011-2012 to carry out some Brucellosis blood sampling for the Department with an indication of what they would charge for providing the service. This offer was made on the basis of their understanding that the Department had insufficient staff to carry out this work. The offer was made again in correspondence from the Association of Veterinary Surgeons Practising in Northern Ireland (AVSPNI) in February 2012 and a reply issued from the Department declining the offer and explaining our position.

The offer was not taken up for a number of reasons, most directly because the welcome reduction in brucellosis means that the Department has sufficient lay blood sampling officers to carry out the activity. It was concluded that to privatise this work even on a temporary basis would not assist the Department financially as the existing staff doing this work could not readily be re-deployed.

However I should point out, by way of background, that Private Veterinary Practitioners (PVPs) do already carry out pre-movement brucellosis sampling of individual cattle on behalf of the Department, at the request of individual farmers. In such cases the farmer pays the PVP directly for carrying out the sampling.

To minimise bureaucracy, the Department strives to ensure that the routine Brucellosis herd tests carried out by its staff are synchronised with any TB test due on the herd, whether allocated to a PVP or a DARD testing vet. A very high level of synchronisation is already achieved which ensures that farmers do not have to gather in their cattle for testing more than absolutely necessary. Indeed the presence of separate Brucellosis sampling and TB testing personnel ensures that the farmer benefits from the double job being done as quickly and smoothly as possible.

The Department accepts the principle that some efficiency savings might be possible in future, particularly if small herds were jointly tested for TB and Brucellosis by a single person. The Committee will wish to note that the Department is reviewing its contractual arrangements for TB testing. In the course of this review it will be possible to consider the mechanisms whereby other veterinary work, such as routine Brucellosis blood sampling, might be undertaken by those who successfully tender for such work.

Yours sincerely

Joe Cassells

Departmental Assembly Liaison Officer

Memo from UWT

From: Conor McKinney [mailto:Conor.McKinney@ulsterwildlifetrust.org]
Sent: 22 June 2012 11:06
To: Ward, Claire
Cc: Jennifer Fulton; Maeve Bogie; Victoria Magreehan
Subject: Cited report

Claire,

Find enclosed the reference I cited in the ARD Committee bTB Ulster Wildlife Trust evidence session. The original can be found in the Journal of Zoology, Volume 194, Issue 2, Pages 284-289, June 1981.

If there is anything else you need to know please don't hesitate to give me a ring.

All the best,

Conor

Conor McKinney
Living Landscapes Manager
Ulster Wildlife Trust
Direct Line: 028 4483 3972
Tel: 028 4483 0282 Fax: 028 4483 0888
Address: 3 New Line, Crossgar, Co Down, BT30 9EP

The Ulster Wildlife Trust is Northern Ireland's largest local nature conservation charity working for a natural environment, rich in native wildlife, valued by everyone.

The Ulster Wildlife Trust is a charity recognised by HM Revenue & Customs No. XN45269 and a company limited by guarantee No. 12711.

Are you a member yet? You can join online www.ulsterwildlifetrust.org

Memo from UWT Appendix - Cheeseman and Mallinson 1981

Lowe, V. P. W. & Gardiner, A. S. (1975). Hybridisation between Red deer (*Cervus elaphus*) and Sika deer (*Cervus nippon*) with particular reference to stocks in N.W. England. *J. Zool., Lond.* **177**: 553–566.

Lowe, V. P. W. & Gardiner, A. S. (1976). The implications of the hybrid deer (Red X Sika) on Cartmell Fell for native deer of the Lake District. *Deer* **4**: 28–32.

Mitchell, B. (1967). Growth layers in dental cement for determining the age of Red deer (*Cervus elaphus* L.). *J. Anim. Ecol.* **36**: 279–293.

Mitchell, B. (1973). The reproductive performance of wild Scottish Red deer, *Cervus elaphus*. *J. Reprod. Fert.* (Suppl.) **19**: 273–285.

Mitchell, B. & Crisp, J. M. (1981). Some properties of Red deer (*Cervus elaphus*) at exceptionally high population-density in Scotland. *J. Zool., Lond.* **193**: 157–169.

Mitchell, B. & Lincoln, G. A. (1973). Conception dates in relation to age and condition in two populations of Red deer in Scotland. *J. Zool., Lond.* **171**: 141–152.

Mitchell, B., McCowan, D. & Nicholson, I. A. (1976). Annual cycles of body weight and condition in Scottish Red deer, *Cervus elaphus*. *J. Zool., Lond.* **180**: 107–127.

Mitchell, B., Staines, B. W. & Welch, D. (1977). *Ecology of Red deer*: A research review relevant to their management in Scotland. Cambridge: Institute of Terrestrial Ecology.

Mitchell, B. & Youngson, R. W. (1978). *Teeth and age in Scottish Red deer: a practical guide to age assessment*. Inverness: Red Deer Commission.

Red Deer Commission (1961 onwards). *Annual Reports*. Edinburgh: H.M.S.O.

Staines, B. W. (1978). The dynamics and performances of a declining population of Red deer (*Cervus elaphus*). *J. Zool., Lond.* **184**: 403–419.

Behaviour of badgers (*Meles meles*) infected with bovine tuberculosis

C. L. CHEESEMAN and P. J. MALLINSON, Ministry of Agriculture, Fisheries and Food, Agricultural Science Service, Worplesdon Laboratory, Tangley Place, Worplesdon, Guildford, Surrey.

Bovine tuberculosis (*Mycobacterium bovis*) is a major cause of natural death in badgers in Gloucestershire (Gallagher & Nelson, 1979). Behavioural changes in ailing badgers have been reported (Muirhead *et al.*, 1974) including being seen abroad during daylight, sometimes in or around farm buildings, with no fear of man. This note reports the behaviour of three badgers, which post-mortem examination showed were infected with bovine tuberculosis. They were observed in an area of the Gloucestershire Cotswold escarpment where badger ecology and behaviour are being studied. Movements were observed by radio tracking (Cheeseman & Mallinson, 1979) and post-mortem examinations were carried out at the Ministry's Veterinary Investigation Centre at Gloucester.

Case 1

Sow G7. This badger was caught 3 May 1977 whilst foraging for earthworms in short grass pasture. Its gait was contorted and its back hunched and at 6·0 kg it appeared to be underweight for an adult female. Its original social group was not known. A transmitter was fitted and on release it went to ground nearby in a small, unoccupied outlying sett which was close to a territorial boundary between two social groups of badgers.

Subsequently on nine consecutive nights the badger was observed foraging within 150 m radius of the sett, mostly in short grass pasture where earthworms were abundantly

available on most nights and occasionally in woodland and scrub. In daytime it always laid up in the same outlying sett and was never seen with other badgers at night.

On the fifth night the use of the hindquarters seemed to be impaired. Limping suggested that the left leg was apparently worse than the right and the sow occasionally sat down as if the back legs were tired. This condition grew steadily worse until the ninth night after release, the last time the badger was seen alive, when the back legs, apparently paralysed, were being dragged behind the animal. Forty-eight hours later the body of the dead badger was dug out of the sett. It was emaciated and weighed 5·0 kg.

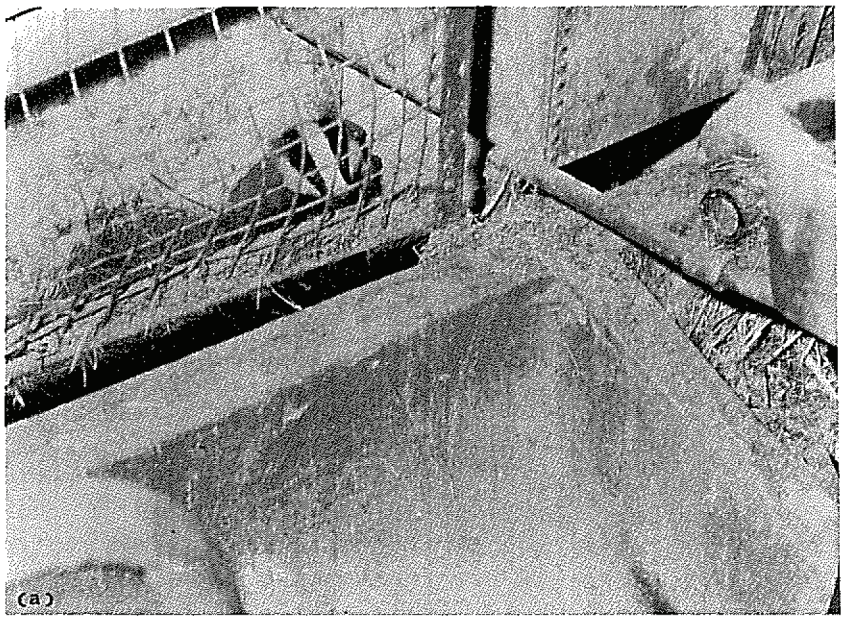
Post-mortem examination confirmed tuberculosis as the cause of death. Tubercular lesions were found throughout the lungs and an extremely large abcess in the lumbar region containing almost 250 ml of viscid pale yellow pus with very large numbers of acid-fast bacilli typical of tuberculosis. Tubercle bacilli were isolated on culture and typed as *M. bovis*. The signs of paralysis exhibited shortly before death were due to the extensive abcess formation. Unusual features of this badger's behaviour were the solitary existence and very limited movements.

Case 2

Boar G10. When first caught on 30 May 1977 this badger appeared to be healthy. It was of average weight (8·25 kg) and was judged to be aged by the very worn state of its teeth. The transmitter fitted to it revealed that it was resident in a main sett with other members of a known social group. No unusual behaviour was observed during the following few weeks. The badger occupied a main sett with other members of the group and foraged at night within the group territorial limits. On 16 July, 47 days after capture, the boar was discovered at night in a disused byre. It was seen grooming and resting on a nest of hay in a corner of the building where it remained until observations ceased at 0230 hrs. As the farm buildings were just inside the territory of the neighbouring group of badgers the assumption was made that this was an exploratory foray.

The following day the badger was not present in the main sett and was found in the same small outlying sett (near the periphery of the group territory) from which G7 (Case 1) had been dug out four days previously. Two hours before dark that evening, the boar left the sett, moved approximately 400 m along a thicket covered bank, crossed a farm track and entered the byre.

The byre had been disused for about one month and contained some remains of peanut-based cattle food which the boar proceeded to eat, ignoring the noise of cars and people around the buildings. It remained in the byre until observations ceased at 0215 hrs. The following day the same pattern of behaviour was observed; it was again found in the outlying sett and that evening, again two hours before dark, the boar made its way to the byre. On this occasion it was chased across the yard by a farm dog but once inside the byre it began to search for food. The boar moved off to the nest in the corner of the byre after feeding for 15 minutes. A photographic flash (Plate I (a)) caused it to retreat between some pillars supporting a water tank. A further nest of hay was later found under the tank. Fresh badger faeces were also found in the adjacent feeding trough (Plate I (b)). The badger spent the following day beneath the water tank in the byre. As it appeared to be sick it was caught for examination. There was no external sign of injury but it was emaciated (6·0 kg); a 27% loss in seven weeks. It was killed a day later owing to its deteriorating condition.



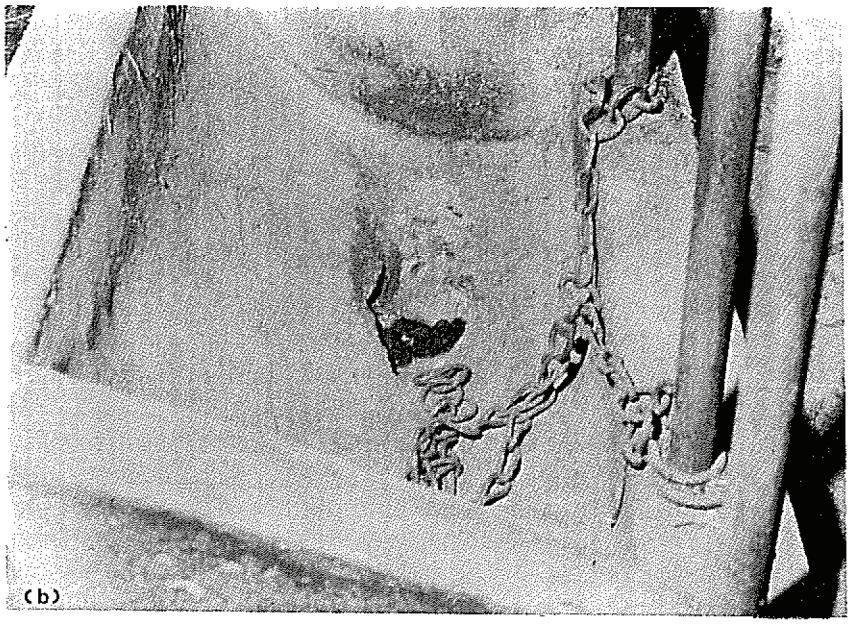


PLATE I(a). Sick badger (Case 2, ♂G10) on a nest inside a byre.

PLATE I(b). Faeces of same badger deposited in a cattle feeding trough inside the byre.

Post-mortem examination revealed a single tubercular lesion (confirmed as *M. bovis*) of approximately 5 mm diameter in the right lung. However, no further evidence of tuberculosis was found and the cause of emaciation and illness in this badger was unclear. It is assumed that the badger left its social group in an ailing condition but there were no signs of bite wounds and no other observations which would indicate that G10 had been attacked by other members of the group. Hunger may have been the primary reason and the cattle food provided an abundant food supply.

Case 3

Boar G30. This badger was first caught on 20 June 1977 as a cub (5·3 kg) of approximately five months old. A transmitter fitted to it then was replaced by another on 5 December 1977 which performed satisfactorily until 28 February 1978, when the signal ceased. A betalight attached to the collar of the transmitter enabled further occasional sightings to be made during 1978. Throughout the period from June 1977 to the end of 1978 the badger was resident within one social group and was never located outside the territorial boundary of the group (No. 31, Fig. 1). In 1979 no sightings were made until 27 June, when the badger was captured at an outlying sett (No. 33a, Fig. 1) in an adjacent territory. It was in poor condition with large open bite wounds on the rump and several

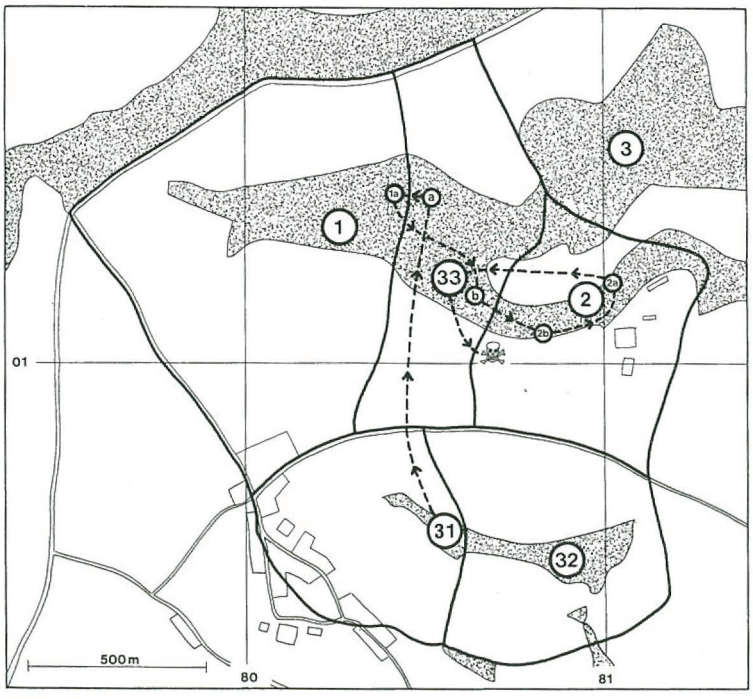


FIG. 1. Erratic movements of an ailing badger (Case 3, ♂G30) in the 22 days prior to death due to tuberculosis. Large circle, main sett; Small circle, outlying sett; ——, territorial boundary; . . . . . sequence of sett occupation (not route taken).

canine tooth punctures around the jaw. The bitten areas around the lower jaw were swollen and suppurating. The transmitter collar was missing but the badger was identified by the tattoo mark and ear tags applied when first captured. A new transmitter was fitted.

The badger's movements over the next 22 days were erratic (see Fig. 1). It used six different setts spread over three separate social group territories, never staying more than two consecutive days in one sett. Only once was another badger (an adult female) resident in the same sett (No. 2a, Fig. 1). The badger was always alone when seen foraging at night. On 20 July 1979 it was found dead under a hollow oak tree in open pasture in one of the three territories.

Post-mortem examination showed that the badger had died as a result of acute tuberculous pneumonia. Extensive tubercular lesions were found in the lungs and kidneys and in the lymph nodes associated with these organs. In addition there was a large tubercular abcess near the jaw, probably resulting from infected bite wounds. Large numbers of tubercle bacilli (confirmed as *M. bovis*) were found in the lungs and the pus from the jaw abcess.

There are no clues to why this badger should have left the social group in which it had been resident for at least two years from birth, nor to indicate when and where the extensive bite wounds on the neck and rump were received. The erratic movements observed are most atypical in our experience of badgers in this area.

Tuberculosis in cattle in the study area

All three of the infected badgers were associated with the same farm. There was no evidence of tuberculosis in cattle on this farm up to the end of 1977, even though six badgers (including cases 1 and 2) affected with bovine tuberculosis were found during 1977. There is no information available on tuberculosis in the badger population prior to 1976 when this study of badger ecology and behaviour began.

Cases 1 and 2 occurred during the period May to July 1977, sequentially using the same outlying sett located on a scrub covered bank in a field of permanent pasture. Cattle grazed this field during the period and the infectious sow in Case 1 was seen to forage within a few metres of grazing cattle on several occasions (no behavioural interaction was observed). A routine tuberculin test was carried out on the herd in August 1977 when two animals reacted. However, neither showed lesions of tuberculosis when autopsied. One of the social groups of badgers with access to the farm was removed in July 1977 after the discovery of two dead infected badgers above ground on the main sett; four of the remaining 11 badgers in this group were found to be infected with bovine tuberculosis. The sett was reoccupied and when Case 3 occurred in July 1979 was then occupied by an adult female and her three cubs (from the previous year). The territory of this small social group was one of those used by the boar in Case 3. The boar eventually died within this territory.

At the annual tuberculin test carried out on the farm in November 1979 one animal reacted. Autopsy revealed a tuberculous lesion in the lung lymph nodes of this animal and in another animal which reacted at a further tuberculin test carried out two months later.

Discussion

These findings support the view that a sick badger may sometimes leave its social group and live a solitary existence. Such an animal may be rejected by other members of the group

or experience difficulty in finding food. Tuberculous badgers do not always leave a social group since they have been found dead above ground on main setts of groups to which they were known to belong. Whether any change in behaviour increases the chances of cross-infection of tuberculosis from badgers to cattle is conjectural but it seems likely that this could be so in the confines of farm buildings.

The three examples described have some common features. Apart from living a mainly solitary existence the three badgers appeared partially to lose their fear of man. Movement into a neighbouring territory, as in Cases 2 and 3, could be an important factor in the maintenance and spread of infection within the badger population. Kruuk (1978) found that in a high density population there was little movement of individual badgers between groups and this has been confirmed in our other studies in Gloucestershire. Kruuk points out that the elimination of part of the population might well cause individual animals to range over much larger areas. The boar in Case 3 ranged over a wide area and eventually died in a territory where the badgers had previously been removed.

Case 2 illustrates that in certain situations, such as farm buildings, the chances of disease transmission could be increased. There is no direct evidence on the mode of transmission of tuberculosis from badgers to cattle though it is believed that cattle may pick up infection while grazing pasture which has been contaminated by an infected badger (M.A.F.F., 1979). It is difficult to say how important the behaviour of an infected badger might be or to know the extent of abnormal behaviour in tuberculous badgers. Out of a total of eleven badgers either found dead or *in extremis* in farm buildings in Gloucestershire and Avon from 1972 to 1980, seven (64%) were found to be infected. This is significantly higher than the overall incidence of 21% in 1139 badgers killed on the road and taken for diagnostic purposes from 1972 to 1976 inclusive, before official control measures had taken effect ($Z = 3{\cdot}44$; $P < 0{\cdot}01$) (Gallagher, pers. comm.).

On the basis of the evidence presented in this note and the records from Gloucestershire and Avon it is concluded that, in those areas there would be a higher risk of transmission of infection to cattle kept in farm buildings to which badgers are known to have access.

We are most grateful to the occupiers and landowners who gave their permission for this work to be carried out on their land and to John Gallagher of the Ministry's Veterinary Investigation Centre at Gloucester who performed all the post-mortem work.

REFERENCES

Cheeseman, C. L. & Mallison, P. J. (1979). Radio tracking in the study of bovine tuberculosis in badgers. In *Handbook on biotelemetry and radio tracking*: 649–656. Amlaner, C. J. and MacDonald, D. W. (Eds). Oxford: Pergamon Press.

Gallagher, J. & Nelson, J. (1979). Cause of ill-health and natural death in badgers in Gloucestershire. *Vet. Rec.* **105:** 546–551.

Kruuk, H. (1978). Spatial organisation and territorial behaviour of the European badger (*Meles meles*). *J. Zool., Lond.* **184:** 1–19.

Ministry of Agriculture, Fisheries and Food (1979). *Bovine tuberculosis in badgers*. Report: London.

Muirhead, R. H., Gallagher, J. & Burn, K. J. (1974). Tuberculosis in wild badgers in Gloucestershire; epidemiology. *Vet. Rec.* **95:** 552–555.

Lay Tb Testing letter to Clerk

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Our Ref:
Your Ref:
Date: 3 October 2012

Dear Stella

DARD Submission – Lay Tb Testing Pilot Post-Project Evaluation Report

The Lay Tuberculosis Testing Pilot Project started in June 2011 and was completed on 31 December 2011. Written briefings were submitted to the Committee in June 2011 and in January 2012. The Committee asked for a further update once the post project evaluation was completed.

The Pilot has been evaluated by DARD's Business Development Branch with input on the training element of the project provided by DARD's Training and Development Unit. The evaluation report has now been signed off and a copy is attached at Annex A.

The background and outcome of the Pilot has been covered in the previous updates and the Post-Project Evaluation Report is generally positive. The project satisfied the Proof of Principle objective. Although a number of recommendations have been made in the PPE, these are largely of a project management nature or procedural and no obstacle has emerged which would prevent the development of Approved Lay Tuberculosis Testers in the North, working as DARD employees. Specifically, the pilot showed that technically, Veterinary Service could train, register and deploy lay testers.

Veterinary Service will consider the report's recommendations and will endeavour to take these forward in the development of any future Lay Tb Testing training.

While the project investigated the practicalities of training and deployment of lay tuberculosis testers it did not investigate the economics of training and deployment. The economics of training and deploying lay tuberculosis testers will be addressed in a business case which will be prepared in the coming months.

I would be grateful if you would bring this to the attention of the Committee.

Should you require any further information or clarification please do let us know.

Yours sincerely

pp
Joe Cassells
Departmental Assembly Liaison Officer

Lay Tb Testing letter to Clerk Annex A

Annex A

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

Lay TB Testing Pilot Project

POST-PROJECT EVALUATION

Glossary

Acronyms used in this report

AHWI	Animal Health and Welfare Inspector
BDB	Business Development Branch
DARD	Department of Agriculture and Rural Development
DEFRA	Department for Environment, Food and Rural Affairs
OCN	Open College Network
PADT	Procurement of Animal Disease Testing (Programme)
PID	Project Initiation Document
PVP	Private Veterinary Practitioners
RCVS	Royal College of Veterinary Surgeons
REB	Resource Economics Branch
ROI	Republic of Ireland
SAHWI	Senior Animal Health and Welfare Inspector
SMART	Smart, Measurable, Attainable, Realistic and Timebound
TB	Tuberculosis
TDO	Training and Development Officer
TVO	Temporary Veterinary Officer
VOT	Veterinary Officer Testing
VS	Veterinary Service

Index

1. SCOPE OF POST PROJECT EVALUATION

1.1 This is a Post Project Evaluation (PPE) report which was commissioned by Veterinary Service (VS) Tuberculosis (TB) Section management which required Business Development Branch to deliver an independent assessment and analysis of the Lay TB Testing Pilot Project. This report will consider issues around project costs, the delivery of objectives identified in the business case, project benefits and their management, the delivery and governance of the project, any emerging lessons learned and recommendations for future work.

1.2 In order to complete this evaluation report BDB consulted with colleagues mainly from within VS including management and staff with key roles within the Project (administrative, veterinary and field staff).

1.3 Our approach was to consolidate available management information to build as complete a picture as possible. Where detailed information was not available, this is highlighted in the report.

2. BACKGROUND

2.1 Veterinary Service, TB Section, HQ Branch is located in Dundonald House. It has two broad functions:

1. Management of TB Programme Delivery
2. Provision of advice to Policy Colleagues

2.2 This is achieved through

- Maximising the quality and effectiveness of the Programme delivery through good planning, training, application of challenging standards, audit and management;
- Meeting DARD's target to achieve and maintain annual EU approval for the NI TB Eradication Programme (to ensure optimum funding is received from EU); and
- Provision of quality advice to Policy colleagues.

It is the long-term objective of the Department of Agriculture for Rural Development (DARD) to eradicate bovine tuberculosis from the cattle population of Northern Ireland. In 2009/10 the TB Eradication Programme cost £23m. The main component of the cost relates to animal testing. For instance, TB testing is mainly carried out by Private Veterinary Practitioners (PVPs), who conducted approximately[1] 1,907k bovine tests in 2011/2012, at a cost of approximately £6.5m[2] per year. In addition to the PVPs, DARD's Veterinary Surgeons test approx. 524k bovine tests per year, and these staff cost DARD in the region of £1.36m million for 2011/12, including full employment costs and travel and subsistence. The testing equates to around 1,273k animals[3] tested in 2011/12 by PVPs and 350k animals tested by DARD Veterinary Surgeons. DARD's current approach is to use its veterinary staff resource mainly for surveillance of herds where disease is present. These herds are restricted i.e. cattle movements

[1] Based on DARD data between 1/4/11 and 31/3/12

[2] Annual costs vary based on the number of bovine tests carried out by PvPs

[3] The number of animals tested is smaller than the number of bovine tests carried out as an animal may be tested more than once.

from these herds are only allowed direct to slaughterhouses under licence by DARD.

2.3 The Veterinary Surgery (Testing for Tuberculosis in Bovines) Order 2005 came into force on 15th August 2005 and operates in Northern Ireland (NI). This Order specifies tuberculosis testing of bovine animals as a test to which the prohibition of the practice of veterinary surgery by persons other than veterinary surgeons in section 19(1) of the Veterinary Surgeons Act 1966 does not apply. Effectively, this means that the physical conducting of the bovine TB test (i.e. the administering of the tuberculin into the animal, the observing and palpating of lumps, and their measurement) does not have to be carried out by a Veterinary Surgeon. However, the legislation (as it currently stands) means that a DARD Veterinary Surgeon must interpret the test results and issue the appropriate notification, if necessary, to the herd-keeper, e.g. notice for the compulsory slaughter of animals testing positive for presence of the disease, and other herd restrictions as deemed necessary.

2.4 In Great Britain, the Department for Environment, Food and Rural Affairs (DEFRA) piloted Lay TB Testing in England from May 2005 to June 2006. Unlike Northern Ireland, one of the main drivers for the DEFRA pilot was that there were insufficient numbers of qualified vets in some areas to carry out TB testing.

2.5 The findings of the DEFRA pilot were interesting for DARD. The design of the pilot training had to be similar to the DEFRA model to ensure that DEFRA and RCVS would be satisfied and would endorse it. The training also had to meet the needs of the NI TB Eradication Plan, for example, with it different testing intervals and in the way herds are confirmed with TB (incorporating different laboratory and abattoir data). The driver for DEFRA introducing lay testing was insufficient numbers of qualified vets whereas the drivers for DARD are efficiencies, including for example, exploring the potential for a more efficient utilization of the Animal Health and Welfare Inspector (AHWI) resource. There were a number of useful points in the evaluation of the DEFRA Pilot Project and the overall findings of the DEFRA pilot were positive.

2.6 The Lay TB Testing pilot in GB ran from 20th May 2005 until 30th June 2006. Lay testers have been deployed in GB since that date although DEFRA are having ongoing discussions with the Commission on their use. The European Commission has accepted DEFRA's approach on training, veterinary supervision, quality assurance and audit. The Commission also accept the principle that properly trained and supervised technicians could do a good job and are acceptable for all TB herd tests. The pilot yielded 100+ dedicated lay testers trained and deployed in England and Wales.

3. DESCRIPTION OF THE PROJECT AND APPRAISAL HISTORY

3.1 The Lay TB Testing pilot project was a proof of principle project which also tested the detail through implementation. Specifically this pilot project investigated whether a very small number (3) of AHWIs from within Veterinary Service could be trained to carry out TB Testing and after registration as approved Lay Testers, be deployed in the field. It was considered that such a project would be useful in feeding valuable data/insights into any future consideration of whether TB lay-testing should be, or could be, rolled out in NI.

3.2 Current arrangements for TB testing in NI rely mainly on the use of PVPs at a cost of approximately £6.5 million per annum. Departmental Vets (VOTs and TVOs) carry out the remainder of testing, their focus being mainly on restricted herds.

3.3 The Lay TB Tester role, on deployment, would replace only the 'on-farm' element of carrying out the TB test. Legal requirements mean that a veterinarian's input is still required to interpret test results and take decisions relating to follow-up work with regard to the herd, as necessary.

3.4 The pilot involved the development of an externally approved training course for Lay TB Testers. The course was based on the DEFRA course and as with the DEFRA, it was developed in close consultation with the Royal College of Veterinary Surgeons (RCVS). Open College Network (OCN) Skills accreditation was also sought. The rationale for this stems from 'Professional skills in Government' a top down approach in the UK Government's approach to skills development and is mirrored under the NICS training and development strategy[4]. The approach aims to create a more systematic and consistent approach to skills and career development and building capacity in operational skills. Accreditation also rewards individuals by providing credit for skills and training.

. There are some differences between the DEFRA course and the DARD course, which are outlined in **APPENDIX A** to this PPE.

[4] Skills Strategy for Northern Ireland: November 2004 *and* Northern Ireland Civil Service Training and Development Strategy 2006-2009

3.5 The pilot project involved the recruitment, training, approval and registration of three trainees. All three trainees successfully completed the classroom and field training elements before approval and registration. Within the 6 month period set aside for the Pilot Project, there was some time left for two of the three trainees to be deployed in the field post-completion of their training (i.e. post-registration with OCN which is achieved after completion of both the classroom and field experience elements). The third did not have sufficient time after registration to be deployed before the end of the project.

3.6 Although not an objective, the pilot project also afforded the opportunity to introduce and test a new mobile technology product i.e. a Personal Digital Assistant (PDA) known as the Trimble (see Para. 7.3.2).

3.7 There were a number of Strategic Objectives and drivers which contributed to the decision to undertake the Pilot Project at this time. They are detailed in the Business Case and include:

i. Draft DARD Budget 2011-15;
ii. DARD PSA Delivery Arrangements 2008-2011;
iii. DARD Strategic Plan 2006-2011; and
iv. Recommendation 10 of 2009 PAC Report on TB.

3.8 The outcomes of this Pilot Project will be used to inform the process of wider consultation on the use of TB lay testing and the decision making process regarding the potential for use of lay testing in the future.

Original Business Case

3.9 A Project Initiation Document (PID) was prepared initially (version 0.1 was dated 21/4/11 and a final version agreed on 9/9/11). A business case was then developed (although some elements of the pilot had commenced by that stage). **Lesson learned:** VS should factor in sufficient time for proportionate appraisal to be completed, in addition to a PID document, in advance of any project commencing. The two options considered in the business case were:

3.10 **Option 1:** Base case - Continue as before, i.e. continue to use veterinarians to test bovines for TB.

Option 2: Carry out a pilot of DARD's ability to develop and deliver a quality assured, accredited training programme, resolve any legal issues, select and train Lay TB Testers, and deploy them in the field (for the limited period of the pilot) when they have completed their training and have been approved and registered.

3.11 The pilot project was delivered over approximately seven months, generally following the timeline detailed in the Project Initiation Document (PID) in the Key Milestones section. Some slippage did occur at certain stages, but the pilot did conclude on 31/12/11 as originally planned.

4. PROJECT COST AND PROJECT COMPLETION DATE

4.1 The project was a pilot to develop and deliver an accredited TB test training course for non-veterinarians, and to test if approved Lay TB Testers could successfully undertake TB testing in the field. **TABLE 1** provides a summary of the key projected target dates, and the actual outturns.

TABLE 1 PROJECTED AND ACTUAL DATES OF THE LAY TB TESTING PILOT PROJECT

Target	Projection in EA	Actual	Variance (working days)	Comment on variance
Pilot start date	01/06/2011	02/06/2011	1	No evidence on file as to the start date variance
Pilot end date	31/12/2011	31/12/2011	0	
PPE to be completed	29/02/2012	06/04/2012	27	PPE was completed with an agreed delay between VS and BDB due to other DARD work priorities

4.2 The actual cost information provided in **TABLE 2** on the following pages reflects expenditure for the short pilot project. Variance in the actual costs when compared to the projected cost information mainly reflects additional expenditure associated with equipment and extra travel and subsistence expenses for trainees.

4.3 The costs detailed in the original business case for the pilot project are shown in **APPENDIX B**.

TABLE 2 TABLE DETAILING ACTUAL COSTS VS PROJECTED COSTS AS PER ORIGINAL BUSINESS CASE

		Additional cash cost, or opportunity cost?	Projections in EA	Projections in EA	Actual outturn	Variance	Reason(s) for variance and lessons learned	Additional notes
COST ITEM	**Assumption in EA**		**3 trainees**	**10 trainees**	**3 trainees**			
Cost of developing training course	3 Vet. Officers taking 5 days each, assuming annual full staff cost of £73,251 divided by 211 to get daily charge of £347	Opportunity cost	5,207	5,207	see total in row 5		Costs per student would however decrease in a rolled out implementation phase - also in a roll out phase there would be minimal development costs	Full staff costs - column three of ready reckoner - VS ready reckoner used TRIM REF DA1/11/406513 Costs of VO involved met expectations
Cost of tutors to undertake the classroom training	3470 for two tutors for 5 days... 8675 for 5 tutors for 5 days	Opportunity cost	3,470	8,675	see total in row 5		Original thinking for pilot was informed by experience of DEFRA - more tutors were required to bring in a wider range of subject areas and the different style of training in our pilot . We have learned that the training course required 5 tutors. The orginal tutor estimate therefore was unrealistic .	Full staff costs - column three of ready reckoner - VS ready reckoner used TRIM REF DA1/11/406513
Subtotal			**8,677**	**13,882**	**7,563**	-1,114		

		Additional cash cost, or opportunity cost?	Projections in EA	Projections in EA	Actual outturn	Variance	Reason(s) for variance and lessons learned	Additional notes
COST ITEM	**Assumption in EA**		**3 trainees**	**10 trainees**	**3 trainees**			
Cost of classroom training - trainee related cost	3 gp 2s at 5 days each (37166 full staff cost and 176 daily cost) Trainee T&S for classroom element now included	Cash cost	2,640	8,800	3,129	489	T&S costs will vary widely per trainee depending on their home location	Full staff costs - column three of ready reckoner - VS ready reckoner used TRIM REF DA1/11/406513 Assumed costs of handouts were De Minimus
Cost of hiring a venue for classroom training	No cost as free classrooms at Greenmount will be used for the classroom training and elements of the field training	Opportunity cost	0	0	0	0	No variance	While it can be assumed that there will be no costs associated with internal training it would remain a risk to the programme if the accommodation was not available therefore this should be included in a roll out risk log.
Cost of OCN fees for accreditation of the training course	Estimated to be £250 (based on quote from OCN certificates each are £15 - registration is £67 each) OCH licence is paid by VS regardless of pilot	Cash cost	250	250	250	0	No variance	Further quote can be obtained within a roll out phase.
Cost of staff liaising with, and co-ordinating the trainees during the field training	1 Group 4 staff member, for 2 days per wk, for 5 months @ full staff cost of £47314, converted to daily rate of £224	Opportunity cost	8,982	8,982	8,982	0	It is not known if there will be economy of scale in any roll out /implementation phase and this aspect could be further monitored in a second phase	Full staff costs - column three of ready reckoner

		Additional cash cost, or opportunity cost?	Projections in EA	Projections in EA	Actual outturn	Variance	Reason(s) for variance and lessons learned	Additional notes
COST ITEM	**Assumption in EA**		**3 trainees**	**10 trainees**	**3 trainees**			
Cost of Veterinarian staff supervising trainees during field training	No additional cost - it is assumed that the supervision of a trainee will not slow down the testing throughput of herds/animals to any significant degree	Opportunity cost	0	0	0	0	While no additional supervision costs were attributed to the cost of the pilot any future implementation should monitor this aspect where there are more trainees to be supervised to see that this holds true in a scaled up version	
Extra travel and subsistence expenses for the trainees visiting farms for TB testing	Estimated to be £2,000 per trainee based on assumption in EA of 1,200 miles	Cash cost	6,000	20,000	6,829	829	There may have been further costs in T&S if one trainee had actually been deployed beyond field experience. Additional travel required for 2 trainees during field training in order for them to see the required number and type of reactors.	Deployment was only more fully considered as the success of the training was assessed - therefore the actual costs at the outset would not have been fully taken into consideration -
Extra travel and subsistence expenses for the supervision of field staff	Estimated to be £540 in total	Cash cost	540	540	416	-124	Less T&S required for trainers than anticipated.	As above - deployment was more fully considered as the pilot progressed and training was successful
Cost of temporary promotion of trainees during the pilot	Estimated to be £1,000 per trainee. AHWIs are currently normally graded as Group 1 staff, and their full staff cost to DARD is £35138/yr; Group 2 full staff cost is £37,166 therefore difference in cost is £2028 ; Lay testing staff in DEFRA are on salary scales that equate to Group 2 staff, which cost DARD £37,166/yr. Bearing in mind that the pilot is to run for an 6 month period, the additional cost to DARD per trainee will, on average, be: £ 1,000	Cash cost	3,000	10,000	3,000	0	Costs associated with temporary promotion can be accurately assessed and measured	

		Additional cash cost, or opportunity cost?	Projections in EA	Projections in EA	Actual outturn	Variance	Reason(s) for variance and lessons learned	Additional notes
COST ITEM	**Assumption in EA**		**3 trainees**	**10 trainees**	**3 trainees**			
Cost of supplying the new trainees with the necessary equipment to carry out testing	Trainees each will need: a Trimble (£1,130 each), mclintock syringes, scissors, callipers and holsters (these last three were loaned for pilot so no cost to pilot) There are no more Huskies. Trimbles are the only PDAs available for this purpose now. While the replacement of the PDA was recognised early on in the project the difference in price was not fully anticipated.	Cash cost (opportunity costs of equipment)	3,490	11,633	8,685	5,195	Underestimated cost of Trimbles at EA stage - Original estimate was based on consideration of huskies - these were cheaper but of lower specification - note pilot was supposed to be about proof of principle ie whether or not a PDA could be used in the lay testing environment - all equipment was actually loaned to trainees and returned to stores following the pilot	Any further equipment costs can be recalculated for any roll out business case and applied across the projected number of staff.
		Total	**33,579**	**74,087**	**38,854**	**5,275**		

Actual staff time costs are based on feedback from VOs as not all record their time on TARDIS. Also there was an assumption made that the veterinarians who supervise the trainees during their field training will not be an additional cost because they will be carrying out the same number of tests they would have been doing as part of their normal work activities.

5. PROJECT OBJECTIVES

5.1 The original economic appraisal said that the overall aim of the pilot Lay TB testing Project was to recruit, train, register and deploy 3-10 AHWIs as Approved Lay TB Testers before the end of December 2011. **TABLE 3** on the following pages summarises the targets, aim, objectives, outcomes and lessons learned:

Targets	Projection in EA	Actual	Variance (working days)	Comment on variance	Lessons learned
Pilot start date	01/06/2011	02/06/2011	1	No evidence on file as to the start date variance	
Pilot end date	31/12/2011	31/12/2011	0		
PPE to be completed	29/02/2012	06/04/2012	27	PPE was completed with an agreed delay between VS and BDB due to other DARD work priorities	
AIM					**Lessons learned**
To recruit, train, register, and deploy 3-10 AHWIs as Approved Lay TB Testers before the end of December 2011	3-10 AWHIs **trained** by 31/12/11	3 AWHIs trained	Achieved	All AHWIs were given the opportunity. 30+ applied and 3 were approved for entry into pilot	The positive take up of this opportunity should be built on in any roll out and into feedback to stakeholders esp. TUS (Positive communication has already taken place in DARD Bizz)
	3-10 AWHIs **deployed** by 31/12/11	2 AWHIs deployed	Out of range of target	The 2 staff that were deployed finished their training on 11/11/2011 and 09/12/2011 - leaving 32 and 12 working days for deployment (effectively less as Wednesdays are not normally used for testing and 29 and 30 December were effectively unusable - one took longer to view the required number of reactors of the required types, and did not finish his training until 29/12/2011 leaving insufficient time for deployment before the pilot ended. AWHIS were not expected to carry out any Gp 1 duties on a non test day eg Wednesday. Some TVOs carry out testing on a Wednesday and therefore on occasion the trainees did go out testing on a Wednesday - these tests were followed up on a Saturday. Examples of duties typically carried out on a Wednesday would include paperwork associated with the tests.	Deployment timescales need to be properly factored into the implementation phase Wednesday is not normally used as a test day due to the nature of the TB test process

Objectives	Projection in EA	Actual	Variance	Comment on variance	Lessons learned
To develop an externally approved training course on Tb testing for non-vets, and achieve external validation of the course by the Royal College of Veterinary Surgeons and Open College Network (OCN) by May 2011	by end of May 2011	Fully met	none	N/A	This highly positive aspect of the project has been communicated to TUS and has been communicated to all staff through *DARD Bizz*
Recruitment of 3-10 trainee Lay Tb testers from among AHWIs within Vet. Service by July 2011	3 - 10	3	Achieved	See explanation above.	Twenty seven candidates applied for the Lay Testing pilot opportunity. The competition was run using normal NICS procedures with selected based on merit. Three candidates were accepted for entry to the pilot. The specific number of pilot trainees was based on DARD pressures on Group 1 resource - at the time of selection there were additional pressures on Group 1 resource from the DARD LPIS project.
Successful completion of the approved training course by the trainees by Oct 2011 - the approved training course includes the classroom element and the field experience.	Registration by Oct	Dates of registration were 11/11, 9/12, 29/12	Outside projected date	Timescale overrun - Timescales for candidates completing the training (classroom and field work) were unrealistic in the Economic Appraisal.	We have learned that it takes longer than originally anticipated to see the required amount of different types of reactors and this will be taken into account in the design of any subsequent roll out.
Any deployment is to be completed by 31/12/2011 (deployment is defined as testing without supervision following registration)	3	2	-1	While deployment was not originally a fully defined target - one was not deployed as no time to deploy him.	

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Outcomes	Projection in EA	Actual	Variance	Comment on variance	Lessons learned
Better understanding of the costs that could be involved in rolling out Lay Testing		Only partly achieved	Part of this work lies in a further implement ation phase	The reference to costs here was in regard to the **type** of costs involved not the detailed costs down to the level of comparing costs of lay testers to costs of PvPs for example	This was not fully possible given the nature of the pilot . The pilot was not compare PvP costs with for example lay testing costs per test at this stage - the pilot a technical proof of principle that Gp staff could be trained. We now have a better understanding of the type of costs of training but we do not at this stage know more about the difference in cost between using lay testers and vets. We will be addressing this issue in a full EA which will now follow.
More informed consultation with industry, farmers and vets.		Only partly achieved	Part of this work lies in a further implement ation phase	VS consulted at all times with the internal stakeholders - eg Policy and TUS. External consultation was not a formal part of the pilot - however all aspects of the pilot will inform any such future consultation	The outcomes through the PPE and quality assurance exercise will be available for any consultation exercise subject to Ministerial agreement.
The grading of the lay testing post will be undertaken by Business Development Branch as part of the evaluation process	During PPE process	Achieved	Outcome was after pilot finished	Grading for pilot was assumed to be Group 2 and this was confirmed after pilot has finished	A job description for official grading has been progressed with BDB - agreed with Trade Union Side. Grading advice has been provided by BDB
					An additional lesson learned lies in and around the area of striving to have a more definitive and measurable outcome for a pilot - there could have been better clarity about what could have been realistically achieved in a pilot and what could only be achieved in a roll out or scaling up phase.

6. FINANCIAL PROJECTIONS (profitability, main assumptions – revenues, costs etc)

6.1 This pilot project involved a total capital expenditure of £8,685 compared to a projected cost of £3,490. The recurrent/revenue costs were £30,169 compared with £33,579, The recurrent costs are attributable in the main to staff costs and travel and subsistence costs for trainers and trainees.

6.2 As this was a pilot / 'proof of principle' project, there were no ongoing recurrent/ revenue costs.

7. BENEFITS (including comment on any unforeseen benefits)

7.1. Benefits Identified in the Business Case

As this is a pilot project, the associated expenditure is not a benefit in itself but has enabled the 'Proof of Principle and the detail of implementation' to be tested over a short period of time.

7.1.1 The business case detailed seven key benefits for the pilot project to realise. These were:

1. **Consultation benefits:** Discussions and negotiations with key stakeholders, such as TUS and industry will have been opened and some of the initial concerns and fears will have been allayed.
2. **Better informed future consultation, including information presented in any consultation documentation (if it is decided to roll out a lay testing approach):** The consultation document for a full scale consultation process will be much better informed and therefore stakeholders in the wider industry will be able to give better informed feedback.
3. **Better informed decision making:** Senior management will have better information available when making key decisions, formulating recommendations, briefing the Minister and seeking Committee approval.
4. **Identification and resolving of implementation problems:** Many of the problems and issues of full scale roll-out will have been identified and resolved.
5. **Training course development:** An accredited training course and training materials will have been developed and be available.
6. **Logistical solutions developed:** A system will have been established for allocating tests to trainees, supervision and evaluation will have been developed.
7. **Improved understanding of costs:** There will be a much better understanding of the costs of training and roll out.

7.1.2 The benefits detailed in 7.1.1 were not developed into a Benefits Realisation Plan. Measurement of whether benefits were achieved was not always straightforward particularly as the benefits were not SMART. As a consequence

qualitative analysis was possible for some, but not for all of the benefits, and where quantitative analysis has not been possible, qualitative/anecdotal evidence is provided. That said, consensus of staff involved at various points in the project indicate that the benefits have generally been achieved.

7.1.3 Although there was no empirical data available in relation to many of these benefits, the delivery and evidence of them will form a valuable foundation should the decision be taken to 'roll-out' Lay TB Testing. The success of the benefits detailed in the Business Case could be evidenced as such:

1. **Consultation benefits:** BDB have been informed that regular meetings were held with TUS and other relevant stakeholders throughout the course of the pilot. This helped ensure understanding and buy-in to the pilot and the minutes of these meetings show support for the pilot. The Project Team also kept in regular contact with the RCVS and the OCN throughout, developing and maintaining a good working relationship with both of these institutions. This aided the development of the training course to meet the requirements for accreditation.
2. **Better informed future consultation information:** The information gathered and the lessons learned during the pilot will be used to inform the drafting of a consultation document on the introduction and use of Lay Testers in N Ireland. This consultation is expected to proceed later this year.
3. **Better informed decision making:** As above. The pilot has enabled VS management to explore the principle of Lay TB Testing in Northern Ireland i.e. the development of a training programme, training and deployment and the associated logistics and policy issues. Should the pilot proceed to full roll-out, significant information is now available which can be further refined to implement lessons learned, therefore providing an opportunity to optimise the resource to meet business need.
4. **Identification and resolving of implementation problems:** Any issues that became apparent during the course of the pilot were dealt with and lessons learned from this can be applied to any future roll out. This was a useful outcome of the Pilot.

5. **Training course development:** A very comprehensive training programme was developed involving both classroom and field elements (the full post course training evaluation is shown in **APPENDIX C**) . The training was accredited by the OCN and formally agreed by RCVS on 8 June 2011 and 8 November 2011 respectively. This can be used to train future Lay Testers, although some further refinement may be necessary particularly with regard to the field training element (see para 9.4).
6. **Logistical solutions developed:** A system was developed to allocate tests to Lay TB Testers which did prove to be problematic in some cases particularly in the area of targeting of tests and timing issues. It was recognised that tests to be completed by Lay Testers should not be allocated until the trainee is 'approved'. This is discussed further in the 'Considerations for Future Work' section, para 9.5.
7. **Improved understanding of costs:** The pilot has provided very useful baseline information relating to human and monetary resource required to run this small pilot. The actual costs can now be further analysed by VS and extrapolated to develop full 'roll-out' estimates if and when the time arises. The staff resource involved in the development of the training programme was significant, involving two of the Department's veterinary staff. The development of the training programme was a 'one-off' and it will not be necessary to repeat this element of resourcing unless additional veterinary tests, other than Lay TB Testing, are explored for 'roll-out' to Lay Testers and consideration given to the mechanism for refresher training. However, trainers will need to spend some time amending the training material in light of experience in delivering the training programme and in the light of comments from trainees. Consideration should also be giving to resource implications if legislative change or a change in operating procedures necessitates a revision of the training programme. In the event of full 'roll-out' of Lay TB Testing, a significant resource would be required to deliver training and mentor the numerous trainees. Costs associated with field training could be revisited in parallel with better targeting of field training to areas with a higher incidence of TB reactors.

7.2 Monetary Benefits

This project in itself does not deliver monetary benefits, but instead forms a future basis for better informed decision making, most notably as to whether there should be a further roll-out of Lay Testing in N. Ireland.

7.3 Additional, Unforeseen Benefits

A number of benefits emerged throughout the lifetime of the short pilot project that were not anticipated at the time the original business case was developed. These are outlined below.

7.3.1 Resourcing

7.3.1.1 Career Development

The project provided a development opportunity for the three AHWIs involved. During the project the Trainee Lay Testers were temporarily promoted to the Senior Animal Health and Welfare Inspector (SAHWI) grade (Inspector Group 2). They were afforded the opportunity to develop and implement a range of new skills and knowledge following completion of the accredited training programme. This opportunity was welcomed as indicated by evidence provided through interview.

7.3.1.2 Training Resource

Veterinary Service employed internal resource to develop and deliver the accredited training course. Existing Departmental resources were also used to mentor and coach the Trainees as required and to undertake the field training element. Because existing Departmental veterinary resources were employed this provided an opportunity to make maximum use of skilled staff while removing the necessity to procure expensive training services from outside the Department.

7.3.2 Technology

7.3.2.1 Equipment

As part of the pilot a new mobile Personal Digital Assistant (PDA) device was used to capture results in the field and upload DARD systems. The costs identified in the business case were based on the purchase of the Huskey device, but a new

Trimble device already available through the TB programme was used instead. The Trimble device is considered to be future-proofed and has the potential to be used more widely than for solely TB in the field. The Huskey, however, is tried and tested, is robust in field conditions, is smaller and more compact.

Lesson learned: in any roll out phase a TRIMBLE will be used as this is now the accepted hand held device in use within the TB programme and is viewed as meeting the needs of TB testing.

7.4 Disbenefits

7.4.1 Relationships

The pilot has identified the possibility of resistance to change within the Veterinary Service regarding the introduction of the Lay TB Testers. It is common within any organisation undergoing a period of change, to experience an impact upon the morale of staff. By way of illustration, Mullins (Management and Organisational Behavior) writes: 'the forces against change in works organisations include: ignoring the needs and expectations of members; when members have insufficient information about the nature of the change; or if they do not perceive the need for change. Fears may be expressed over such matters as employment levels and job security, deskilling of work, loss of job satisfaction, wage rate differentials, changes to social structures and working conditions, loss of individual control over work, and greater management control.'

Lesson learned: Strategies to manage such resistance to change should be considered as part of any change management process. The outworking of this pilot project has negatively impacted on VOT morale. In addition the pilot has impacted on the external DARD-PVP relationship. The Department relies on PVPs to deliver a number of services, one of which is TB testing. Anecdotal evidence suggests that PVPs are apprehensive that a decision will be taken to 'roll-out' Lay TB testing or to increase further the scope of tests to be delivered by Lay Testers. If the Lay TB Testers Project is to be further rolled out in the future, consideration will need to be given as to how best manage the expectations of current staff and relevant stakeholders through the change process.

7.4.2 Work Scheduling for Lay TB Tester

The requirements of the delivery of the TB test are such that the two intra-dermal injections take place on day one and results are read on day four. On the ground this generally translates to visiting herd keepers on Monday and Tuesday to carry out part 1 of the test i.e. perform injections, and re-visiting these herd keepers on Thursday and Friday to read the respective results. The consequence of this work pattern is that on a Wednesday, a Lay TB Tester is not involved in testing or reading results 'on-farm' and so in effect there is a 'down day' from TB testing. During the pilot, these days were used by the lay testers to gain more knowledge about TB breakdowns and investigations. There was also some opportunity to observe DARD Veterinary Surgeons testing.

Lesson learned: This issue would have to be explored further in the consideration of any further roll-out. Already, the identification of other job activities and rescheduling of work is being further explored in a parallel but separate exercise through Job Evaluation and Grading of the Lay TB Tester role.

7.4.3 Time required to complete testing workload during field training

Anecdotal evidence provided through interview indicated that in some cases during the field training aspect of the pilot, the time taken to carry out the tests 'on-farm' involving the trainee was extended and took longer than usual. This was to be expected and takes account of necessary, additional time to interact with the Trainee when administering the test on day one and reading and interpreting the results on day 4. Survey data, including comments provided in a survey conducted with customers by VS (**APPENDICES D & E**) corroborates the anecdotal evidence provided by staff. The time increase impacted the farmer and the testing veterinarian, potentially impacting on the payment of the TVO/VOT (paid on a headage basis rather than a daily rate) i.e. more time required to complete the tests to receive the same level of payment.

Lesson learned: Unfortunately, quantifiable time data relating to this was not collected as part of the pilot, however, when considering any further roll-out DARD will take cognizance of this issue, and will endeavour to seek further feedback from supervising veterinarians, and pilot trainees to get an approximation for the additional time taken.

That said, anecdotally, DARD did acknowledge that one advantage of using internal Group 1 staff for the Pilot was that they were accustomed to dealing with cattle in their normal duties, and were very comfortable with the cattle handling issues, so the additional time taken for the TB testing probably was not what it might have been if staff had not had previous cattle handling experience, and this will be factored in to the consideration of any roll-out.

7.4.4 BR tests Backlog

During the project, a backlog of BR tests developed. The backlog of BR tests was in the DVO areas of those staff participating in the pilot project. Anecdotal evidence would suggest that the BR tests were not reallocated to other AHWIs effectively, therefore resulting in the development of backlogs to be cleared by the Lay Testers on return to their 'normal' AHWI role.

Lesson learned: in any future roll-out, the knock-on effect of possible recruitment of staff into a lay testing role on other DARD work areas would have to be assessed, and mitigation strategies developed.

7.3.5 Technology Failure

The project provided the opportunity to pilot the new PDA – the Trimble device. On at least one occasion, there was technological failure and the Lay Tester was unable to upload results. There was no data lost in this incident and following insertion of a new 'chip' the data was fully recovered. The other PDAs were retro-fitted with new chips.

Lesson learned: The chosen technology was fit for purpose and meets DARDs needs - therefore TRIMBLES will feature in any roll out of lay testing.

8. MAIN LESSONS LEARNED

8.1 Project Implementation

8.1.1 Scoping of the Project

The Lay TB Testing pilot project had a clearly defined objective but a short timescale in which to deliver. During the interviews undertaken with staff involved in the project, it was suggested that the scale of the project had been underestimated. As the objectives and tasks within the project were defined, it became apparent that further resources in numbers of staff involved and staff time would be required to ensure the successful completion of this project within the timescale.

The project would have benefitted from a scoping exercise to establish the scale and complexity of requirements. This would have helped set the direction of the project and help shape the roles, responsibilities and governance arrangements for the project at an early stage.

Lesson learned – Carry out a scoping exercise at the project initiation stage to fully establish all aspects of the project required to successfully fulfill the project objectives.

8.1.2 Governance arrangements

At the outset of the project a Project Team and Project Board were established. The Project Board was encompassed in the function of the Procurement of Animal Disease Testing (PADT) Programme Board. The Project Team met regularly, generally on a monthly basis and their work was supported and supplemented by the establishment of several separate working groups e.g. TUS and the Communications Sub- Group. A detailed Project Initiation Document was prepared. However, not all project management governance documentation was in place. Indeed the project was well commenced before a business case was prepared. A formal risk register was not maintained throughout the project although risk monitoring was reported as part of the regular update provided to the monthly Project Board meeting. Evidence provided by staff involved in the project

indicated that, although a project team was established, the project roles were not clearly defined, but became clearer as the project progressed. There were regular project team meetings throughout the lifecycle of the project at which feedback and progress updates were reported. The project team meetings were used to highlight and address risks but no formal risk register was developed or maintained during the project.

Lesson learned – Clarity in the definition and understanding of project roles is an essential requirement for all projects.

Lesson learned - Develop all relevant project governance documentation, including the business case before the commencement of the project.

8.2 Training

A separate evaluation of the development and delivery of the training was carried out by DARD Training and Development Officer (TDO). There are some areas of overlap between those covered in the training evaluation report and those detailed and discussed in this section of the report.

8.2.1 Trainees

The sample size of three trainees, participating in the project, was very low from a statistical analysis viewpoint. Unfortunately this was necessitated by coincidental and competing high Departmental priorities for the staff resource. The pilot would have benefitted from a larger number of trainees to enable wider development and consideration of factors and procedures to be investigated e.g. actions to be taken in the event of failure to complete the training programme or the inability to satisfactorily carry out the full range of responsibilities or poor performance etc. That said, evidence gathered through interview suggested that internal systems could not have provided the necessary support to any additional trainees, in particular the field-training element in the pilot project timescale. In conclusion, VS management were content with the sample size of trainees in the project.

Lesson learned – Statistical guidance on sample sizes should be sought before commencement of any project.

8.2.2 Practical Experience

An opportunity to improve the practical element of the training exists to develop competence and confidence in basic practical skills of the trainees before deployment. Through interview, it was noted that an opportunity to improve the practical skills of trainees in e.g. clipping and a method/facility to practice the intra-dermal injection procedure would be very advantageous prior to deployment. The former could be quite easily implemented e.g. using the Greenmount herd, although the latter may prove much more difficult. This observation concurs with the recommendations identified in the Lay TB Testing Pilot Post Course Evaluation Report.

Lesson learned – Review of practical training to include some pre-deployment training to develop basic practical skills including animal clipping would be advantageous.

The course requires trainees to observe a specific number and type of reactors, as agreed through consultation with the RCVS. This proved more challenging than expected for two of the three trainees. Generally the field training element should be better targeted taking account of seasonal variation and known high incidence areas in NI. Also consideration should be given, if possible, to include the observations made involving infected animals during a visit to ROI (visit was part of the classroom training element). This potential resource would be, particularly useful to observe for the less common reactions.

Lesson learned – Improved and better targeted field training for trainees on a peak seasonal basis and to areas where known incidence of TB is higher would be preferable.

Lesson learned – Now that Veterinary Service are fully aware of the facilities available at the ROI TB Research facility, this can now be integrated into future Lay TB Testers training courses.

The limited survey data provided by customers, relating to the Lay TB Testers (accredited and deployed), expressed satisfaction in the delivery of the test by the Lay Tester. There were no references made to the speed and throughput of the cattle during testing unlike feedback received relating to field-training (see para 7.4.3).

8.2.3 Field Training – Internal Feedback

In agreement with the recommendation of the Lay TB Testing Pilot Post Course Evaluation Report, it was apparent that no formal feedback mechanism was in place for the veterinary staff overseeing the field-training of the Lay TB Testers. Feedback was unstructured and often provided informally if at all.

Lesson learned – The need for improved communication through development of a feedback mechanism, for veterinary staff overseeing field-training, should be revisited and implemented if roll-out of Lay TB Testing proceeds.

8.3 Other

8.3.1Staff

This project involved a number of people in key roles who were involved to some extent as a result of personal choice. A favourable outcome was more likely as a result of this factor. Specifically the trainee Lay Testers were recruited following an application process which resulted in a period of temporary promotion to the higher SAHWI grade whereas other individuals involved generally volunteered. A number of staff involved in the training aspect of the pilot project did so voluntarily. During interview with some of those involved it was indicated that this project had been viewed as a development opportunity and therefore they may not volunteer again. Consideration should be given to factoring the training of Lay TB Testers into regular work activities of relevant staff. If the same level of co-operation and “good will” is not forthcoming in any further roll out of the Lay TB Testing project,

Veterinary Service may encounter issues with staff motivation and capability. This will have to be managed through proper performance management procedures.

Lesson learned – DARD staff are a key resource and their 'good will' impacts positively on the delivery of a project.

8.3.2 Test Allocation

A system to allocate tests to accredited Lay Testers was developed and implemented in the project. There were a number of difficulties with the system, most notably that all of the trainees did not complete the field-training element of the training as quickly as expected. As a direct consequence tests were allocated to the trainees before they had completed field-training.

Lesson learned – Test allocation to Lay Tester should coincide with the successful completion of training programme and therefore accreditation.

9. CONSIDERATIONS FOR FUTURE WORK

9.1 A number of recommendations for future work to further inform the pre and post decision making process whether to implement Lay Testing in N Ireland are outlined below. The decision as to whether to implement Lay Testing in Northern Ireland would be taken following a public consultation exercise.

9.2 The benefits associated with this and future projects should be easily measured. Baseline information/data must be gathered so that meaningful comparison data can be gathered and analysed in the lifetime of the project. This pilot has provided a starting point for establishing such a baseline. This approach will ensure that reliable, quantitative data is available to management to monitor project progress against targets at key milestones. Examples of the type of data to be measured can be found within the DEFRA Lay TB Testing Pilot, Pilot Report and Review. In this DEFRA have collected quantitative information regarding:

- Total number of TB tests undertaken by Lay TB Testers
- How many herds tested by Lay TB Testers
- How many reactors and inconclusive reactors were viewed and measured by Lay TB Testers
- How many solo tests were carried out by Lay TB testers: and
- Time spend, in hours, of those staff administering the project, delivering the training etc.

During the course of this pilot project, Veterinary Service collected information in relation to the Total number of TB tests undertaken by Lay TB Testers, how many herds tested by Lay TB Testers, how many reactors and inconclusive reactors were viewed and measured by Lay TB Testers and how many solo tests were carried out by Lay TB testers. The pilot group size was very small (3) and the data collected is somewhat limited but by recording and analysing this information, Veterinary Service should be able to more accurately measure the success of the Lay TB Testing pilot project and gain an insight into the incidences of TB reactors over the period of the pilot.

Each trainee tested, under supervision, a minimum of 500 animals in 10 different herds. Each trainee saw, measured and palpated swellings on a minimum of 30 reactors and 30 inconclusive reactors. Each trainee saw, measured and palpated 30 circumscribed swellings and 10 slightly oedematous swellings. They each tested a range of breeds and both male and female animals. Solo test data (without a supervisor present) is shown in **APPENDIX F**. It is not possible to readily draw inferences about testing from reactor rate. However all the data will be taken forward in any further lay testing considerations.

9.3 If similar arrangements are employed to those in the pilot with regard to the development of training and its delivery using internal DARD staff resource (to include classroom and field training elements), a review of current systems should be undertaken. Specifically such a review should consider how VS could facilitate and repeat the training, mentoring and field-training elements for a larger number of trainees while maintaining the same high standards delivered during the pilot.

9.4 Further refinement of the training course as detailed in the Lay TB Testing Pilot Post Course Evaluation Report and detailed in sections 8.2 and 8.3 will enhance the learning experience for all involved. In addition the arrangements for and the policy for the provision of refresher training and the reaccreditation process for the Lay Testers should be considered. With regard to the field-training element of the training, improvements in trainee coordination as detailed in para 8.2.2 should be investigated further.

9.5 Further work will need to be carried out to ensure that a robust system for allocating tests to newly certified Lay TB Testers is in place for any future roll out. This system will be such that all newly certified Lay TB Testers are allocated a sufficient number of tests to ensure they are fully loaded. The system should also be able to ensure that all tests are completed within the timescales outlined in

Departmental policy and that a contingency is in place to ensure all tests are carried out if some of the Lay TB Testers fail to attain certified status.

9.6 As part of this pilot feedback was sought from the stakeholders directly involved, i.e. the herd owners who had cattle tested by the Lay TB Testers. In the main the feedback from herd owners was positive, however, some negative feedback was provided with regards to the carrying out of the training tests for the Lay TB testers. This was focused on the lack of communication with herd owners regarding the purpose of the training and the time it took to carry out the training tests. Although Veterinary Service expected that the training tests would take longer than normal TB tests, it appears that this was not successfully communicated to all of the herd owners involved. This information should be used to inform stakeholder communication and consultation if any further roll out of the Lay TB Testing project is undertaken. Stakeholders should be made fully aware of the purpose of training visits and the impact that they will have on the time needed to carry out the tests. However, it should be noted that none of these issues were raised in the feedback provided in relation to the test carried out by the Lay TB testers once accredited and deployed. This can be viewed as indicating that the training of the Lay TB Testers was successful.

APPENDIX A

COMPARISON OF THE DEFRA TRAINING REQUIREMENT FOR TB LAY TESTING, AND THE DARD TRAINING REQUIREMENT

	DEFRA Training Requirement	DARD Training Requirement	Difference	Comment	Lesson learned
RCVS experience outlined the following elements of the training course (NB: the approval of the DARD course was pro actively sought from RCVS):					
Royal College of Veterinary Surgeons (RCVS) approved the course?	Yes	Yes	None		
Open College Network approved course?	No	Yes	Yes	Appropriate external recognition is endorsed by Veterinary Service and DARD as part of its T&D policies. OCN registration was also negotiated and agreed with TUS. This would be a recommended feature of any roll out project.	
No. of days spent on classroom based training	2 days	5 days	+3 days	DARD VS could possibly cut it down by 1 day. However, as there is a requirement for 1 to 1 tutoring, training a larger number of trainees will be time consuming. The rollout course will be nearer 5 days than 2 days.	DARD's VS ran a course which met all the RCVS and OCN requirements. Defra training was focussed only on meeting RCVS requirements and the courses were not directly comparable. The DEFRA course was a simple presentation on the TB testing mechanics, rather than a interactive hands on approach which was deemed to be a more effective training mechanism. The feedback from the trainees trained in the pilot supported this.
Written exam to be sat and passed?	Yes	Yes	None	Reasonable way to proceed.	
No. of animals to be tested by trainee	500	500	None	Target was derived from consultation with RCVS.	
No. of herds to be tested by trainee	10	10	None	Target was derived from consultation with RCVS.	

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	DEFRA Training Requirement	DARD Training Requirement	Difference	Comment	Lesson learned
No. of reactors to be examined (i.e. Observed, palpated and measured) by trainee	30	30	None	Target was derived from consultation with RCVS.	
No. of inconclusive reactors to be examined by trainee	30	30	None	Target was derived from consultation with RCVS.	
No. of slight oedemas swellings which must be observed	30	10	-20	The Pilot showed that a "slight" oedema is a rare finding in NI. RCVS accepted our data and agreed to a reduction in DARD VS's target below that required by DEFRA.	DARD, in a roll out scenario, may change the target to oedema rather than slight oedema.
No. of circumscribed swellings which must be observed	30	30	None	Target was derived from consultation with RCVS.	
Range of breeds/ages/sexes	range	range	None	Target was derived from consultation with RCVS.	

APPENDIX B

FROM DRAFT BUSINESS CASE

Category	Item	Option 2 costs
		Based on 3 trainees and 2 trainers
Staff time	Course development	£5,207
	Course delivery: trainers	£3,470
	Classroom training: trainees	£2,640
	Liaise with and co-ordinate the trainees during the field training	£8,982
	Temporary promotion	£3,000
Travel costs	Trainees	£6,000
	Trainee supervision	£540
Equipment:	Trimble, scissors, calipers, holsters	£3,490
OCN accreditation		£250
Total		**£33,579.00**

Assumptions:

- The assumption is made that the veterinarians who supervise the trainees during the field training will not be an additional cost because they will be carrying out the same number of tests they would have been doing anyway.
- Greenmount will be used for the classroom training at no additional cost.
- The field training will take place at Greenmount at no additional cost and the trainees will shadow field vets on their routine TB tests at no additional cost.
- The assumption is made that trainee time is not an additional cost because there is sufficient capacity to release AHWIs to take part in the pilot without recruitment. However, they will be paid temporary promotion and therefore that extra cost is included above.

APPENDIX C

Department of Agriculture & Rural Development

Lay Tuberculosis Testing Pilot

Post Course Training Evaluation Report

23 February 2012

DARD Training & Development Unit

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CONTENTS

Preface

The Lay Tuberculosis (TB) Tester Pilot Project is a project with the aim of investigating if 3-10 Animal Health and Welfare Inspectors (AHWIs) within Veterinary Service (VS) can be trained to carry out TB testing and can, after registration as Approved Lay TB Testers, be deployed for a limited period. The training is to be of such a standard that DARD can issue a Certificate of Competence to the trainees and the trainees can then be registered by DARD as Approved Lay TB Testers. Insight gained through the running of the pilot project will inform the broad consultation process which will take place before any further training, registration and deployment of Lay TB Testers.

Purpose

The purpose of this post training evaluation report is to establish and confirm that the training delivered by VS as part of the Lay TB Testing project was robust in terms of transferring effective knowledge and skills to ensure staff could adequately perform these duties.

Terms of Reference - Scope of the Post Training Evaluation

Background

The Lay TB Tester Pilot Project is a project with the aim of examining if three (3) Animal Health and Welfare Inspectors (AHWIs) within DARD's VS can be trained to competently carry out TB testing and can, after registration as Approved Lay TB Testers, be deployed for a limited period. The training delivered is to be of a standard that will ensure that DARD can issue a Certificate of Competence to the trainees allowing them to be registered by DARD as Approved Lay TB Testers.

Insight gained through the evaluation of training delivered on this pilot project will inform any future roll-out of this project.

DARD Training and Development Unit (TDU) which is part of Business Support Branch (BSB) have undertaken an independent post training evaluation on behalf of VS as part of the Lay TB Testing Project.

This post training evaluation will:

- Assess the standard of the classroom based and on-the-job training delivered by Departmental staff and accredited by the Open College Network (OCN);

- Make recommendations for future training delivery pending the complete review of the project.

Report Findings and Conclusions

This Evaluation Report findings and recommendations come from three main sources of information as follows:

- An on-line questionnaire to the Lay TB Testers completed using the Survey Monkey tool;
- Separate focus group meetings with both the Lay TB Testers and the Principal Tutors who developed, designed and delivered the training product;
- The background information and data provided by VS through their TRIM containers.

The report findings centre on the classroom based training, the field training and the accreditation through assignments process. The findings of this report are extremely positive and they endorse the training design and delivery methods used. The only shortcoming is that the data collected and reported could be seen as potentially biased because of the low number of Lay TB Testers (three) used in this pilot.

Key findings

The key findings are as follows:

- This pilot was successful in terms of skills, knowledge and learning transferred. The Lay TB Testers have proven that they are competent to perform tests to an agreed level and have passed the OCN Accreditation standard. However, in order to validate the entire training process VS need to also assess the feedback received from the customers whose animals were tested under this pilot. This assessment will corroborate the entire training process.
- In terms of the post classroom course evaluation the training, support and coaching provided was more than adequate to ensure that the trainees passed the OCN Accreditation standard;

- Overall the training delivered was a good product however, there are some issues surrounding the timing of this training and the use of a TVO/VOT to ensure the field training was adequate;
- There are a number of areas that could be improved, these are highlighted in the 7 recommendations of this report;

The small number of trainees selected to attend this training coupled with no pre-training baseline data, means that the statistical reporting is potentially biased.

Lay TB Testing Evaluation Results

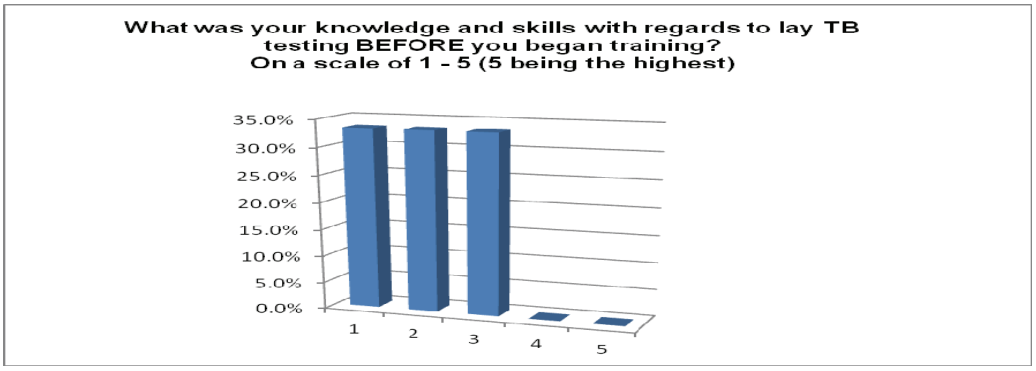
1. Evaluation Response Rate

There was a 100% response return rate (3) for this survey

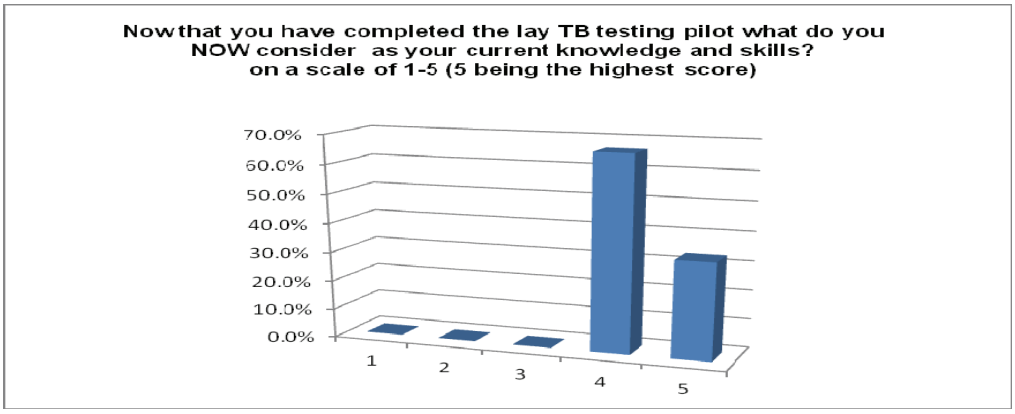
2. Relevance & Benefits of Classroom Based Training

2.1 When asked about their length of service working in Veterinary Service all respondants revealed they had worked for between 3 – 5 years.

2.2 When asked to rate their knowledge and skills with regards to Lay TB Testing, on a scale of 1-5 (where 1 is low and 5 is high) before attending the training 2 staff rated their knowledge as 2 or less. The remaining member of staff rated themselves as a 3. See the bar chart below for the full ratings:



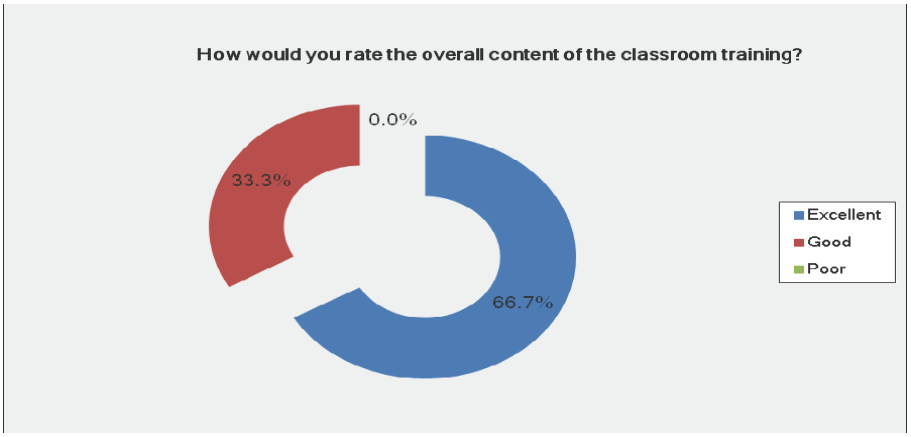
2.3 When asked to rate their knowledge and skill after completing the Lay TB testing training programme, on a scale of 1-5 (where 1 is low and 5 is high), All of the trainees had improved their score rating to either a 4 or 5. This is illustrated in the bar chart below:



2.4 When asked if the 5 day classroom based training was sufficient all three respondents indicated that it was. At the focus group session they articulated that the 5 days was time well spent, with the tutors using lulls between speakers to recap theories and to reiterate the learning.

2.5 All respondents agreed that having 5 consecutive days training was not intense and they felt that the training flowed well over the period.

2.6 When asked to rate the overall content of the classroom training, all of the respondents rated the training either excellent or good, as illustrated in the chart below:



2.7 When asked to rate the standard of the classroom training delivered by the principal tutors the results revealed that all trainees rated them as excellent. This rating was reinforced during the focus group were the comments received were as follows:

- "The tutors were very approachable and took lots of time to coach me"
- "They fielded difficult questions and were very patient"
- "Spent a lot of time and effort in training us, they were easy to talk to and patient. The coaching I received was very good"

2.8 When asked did they think having the training delivered by in-house DARD staff helped them understand TB testing, all attendees agreed that it was essential to have VS staff deliver the training.

2.9 The attendees were asked to rate on a scale of 1 – 5 (5 being the highest) each of the training sessions, what follows are the results:

Training Session Titles	**1**	**2**	**3**	**4**	**5**
Overview of what the training entailed and the Accreditation process	0	1	0	1	1
Staff Roles and Responsibilities	0	0	1	1	1
Understanding Bovine Tuberculosis	0	0	0	0	3
Understanding the theory behind Single Intradermal Comparative Cervical Tuberculin (SICCT) testing	0	0	0	0	3
Understanding SICCT testing in practice	0	0	0	0	3
Abattoir Procedures	0	1	1	0	1
Laboratory Procedures	0	0	2	0	1
Immune system and how it relates to the test	0	0	0	1	2
the Husky PDA	0	0	1	1	1
Health and Safety	0	0	1	1	1
Clinical signs of bovine TB and things that happen at tests	0	0	1	0	2
Mycobacterium Bovis	0	0	1	1	1
Bovine TB: Worldwide	0	0	2	0	1
Bovine TB: GB and the South	0	0	2	1	0
Bovine TB: Northern Ireland	0	0	1	1	1

Legislation	0	0	2	1	0
The immune system of cattle	0	0	0	1	2
TB testing equipment and consumables	0	0	0	2	1
Interpretation of test results	0	0	0	1	2
Isolation of positive reactors and inconclusive reactors	0	0	1	0	2
Communicating with herd keepers and dealing with confrontation	0	0	0	2	1

The majority of the training sessions were rated from a score of 3 – 5, with the exception of the Overview of what the training entailed and the Accreditation Process and the Abattoir Procedures.

2.10 The attendees were asked what training session as outlined in question 9 could have been expanded on in the classroom scenario. Apart from using the Husky and downloading the data to Aphis there was nothing more that they thought could be lengthened. This was reiterated during the focus group discussion and it was generally agreed that the Husky equipment failure was unavoidable and that the new Trimble equipment was more reliable.

2.11 When asked to comment on what classroom training could have been improved, the respondents stated the following:

- "Handouts could have had more information"
- "Maintenance and Use of Equipment"
- "More practical work incorporated"

Discussion at the focus group expanded on these replies as follows:

- **Handouts could have had more information** – *some of the handouts contained abbreviations, some areas there could have been elaborated on – "but nothing major"*
- **Maintenance and Use of Equipment** – *the fact that the Husky equipment failed at one point drew attention that this could be an issue. However as new version of this equipment is now in use this should not impact in the future;*

- **More practical work incorporated** – *it was felt that there could have been more practical work such as the use of equipment and in particular scissors and guns. This would have made the field training easier.*

2.12 When asked to state what was the most useful part of the classroom training, the following:

- "Immune system of cattle"
- "Theory behind Sicct"
- "Understanding Sicct testing"

2.13 When asked to state what was the least useful part of the classroom training, the following:

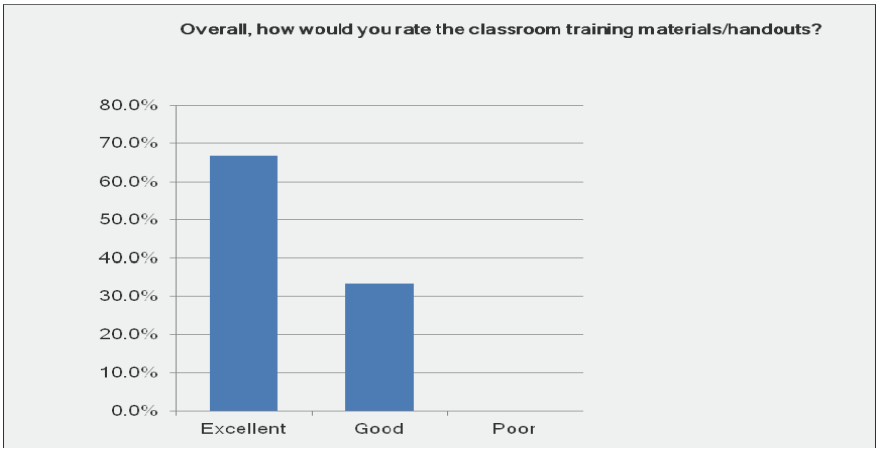
- "Abattoir + laboratory training"

The focus group expanded on this response by explaining that they thought it was more relevant to know the theory but not what happens.

2.14 The group felt that there was nothing else that should or could have been included in the classroom training.

2.15 The group also revealed that the support, guidance and in particular the coaching they received was excellent; in their opinion the principal tutors really stepped up to the mark.

2.16 The chart below outlines how the attendees rated the training materials and handouts. This should be qualified by comments made at the focus group i.e. *some of the handouts contained abbreviations, some areas could have been elaborated on.*



2.17 All staff stated they were content that they had received sufficient information prior to attending the classroom training.

2.18 The following additional comments were received through the survey and at the focus group:

- “The training was very comprehensive”
- “I felt that the classroom training was very good but could have had a bit more of a practical side to it perhaps using the CAFRE herd”
- “I thought the training was excellent, much better than I expected”

3 Relevance & Benefits of the Field Training

3.1 All respondents agreed that the field training was delivered in a way that was easily understood and that they received sufficient support and guidance from both the VO's and Group 4 Supervisor.

3.2 The survey also confirmed that the training was delivered to a reasonably high standard to ensure that the trainees were content to carry out testing on their own. It also confirmed that the training manual they received was easily understood and was a good resource for support and aid memoire.

3.3 When asked to list the most useful part of the field training the following comment were received:

- Testing under VO supervision;
- Making sure the guns worked properly;
- Learning to do the testing.

3.4 When asked to list the least useful part of the field training the following comment was received:

- "Working with the large herds, especially those not in a crush, I was unable to test very many cattle because of time constraint to get job finished"

The focus group expanded on this response by explaining:

- They thought they should have been focusing on smaller herds to begin with and then progressing to middle and large sized herd;
- They felt that they were constantly under pressure from the TVO/VOT to get the test done quickly so that they could move on to the herd. They got the impression that by supervising them the TVO/VOT was losing money;
- They always had an audience i.e. the customer(s), VO, TVO/VOT and anyone else who was around – at the beginning this put them under extreme pressure to complete the test quickly and accurately.

3.5 When asked to comment on whether there was anything else that should have been included in the Field training, the following comment was made:

- "We should have tested at least 10 animals before going out with the VO. This comment was reinforced at the discussion with the focus group suggesting that the CAFRE herd could be used as a testing ground"

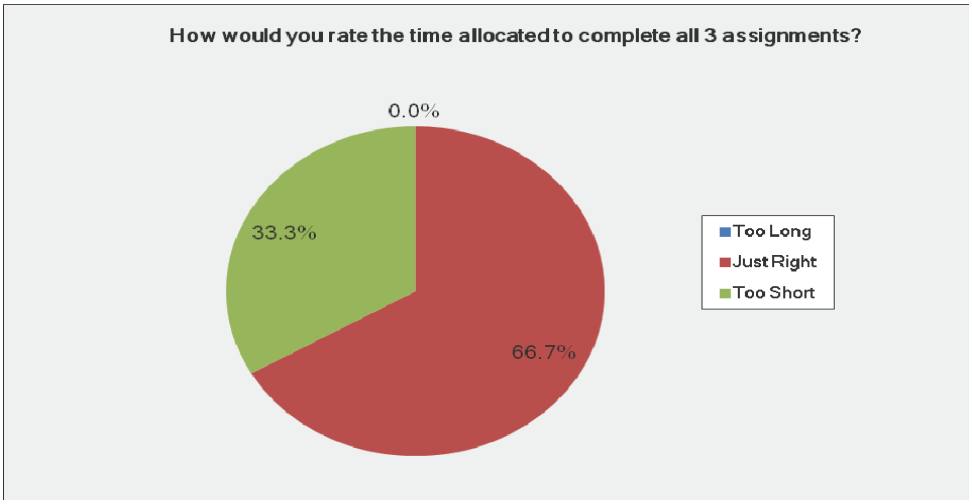
3.6 The following additional comments regarding the field testing were received both through the survey and discussion at the focus group:

- "Sourcing of reactors could be more co-ordinated so that relevant numbers can be seen quicker. Vets should be selected on basis of areas where there is likely to be reactors and tests small enough so that trainees can test more cattle each day"
- There should be more contact/communication between the Lay Testers and the VO's when reactors and inconclusive's were discovered, this would have made the training more effective and cut down on the immense travel time;
- It may be worth considering the field training being targeted to one area in Northern Ireland where incidences of TB in cattle are known. This would again cut down the training and travel costs;

4 Relevance & Benefits of Written Assignments

4.1 All respondents agreed that the training they received was sufficient to enable them to fully complete all 3 written assignments.

4.2 When asked if the time allocated to complete the assignments was adequate 2 staff said it was just right, with the remaining staff member stating it was too short. This is illustrated in the pie chart below:



4.3 All respondents found that the assignments were easy to follow and that they did not have difficulty in completing them. The focus group session revealed that the Lay Testers could not have completed the assignments without the assistance of the tutors both in the terms of explaining what they needed to do and extensive coaching. All three staff were very complementary and appreciative of both tutors in terms of the support and guidance they received not only in completing the assignments but throughout the entire process.

4.4 When asked their opinion on having the Lay TB Tester accredited, all agreed that it was a good to have this Certificate of Competence and that having gone through the training process it has given them not only the competencies but also the confidence to fully complete TB tests. They also see that having a Certificate of Competence gives them more authority with the customers and stakeholders alike when deployed.

5 Feedback from the Principal Tutors

Having completed an on-line survey and focus group with the Lay TB testers a subsequent meeting was held with the two principle tutors to ascertain their feedback on the training.

5.1 The tutors in general terms felt the training delivered was good. But they did have a number of concerns as follows:

3. The preparation time given to develop, design and deliver the pilot was not adequate; however in stating this they both acknowledged the fact that they completed the task. Nonetheless it was extremely pressurised to have everything in place for the classroom based training. In addition, this was completed during the peak annual leave period.

4. It was essential that both principle tutors were qualified and experienced trainers. Their training styles complemented each other and the fact that they both were heavily involved in developing and designing the training product was important to the success of this training. However the concern is that this is not an off-the-shelf training package that anyone can deliver, therefore if this training is to be rolled out there would need to be consistency in how it is delivered.

5. The timing of the classes could have been better – it would be more effective to begin classes in the Autumn;

6. They felt that the classroom training was good and the feedback after each training session reinforced the learning and skills transfer. This worked reasonably well with three trainees; however Veterinary Service need to consider if this would be as straightforward if the class size was much larger.

7. The 5 oral assessments proved difficult and there was a lot more coaching needed than was expected. It was helpful that one of the tutors had previous experience of this type of assessment and was able to structure the questions to a level that the trainees could easily understand and respond to. It would

therefore be important that any future tutors should be competent in the delivery of oral assessments.

5.2 When asked about lessons learned from the entire training programme the following points were discussed:

5.2.1 The Health and Safety session of the classroom training was an oral presentation and the feedback was that whilst this session was very valuable and was delivered professionally, the learning should have been reinforced by a PowerPoint presentation. This was an issue documented through the audit process which recommended that for scrutiny purposes an account of what was delivered should be recorded.

5.2.2 It is acknowledged that a vast amount of time and effort went into the development and design of this pilot training package. If this training is to roll-out then pre-training time would need to be factored into any subsequent delivery to ensure that any new and/or best practice methods and lessons learned are considered. All training lesson plans, presentations, materials, methods used and evaluation/feedback should be fully recorded and pulled together for use as the generic Trainers Brief. This Trainers Brief would be used as the core resource for all future training.

5.2.3 More practical training sessions in relation to clipping and measuring, perhaps using the CAFRE herd and the use of equipment should also be considered. This would give added confidence to the trainees before they start their field training sessions.

5.2.4 The tutors have considered introducing a method of evaluation after each test. This would leave them better placed to gauge the training delivery against each lesson plan; if the level of communication is right and to access the knowledge and skills transfer process.

5.2.5 The timing of the training should also be considered and if possible it should be geared to coincide with the main TB testing period.

5.3 Other comments received from the principle tutors are as follows:

5.3.1 VS should think about having a VO dedicated for 3-4 month period to supervise the trainees in the field. This VO would be able to target hot spots for testing, have the initial interface and communication with the customers, and there would be a skills and knowledge transfer by passing on practical tips and know-how to the trainees. It would be a professional way to introduce Lay TB testing to the customer and it would show commitment to the trainees. This would be more effective for field training and would ultimately reduce travel time and cost.

Report Recommendations

In all there are 7 main recommendations emerging from this report, they are as follows:

(i) Given that there were only three staff selected to complete this project any further roll-out should include a greater number of trainees (up to 10). Any future training should be fully evaluated i.e. a pre-course training evaluation in order to gather baseline data and a post training evaluation to measure for improvement, application and performance;

(ii) The OCN Accreditation process should be endorsed as a measure of demonstrating that Lay TB Testers have been fully trained, certified and are competent to carry out tests. If this pilot is to be rolled out then VS should investigate what measures they need to take to ensure that these and any future certified Lay TB Testers maintain their certification i.e. refresher training and/or reaccreditation;

(iii) VS should ensure that staff selected as principle tutors should be fully qualified to develop, design and deliver training and in particular are competent to complete oral assessments to the satisfaction of the examining body, VS should consider the minimum qualification for the principle tutors is set at least at City & Guilds Level 3 Preparing to Teach in the Lifelong Learning Sector (PTLLS);

(iv) VS should consider appointing a dedicated VO for 3-4 month period to fully supervise all trainees in the field. This VO would liaise fully with the principle classroom tutors and play a part in the accreditation process;

(v) The timing of any further training roll-out should coincide with the peak test period for TB. This will ensure that the Lay TB Testers' field training is more targeted thus ensuring a more cost effective process;

(vi) There should be a full review of the training provided in this pilot and the feedback provided in this report should be used as a basis for any amendments. To

complete this review adequate time must be allowed to ensure positive improvements are made. A greater emphasis should be put on the practical side of the training provided.

vii) The principle tutors should consider as best practice to complete wash-up/ evaluation sessions as follows:

- With the Lay TB Testers after each stage of the training process;
- With themselves;
- With their peer group.

All lesson plans, training objectives exercises and procedures should be documented and updated during the process. VS should consider introducing an independent quality assurance to ensure this training is validated. A Trainers Brief described at paragraph 5.2.2 should be developed and used as the core resource for all future training.

APPENDIX D

CUSTOMER SURVEY DATA

Section A: Test at which a trainee Lay Tuberculosis Tester was being trained

What did you think of the following: Number of Returns:42

Before the test	Good	Average	Poor
The way initial contact was made with you by DARD?	**48%**	31%	21%
Information supplied to you about the lay testing project?	**43%**	29%	29%
Availability of further advice or information?	**36%**	38%	26%
If you have given a poor rating please explain/comment.			
A) No further advice available			
b) No info at all was given			
c) Was not aware of project - not explained			
d) No further info provided			
e) Did not know about test until staff arrived.			
f) DARD staff just turned up on farm			
g) no knowledge of AHWI coming			
h) No further info given			
i) Wasn't aware of testing taking place			
j) No info provided re trainee arrival			
k) Herdkeeper unaware of trainee coming. No further info offered			
l) No contact was made before test. It was just a matter of fact it was going to happen unless I was very unhappy about it			

How satisfied were you that:

During the test	Good	Average	Poor
Staff made it clear who they were?	**86%**	10%	5%
Staff made it clear what they were doing?	**88%**	7%	5%
The visits were well organised?	**76%**	14%	10%
The staff understood your business?	**79%**	17%	5%

If you have given a poor rating please explain/comment.
a) Think it was the first time the man had seen a cow
b) Staff didn't explain who they were
c) Too slow. Full hour to do test

How would you rate:

Overall	Good	Average	Poor
The quality of work done?	**62%**	21%	17%
The knowledge of the people doing the work?	**79%**	17%	5%
The politeness of the people doing the work?	**83%**	17%	0%
The helpfulness of the people doing the work?	**81%**	17%	2%
The capability of the people doing the work?	**74%**	17%	10%

If you have given a poor rating please explain/comment.
a) Two different testers 1 average 1 poor
b) Did not have a clue. Don't even think about sending another trainee tester ever again !!!
c) On completion of the test, I remarked to the senior person how willing & capable the trainee was (he will go far). Interested in what was taking place.
d) Work was a bit slow. Would not have suited someone with a bigger herd
e) Very slow
f) Test too slow - maybe because of training
g) Work a little slow
h) Trainee was not a stock man at all. Needed Glasses. Training kept herdkeeper back
i) Maybe they could do future testing elsewhere eg Greenmount
j) Testing very slow because of training
k) Staff arrived totally unannounced. Herdkeeper had to approach staff and ask them who they were and what they were doing
l) This herdkeeper asked for the test himself. Trainee was just an observer so he saw the questionnaire as largely irrelevant
m) Herdkeeper thinks a blood test would be better for TB. Tests should always be done in one day.
n) No actuad testing carried out on this herd. The herdkeeper thinks the VO just gave instructions to the AHWI
o) very slow and futtery. Vet could have done 10 animals in time AHWI done 1

Section B: Test carried out by a registered Lay Tuberculosis Tester working alone

What did you think of the following: Number of Returns:10

Before the test	Good	Average	Poor
The way initial contact was made with you by DARD?	**90%**	10%	0%
Information supplied to you about the lay testing project?	**70%**	30%	0%
Availability of further advice or information?	**50%**	50%	0%

How satisfied were you that:

During the test	Good	Average	Poor
Staff made it clear who they were?	**90%**	0%	10%
Staff made it clear what they were doing?	**100%**	0%	0%
The visits were well organised?	**90%**	0%	10%
The staff understood your business?	**100%**	0%	0%

If you have given a poor rating please explain/comment.
a) Came 1 hour late & with only 1 set of print outs for 2 herds

How would you rate:

Overall	Good	Average	Poor
The quality of work done?	**80%**	20%	0%
The knowledge of the people doing the work?	**90%**	10%	0%
The politeness of the people doing the work?	**100%**	0%	0%
The helpfulness of the people doing the work?	**100%**	0%	0%
The capability of the people doing the work?	**90%**	10%	0%

60

APPENDIX E

PROJECT STAFF SURVEY DATA

Northern Ireland Lay TB Testing Pilot Project DARD Staff Feedback

Number of Returns: 19

1 = strongly disagree
3 = neither agree nor disagree
5 = strongly agree
N/A = not applicable, I did not experience this aspect of the project

Recruitment and selection of lay tester trainees	1	2	3	4	5	N/A
The expression of interest circular was effective in getting AHWIs to apply for training	0%	11%	**32%**	**16%**	0%	42%
The selection process was effective in selecting suitable candidates for training	0%	11%	**26%**	11%	0%	53%
The number of trainees was adequate	5%	**32%**	11%	0%	11%	42%

Explanation/comment
a) No AHWIs in Ballymena interested as I am aware
b) For pilot purposes 2 would be sufficient as the end game was surely to establish the official certification of these group of workers under the guidelines of the RCVS and within European regulations. 1 would be ok, but I realise the merit in having a second as back-up.
c) I didn't read the interest circular. In my view, a more suitable candidate than one of those chosen was rejected.
d) I would have liked more to have been trained.
e) I was not involved in AHWI recruitment for this project. I think three lay testers, one of who did not progress to testing, and the short period available for the testing phase renders this exercise in-valid.
f) If lay testing is to be rolled out, then AHWIs will need to be directly informed as to the reasoning behind it as an interest circular may not yield a high enough number of volunteers.
g) not enough thought given to in depth discussion with AHWIs to alleviate fears by explaining purpose and need for pilot
h) I had no input in above.

Classroom based training of lay testers	1	2	3	4	5	N/A
The training delivered by me was relevant to the trainees	0%	0%	5%	**11%**	11%	74%
The trainees were able to understand the training I delivered	0%	0%	5%	**11%**	11%	74%
The programme covered all the theoretical knowledge required by the trainees	0%	**5%**	**5%**	0%	**5%**	84%
I received training which was relevant to my needs	0%	0%	0%	0%	**11%**	89%
The trainers treated me with respect	0%	0%	0%	**11%**	11%	79%
I was provided with enough printed material for future reference	0%	0%	0%	**5%**	**5%**	89%
The trainers were knowledgeable in their topic	0%	0%	0%	**5%**	**5%**	89%
The length of the course was appropriate to the amount of training	0%	0%	**5%**	**5%**	**5%**	84%
The involvement of the Open College Network improved the training	0%	0%	**11%**	0%	5%	84%

Explanation/comment
a) none of my AHWIs were involved
b) I oppose the fact that these group of workers can receive only 1 week of classroom training and are now eligible to carry out on-farm TB diagnostic testing. I gained a professional 3rd level veterinary degree with honours, having spent 5 intensive years study. i was examined with supreme scrutiny in order to achieve the prestigious qualification of veterinary medicine. Only then, was I eligible to partake in TB testing. TB testing has always been in my opinion 'an act of veterinary medicine'. I would caution the deployment of AHWIs in such a role given the unfolding 'sharp rise' of 18.5% in TB reactors since Nov 2010. Vets have proven themselves in the past, that in 2003 when TB herd incident had soared to 10% then, with the recruitment of 29 VOTs herd incident fell year on year. A professional approach is whats needed currently to stem the rise in TB infection
c) I only delivered practical training and it was not satisfactory as testers were not allowed to inject animals.
d) I had no involvement in these aspects of the trial.
e) I was not involved in classroom based training
f) I have trained many young vets in my career. James Buchanan was the best I have trained.
g) I was not part of training

Field training of lay testers	1	2	3	4	5	N/A
DVOs and SVOs understood their role as Authorised Veterinary Surgeons during field training	5%	5%	**16%**	**16%**	0%	58%
Selected VOs understood their role as Authorised Veterinary Surgeons during field training	11%	5%	11%	**32%**	5%	37%
TVOs and VOTs involved in training understood their role as Authorised Veterinary Surgeons	0%	11%	16%	11%	**16%**	47%
The targets for field work training, in particular seeing various reaction types, were achievable within 11 weeks	16%	16%	**21%**	11%	11%	26%
The trainers treated me with respect	0%	0%	0%	**5%**	**11%**	84%
The herdkeepers treated me with respect when I was being trained	0%	0%	**5%**	**5%**	0%	89%
The trainers were knowledgeable	0%	0%	0%	5%	**11%**	84%
The field training prepared me for deployment	0%	0%	0%	**5%**	**5%**	89%
The programme covered all the theoretical knowledge required by the trainees	5%	5%	0%	**11%**	**11%**	68%

Explanation/comment
a) as a trainer I observed that my trainee was treated with respect
b) Field work training was carried out at the quietest time of the year for TB testing. As a result the targets were unlikely to be achieved within 11 weeks
c) No First hand experience of training
d) theory was not part of the field training given by VOTs. I didn't receive any instruction to involve theory with the physical act of TB testing. The trainees were not given any formal training in fraud awareness. This will mitigate against effectiveness of the ERAD programme given the likelihood for such incidents to occur, in light of the fact of high livestock values presently.
e) I had no involvement in these aspects of the trial.
f) I can only comment on what I saw on farm.

Deployment of lay testers	1	2	3	4	5	N/A
Instructions were clear for allocation of tests to lay testers	16%	21%	0%	**26%**	5%	32%
A sufficient number of tests were made available for lay testers	16%	11%	11%	**26%**	11%	26%
The number of tests available to TVO's and VOT's was reduced	5%	11%	**42%**	0%	5%	37%
The Staff Instructions for lay testers were fit for purpose	0%	16%	5%	**21%**	0%	58%
DVOs and SVOs understood their role as Authorised Veterinary Surgeons during the Deployment Phase	5%	11%	**21%**	**16%**	0%	47%
Selected VOs understood their role as Authorised Veterinary Surgeons during the Deployment Phase	5%	5%	**21%**	**16%**	11%	42%
Herdkeepers treated me with respect when I operated as an Approved Lay Tester	0%	0%	0%	**5%**	**11%**	84%
The length of the deployment phase was adequate for the lay tester to develop confidence in his role	**16%**	**11%**	5%	5%	**11%**	47%
I was supplied with the equipment necessary for carrying out my work	0%	0%	0%	**5%**	**5%**	89%
Amended forms (BT15, BT23 and BT28) were fit for purpose	5%	**11%**	**11%**	**11%**	**11%**	53%

Explanation/comment
a) a lot of time spent trying to see the required number of reactors and its this could have been better co-ordinated to reduce time and have time testing by trainee on his own would have increased
b) Ballymena could only find two tests of relevance and only one by trainee
c) From my understanding the pilot, having trained the AHWIs was that when all the targets had been met regarding numbers of reactors, inconclusives and reaction types, the pilot would come to a natural end. I had assurances that the lay testers would be effectively 'parked' until DARD undertook a public consultation in early 2012. Pending the outcome of such a consultation the decision would be made whether or not to 'deploy' lay testers. it seems to me that DARD have not honoured this commitment. Should AWHI's be currently TB testing?
d) I wasn't personally involved but there was general confusion over allocation of tests and DVO role expressed at DVO forum - initally at least. I think the role of AVS should have stayed within TB policy section.
e) I had no involvement in these aspects of the trial.
f) Number of tests available was borderline and may have been low if all 3 AHWIs would have started to do field work at same time.

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g) more time should have been spent creating a workable, efficient and practical procedure for the field, once LT were deployed. Too much uncertainty re date of deployment, not enough communication with field offices and HQs
h) so little input that I could only answer a few of the questions

Please indicate your role in the project:

Trainee	2
DVO/SVO in Divisional Veterinary Office which is headquarters to a trainee	3
DVO/SVO in Divisional Veterinary Office which is not headquarters to a trainee	5
TVO/VOT involved in training trainees	3*
TVO/VOT not involved in training trainees	
VO selected to allocate tests and provide direction on behalf of DVO/SVO to lay testers	6
Trainer for practical class in Greenmount	1

** 1 VO involved in training*

APPENDIX F

TESTS CARRIED OUT BY APPROVED LAY TESTERS[5]

In the period 01/11/2011 – 31/12/2011

RESULTS FOR LAY TESTER 1 - date of Registration: 11 November 2011

Herd	Test Type	Date completed	Number of Animals	Number of field Reactors	Number of field Inconclusives
1	RH1	17/11/2011	74	1	2 severe
2	RH1	18/11/2011	126	1	1 standard
3	RH1	25/11/2011	130	0	0
4	RH1	01/12/2011	24	0	0
5	RH1	15/12/2011	29	0	0
6	RH1	09/12/2011	172	1	0
7	RH1	08/12/2011	142	0	0
8	RH1	16/12/2011	42	0	0
9	RH1	16/12/2011	108	0	0
10	RH1	15/12/2011	58	0	0
11	RH1	23/12/2011	49	1	1 standard
12	RHT	22/12/2011	86	0	0
13	RH1	22/12/2011	26	0	0
14	RH1	23/12/2011	27	0	0
15	RH1	22/12/2011	3	0	0
Total			**1096**	**4**	**4**

Outcome for reactors

Herd	No. of reactors identified by Lay Tester	PM	Comment
1	1	Not lesioned	
2	1	Lesioned	TB generalised – carcase condemned
3	1	Lesioned	
4	1	Lesioned	TB generalised

[5] Data for testers and Herds has been anonymised

Outcome for inconclusives

Herd	No. of inconclusives identified by Lay Tester	RI1 test results
1	1	No result as of 09/01/2012
2	1	No result as of 09/01/2012
3	1	No result as of 09/01/2012

RESULTS FOR LAY TESTER 2 - date of Registration: 09 December 2011

Herd	Test Type	Date completed	Number of Animals	Number of field Reactors	Number of field Inconclusives
1	RH1	23/12/2011	136	0	0
2	RH1	15/12/2011	65	1	0
3	RH1	13/12/2011	30	1	0
4	RH1	22/12/2011	30	1	0
5	RH1	30/12/2011	93	0	1
Total			**354**	**3**	**1**

Outcome for reactors

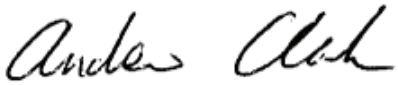
Herd	No. of reactors identified by Lay Tester	PM	Comment
1	1	Lesioned	TB generalised
2	1	Lesioned	
3	1	Lesioned	

Outcome for inconclusives

Herd	No. of inconclusives identified by Lay Tester	RI1 test results
1	1	No result as of 09/01/2012

RESULTS FOR LAY TESTER 3 - date of Registration: 29 December 2011

No tests carried out after registration.

	Name(s)	Signed	Date
Prepared by:	Joanne McClements		3/4/12
	Andrew Clark		3/4/12
Verified by:	Michael McLernon		3/4/12
Approved by:	Roly Harwood		

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Correspondence

4th October 2012 - DALO letter to Clerk re. Bovine TB

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Our Ref:
Your Ref:
Date: 4 October 2012

Dear Stella

Committee Meeting 11 September 2012

Further to my letter of 2 October, please find below the outstanding response to the query raised by Committee Members on 'Bovine TB'.

Bovine TB

Members have asked to be provided with any information the Department has had in the past regarding approved finishing/fattening units.

DARD has from time to time received approaches from both individual herdkeepers and industry representatives in relation to introducing approved finishing units (AFUs) here. An AFU is generally understood to be a specially designated herd that only finishes cattle prior to movement direct to a meat plant; may receive animals from a TB restricted herd; and would have a reduced test regime. However, the AFU proposals received to date, if implemented, would increase the disease risk to neighbouring herds. In this context, DARD is aware of a range of expert opinion that views the collection of cattle from TB restricted herds as a system that involves a high risk of spreading TB.

However, the recent Press comments in support of such units is related to seeking to alleviate the burden on TB breakdown herdkeepers who may be facing potential difficulties due to increased stocking levels over the winter, particularly given the rise in feed costs and that forage intake and quality is poorer as a consequence of the wet summer.

While DARD must protect against increased disease risk and ensure that it does not jeopardise its export trade assurances, it has reminded industry stakeholders that in exceptional circumstances, where there is a welfare problem, requests to move animals from a breakdown farm to another farm will be considered by the local DVO on a case by case basis. Such arrangements are subject to strict conditions to minimise risk to other herds because of the potential disease risks involved. We continue to engage with farming representative organisations in this regard and have established that this is the issue to which they have been referring in recent Press comment.

I would be grateful if you would bring this to the attention of the Committee.

If you require any further information please let me know.

Yours sincerely

Joe Cassells
Departmental Assembly Liaison Officer

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