

Bovine TB in Ireland Pathways to Eradication

A report for



**NUFFIELD IRELAND
Farming Scholarships**

2024 Nuffield Scholar

John Keane

November 2025

© 2025 Nuffield Ireland.
All rights reserved.

This publication has been prepared in good faith on the basis of information available at the date of publication without any independent verification. Nuffield Ireland does not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this publication nor its usefulness in achieving any purpose.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. Nuffield Ireland will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Products may be identified by proprietary or trade names to help readers identify particular types of products, but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to.

This publication is copyright. However, Nuffield Ireland encourages wide dissemination of its research, providing the organisation is clearly acknowledged. For any enquiries concerning reproduction or acknowledgement contact the Executive Secretary.

Scholar Contact Details

John Keane

Errill,
Portlaoise
Co. Laois

Phone: 0857049175
Email: johnrkeane@gmail.com

In submitting this report, the Scholar has agreed to Nuffield Ireland publishing this material in its edited form.

NUFFIELD IRELAND Contact Details

Catherine Lascurettes
Executive, Nuffield Ireland
Phone: +353-86-2691197
Email: exec@nuffield.ie

Executive Summary

At the outset of my studies, I believed that bovine TB (bTB) eradication in Ireland was simply a matter of sufficient funding, consistent science-based measures, and the courage to make hard decisions. The journey since has revealed something far more complex: a disease deeply entangled not only in biology and science, but also in culture, history, and social realities.

This paper examines bTB within the context of Ireland's National Eradication Programme, running since 1954. At its inception, Ireland had around 250,000 herds with 4.5 million cattle, and reactor incidence was 17% (22% in cows, 8% in other cattle). By 2016, the incidence fell to a historic low of 3.27%. Yet progress has reversed: rising to 4.33% in 2021, 4.31% in 2022, and continuing upwards through 2023 and 2024. Programme costs have escalated too—€82 million in 2015 to €97 million in 2020—while farmers face hidden costs in lost production, labour, and stress.

While science must remain central, this paper highlights the wider cultural and social implications of change. New Zealand's approach—outsourcing testing to private companies—demonstrates how standardisation improves test quality. Yet in Ireland, such a move could threaten small rural veterinary practices, raising questions of unintended consequences in already fragile communities.

The role of wildlife is a critical factor. Wildlife vaccination offers potential, with trials in humans and badgers suggesting 59% efficacy. However, uncertainties remain about duration and coverage, and Irish-specific data is lacking. Farmers often describe the current wildlife control programme as underfunded and ineffective. Given persistent staffing shortages and perceived inefficiencies, a full overhaul is required, including a re-examination of legislative protections for certain species. Science clearly shows that the density and dispersal of disease vectors directly influence infection rates.

Technological advances offer new possibilities. Whole Genome Sequencing can illuminate transmission pathways and sharpen decision-making. Genetic selection for natural resistance within cattle breeding programmes deserves investment. A bovine vaccine could be transformative, but Ireland must invest early in research and regulatory preparation if it is to avoid being left behind when EU approval processes intensify.

Farm-level measures are also critical. International experience—from New Zealand, Australia, UK and beyond—demonstrates the importance of strong biosecurity and movement controls. These measures can be burdensome, yet Irish farmers who have endured breakdowns consistently told me: "I would take the hit and the heartache if I knew it wouldn't happen again." That sentiment underscores the need for measures with proven efficacy abroad to be adopted here, unless there is strong justification against them. Risk-based trading, stricter cattle movement oversight, and routine farm-level biosecurity planning should all form part of annual herd health strategies, not just crisis responses.

For seventy years, Irish taxpayers have supported the bTB eradication programme, contributing more than €2 billion. Farmers too have invested heavily—financially, emotionally, and socially. Now, with incidence rates rising again, we stand at a turning point. To avoid the looming "tragedy on the horizon," Ireland must confront uncomfortable realities, reform wildlife control, embrace technological innovation, adopt global best practice, and balance cultural considerations with scientific imperatives. Only then can we hope to achieve what has eluded us for generations—true eradication of bTB.

Table of Contents

Table of Contents

Disclaimer	2
Executive Summary	3
Table of Contents.....	5
Table of Figures	6
Acknowledgements	7
Abbreviations	8
Foreword	10
Aims and Objectives	11
Chapter 1 Introduction to Tuberculosis	12
History of Tuberculosis in Cattle	13
Chapter 2 Eradication Programme History	14
The Downey Era 1988-1991	16
Establishment of the Bovine TB Forum	17
Bovine TB Eradication Strategy 2021-2030	18
Methodology	20
Chapter 3, Case Studies	21
United Kingdom	22
History of Tuberculosis in the United Kingdom	22
Future Strategies deployed across England	23
Ongoing work in England	24
Chapter 4, Case Studies	26
Wales	26
Future Strategies deployed across Wales.....	27
Chapter 5, Case Studies	28
Scotland	28
Reasons for low National Incidence Rate	29
Chapter 6, Case Studies	31
Northern Ireland	31
Future Strategies deployed across Northern Ireland	32
Chapter 7, Case Studies	34

Australia.....	34
Chapter 8, Case Studies	36
New Zealand	36
Historical Background to Tuberculosis in New Zealand	37
Importance of Wildlife Controls	38
Measures Implemented in New Zealand	39
Chapter 9, Technological Advancements	40
Whole Genome Sequencing	40
Vaccine Development	41
Current Barriers to Vaccine Rollout	42
Testing	43
Conclusions	44
Recommendations	46
References	50
Appendix	54

Table of Figures

Figure 1.	Number of Cattle Removed from Farms Under bTB Eradication Scheme
Figure 2.	Trends in Disease Prevalence
Figure 3.	Longterm view of new herd incidents per 100 herds – UK.
Figure 4.	Bovine Tb Risk Map across England, Scotland and Wales
Figure 5.	Scotland's bTB Statistics 2015-2020
Figure 6.	Total Number of Cattle in Scotland 1974 – 2024
Figure 7.	Total Numbers of Cattle in Republic of Ireland 2023 – 2025
Figure 8.	TB Herd and Animal Incidence NI, 2014 - 2025
Figure 9.	National TB infected herd update New Zealand

Acknowledgements

Firstly, I would like to thank Nuffield Ireland and the many sponsors that have afforded me this fantastic opportunity. To Bruce Thompson my mentor, Catherine Lascurettes and Joe Leonard, along with all the Nuffield Alumni that have been so supportive over the past two years I am extremely grateful for all your support and encouragement along the way. To all who contributed to the reading and preparation of this report, thank you very much.

To my fellow 2024 Irish Scholars, Niall Hurson, Molly Garvey, Nick Cotter and Michael Martin. It has been a tremendous pleasure to share this once in a lifetime experience with you all. To my GFP group 6 what an experience we had, twice around the globe in five weeks and memories that will last a lifetime. Thank you for the lasting memories and your enduring friendships.

To my wife Helen who has borne the brunt of the family workload over the past two years, you have been my rock. Our daughter Margot was four weeks old at the Nuffield Ireland Conference 2024, a greater bundle of mischief and laughter we could not have been more blessed with. To my parents, thank you for being the constant support you have been over the past two years and indeed for the thirty-two years previous.

As I reflect over the last two years, my Nuffield scholarship has highlighted to me that it is the people you meet and the connections you make that create the best experiences. I have been fortunate to be in people kitchens, milking parlours, local bars and much more across six continents over the past two years. To all who welcomed me and made this possible thank you.

Abbreviations

bTB	Bovine Tuberculosis
DAFM	Department of Agriculture Food and The Marine (Republic of Ireland)
TB	Tuberculosis
UCD	University College Dublin
M.Tuberculosis	Mycobacterium Tuberculosis
EU	European Union
OIE	Office International des Epizooties
UK	United Kingdom
IFA	Irish Farmers Association
ERAD	Eradication of Animal Disease Board
DVO	District Veterinary Office
TD	Teachta Dála
EEC	European Economic Community
RVO	Regional Veterinary Office
OTF	Officially bTB Free
MAF	Ministry of Agriculture and Food
EA	Edge Area
LRA	Low Risk Area
HRA	High Risk Area
APHA	Animal and Plant Health Agency
M.Bovis	Mycobacterium Bovis
DIVA	Detect Infected among Vaccinated Animals
BCG	Bacille Calmette- Guerin
PCR	Polymerase Chain Reaction
WGS	Whole Genome Sequencing
ATTs	Approved Tuberculin Testers
AIM	Animal Identification and Movements
BioSS	Biomathematics and Statistics Scotland
DAERA	Department of Agriculture Environment and Rural Affairs
NI	Northern Ireland

TBPSG	TB Partnership Steering Group
CVO	Chief Veterinary Officer
INFg	Interferon Gamma
APP	Approved Property Programme
AHB	Animal Health Board
DNA	Deoxyribonucleic acid
SNP	Single Nucleotide Polymorphism
WOAH	World Organisation for Animal Health
VMO	Veterinary Medicines Directorate

Foreword

Being born and raised on a farm in south county Laois, agriculture has always been a constant in my life. My parents both came from farming families, one from the hills above Ballinakill in Co. Laois the other from Revanagh Co. Kilkenny. My grandfather and grandmother moved to the farm where I farm now with my parents in 1971. The farm has evolved over the past five decades and has overcome many regulatory and technical challenges. My topic 'Pathways to Eradicating bTB in Ireland amongst the National Bovine Herd' is inspired by personal experience on our home farm along with experiences I was afforded as Macra na Feirme National President.

I am fortunate to have the very best of memories growing up on the farm. Farming life and the people in agriculture have certainly shaped the individual I am. I look forward to seeing my 22-month-old daughter being exposed to the same experiences on our family farm in the years ahead.

Having completed my leaving certificate, I studied Agricultural Science at UCD. On completion of my degree in Dairy Business I travelled to work in New Zealand. Working on large scale dairy farms in the South Island was an eye opener to the possibilities in agriculture. I returned home in 2017 and started farming full time on our family farm. The post quota era afforded opportunity not seen in the sector in Ireland for more than four decades. In 2021 I was elected National President on Macra na Feirme and had the opportunity to meet agricultural leaders from across all sectors in Ireland and the EU. I am married to Helen, and we have a daughter Margot.

Aims and Objectives

Aim

The overall aim of the study was to examine the progress of Irelands Bovine TB eradication programme and study international best practice in order to identify future steps and measures that can be used to aid eradication efforts.

Objectives

The objectives of this study were to:

- 1) Review the current and historical measures that have been implemented in Ireland's various bTB programmes since the 1950s.
- 2) Investigate International best practices in eradication programmes that have been successful and also programmes in progress.
- 3) Identify new concepts and measures required for implementation in Ireland that ultimately lead to a reduction in herd incidence and eventual eradication.

Chapter 1 - Introduction to Tuberculosis

History of TB

The history regarding the coexistence of *M. tuberculosis* and humans comes primarily from studies of bone samples collected from a Neolithic human settlement in the eastern Mediterranean (Rodgers, 2025). The genetic evidence gathered from these studies indicate that roughly 9,000 years ago there existed a strain of *M. tuberculosis* similar to strains present in the 21st century. Evidence of mycobacterial infection has also been found in the mummified remains of ancient Egyptians, and references to *phthisis*, or “wasting,” occur in the writings of the Greek physician Hippocrates. Although the environs in which the human species has evolved over the past 9,000 years has dramatically changed, the disease “consumption” as it had been commonly referred to prior to 1882, remained one of the largest causes of death (National Centre for Health Statistics).

Prior to 1882, it was suspected that TB was caused by an infectious agent. However up until this point the organism had not yet been isolated nor had it been identified. In 1882, a German physician and one of the founders of bacteriology Robert Koch who was studying the epidemiology of Tuberculosis made a groundbreaking scientific breakthrough by discovering and culturing the bacteria responsible for Tuberculosis. Koch discovered the tubercle bacillus and established its presence in the tissues of animals and humans suffering from the disease. In March 1882, Koch announced before the Physiological Society of Berlin that he had isolated and grown the tubercle bacillus, which he believed to be the cause of all forms of tuberculosis (Stevenson 2025).

History of TB in Cattle

Bovine TB (bTB) causes illness, production loss and death in cattle, and can also infect humans. While human infection was a significant issue in the 1950’s and 1960’s, cases in Ireland are now extremely rare.

The objective of the bTB eradication programme now is to protect herds from infection, clear infection out of diseased herds, and secure our access to European and world trade markets, thereby protecting farm incomes. Under European Trade Law, where a Member State is not free of bTB, an effective eradication programme is compulsory and is a prerequisite for bovine animals and products to be traded within the EU. Separately, Office International des Epizooties (OIE) rules also require bTB testing to facilitate the international movement of animals and animal products. Increasingly, trade partners outside the EU are now requiring additional assurances related to bTB controls in respect of both animals and especially products (Statutory Instrument 58 of 2015, Animal Health and Welfare act of 2013).

As stated by Ireland’s Department of Agriculture, there are many complex challenges in both designing and implementing and eradication strategy. The eradication programme has spanned multiple generations, bTB has various transmission channels, and eradication tools are not perfect. There are many interventions that are part of an ongoing process which will continue to require further actions. However, farmers trust and willingness to engage in new

actions remains a challenge, given the recent trajectory of herd incidence rates and the greater policy environment surrounding farming. Farmers have consistently expressed their dissatisfaction with the eradication programme, along with explaining the financial and, more often, emotional toll that the disease has had on their farm and their families.

Chapter 2 - Eradication programme History

In the early 1950's, the impetus for a national eradication scheme in Ireland had come from a UK government decision to have its herd TB- free by 1961. As a consequence of this decision there was a risk that Irish cattle would be excluded from the British market at that point if bTB was not eradicated (O'Brien, 2025.).

Similarities can be drawn between now and the early 1950's, namely the reliance the Irish livestock sector has on exports as a route to sale. In the 1950's, between 500,000 and 650,000 head of cattle were live exported annually forming the bedrock of the sector (O'Brien, 2025). A total of 283,357 cattle have been exported to date in 2025, which is up 25,681 or 14% from the same period in 2024 (IFA Livestock Council Report July 2025). With the development of access to international markets and the shrinking of the world as a result of global trade, the value of Irish food and drink exports have risen to €17 Billion in 2024 according to Bord Bia (Bord Bia January 2025).

At the outset the prevalence of bTB across herds in Ireland was unknown. A pilot testing programme was established in Bansha Co. Tipperary in the early 1950s which found that 30% of cattle and 44% of cows were infected. In 1952 a pilot eradication scheme was established in Clare and Limerick which was followed by a national voluntary programme in 1954 and a compulsory scheme in 1957 (O'Brien 2025). By 1954, when the eradication programme commenced, there were approximately 250,000 herds, with 4.5 million cattle registered in Ireland, with an animal test reactor incidence of 17% (cows 22%, other cattle 8%) (Watchorn, 1965). In 2003, there were 125,000 herds with approximately 7 million cattle and an animal test reactor incidence of 0.4% according to DAFM's statistics.

In October 1965, the Government of the day declared the country attested i.e., virtually free of tuberculosis (Watchorn, 1965).

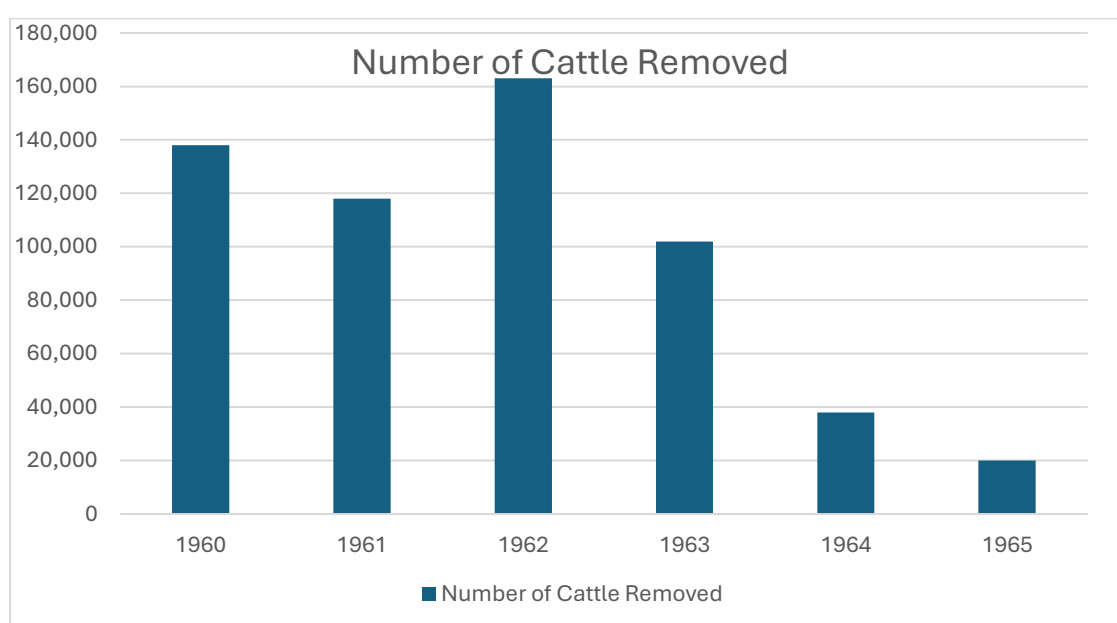


Figure 1. Number of Cattle Removed from Farms Under bTB Eradication Scheme

In 1964, Directive 64/432/EEC, the 'trading' directive, had been adopted by the, European Economic Community. All countries wishing to trade in live bovine animals with Member States of the Community were required to conform to this directive (Good, 2006). Meeting the requirements of this directive was critical to ensure that Ireland was afforded the opportunity to take advantage of trading opportunities within Europe. At this point in the late 1960's there was an expectation reactor numbers would continue to decrease. Despite these expectations reactor numbers remained circa 30,000 per annum.

Professor Bob O'Connor of the Irish Economic and Social Research Institute conducted a major bTB review in 1986. He consulted widely and listed all the issues that the then current wisdom perceived as reasons for the stalled programme (O'Connor 1986). These issues included, increasing wildlife to cattle transmission and vice versa, disjointed approach to programme management, lack of research around wildlife in particular badgers and inconsistencies around breakdown management.

Badgers were first identified as being susceptible to infection with Mycobacterium Bovis (M.bovis), the bacterium that causes bTB, during the 1980's. DAFM funded research in the East Offaly area and other studies which concluded that badgers were likely to have been involved in the cycling of bTB in cattle and concluded that eradication of bTB from the national herd would not be feasible until TB in badgers was addressed and controlled. DAFM would later fund studies between 1997-2002 which evaluated the effects of culling badgers, and these culminated in the 'Four Area Study' in which removals of different intensities were carried out and compared in areas in counties Cork, Donegal, Kilkenny and Monaghan. The study concluded that lowering badger densities in areas resulted in reduced incidences of bTB in those areas (DAFM, 2008).

In April 1988, in response to Professor O'Connor's recommendations, the Irish Government established a new initiative, ERAD, the Eradication of Animal Disease Board, as a specialised agency to implement a vigorous four-year eradication programme. ERAD was an executive agency of the Department of Agriculture and Food with a board representative of the various interests, including farmers and veterinarians, involved in TB eradication (Good, 2006).

The establishment of ERAD resulted in a multi-annual plan being developed with a specific budget set aside and ambitious targets being set. Specific area strategies were implemented in areas deemed to be black spots for the disease. Herds were categorised according to disease incidence and additional check testing was introduced on high incidence herds and contiguous herds.

The 'Downey' era 1988-1991

Under the direction of Chief Executive Dr Liam Downey, ERAD introduced a number of long-lasting key measures were introduced throughout the 1990's.

- Exhaustive tuberculin testing (~44 million tests, ~7 million cattle, 4 years).
- Improved support measures,.
- The refinement of a programme management system.
- Reactor collection service and improved compensation/hardship grants.
- Random sample testing of herds by government veterinarians.
- Establishment of a specialised research, TB investigation unit, epidemiology and laboratory services.
- Continuation of a pre-movement test.
- Improved control of dealers.
- Depopulation of problem herd.
- Improved cattle identity tags and checking of cattle at factories and marts.
- Extended restriction and de-restriction.
- Establishment of local ERAD committees and a TB farm advisory service.
- Farmer awareness campaign.
- Improved post-mortem procedures during factory surveillance.
- Establishment of badger research and control services.
- Improved control of slurry/factory waste.
- Control of calf movements.
- Attention to the cleaning of trucks of the reactor collection service.
- Improved District Veterinary Office (DVO) procedures.

Many of these interventions would ultimately become embedded as part of the long-term suite of measures aimed at reducing and ultimately eradicating bTB. However, a combination of misaligned resource investment, battle fatigue, lack of clarity on objectives and a disjointed approach to the implementation of specific measures resulted in little progress being made on total annual reactor numbers (Downey, 1991).

By 1994 it had become clear that the bTB eradication programme now faced two separate challenges. It had to address eradication in bovines in parallel with a programme to eliminate the disease in badgers if progress was to be achieved. At this time the potential for vaccination of badgers as a means to control the spread of the disease was heralded as a potential game changer in the face of rising reactors. A feasibility study was carried out as to whether badger vaccination in conjunction with traditional testing and removal practices would result in lower reactor numbers and ultimately eradication. At the time the fox rabies vaccination programme in Europe had proved highly successful despite initial reservations, and this example provided the model (Downey, 1991). Modelling had suggested that it would not be necessary for the vaccine to provide full protection to the badger population to have significant effect on the overall programme (Pastoret and Brochier, 1999). In essence the Test, Vaccinate, Release programme that is in effect today was borne from the programme that was initially modelled and trialled in the late 1990's.

Disease levels in Ireland reached a historic low in 2016 when herd incidence fell to 3.27%. Over the previous decade, additional controls on animal movements, wildlife density reduction measures, increased awareness amongst farmers, improvements in testing and

technological advancements had all contributed to the downward trend. However, from 2016 to 2020 Ireland saw herd incidence rates increase from 3.27% to 4.37% (DAFM, 2021).

Establishment of the Bovine TB Forum

On 8 May 2018, the Irish government approved a proposal from the Minister for Agriculture, Food and the Marine, Michael Creed TD, to commit to the eradication of bTB by 2030. As a result, the bTB Stakeholder Forum was established with the clear stated aims of developing options for strengthening the bTB programme, ultimately delivering national eradication of the disease by 2030. Stakeholders consisted of farmers representatives, scientists, international experts, veterinary representatives, and industry stakeholders along with team leads from within the eradication division in the Department of Agriculture Food and the Marine. The first meeting of the forum occurred on the 5th of September 2018, in Backweston Campus, Celbridge, Co. Kildare. A review of the minutes of this meeting shows that a cross-stakeholder commitment was given to the working in partnership model as central to achieving success. In subsequent meetings agreement was garnered that a long-term strategy document required development, and implementation of this strategy would ultimately deliver reduced herd incidence rates and disease eradication. Policy analysis papers informed discussions to this end and in 2021 Minister for Agriculture Food and the Marine Charlie McConalogue launched ‘Eradicating Bovine Tuberculosis from Ireland A roadmap towards eradication 2021-2030’. The Minister and indeed the bTB Forum Stakeholders recognised that the strategy would be subject to ongoing evolution based on responding to changing risks and disease patterns and continually (DAFM, 2021).

As stated earlier, any bTB eradication policies in Ireland must comply with the provisions of EU animal health law, which historically was the Council Directive 64/432/EEC. As and from April 2021, Regulation (EU) 429/2016 (commonly referred to as the Animal Health Law) and the associated delegated act now applies to eradication programmes including bTB, and any other regulations which may apply.

Bovine TB Eradication Strategy 2021-2030

This strategy document was developed with wide consultation across all stakeholders involved in and affected by the eradication of the bTB. The strategy is broken down into eight main focus areas.

These include:

- 1 Working in partnership.
- 2 Reducing cattle-to-cattle spread.
- 3 Tackling disease transmission at the wildlife/cattle interface.
- 4 Local area action plans.
- 5 Improving communications about bTB.
- 6 Legislative changes at EU level from April 2021.

7 Financial.

8 Improving programme effectiveness.

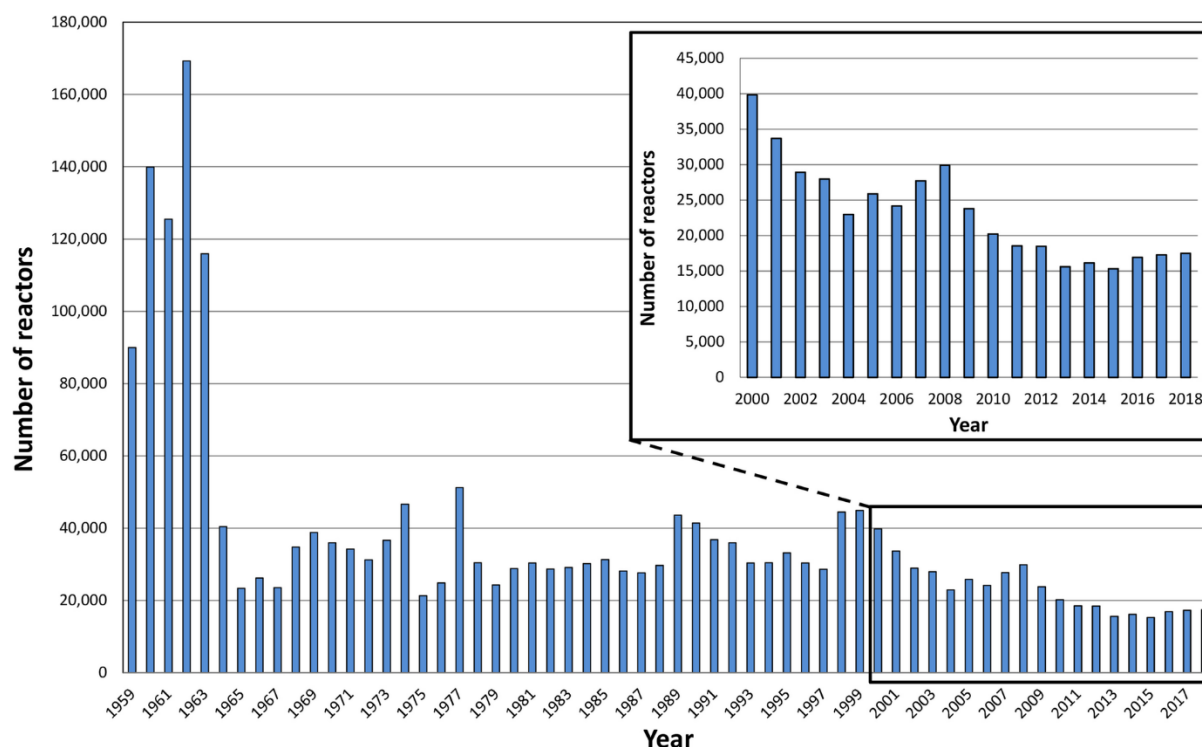
As part of formulating the bTB eradication strategy, the bTB Forum was presented with a number of proposals to move towards lower herd incidence rates and ultimately eradication. In July 2019 TB Forum Chairman Mr Michael Cronin presented the Interim Report to the Minister for Agriculture, Food and the Marine. Mr Cronin outlined that the bTB forum were making a number of recommendations to inform the development of the strategy. The recommendations from the bTB forum were largely embedded in the resulting strategy (DAFM, 2021) (See Appendix 4).

The strategic actions as set out in the Bovine TB Eradication Strategy 2021-2030 are,

- Working in Partnership.
- Preventing spread from herds with a high risk of recurrence.
- Enhanced actions to clear infection from extended breakdown herds.
- Addressing the risk from inconclusive animals.
- Action plans for areas with increased localised bTB levels.
- Aligning with changes in the EU Animal Health Law bTB regulations, which come into effect in 2021.
- Reducing the risk posed by badgers.
- Reducing the risk posed by deer.
- Tailored, simplified communications on the bTB eradication programme between DAFM and herdowners.
- Clearer messaging of the risks of bTB transmission and how to address those risks.
- Biosecurity advice delivered to farmers, with a focus on practical, clear and effective actions to reduce risk and incentivise risk-lowering behaviour.
- Standardised RVO bTB annual meetings.
- Improved DAFM bTB breakdown communication.

With new measures now being required under the EU Animal Health Law 2021, amendments to the existing suite of eradication measures are on-going and amendments have been proposed. These proposals have been designed by DAFM and are under consideration by the bTB Forum. It is in that context that this paper is written, noting that at the time of writing, this paper best reflects the incumbent measures that then existed.

Figure 2. Trends in Disease Prevalence



(Source DAFM 2021 bTB Eradication Strategy)

As illustrated in figure 2, there was a steep decline in the numbers of reactors up until and including 2016. Since 2016 there has been an increase in the number of reactors and the herd incidence rate. The six-year herd incidence rate from 2019 – 2024 is:

Year	2019	2020	2021	2022	2023	2024
Rate	3.72%	4.38%	4.33%	4.31%	4.94%	6.04%

Herd incidence rate 2019-2024

The herd incidence is predicted to increase further by the end of 2025. As of 29th June 2025, 43,290 reactors have been identified, and 6,449 herds were restricted on a 12-month rolling basis. As of 29th June, herd incidence is 6.40% (DAFM, bTB Statistics July 2025).

Methodology

The primary purpose of this research paper is to investigate and complete in depth analysis of the bTB eradication programme to date in Ireland which has been detailed in the previous section. The following sections of this paper will comprehensively explore, eradication programmes from across the world. The learnings from these findings based on factual evidence and critical analysis will inform the recommendations that follow. Coupled with this there will be an insight into some of the technological advances that are progressing in the field that offer additional firepower to Ireland in its battle against the disease.

Chapter 3 - Case Studies

United Kingdom (UK)

The responsibility for bTB eradication efforts across the UK is devolved to the individual Governments of England, Wales, Scotland and Northern Ireland. For the purposes of this paper the background information and historical data associated with England and Wales are examined together given the similarities of herd incidence and eradication efforts along with present day circumstances. Northern Ireland and Scotland are examined separately. Northern Ireland is a land bordering nation to the Republic of Ireland and needs to be examined in that context.

Scotland on the other hand was officially granted bovine bTB free status (OTF) from the EU in 2009. Given that the disease is still prevalent in certain areas of that country and that it is a land bordering country of England, it is important to examine the policy instruments and practical measures that are being implemented in order to continue progress made to date and ensure there is no regression in trends of herd incidence or reactor numbers.

History of bTB

Throughout history Tuberculosis was a significant cause of death amongst humans. Attempts had been made in the UK to reduce the effect of TB/bTB by improved hygiene and the introduction of improved veterinary practices on farms. However, it wasn't until 1935 that the Ministry of Agriculture and Food (MAF) launched the first voluntary testing scheme in England and Wales (Cooper, G 2007). This introduced the basic principles of regular skin testing and compulsory slaughter (with compensation) of clinical cases and test reactors, with additional monetary incentives for attested herd owners (bonuses per gallon of milk or head of cattle). A national compulsory bTB eradication scheme using the tuberculin skin test and slaughter of reactor cattle was launched on 1st October 1950. This took the form of an Area Eradication Plan which began in those counties of the UK with the lowest bTB incidence (and those with the highest proportion of herds enrolled in the voluntary attestation schemes) and was gradually rolled out to the rest of the country.

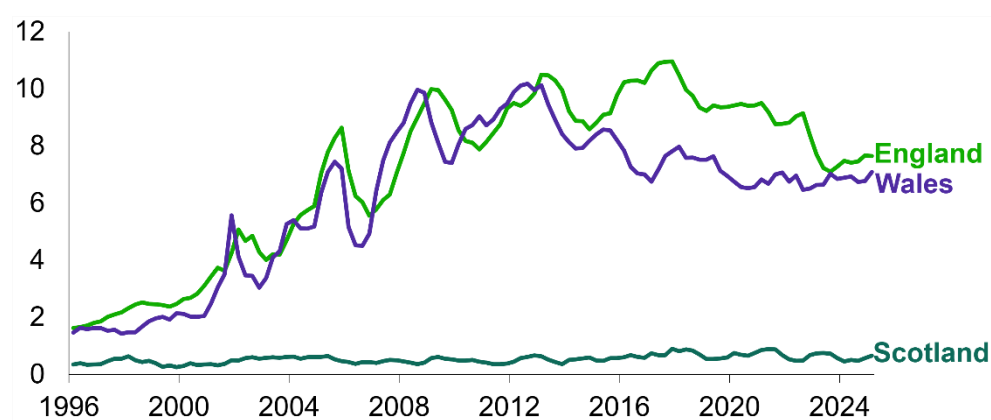
The whole of the UK became "attested" on 1st October 1960. Once a county had remained bTB attested for some time, with a very low incidence of reactor herds, the testing interval became extended to 2, 3 and eventually 4 years (Tb Hub, UK, History of bTB). Progress was maintained throughout the 1960s and 1970s, with the incidence of bTB reaching a historical minimum in the late 1970s and early 1980s. This highly successful test and slaughter scheme reduced the annual number and rate of test reactors from nearly 15,000 (16.2 reactors per 10,000 cattle tests) in 1961 to 569 (2.3 reactors per 10,000 tests) in 1982. As the testing coverage of the national herd improved year on year, the contribution of clinical examinations to the detection of infected cattle steadily declined and by the mid-1960's less than 10 cattle with clinical bTB were being removed each year. Over the same period, the proportion of all tested herds with reactors fell from 3.5 % to 0.49 %.

Unfortunately, the progressive reduction in bTB incidence stalled in the mid-1980's (Tb Hub, UK, History of bTB). Herd incidence in parts of the Southwest of England had remained about three times higher than in the rest of the UK, despite the retention of an annual (and

occasionally more frequent) tuberculin testing regime in those areas. The difficulties in resolving these final bTB hotspots, and the identification in 1971 on a Gloucestershire farm of a wild Eurasian badger (*Meles meles*) infected with *M. bovis*, meant that attention began to turn to the badger as a possible wildlife reservoir of infection. Subsequent studies (such as the RBCT) have demonstrated that the badger is a maintenance host to *M. bovis* and a major impediment to the eradication of bTB in large tracts of the UK, notably the Southwest and parts of the Midlands in England and in Wales (De la Rua, 2006).

From 1973 to 1998, the cattle test-and-slaughter regime was complemented with a succession of culling strategies, aimed at reducing badger populations in the areas where bTB remained endemic (TB Hub, UK, History of bTB).

Figure 3: Longterm view of new herd incidents per 100 herds - UK.



Source: TB Hub, UK

It is clear from the data presented in Figure 3 above that the trends in disease incidence in both England and Wales is at distinct odds with that across Scotland. The exact reason behind why there was such a dramatic rise in reactors across both England and Wales after the year 2000 is not fully understood or agreed. There is a school of thought amongst farmers and veterinary practitioners across the UK that the cessation of bTB testing during the foot and mouth outbreak in 2001 was a significant factor. Others have suggested that impaired implementation of wildlife controls coincided with the rise in reactors. The policy around testing also changed at this time with the introduction of the gamma interferon testing across the entire UK, which has greater sensitivity than tests which were previously used. In 2005 a zero-tolerance approach was also applied across the entire UK to deal with farms which had been “overdue” a herd test (Parker, J. 2017).

Given the turbulent nature of the eradication programme across England and Wales in particular, farmers have expressed frustration at the lack of progress in areas where persistently high herd incidence rates continue to exist. These same farmers have also spoken about impact the disease has had on them and their farm. A report in 2023/2024 commissioned by Farm Community Networks highlighted one of the key findings was that many farmers believe the impact of the long-term physical, emotional and financial impact of bTB outweighs having to deal with the shorter-term impact of a disease outbreak (Farm Community Network 2025).

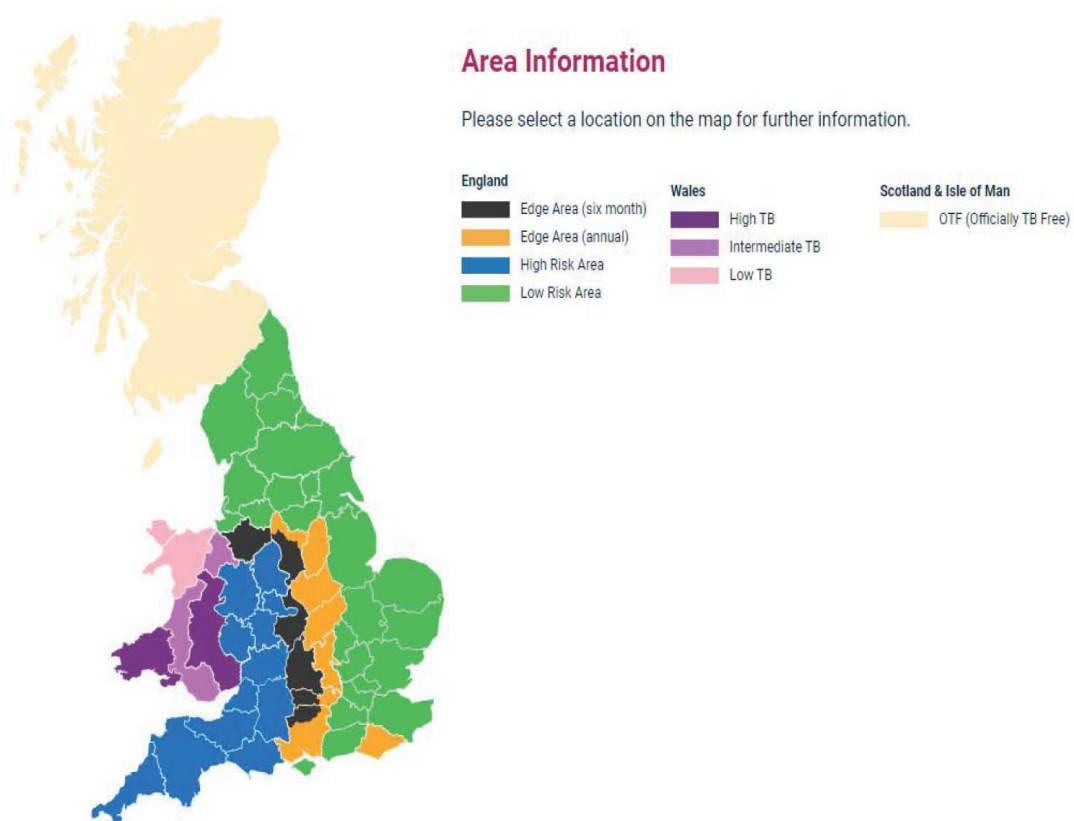
Future Strategies deployed across England

The government is committed to implementing a 25-year strategy to eradicate bovine bTB in England. The variation in disease occurrence, presence and pressures across England is defined by specific area-based assessments that define geographical areas into one of three categories.

1. High Risk Area
2. Edge Area
3. Low Risk Area

The measures around testing, movements and breakdown surveillance vary depending on the area that your farm/farms are located in. For example, a farmer that is farming fragmented land across two risk areas must conform to the rules associated with the higher of the two risk areas.

Figure 4. Bovine Tb Risk Map across England, Scotland and Wales



Source: TB Hub UK, 2025

There have been a number of measures introduced across England over the past number of years in an effort to tackle disease spread and occurrence. Some of these measures include:

- Cattle moved to herds in annual surveillance testing parts of the Edge Area may require compulsory post-movement testing depending on the herd they originate from,
- Increasing the frequency of bTB surveillance testing across the HRA of England,
- Enhanced measures implemented in defined hotspots identified in low-risk areas,
- Increased deployment of gamma interferon testing in high-risk areas along with mandatory deployment in the case of breakdowns in low-risk areas,
- In April 2016, compulsory post-movement testing was introduced in the Low-Risk Area (LRA) of England for cattle moved from other areas of England and Wales,
- Radial testing (3Km) of a breakdown within a bTB edge area,
- Annual or six-monthly testing in edge areas depending on disease occurrence and prevalence,
- Enhanced communication between all stakeholders including all-encompassing source of information via the TB hub website (TB Hub, UK, Policy 2024) (See Appendix 6).

Between 1996 and 2013 there was a general increase in herd incidence in England. England's herd incidence remained stable until 2017 and has shown a generally decreasing trend since. In England overall, herd incidence between July 2024 and June 2025 was 7.8%, an increase of 0.4% from the previous 12 months. Between June 2024 and June 2025, herd prevalence remained unchanged.

The introduction of measures such as a regionalised approach to disease management has made an impact by steadily reducing the disease occurrence. The wider deployment of higher sensitivity gamma interferon testing has resulted in positive animals being identified faster. Post movement testing in low-risk areas has also been demonstrated to identify the disease at an earlier stage and before it has had the opportunity to infect more animals within the herd. Radial testing has also been attributed to identifying disease spread across a geographical area sooner than had it not been implemented.

Ongoing Work in England

In 2025 a new review panel, (the Godfray Panel) was established to conduct a review of recent developments and identify any additional measures that may be required. This review is ongoing and is considering the main priorities as set out under the strategy.

As part of a wider programme of bTB research, a deployable cattle TB vaccine, namely the BCG vaccination was developed. However, limitations remain regarding the ability of diagnostic tests to differentiate between vaccinated animals that have developed an immune response to a vaccine versus the immune response developed by the animal to infection of the disease.

The Animal & Plant Health Agency (APHA) of the UK made a significant breakthrough in the development of a potential new "DIVA" skin test (to Detect Infected among Vaccinated Animals). This new test could overcome these testing challenges by identifying cattle that are infected with *M. bovis* despite having received the vaccine, i.e. true positives. In 2021, cattle TB vaccination field trials began in England and Wales using Cattle BCG in combination with this potential new DIVA skin test. Early indications are positive in the field trials. Work is completed in a second phase of the trials, but some challenges remain. As of March 2024, the third phase has been initiated in order to gather additional data on the DIVA test

specificity and explore options to optimise the performance of the new test. The third phase will assess the companion DIVA skin test on a broader cohort of vaccinated animals in selected herds to further inform collective planning for delivery (Browne, E 2025).

Improving diagnostics, surveillance and epidemiology is also another critical area that the Godfrey panel is reviewing. Increased funding for research and development of diagnostic tools along with enhanced surveillance are likely to play an important role in providing greater knowledge around diagnostic. Increasing investment in PCR testing from postmortem samples to reduce the lag time for results will allow for faster response times in the face of a breakdown. Further rollout of Whole Genome Sequencing (WGS) of *M. bovis* isolates across the UK is also being examined.

Encourage the farming sector to reduce the spread of bTB is a central part of the strategy, through increased uptake of effective biosecurity measures and enhancing the tools for informed purchasing of stock. Creating stronger partnerships between Government, industry and other key groups by improving cooperation at every level. A bTB forum was established in 2021 and is aimed at creating a joint approach across all stakeholders towards eradication by 2028 (TB Hub, UK, Policy 2024).

Chapter 4 - Case Studies

Wales

The aim of the Welsh Government is for Wales to be officially TB-Free by 2041. The Welsh Government fully refreshed its approach to bTB Eradication in 2017, with the publication of a long-term overarching Programme document and an initial Delivery Plan, which ran from 2017 until 2023. As part of this delivery plan a new regionalised approach to bTB eradication in Wales similar to that which exists in England was introduced. Wales introduced this new regionalised eradication strategy, based on spatial units which reside within the five TB Areas (Griffiths. L 2023).

In March 2023 the Welsh Government launched the second bTB eradication programme delivery plan which runs from April 2023 to March 2028. The complexities that the eradication programme faces in England are very similar to those that arise in Wales also. These include:

- High disease prevalence in some areas.
- Endemic disease incidence.
- Wildlife vectors.
- Complex nature of disease diagnostics.

In Wales overall, herd incidence between April 2024 and March 2025 was 7.1%, an increase of 0.2 from the previous 12 months, while herd prevalence rose by 0.5%. By comparison in England overall, herd incidence between April 2024 and March 2025 was 7.6%, an increase of 0.1 from the previous 12 months (Department for Environment, Food and Rural Affairs 2025).

Future Strategies deployed across Wales

As is the case in England, the delivery plan 2023 – 2028 in Wales set out a number of actions/measures to be taken over the coming years to eradicate the disease. These include but not limited to:

- A toolkit of hotspot measures has been developed and deployed in the areas where the disease prevalence is at its worst. These measures include the use of a more severe interpretation of the tuberculin skin test, strategic use of the Interferon-gamma test towards the end of a breakdown.
- Offering enhanced biosecurity advice through a keeper's own vet to herds neighbouring a bTB breakdown (contiguous herds).
- A cattle vaccine programme which comprises four interconnected projects: research and development, evidence, policy and deployment. The aim is to have a deployable vaccine within the next five years.
- Within the Programme for Government in Wales there is a commitment to forbid the culling of badgers to control bTB in cattle. As a result, the Welsh Government is pursuing a badger vaccination policy.

- Continued programme governance review in relation to the Terms of Reference of existing TB boards, as well as reviews of existing initiatives and programmes.
- Development of a scheme of mandatory Informed Purchasing will be developed through engagement with stakeholders.
- Under a pilot programme, Approved Tuberculin Testers (ATTs) are able to undertake TB testing in parts of Wales. These ATTs carry out a similar function to those that exist within England. These “lay” testers were introduced and trained as a result of concerns over capacity within the existing Veterinary surgeons to carry out the required level of testing on farm. The aim is to assess the effectiveness of the pilot and to roll out to a larger scale across the country (Welsh Government 2023).

Chapter 5 - Case Studies

Scotland

Scotland has been officially bTB free (OTF) since September 2009. This unique position within the UK is in recognition of the relatively low and stable incidence of bTB found in Scottish cattle herds.

This allows Scotland the flexibility to better target resources and adopt a risk-based approach to surveillance, while continuing to protect and maintain OTF status. Low bTB risk herds that meet certain criteria are exempt from routine four-yearly surveillance bTB testing (TB Hub, UK, Policy 2024).

This does not mean that Scotland has no cases of bovine tuberculosis, but recognises that there are relatively few cases, below the threshold for the designation of officially bTB free. This designation is given to a country where less than 0.1% of herds experience infection annually in a country or region.

Figure 5. Scotland's bTB Statistics 2015-2020

Scotland TB statistics 2015 – 2020

	2015	2016	2017	2018	2019	2020
Total cattle tested	265,800	244,188	209,951	262,494	248,090	244,125
Total cattle slaughtered	128	150	273	496	199	261
New TB herd incidents	15	11	13	12	14	14

Source: (Scottish Government 2024)

Scotland as a whole has a default testing interval of 48 months. However, in certain circumstances a herd may require more frequent testing, and the keepers of these herds are notified on an individual basis. Herds identified as "low risk" will be exempt from the four yearly routine herd testing and will also be notified separately.

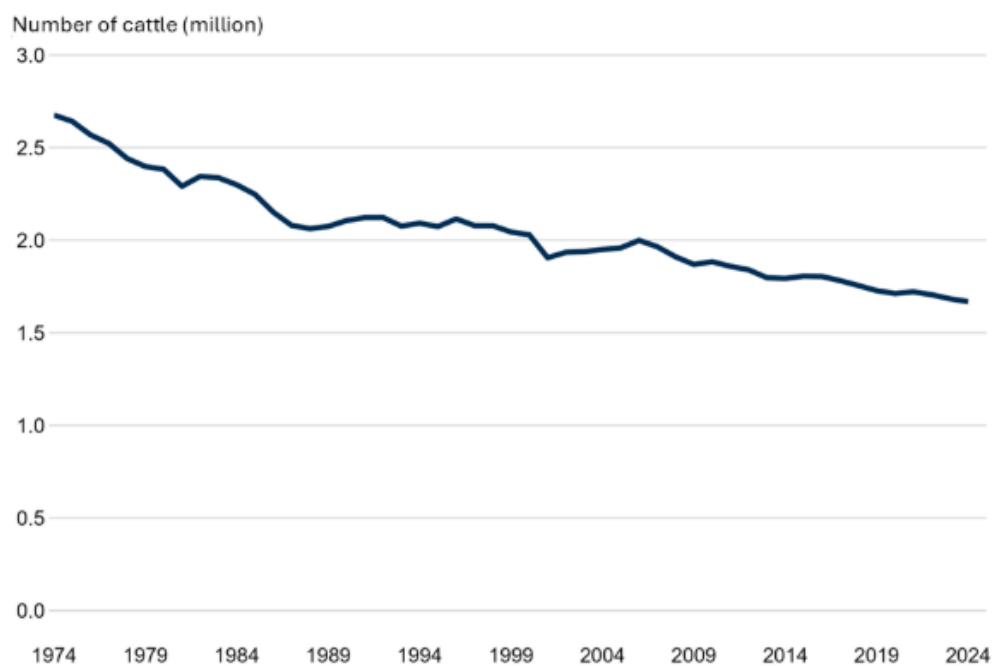
Strict pre and post movement testing requirements are implemented in Scotland with rules varying depending on the region from which cattle are being moved. For example, cattle

coming into Scotland from a High Incidence Area in England require a pre movement test within 30 days of movement and a post movement test within 60 – 120 days.

Reasons for Low National Incidence Rate

Although the area of Scotland is similar to that of Ireland, the total cattle numbers in Scotland are significantly lower and have been in a long-term decline since a high in 1974. At that time there were 2.68 million cattle while in 2024, the national cattle population was 1.67 million, a decline of 38% (Scottish Ag Census 2024).

Figure 6. Total Number of Cattle in Scotland 1974 - 2024



Source: Scottish Ag Census 2024.

When you compare the table above to the comparative figures in Ireland which has had a generally stable total cattle population of circa 7 million since the mid-1970's (see Figure 7) it is clear that the total number of the cattle population in Scotland has been a beneficial factor in reducing the spread of the disease. Lower numbers of cattle within herds mean that animal to animal contact is less frequent and less intense, thus reducing the opportunity for disease transmission. A greater geographical spread between herds ultimately reduces the likelihood that animals from different herds come into close contact with one another which also reduces the opportunity for disease transmission.

Number of cattle, sheep and pigs 1849-2019

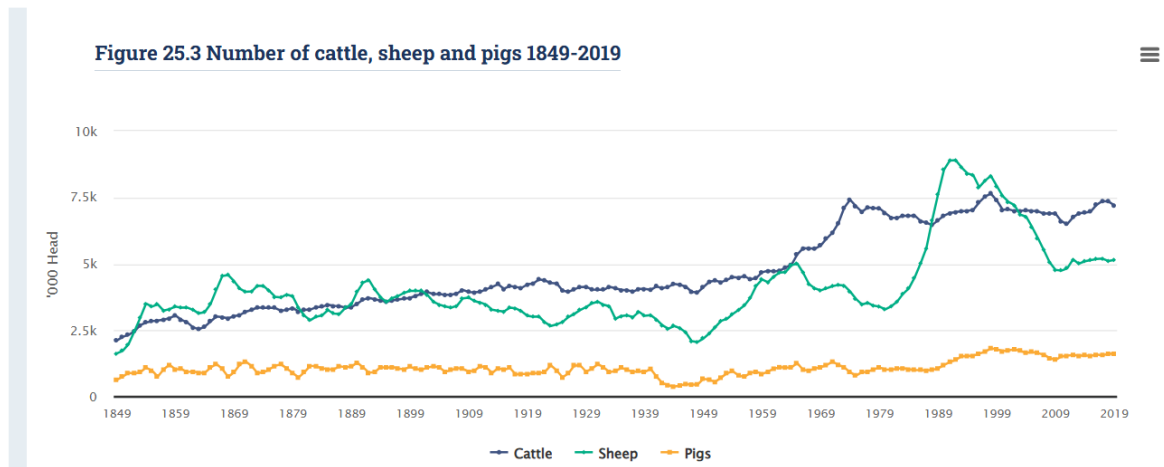


Figure 7. Total Numbers of Cattle, Sheep and Pigs in Ireland 1849 - 2020

Source: CSO Agriculture Statistics Report 2020

Holdings in Scotland are also generally larger than in the Republic of Ireland and there tends to be a greater geographical dispersal of herds leading to less contiguous contact. Though there is no ongoing monitoring or testing of wildlife for TB within Scotland only five confirmed cases of TB have been discovered in the wildlife population, four of these coming in deer and one in a badger, the last case of which was in 2003. Based on the results calculated by BioSS, there are estimated to be between 10290 and 15864 badger main setts in Scotland. Also, an estimated 11% to 14.5% of 1-km squares in Scotland contain at least one badger main sett, with badgers being completely absent from 60-70% of Scotland's land mass (Connolly. S 2025).

By contrast in a 1995 report written by Chris Smal "The Badger and Habitat Survey of Ireland" he noted that, in a survey conducted between 1989 – 1993 of 1% of the total land area, that the average density of badger was 2.95 individuals per square kilometre, with the average setts per square kilometre numbering 1.89 (Smal.C 1995). This survey also highlighted that over 75% of setts were located in the vicinity of cattle, and setts were also commonly used by rabbits and foxes. Social group size was estimated at 5.9 adults per group, each social group was accompanied by an average of 4.09 setts, with 1 active main sett 0.19 disused main setts, 0.50 annexe setts, 1.32 subsidiary setts and 1.08 outlier setts. The geographical distribution of these setts varied between groups. The geographical distribution of setts also meant that the home range of each social group of badgers contained within it, many separate herds of cattle.

Chapter 6 – Case Studies

Northern Ireland (NI)

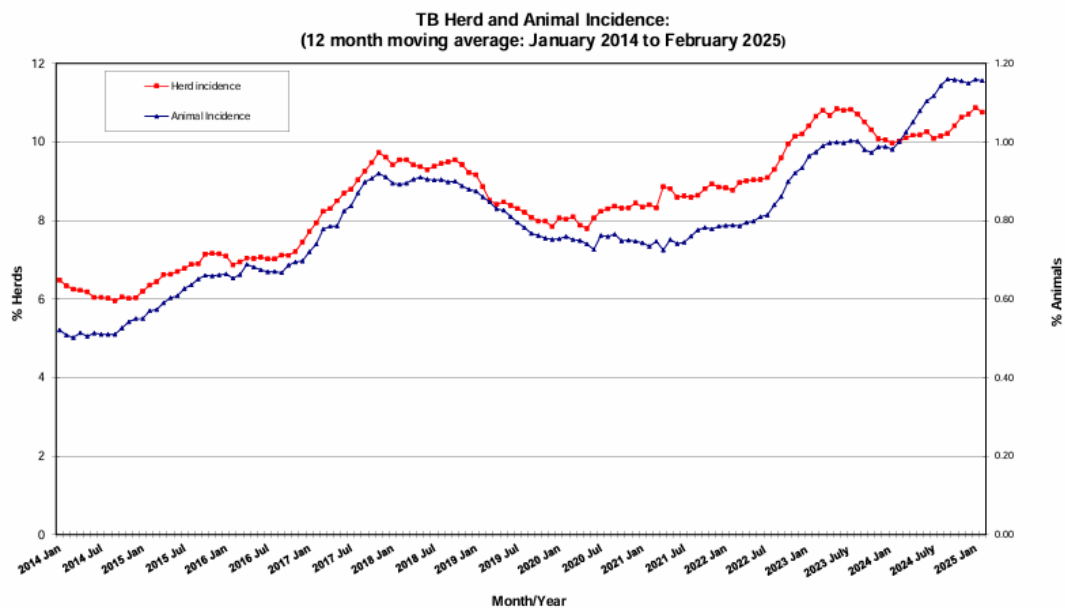
A national programme to eradicate bTB has been in place in NI since the late 1950s. In recent years there has been a significant deterioration in the bTB situation with substantial increases in both animal and herd incidence. In 2014, the Department of Agriculture appointed an independent expert advisory group, the TB Strategic Partnership Group (the Group), to develop a long-term strategy to eradicate bTB from the cattle population in NI. The Group formulated a TB eradication strategy that was initiated in 2016. In March 2022, DAERA launched the NI Bovine TB Eradication Strategy (TBES), consisting of a package of recommendations designed to achieve a sustained reduction and eventual eradication of bTB. The recommendations were based upon work undertaken by the NI TB Strategic Partnership Group (TBSPG). The TBES contained 21 recommendations in total and were grouped into six interrelated themes as outlined below:

- Management, Oversight and Governance.
- Tools and Processes.
- Herd Health Management.
- Wildlife.
- Finance.
- Research.

According to Chief Veterinary Officer of NI in October 2024, approximately 12% of herds were under restriction for bTB, with these herds constituting 24% of the total bovine population reflecting the fact that bTB breakdowns are skewed towards the larger herds. They are also disproportionately impacting dairy farms.

In the spring of 2025 after a consultation process, the TB Partnership Steering Group (TBPSG) published “Bovine Tuberculosis in Northern Ireland, Blueprint for Eradication” document which sets out the priorities and actions that will be taken over the coming years to eradicate TB.

Figure 8. TB Herd and Animal Incidence NI, 2014 - 2025



Source: Bovine Tuberculosis in Northern Ireland Blueprint for Eradication

Future Strategies deployed in NI

The aim of the TBPSG, working with DAERA, is to reduce bTB herd incidence by 2% by 2030, placing NI on a pathway to halve current bTB levels by 2040 and achieve eradication by 2050. The new blueprint is a comprehensive document that is broken down into a number of key categories with a list of actions associated with each. Below are each of the key categories with a selection of some of the actions. The full strategy can be found in appendix 1 of this paper.

1. People, Partnership and Science

- Establish new cross cutting governance structures.
- Consider partnerships with neighbouring jurisdictions to maximise impact of research.
- Establish CVO led North-South bTB eradication forum.
- Review programme disease measurements and indicators, including how they are shared and communicated both internally and externally, to support data driven decision making & continuous improvement.

2. Cattle Interventions

- Review criteria used to monitor testing performance and roll out increased surveillance.
- Review criteria for gamma interferon testing and evaluate possibility of introducing compulsory gamma interferon testing, with initial target of 24,000 tests per annum to protect herds from future risk of bTB breakdowns.

- Develop and implement pilot based on advice from the Taskforce for herds with prolonged and persistent breakdowns.
- Engage with DEFRA and DAFM regarding ongoing work on alternative testing strategies.
- Review current bTB case management approach, (including deployment of adequate resources) and develop veterinary led proposals to improve current approach.
- Explore options for providing grant aid to improve animal handling/testing facilities and to undertake works aimed at improving biosecurity as part of the wider DAERA sustainable agriculture programme.

3. Wildlife

- Bring forward proposals for effective, evidence-based wildlife interventions and TBPSG views for consideration by Minister.
- Develop proposals to evaluate further the role of deer in the transmission and persistence of bTB.

4. Regionalisation

- Develop a 'Proof of Concept' pilot for delivering a holistic package of measures (wildlife, cattle, people) on a regionalised basis (Bovine Tuberculosis in Northern Ireland Blueprint for Eradication)(See Appendix 3).

Given the increasing trend in both animal and herd incidence rate in NI over the past decade (see figure 8) it is clear that a change in approach to bTB eradication is needed. The blueprint sets out clearly defined timelines for the implementation of various measures and also details the key stakeholders that need to be involved. The three-pronged approach of people, wildlife and cattle also demarcate clear areas of responsibility. The formation of a North/South TB Forum would also be a welcome development in Ireland in order to ensure cross border cooperation and consistency around eradication measures.

A greater roll out of gamma interferon testing would see faster detection of new infections within herds, similar to what has been implemented in New Zealand for some time. Grant aid support for facilities development is also a step in the right direction to ensure a smoother handling of stock. A system similar to Targeted Agricultural Modernisation Scheme (TAMS) which exists in Ireland may provide a template. It is clear that there still remains a body of work regarding wildlife interventions and further research and consultation is required. The development of a proof of concept pilot for regionalisation marks a significant advancement given the success that this measure has had in New Zealand and more recently in England and Wales.

Chapter 7 - Case Studies

Australia

There are a limited number of international examples whereby countries/regions have successfully eradicated bTB. Australia is one of those countries that has successfully eradicated bTB. The national bTB eradication campaign ran for 27 years from 1970 to 1997 and since then has been followed by ongoing abattoir surveillance. Declaration of bTB freedom was made on December 31, 1997 (More. S.J. 2015).

Prior to the introduction of the national eradication programme there was a compensation scheme for tuberculin reactor dairy cattle which commenced shortly after the Second World War, and infection had become uncommon in Australian dairy herds by the 1960s (Mylrea 1990, Lehane 1996). However, these control efforts were not nationally coordinated, but rather State-based.

Former Professor of Veterinary Epidemiology at UCD, Simon J More has consistently stated in relation to the eradication programme in Australia that the role of abattoir surveillance, effective elimination of residual infection and a consistent application of programme measures ultimately led to the success of the programme (Personal Meeting).

Given the scale of Australia and the varied farming systems across states, different measures were needed to successfully eradicate the disease. For example, in some northern parts the management of cattle was limited to irregular harvesting from what were essentially feral cattle populations (Lehane 1996). These farms needed investment in paddock systems and handling facilities to manage mobs of cattle more effectively. Destocking (partial depopulation) of high-risk (older age) groups from paddocked areas and the removal of all cattle and buffalo from areas where a clean muster was not possible (i.e, bush areas) was used extensively in northern Australia. Mobs of younger animals were created and grouped together and put under a testing regime (More, 2024)

Introduced in 1984, Approved Property Programme (APPs) became an essential component of eradication strategies throughout central and northern Australia (Lehane 1996). These programmes were developed in partnership with the owner, providing an agreed 'road map' for action towards TB freedom. The programmes specified long-term and interim milestones, agreed actions and annual written reviews.

Depopulation of newly identified TB breakdown herds was adopted in all areas from 1990. During the latter stages of the programme, measures were introduced to encourage the removal of all cattle previously exposed to TB-infected animals (More. S.J. 2015).

Throughout the Australian programme, *M bovis* infection was mainly limited to three animal species: cattle, water buffalo and feral pigs (Corner 2006). It is worth noting that in Australia, water buffalo and feral pigs are classified as invasive animal species, with a major negative impact on Australia's environment.

A categorisation system became an integral part of the eradication efforts whereby different areas of the country were classified on risk, while individual herds also received herd categorisation based on the occurrence of the disease. Movement restrictions were also placed on trade between areas categorised as free and those areas with infection as the programme progressed.

Financial support measures within the eradication programme evolved over time. Reactor compensation was available from the start of the campaign. Compensation for destocking (paddock checks, age destocking, bush destocking) became available from the early 1980s with additional assistance from 1984. The latter included a subsidy to hold cattle for the TB test (in yards/holding paddocks).

The last known cases of bTB in Australia were detected in 2002. The whole of Australia was declared impending free in 1992 and Free on December 31, 1997. From 2011, infection with *M bovis* was classified as an exotic disease of cattle (More, 2024).

Chapter 8 - Case Studies

New Zealand

Like many other parts of the world, New Zealand has had a bTB eradication programme ongoing since the mid-1950's. Compulsory TB testing was introduced for fresh milk supply herds in 1956, and for herds supplying milk for factory processing in 1961. By 1970, all dairy cattle were under compulsory TB testing, and this was progressively extended over the next 5 years to beef herds. (Livingstone, P., Hancox, N., Nugent, G., & de Lisle, G. 2015).

By the 1970s all cattle herds were undergoing, regular TB testing or post-mortem inspection for bTB and compulsory slaughter of suspected bTB cases that tested positive partial quarantine of infected herds.

In 1969, vets found proof that the invasive brush-tail possum was carrying bovine TB — and passing it to farmed cattle and deer (Danny Templeman, OSPRI Personal Meeting 2025).

By the mid-1980s large areas of the North and South Island had successfully eradicated bTB, including mid- Canterbury, Taranaki and Northland. These areas implemented control measures in cattle, and later in farmed deer. Control was based on established methods of tuberculin testing of herds, slaughter of suspect cases, and livestock movement control. The adoption of coordinated national pest management strategies also played a key role in bTB eradication. However incidence rates amongst herds remained high in some areas however, these included, the central North Island, the Wairarapa, the West Coast.

By this time Possum related bTB became a major issue in the areas where the disease became entrenched and difficult to reduce the incidence rate. The government started investing in possum control for forest conservation purposes in the 1970's. Resources were allocated to areas with major bTB problems such as those listed above. This led to a sharp decline in livestock infection levels throughout the late 1970's. In 1978, Government funding for possum control was withdrawn due to complacency, Government austerity and a rise in the value of fur.

The test and slaughter model was now the main tool used to fight the disease and management of possum control was devolved to local pest destruction boards. The management across regions was not integrated and often disjointed. This resulted in a rise in bTB incidence rates across the country including in areas that had been previously free from bTB in the early 1970's (OSPRI, 2025).

There was an exponential increase in bTB in livestock during the 1980's. This peaked in 1994, with over 1700 cattle and deer herds infected with TB. This represented a herd infection prevalence of more than 2% (OSPRI, 2025). The Animal Health Board (AHB) was established in 1993 and had the mission 'to eradicate bovine tuberculosis from New Zealand' (Livingstone PG, Hancox N, Nugent G, Mackereth G, Hutchings, 2015)

The AHB assumed the management of the bTB eradication programme, gained access to government funding and agreed levy funding through farmers and industry stakeholders. There was also a formalisation of relationships with veterinary practitioners, vector control agencies, and advisory services.

By June 2000 the numbers of infected herds had fallen to 666. Progress had been made in herd incidence rate but the prevalence of the disease in certain geographical wildlife population remained at high levels. A revision of the strategy was needed, and additional funding was provided by Government and industry. The new strategy had the stated aim 'to reduce the national herd infection rate to no more than 0.2% by 2013' (Biosecurity National Bovine Tuberculosis Pest Management Strategy Amendment Order 2004).

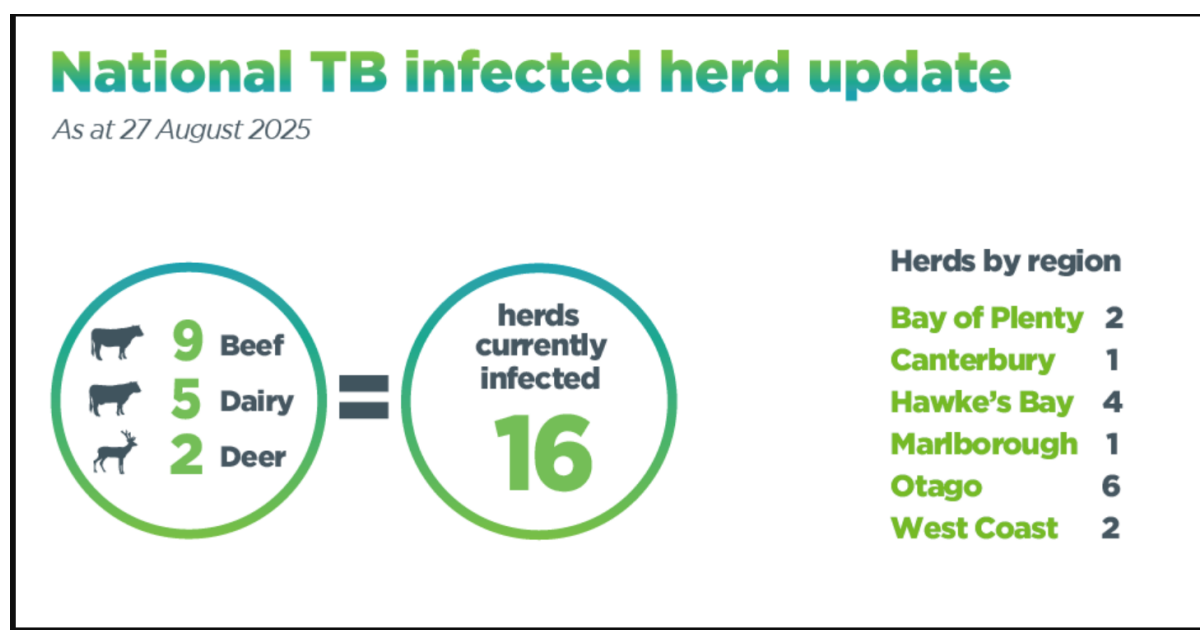
As possums are defined as an invasive species, an intensive depopulation programme of the possum population followed which led to a major decrease in the incidence rate in cattle herds. By 2007 the herd incidence rate had fallen to 0.39%. At this point another strategy rethink was proposed by the AHB and by 2011 a new set of five-year strategic objectives had been agreed (Danny Templeman, OSPRI Personal Meeting 2025). These were,

- to eradicate bovine TB from all species in 2.5 million hectares (25% of the total area occupied by infected wildlife) — including 2 large, forested areas representing difficult environments.
- to prevent TB from becoming established in wildlife in any area currently free of TB.
- to maintain infected herd numbers at no more than 0.4% during the term of the strategy (OSPRI, 2025)

By 2016 the majority of these objectives had been met, with the disease prevalent in a total of 46 herds nationally. New Zealand's bTB eradication Strategy 2016 has the key objectives of achieving:

- TB freedom in livestock by 2026.
- 'Statistical freedom' (high confidence the disease is gone) in possums by 2040.
- Biological eradication of TB from New Zealand by 2055 (Biosecurity National Bovine Tuberculosis Pest Management Plan Amendment Order 2016).

Figure 8. National TB infected herd update New Zealand



Source: National infected herd numbers OSPRI

Importance of Wildlife controls

After the introduction of the ‘test and slaughter’ policy in the late 1960’s reactor numbers across the country began to decline sharply. However, in some regions such as the West Coast this was not the case. For example, in the Buller District reactor numbers remained high. This was the case despite movement restrictions, additional hygiene measures in milking parlours, water trough disinfection measures and whole herd testing every 3-6 months with rapid removal of test positive animals (Danny Templeman, OSPRI Personal Meeting 2025). (See Appendix 5).

Given the conclusions of the research conducted by vets in 1969 (mentioned above) regarding possums as a vector for the disease it was clear that further investigation was required in the Buller District. As a result, a simple field experiment was conducted. Twenty-nine test-negative calves were grazed in a paddock from which 12% of possums had been found with TB lesions some 6 months earlier. After 6 months grazing in the paddock, the calves were re-tested, with 26/29 being test-positive, and 16 having gross lesions of TB at slaughter (Livingstone PG, Hancox N, Nugent G, Mackereth G, Hutchings, 2015).

This proved the role that possums played in the spread of bTB, and an extensive possum control programme commenced in 1972 – 1978. The annual incidence of TB reactors in the Buller-South area subsequently fell from 17% in 1971 to 4.0% by January 1976. The percentage of infected herds fell from 82% to approximately 30% over the same time period (Livingstone PG, Hancox N, Nugent G, Mackereth G, Hutchings, 2015). This example along with many others across New Zealand informed future measures and action plans that would be taken in relation to tackling the spread of the disease. It is clear that an all-encompassing eradication suite of measures needed to be implemented consistently and together to achieve a reduction in disease occurrence.

Measures Implemented in New Zealand

Over the past fifty years a series of measures have been implemented in order to progress the efforts to achieve bTB eradication (Danny Templeman, OSPRI Personal Meeting 2025). A selection of these key measures is outlined below,

- Regionalised approach to disease eradication.
- Establishment of Organisation to manage eradication programme outside of sole government control, namely OSPRI.
- Shareholder structure within OSPRI, consists of producer representatives, industry representatives and government representatives.
- Local level OSPRI Committees and TB Free Committees across the country.
- Regional level OSPRI Committees.
- Huge farmer buy in developed through clearly defined actions along with targets, and active attainment of said targets.
- Extensive pest control programme with set aims and targets which were carefully monitored.
- Investment in practical on the ground research targeted at ‘easy wins’ first of all.
- Movement restrictions on animals according to region categorisation based on risk.
- Targeting of resources at areas with lowest prevalence to disease moving to areas with a higher disease prevalence, in the process creating disease free regions.
- Use a parallel skin and blood testing when disease prevalence became low.
- Use of technicians for skin testing as opposed to vets.
- Use of blood testing to confirm reactors prior to removal from farm.
- Breakdown investigation in the case of each breakdown to establish source attribution.
- Consistent approach to disease suppression within specified geographical areas.
- Risk based trading approach and a risk-based herd categorisation, based on historical purchasing.
- Active monitoring and management of wildlife vector numbers and density.
- Investment in and role out of extensive Whole Genome Sequencing to track and trace genome isolates of bTB.
- Key focus on disease management principles.
- Introduction of parallel blood testing on breeding females from 2011 who are in a herd experiencing a breakdown.

Chapter 9 - Technological Advancements

Whole genome Sequencing (WGS)

Genetic material (DNA) is found in all living organisms, including bacteria. Each *M. bovis* bacterium contains unique DNA which carries the genetic instructions for its development, function, growth and reproduction. WGS is a molecular technique used to characterise the entire DNA content of an organism which can be applied to identify the unique characteristics of TB bacterium.

In a study published by the National Laboratory for Medicine in the United States of America in 2021, the research was conducted based on analysis in Portugal on the primary hosts that transmit the disease and also the rate and frequency between which the disease moves between hosts in a given environment. This research was qualitatively conducted using Whole Genome sequencing which enables the identification of a specific DNA profile of the disease and allows for that DNA profile to be tracked as it moves within and between species. This ultimately is able to identify the initial host and also the pathways that the disease has taken as it moves within a given environment (Orloski K, Robbe-Austerman S, Stuber T, Hench B, Schoenbaum M., 2018).

When considering the livestock–wildlife interface, WGS has been used to demonstrate the close genetic relationship among *M. bovis* isolates recovered from sympatric cattle and wildlife populations in different epidemiological settings, including the UK, Ireland, New Zealand and the United States of America. In this context, single nucleotide polymorphisms (SNPs) emerged as good phylogenetic markers, helping in the definition of *M. bovis* population structure, having been recently used to define four *M. bovis* lineages, and to inform transmission models. When placed together with data concerning the time needed for this slow-growing bacterium to accumulate new SNPs, this information can provide temporal clues on the emergence and divergence of specific genotypes.

In the UK when a TB incident occurs, APHA field vets carry out a disease investigation to gather information about how TB infection could have entered the herd and whether it could have spread. To support this investigation, microbiological culture of *M. bovis* is attempted from tissue samples taken from the carcasses of slaughtered animals at post-mortem inspection. If *M. bovis* is cultured in the laboratory, genetic analysis is carried out to determine the particular strain of the bacterium. APHA uses WGS to characterise isolates of *M. bovis* cultured from cattle slaughtered for TB control. This provides information about the genetic relatedness of *M. bovis* strains, where they have come from and how they have evolved. WGS is an important tool used by APHA for investigating TB breakdowns and studying the spread of TB in the local and national cattle population, and the factors that affect it over time (TB, UK, 2025).

At farm level, WGS helps APHA field vets to identify the most likely source of TB infection aware of the likely origin of a breakdown, they can advise farmers on measures they could take to reduce the risk of further infection entering the herd.

Although WGS can provide more information about genetic relatedness of isolates than genotyping, there are limits to the inferences that can be made when interpreting WGS data.

For example, it's often not possible to determine the direction of transmission of *M. bovis* between different species. However, even considering the limitations it has an important role to play in determining the direction of transmission. In the Republic of Ireland, WGS has been used for a number of years, but greater role out is required with further investment in supporting technologies.

Vaccine development

No TB vaccines are currently registered for protection against TB in domestic livestock, however a vaccine for cattle has long been sought as a complementary tool to reduce infection and transmission. The live attenuated human TB vaccine BCG vaccine (derived from *M. Bo-vis*) has been repurposed experimentally in cattle. Studies have established that BCG vaccination in cattle reduces severity of disease and crucially onward transmission of infection. Over the past 25 years, a large number of vaccination/challenge trials have been undertaken in cattle.

A study conducted by University of Cambridge found that BCG vaccinated cattle had a circa 89% lower onward transmission of infection compared to unvaccinated cattle. In this study vaccinated cows also developed significantly fewer visible signs of TB than unvaccinated ones. This suggests that the vaccination not only reduces the progression of the disease, but that if vaccinated animals become infected, they are substantially less infectious to others (Fromsa, A. et al 2024).

A separate study in Northern Ireland indicated that co-infection of cattle with a liver fluke, *Fasciola hepatica*, and BCG resulted in a suppression of immune responses to BCG, potentially affecting immunity induced by BCG vaccination (Flynn, RJ, et al 2007). Vaccination of cattle with BCG 3 weeks after an experimental challenge with *M. bovis*, did not produce a beneficial effect, nor increased tuberculous pathology. Protection against experimental challenge was shown to be effective at ≤ 12 months post-vaccination but had waned by 24 months post-vaccination.

Two other studies report the effect of revaccination with BCG. In the first study, calves vaccinated within 8 hours of birth or at 6 weeks of age showed a high level of protection against *M. bovis*, while those vaccinated within 8 h of birth and revaccinated at 6 weeks of age had reduced protection (Buddle, BM et al. 2003). The revaccinated calves with the lowest level of protection had the strongest antigen-specific IFN- γ responses post-initial vaccination, suggesting that revaccination had induced an inappropriate immune response in these animals. In contrast, calves who were vaccinated with BCG at 2–4 weeks of age and revaccinated a second time at 2 years of age, showed a significant level of protection when challenged 6 months later, while those receiving only the initial vaccine dose were not protected when challenged at the same time.

Field experiments in Mexico involved the exposure of vaccinated and non-vaccinated calves to herds of cows which had reactor rates of 40%. This field trial showed that vaccination induced a significant level of protection against TB, and the vaccine efficacy was estimated to be 59.4% (Lopez-Valencia, G. et al. 2010).

A large field trial was undertaken in New Zealand to evaluate the efficacy of BCG vaccine administered orally. Free-ranging vaccinated and non-vaccinated cattle were stocked at low densities and were naturally exposed to *M. bovis* for periods of 1–4 years from tuberculin reactor cattle (reactor herd prevalence of 5–10%) and a wildlife reservoir of infection (brushtail possums). BCG vaccine was administered orally to cattle in an attempt to reduce tuberculin skin test reactivity. This trial included 1,286 cattle and at slaughter the prevalence of infection was 4.8% among vaccinates and 11.9% in non-vaccinates. The overall vaccine efficacy was estimated to be 67.4%, but higher for those killed within 2 years post-vaccination (77.4%). Vaccination also appeared to slow the progression of TB, with infected vaccinates more likely to have no visible lesions and less likely to have a high lesion score (Nugent, G. et al. 2017)

In the UK, APHA has launched the Cattle Vaccine Project in which it aims to develop a deployable market ready vaccine. The project had initially planned to occur across two phases however a third phase was added and is due to be concluded in 2026. The first phase of the project started in June 2021 and focused on testing the performance and safety of the DIVA (Detect Infected among Vaccinated Animals) skin test in cattle that had not been vaccinated and came from herds free of TB. The aim of this step was to ensure the test could accurately identify animals that were truly infected, without producing false positives. This initial phase of field trials concluded in May 2022.

The second phase started in January 2023 and focused on the safety of the cattle Bacillus Calmette-Guérin (BCG) vaccine and how well the DIVA skin test worked in vaccinated cattle. This phase involved over 600 cattle from seven herds in five farms from the low-risk area in England. This second phase concluded in December 2024. The third phase will assess the BCG vaccination and companion DIVA skin test on a larger cohort of cattle. This phase will be taking place on commercial livestock farms across England and Wales and is due to be completed in 2026. Phase 3 will involve at least 10 farms with 750 animals participating. The aim is to deliver an effective cattle TB vaccination strategy within the next few years.

Current Barriers to Vaccine Rollout

BCG vaccination sensitises cattle to the tuberculin tests, which is the cornerstone of bTB eradication programme and used for international trade in live cattle.

The World Organisation for Animal Health (WOAH), which sets standards for international trade in animals and their products, advises that cattle vaccination should not be used in countries which operate control or trade measures based on tuberculin tests. Therefore, neither the WOAH's Manual of Diagnostic Tests and Vaccines nor its Terrestrial Animal Health Code make provision for vaccination of cattle against TB at present (WOAH, 2019).

The Tuberculosis in Animals (England) Order 2021 prohibits the vaccination of cattle against TB without the written consent of the Secretary of State (TB Order England, 2021).

There is also a need to obtain UK Marketing Authorisations from the Veterinary Medicines Directorate (VMD) to market Cattle BCG in the UK and ensure it meets the required standards of quality, safety and efficacy. Similarly, there is an urgent need to get the European Medicines Agency aware and involved in the ongoing research and begin the process of screening the vaccine for potential market availability across the EU into the future.

While field work and trials are a very positive development and may add to the suite of measures in the future in order to aid efforts towards eradication it does appear that a market ready bovine vaccine is a number of years away in the UK. Acquiring approval for use within the EU is also another step that needs to be taken, coupling these issues together it appears a market ready bovine vaccine available to EU member states is even longer away.

Testing

All herds of bovine animals in Ireland have at least one herd test per year. All bovine animals present on the farm on the day of the herd test are tested, with the exception of calves aged under 6 weeks which were born on the farm. The test used is the single intradermal comparative tuberculin test (SICTT). This test is commonly referred to as a skin test. The accuracy of a test is usually measured in terms of ‘sensitivity’ (probability that an infected animal is correctly identified) and ‘specificity’ (probability that an uninfected animal is correctly identified). At standard interpretation the skin test has an average specificity of 99.98%. Test sensitivity is more variable and is within the range of 50-80% (or potentially higher) at standard interpretation, depending on the stage/severity of infection and other factors. A sensitivity of 80% means that 20% of infected cattle would be missed by the test. Reasons for this include:

- Johne’s disease –infection with the bacteria which causes Johne’s disease may interfere with the test, meaning that TB infected cattle are not detected.
- The test is not performed correctly– human error or bad technique may mean that infected animals are not identified.
- Overwhelming infection with *M. bovis* – cattle in the very advanced stages of TB may react poorly to bovine tuberculin (TB Hub UK).

The use of Gamma Interferon testing (GIF) is also used in Ireland. The GIF test is a blood test to detect bovine TB (bTB) infection and is carried out in a laboratory. It is also known as the GIF test or IFN- γ test. A blood sample is taken from the animal and brought to the laboratory. The blood sample is then stimulated with bovine tuberculin and avian tuberculin, which stimulate immune cells in the blood to produce a molecule called gamma interferon. The GIF test can detect more than 90% of cattle infected with bTB, so it can detect more bTB infected animals than the skin test and also detect bTB at an earlier stage in disease development. GIF is more sensitive than the skin test with a sensitivity of 90%. The specificity is lower than that of the SICTT test with 3-4 animals in a 100 that may be incorrectly identified (false positive), 96.5% specificity. GIF testing has been deployed in New Zealand and other countries and has yielded results (TB Free England).

Conclusions

The overall aim of the study was to examine the progress of Ireland's bTB eradication programme and study international best practice in order to identify future steps and measures that can be used to aid eradication efforts. Participating in the Nuffield programme has afforded me a once in a lifetime opportunity to broaden my perspective, not just on bTB eradication but also on agricultural systems across the globe. Having examined eradication programmes across seven countries including in Ireland the following are the key conclusions from my studies,

1. Significant progress in terms of understanding bTB, disease pathways and the epidemiology of the disease has been made across eight decades in Ireland since the commencement of the eradication programme in the 1950's.
2. Over the course of that period, it is clearly demonstrable that incidence rates have dropped considerably on various occasions, across the national landscape and also in fully resourced pilot efforts, focused on small geographical areas.
3. When the eradication programme in Ireland is benchmarked against other countries such as New Zealand, Australia and Scotland it has clearly under performed. Given the different factors associated with these regions as discussed in this paper there are reasons as to why this under performance exists.
4. Comparing the eradication programme in Ireland to those across Northern Ireland, Wales and England has seen greater similarities in terms of disease epidemiology and trends in the disease over time.
5. The impact that bTB breakdowns have on farms, the farmers on those farms and the families associated with the farm's is consistent across the seven countries. The mental toll, anxiety and worry weigh heavy on all involved and often causes silent pain to those carrying the burden of worry.
6. The nature of the disease itself is complex, and the variety transmission pathways have made it difficult to implement a cohesive suite of eradication measures simultaneously.
7. Given the significant public investment that has been made by Ireland since the inception of the eradication programme, better coordination is necessary to ensure greater value for money, reduce the disease prevalence and identify gaps in knowledge to implement effectively, future strategies and actions.
8. It is widely accepted that a major focus is needed on regaining the support and goodwill of farmers across Ireland in order to deliver an effective eradication programme. 'Battle Fatigue' is a significant problem and farmers are generally disillusioned with the eradication programme.
9. Full recognition of farmers contribution to the programme including labour, time, mental toll and financial input are critical in ensuring continued commitment and buy in by farmers.
10. Regionalisation of the eradication programme has yielded results in counties such as New Zealand, Australia and England.
11. The consistency at which eradication measures are implemented plays a major role in determining the success of any suite of measures and indeed the effectiveness of an individual action.
12. Wildlife management and control have a significant impact on the long-term effectiveness of any eradication programme.

13. Effective communication is a critical part of eradication efforts in order to ensure consistent application of measures. It also has an important role in ensuring that all stakeholders are informed of progress that is being made towards eradication.
14. Animal movements has played a significant role in the spread of the disease. Movement controls have been successfully deployed as part of eradication programmes across other countries for example in New Zealand.
15. Developments in testing have delivered greater accuracy in terms of locating the disease. The role that new technologies will play in the future will be crucial to successful eradication.
16. Good governance structures surrounding eradication programmes is an essential element in order to ensure measurable outcomes are achieved.
17. A holistic animal health approach has delivered results in various countries. A 'One Health' organisation tasked with delivering eradication scheme's such as OSPRI in New Zealand has demonstrated this approach to be effective.

Recommendations

The most important cross cutting measure that applies to all the recommendations outlined below is the need to apply all measures consistently across all areas. Consistent application of all measures in an eradication strategy has been the central most important measure to many international case studies examined in this report.

The recommendations below are informed by the body of this report and the extensive examination of international eradication programmes. The suite of recommendations is based on the most up to date information as of August 2025. These recommendations are divided into six key sections, and each recommendation is expanded further in Appendix 1 of this report.

(1) Regionalisation

Development of a regionalisation approach to disease eradication has been demonstrated in both Australia and New Zealand to be effective at reducing herd incidence and reactor numbers. At present both England and Wales are implementing a regionalised approach to bTB disease management. The regionalised approach should be as follows;

1. Creation of local, regional and catchment areas for disease management.
2. Based on geographical features, animal movement flows, disease prevalence, wildlife pressures.
3. Develop 'Proof of Concept' area for initial trial basis.
4. Area specific disease management and eradication plan to be developed and implemented.
5. Area based categorisation based on disease prevalence and trends. (See England and New Zealand).
6. Concentration of resources based on regional disease status.(See also Appendix 2).

(2) People and Partnership

All bTB eradication strategies across the world acknowledge the importance of the working in partnership model. This is stated most recently in NI "Blueprint for Eradication Strategy 2025", and an entire suite of actions are identified to address the strategic action. Previous eradication strategies in Ireland have also stated this strategic action, however effective implementation remains a challenge. On this basis the following needs to be implemented,

1. Establishment of a State Body under the aegis of the Department of Agriculture, Food and the Marine similar to that of Bord Bia and Teagasc. The new State Body 'The Infectious Disease, Eradication and Management Agency' would be the responsible authority for bTB eradication and would have the potential to be developed to be responsible for other agriculture-based disease eradication programmes.
2. Establishment of a governance structure similar to that which exists within Bord Bia/Teagasc in Ireland. The Governance structure within OSPRI in New Zealand should also be examined closely and mirrored. These governance structures should also be combined with the regionalisation approach outlined under regionalisation.

(3) Wildlife Interventions

A fully funded, fully resourced wildlife management programme is an essential element of most international eradication programmes that have been successful in eradication bTB. To this end the implementation of the wildlife management programme in Ireland has been patchy at best. Under resourcing, under staffing and inconsistency in terms of application have failed farmers and the exchequer. International case studies highlighted previously demonstrate the need for a fully resourced and consistently applied suite of effective measures in order to eradicate bTB. Addressing all vectors involved in disease transmission and circulation simultaneously across specific geographical areas, is a must in order for the eradication programme to be successful.

(4) Cattle Interventions

All case studies examined across the world have implemented fair and effective cattle interventions. From the outset of a breakdown, clear communication between the eradication programme and the farmer is essential. A Disease Management Agent working on behalf of the Infectious Disease Eradication and Management Agency should be appointed to investigate each breakdown and be a liaison between the agency and the farmer. The following should be conducted and developed;

1. Disease investigation mandatory on all farms where a breakdown occurs regardless of the severity of the breakdown. The timeliness of this intervention is paramount to tackling the disease. The findings of this investigation should outline the following,
 - a. Source attribution.
 - b. Risk period for within herd spread based on recent testing, periods of housing.
 - c. Risk for within mob/group spread of the disease.
 - d. Potential for wildlife spill back.
 - e. Cattle movements into the herd and out of the herd.
 - f. Farm fragmentation along with within farm movements.
 - g. Contiguous herds disease status timelines who are bordering all farm fragments.
2. Herd Health Management plans should be developed in all herds. These plans should encapsulate all aspects of herd health from biosecurity to vaccination programmes to disease management plans. Disease management plans must be developed in all herds experiencing a breakdown. These plans should be developed in partnership between the farmer, the farms own vet and a Disease Management Agent working on behalf of the Infectious Disease Eradication and Management Agency. These plans should include the following,
 - a. Source attribution for disease breakdown.
 - b. Wildlife management plan for all farm fragments and knock on effect on local area wildlife management plans.
 - c. Farm fragmentation management plan around grazing, mob rotation, housing etc.
 - d. Cattle movement plans both within herd and potential purchases.
 - e. Biosecurity enhancements on farm.
 - f. Testing protocols and timelines.

- g. Risk factors to maintaining disease freedom and actions outlined to mitigate the risk of reintroduction of another disease breakdown.
 - h. Short term and long-term biosecurity action measures coupled with planned applications for grant funding (see financial) to support same.
 - i. Scheduled timeframes for wildlife disease status checks.
 - j. In the event of a prolonged breakdown within a herd some of these measures/action points will need to be revisited and alternative plans made and acted upon to achieve disease free status for the herd.
3. Testing is a core element of all eradication programmes. The specificity and sensitivity vary across tests. Therefore, a mix of tests being applied within the context of a herd breakdown may be required. (See pt F in Disease Management Plans). The testing regime within a herd experiencing a breakdown should be informed first and foremost by the disease breakdown investigation and the source attribution identified during the disease breakdown investigation.

(5) Financial

The additional €85 million announced in budget 2026 is a welcome development. According to Minister Martin Heydon this will bring the total allocation of funding by DAFM to €157 million in 2026. The impetus behind the new bTB action plan is also welcome. In order to achieve success which is ultimately eradication any measures and action plans need to be implemented consistently across areas and regions and for a prolonged period.

However, in the case that the suite of proposals outlined above are adopted a fully costed action plan will need to be developed in order to implement the measures outlined in their entirety. In any event front loading of funding is urgently required in order to arrest the rise in reactor numbers and ultimately reduce the infection rate. In addition, the following is needed.

- 1. Recognition of the full farmers expenditure on the current bTB programme, including testing, business related cost and labour.
- 2. Introduction of a paddock fee which would see a sum paid to farmers per head of cattle tested similar to what existed in Australia (mustering subsidy). Alternatively, the routine annual surveillance bTB test should be paid for by the state similar to that which occurs in England.
- 3. Fully costed action plan clearly communicated to all stakeholders with line items and associated costs to provide transparency.

(6) Vaccine Development

Ongoing vaccine development work in the UK in particular represents a significant opportunity for bTB eradication efforts in Ireland. In the event that a market deployable vaccine is ready for use in the coming years Ireland needs to be prepared for its introduction. To this end it is essential that DAFM continue to engage with APHA in the UK and support trials and research as appropriate. It is also essential for timeliness that the following be conducted by DAFM,

1. Review existing literature around bTB vaccine efficacy, safety and long term use. Prepare a “GAP Analysis” to identify areas where knowledge gaps exist.
2. Develop an implementation plan for vaccine roll out.
3. Engage with EU and international legislative bodies around vaccine use and the affects on trade.

References

- Rodgers, Kara, 05 February 2025, Britannica. The history of Mycobacterium, Tuberculosis <https://www.britannica.com/science/tuberculosis/additional-info#>
- National Centre for health statistics, July 6, 2007 Leading causes of death, National Centre for Health Statistics, Vital Statistics System, CDC, National Centre for Health Statistics
- Stevenson, Lloyd Grenfell. "Robert Koch German Bacteriologist. Encyclopaedia Britannica, 23 May. 2025,
- Statutory Instrument 58 of 2015, Animal health and Welfare act of 2013, Regulation (EU) 2016/429 on transmissible animal diseases (the ‘Animal Health Law’) Delegated Regulation 2020/687.
- O’Brien, Declan January 2025 History and Charles Haugheys infamous bTb eradication call. www.farmersjournal.ie/news/news/history-and-charles-haugheys-infamous-tb-eradication-call-852758
- IFA Livestock Council Report July 2025, www.ifa.ie/policy-areas/livestock-council-report-july-2025
- Bord Bia January 2025, Export Performance and Prospectus Report for 2024/2025, www.bordbia.ie/industry/insights/publications/export-performance-and-prospects-2425/
- Watchorn, R.C. (1965). Bovine Tuberculosis Eradication Scheme 1954-1965. Dublin: Department of Agriculture and Fisheries
- Good, M. (2006) Department of Agriculture and Food, Volume 59 (3): March 2006 Irish Veterinary Journal
- O’Connor, R. (1986). A Study of the Bovine Tuberculosis Eradication Scheme. Dublin: The Economic and Social Research Institute, Paper 133.
- Sheridan, M. (2011) Progress in Tuberculosis Eradication in Ireland. Veterinary Microbiology, Elsevier, 2011, 151 (1-2), pp.160.
- Downey, L. 1991 Bovine TB Programme: What are the realistic Expectations? Eradication of Animal Disease Board, Dublin
- Pastoret and Brochier, 1999 Epidemiology and control of fox rabies in Europe. Vaccine 17 (1999) 1750 1754
- Department of Agriculture Food and The Marine January 2021, Bovine tb eradication strategy 2021-2030.
- Department of Agriculture Food and The Marine July 2025, bovine tb statistics www.gov.ie/en/departments-of-agriculture-food-and-the-marine/publications/national-bovine-tb-statistics/

De la Rua-Domenech R. 2006 Human Mycobacterium bovis infection in the United Kingdom: Incidence, risks, control measures and review of the zoonotic aspects of bovine tuberculosis. Tuberculosis (Edinb) 2006, 86(2), 77-109.

Cooper, Ross G. 2007 Historical aspects of bovine tuberculosis in Britain, Journal of Pre-Clinical and Clinical Research, Vol 2, No 1, 006-008

TB Hub, UK, History of bTB, [History of TB control in the UK](#)

Parker, J. 2017, A brief history of TB in Great Britain, veterinary practice, www.veterinary-practice.com/article/a-brief-history-of-tb-in-great-britain

TB Hub UK, preventing tb breakdowns, tb risk map. tbhub.co.uk/preventing-tb-breakdowns/bovine-tb-risk-map.

TB Hub, UK, Policy 2024, Bovine TB Policy and Strategy England, [Bovine TB Policy in the UK | TB hub UK](#)

Browne, E 2025 Deputy UK CVO & Head of bovine TB Programme Defra. Field Trial update, [Bovine Tuberculosis / TB Prevention in Animals | TB hub UK](#)

Griffiths. L, MS, Minister for Rural Affairs and North Wales, and Trefnydd Wales TB Eradication Programme Delivery Plan: March 2023 – March 2028.

Department for Environment, Food and Rural Affairs 2025, Quarterly statistics on tuberculosis (TB) in cattle in Great Britain.

Welsh Government 2023, Wales TB Eradication Programme Delivery Plan: March 2023 – March 2028 [Wales TB Eradication Programme Delivery Plan](#)

Scottish Government 2024, Bovine TB, [Bovine TB - gov.scot](#)

Tb Scotland Order 2023, The Tuberculosis (Scotland) Order 2023. Scottish Statutory Instruments 2023 No. 93

Scottish Ag Census 2024, Results from the Scottish Agricultural Census: June 2024, <https://www.gov.scot/publications/results-from-the-scottish-agricultural-census-june-2024/pages/continuing-decline-in-cattle-numbers>

DAFM, AIM, Bovine Statistics Report, May 2025, [AIM Bovine Statistics Reports](#)

Connolly. S, 2025, Scottish Badger Distribution Survey, Biomathematics and Statistics Scotland, [Scottish Badger Distribution Survey | Biomathematics and Statistics Scotland](#)

Smal. C 1995, The Badger and Habitat Survey of Ireland Dr, C. Smal, 1989-1995, National Biodiversity Data Centre

Farm Community Network 2025, Impact of Bovine TB on farmer's health and wellbeing, [Research - Farming Community Network](#)

DAERA March 2022, Northern Ireland Bovine TB Eradication Strategy, Bovine Tuberculosis Eradication Strategy for Northern Ireland March 2022.

Doherty. B, March, 2025 personal communication.

Tb Partnership Steering- group 2025, Bovine Tuberculosis in Northern Ireland Blueprint for Eradication.

More S.J., Randunz B., Glanville R.J. 2015, Lessons learned during the successful eradication of bovine tuberculosis from Australia, Vet Record, Wiley Online Library. [Lessons learned during the successful eradication of bovine tuberculosis from Australia - More - 2015 - Veterinary Record - Wiley Online Library](#)

MYLREA P. J. (1990) Eradication of bovine tuberculosis from New South Wales — A century of endeavour. *Australian Veterinary Journal* **67**, 104–107

LEHANE R. (1996) *Beating the Odds in a Big Country. The Eradication of Bovine Brucellosis and Tuberculosis in Australia*. CSIRO Publishing

More. Simon. J, Personal Meeting December 2024

CORNER L. A. (2006) The role of wild animal populations in the epidemiology of tuberculosis in domestic animals: How to assess the risk. *Veterinary Microbiology* 112, 303–312

Jerry Mateparae, Governor-General New Zealand, May 2016, Biosecurity (National Bovine Tuberculosis Pest Management Plan) Amendment Order 2016

Livingstone, P., Hancox, N., Nugent, G., & de Lisle, G. (2015). Toward eradication: the effect of *Mycobacterium bovis* infection in wildlife on the evolution and future direction of bovine tuberculosis management in New Zealand. *New Zealand Veterinary Journal*, 63(sup1), 4–18. <https://doi.org/10.1080/00480169.2014.971082>

Danny Templeman, OSPRI, General Manager South Island Personal Meeting 2025.

OSPRI, 2025, History of Bovine TB control in New Zealand, [History of TB control in New Zealand | OSPRI](#)

Livingstone PG, Hancox N, Nugent G, Mackereth G, Hutchings SA. Development of the New Zealand strategy for local eradication of tuberculosis from wildlife and livestock. *N Z Vet J*. 2015 Jun;63 Suppl 1(sup1):98-107. doi: 10.1080/00480169.2015.1013581. Epub 2015 Apr 2. PMID: 25651829; PMCID: PMC4566894.

Biosecurity (National Bovine Tuberculosis Pest Management Strategy) Amendment Order 2004, 2004/271

TB Hub UK 2020, [AR-factsheet-skin-test-11.08.20.pdf](#)

Reis AC, Salvador LCM, Robbe-Austerman S, Tenreiro R, Botelho A, Albuquerque T, Cunha MV. Whole Genome Sequencing Refines Knowledge on the Population Structure of *Mycobacterium bovis* from a Multi-Host Tuberculosis System. *Microorganisms*. 2021 Jul 26;9(8):1585. doi: 10.3390/microorganisms9081585. PMID: 34442664; PMCID: PMC8401292.

TB Free England 2024, [Testing for bTB – TB Free England](#)

Orloski K, Robbe-Austerman S, Stuber T, Hench B, Schoenbaum M. Whole Genome Sequencing of *Mycobacterium bovis* Isolated From Livestock in the United States, 1989-2018. *Front Vet Sci*. 2018 Oct 30;5:253. doi: 10.3389/fvets.2018.00253. PMID: 30425994; PMCID: PMC6219248.

WOAH, 2019, World Organisation for animal health, Protecting animals, preserving our future, Terrestrial Animal health code, Volume I, General provisions, Twenty-eighth edition, 2019.

TB Order England, 2021, The Tuberculosis in Animals (England) Order 2021, UK Statutory Instruments 2021 No. 1001.

Appendix

Appendix 1

Recommendations Expanded

(1)Regionalisation

Governance structures to be implemented based on regionalisation approach.

- Local Area Committees
- Regional Area Committees
- Catchment Area Committees

These key communication pathways allow for smooth information flow and generate ownership of the programme a bottom-up approach.

The decisions made in relation to the eradication programme are informed by the area committees and communicated from the Infectious Disease Eradication and Management Agency via the Catchment Area representative.

(2)People and Partnership

1. Implementation of partnership working as a core element of the eradication programme.
 - Good will and buy in of farmers need to be to the fore. As it stands a huge degree of frustration exists.
 - Minister for Agriculture Food and The Marine to embark on a tour of the country to engage with farmers directly. e.g CAP marts tour.
 - Development and implementation of a communication in partnership strategy. Communication must be able to flow bottom up along with top down and it needs to be acknowledged and fed back upon.
2. Establishment of knowledge transfer and education programme specifically on bTB eradication, to include focus on,
 - Measures contained within the eradication programme itself.
 - Informing farmers what actions can be taken on farm regarding biosecurity to reduce the risk of a disease breakdown.
 - On farm assessment to establish a risk-based approach of implementable actions a farmer can introduce.
 - Annual whole herd health planning consultation with farm specific plan developed, fully funded and provided for by herds own vet or Herd Health specialist working within the 'Infectious Disease Eradication and Management Agency'. Examine the potential for alignment with other animal health programme's already in existence to reduce red tape and eliminate overlapping of resources and farmer's time.
3. Establish North/South bTB eradication forum.

- Forum to consist of Veterinary Officers from both North and South along with farmers who are farming along the border North and South.
 - Full review and comparison of measures currently in place in each jurisdiction in relation to bTB eradication.
 - Cross border strategy to be developed in order to align eradication programmes within the confines of the legislative framework in both jurisdictions.
 - This cross-border strategy must be designed to deal in specific areas along the border and take into account the same parameters as identified under the regionalisation approach outlined earlier.
4. Key performance indicator targets outlined quarterly based on overall annual targets.
- Specific targets need to be set across all aspects of the eradication programme from testing to wildlife management.
 - These targets need to be communicated through the board of the Infectious Disease Eradication and Management Agency to all stakeholders on a quarterly basis.
 - Progress reports should also be made available quarterly in order to generate buy in from farmers and stakeholders and also ensure transparency.

(3) Wildlife Interventions

1. Full review of the Capture, test, vaccinate/release policy and strategy implemented in relation to disease control and suppression within the badger population to evaluate effectiveness surrounding,
 - a. Population coverage within specific clearly defined areas.
 - b. Long term effectiveness of the vaccine.
 - c. Social structure dynamics post vaccination within specific clearly defined areas.
 - d. With an accepted efficacy of 60% of vaccination this review needs to inform a decision as to whether 60% efficacy is enough to rely on this approach to disease control within the wider badger population.
2. Return to badger density reduction per Km² in areas where a serious breakdown occurs or in areas where Tb is found in the badger population. Wildlife density is recognised as a key driver of the disease in The Republic of Ireland and a similar approach yielded very positive results previously along with learnings outlined in New Zealand with regards to possums.
3. Individual tailored wildlife management plans should be devised in relation to badgers based on the regionalisation approach outlined earlier in the recommendations. These management plans need to include,
 - a. Locations of setts and social groups using said setts.
 - b. Number of animals within each social grouping.
 - c. Disease status of the social group based on regular testing and vaccination.
 - d. Culling where disease prevalence is found in the social group.
 - e. Whole genome sequencing of samples taken from badgers found with Tb.

- f. Easy to use Sett identification tool which is monitored and acted upon by regional management team/area team.
- g. Where a breakdown investigation (See cattle measures) is undertaken to identify source attribution in an infected bovine herd the badger population identified within the local area must be tested for disease status within the initial stages of the breakdown investigation.
- h. Electronic identification of badgers for mapping and tracking.
- i. Wildlife screening in advance of major infrastructure development prior to groundworks commencing.

Ultimately the aim must be to protect badgers who are disease free as a priority of the entire eradication programme. Spill back from badgers will remain a major issue unless a disease-free population can be obtained through the implementation of the measures outlined above.

- 4. In areas where deer are identified as a vector for disease spread or as a reservoir of disease, deer density reduction measures need to be implemented to levels where the deer no longer remain a spill back host to cattle.
 - a. The responsibility for implementation deer management measures should fall within the regional area management team given the home range of deer.

(4) Cattle Interventions

Introduction of new testing programme

- a. Introduction of a training programme to appoint Approved Tuberculin Testers to assist additional testing similar to that which is implemented in the UK.
- b. Herd health management plans will inform the historical background of a herd experiencing a new breakdown.
- c. In the case of a new breakdown the focus must be on limiting within herd spread. Disease management plans will inform the actions taken to this end.
- d. It should be noted that stress on animals may interfere with the interpretation of bTB tests. To this end testing of herds should be focused between turnout and housing.
- e. Where herds have active breeding females, one clear GIF test on all breeding females should be completed prior to derestriction.
- f. An initial GIF test should be conducted in herds with breeding females experiencing a severe breakdown. This test should be conducted within a two-week period post the initial SICTT test. In the case where the initial GIF test is clear a single additional clear SICTT test should suffice to achieve derestriction.
- g. Where the initial GIF test is not clear, consequently once two clear consecutive SICTT tests are completed the derestricting GIF test should be completed within two weeks of the final clear SICTT test.
- h. Once a clear GIF derestriction test has been completed the herd should return to six monthly SICTT testing until three consecutive clear tests are completed and then annual testing.
- i. 30-day pre-movement testing should be introduced for all breeding females and exposed cohorts prior to movement off farm.

- j. Where the source attribution has been assigned to wildlife in a disease management plan additional testing may be required in herds that share geographical home-ranges of said wildlife.
- k. Introduction of Radial Testing similar to that which exists in the UK.
- l. Where entire local areas within a regional area have achieved/maintained disease freedom for ten consecutive tests, and wildlife have remained disease free for a similar period, these areas should be moved to bi-annual testing, Individual herds that operate higher risk trading practices within these areas may be subject to more frequent testing regimes.

(5) Supporting Farmers Financially

Enhance the promotion and implementation of using bTB resistant bulls. A financial incentive should be provided for to this end based on bTB resistance figure of a bull along with the health trait figure. A similarly funded scheme comparable to beef welfare schemes should be introduced where farmers receive a € sum per calf born by a bull with a combined health trait and bTB resistance trait figure above a certain figure that was outlined before the previous breeding season.

Introduction of a specific animal disease prevention fund accessible through TAMS. This fund should provide funding for implementation of biosecurity measures on farm which has short approval times particularly for those experiencing a disease breakdown.

Appendix 2

Can a regional approach be applied to achieve eradication of bovine tuberculosis in Ireland?
[Can a regional approach be applied to achieve eradication of bovine tuberculosis in Ireland? - 2024 - Food Risk Assess Europe - Wiley Online Library](#)

Appendix 3

Bovine Tuberculosis in Northern Ireland Blueprint for Eradication <https://www.daera-ni.gov.uk/sites/default/files/2025-04/Bovine%20TB%20in%20NI%20Blueprint%20for%20Eradication%20final%200.PDF>

Appendix 4

Bovine Tb Eradication Strategy 2021-2030 [bovine-tb-eradication-strategy-2021-2030.pdf](#)

Appendix 5

TB and Pest Control OSPRI NZ [National infected herd numbers | OSPRI](#)

Appendix 6

TB Hub UK, The Home of UK TB Information [TB hub - Bovine TB Advice & Tuberculosis Information for Cattle Farmers](#)