NATIONAL BOVINE TB PLAN REVIEW

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National Bovine TB Plan Governance Group (PGG)

Wellington, New Zealand

This paper is also available on the PGG webpage www.tbplanreview.co.nz.

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CONTENTS

PURPOSE OF THE DOCUMENT

The purpose of this document is to set out a Proposal to amend the bovine tuberculosis National Pest Management Plan (the TB Plan). The TB Plan itself is a significant document, affecting the interests of a number of parties and generating wide-ranging benefits for New Zealand.

The consultation process is a very important one, as it ensures that the Proposal is well-tested by interested parties and underpins the best possible amended TB Plan being put in place. We are seeking views on the Proposal from all stakeholders – be it cattle and deer farmers, local communities, iwi/hapu, industry representatives, local authorities, or just an individual who has an interest in the management of bovine tuberculosis (TB) in New Zealand.

Basis for review of the TB Plan

Control of TB in New Zealand is currently delivered through a National Pest Management Plan, a regulatory instrument under the Biosecurity Act 1993 (the Biosecurity Act). Part 5 of the Biosecurity Act sets out the detailed provisions relating to the development, review and funding of national pest management plans (in this case the TB Plan)[1]. Accordingly, that part of the Act provides the framework for the Proposal.

The implementation and operation of the current TB Plan is managed by OSPRI through its TBfree New Zealand subsidiary. The TBfree programme is well-known to stakeholders with an interest in the TB Plan.

The current TB Plan was last reviewed in 2015. An Order in Council amending the TB Plan came into effect on 1 July 2016. The Biosecurity (Bovine Tuberculosis National Pest Management Plan) Order 1998 – as amended to reflect changes in TB Plans over time – provides the specific detail relating to the exercising of legal powers and the setting of rules in order to achieve the objectives of the TB Plan.

In accordance with the Act (section 100D), the Minister for Biosecurity is required to initiate a statutory review of the TB Plan by 1 July 2026. The review must be on the basis of a Proposal; this Proposal can be prepared by the Minister or any other person and must identify whether the Proposal is to amend, revoke, revoke and replace, or leave unchanged the plan or part of the plan.

The Proposal outlined in this document results from that review and recommends amendments to the TB Plan to be applied from 1 July 2026.

Proposer

The Proposal has been prepared by a 'Plan Governance Group' (PGG), which was established by OSPRI, the parent company of TBfree, and the TB Plan funding parties (Beef+Lamb New Zealand, DairyNZ, Deer Industry NZ and the Ministry for Primary Industries.) The PGG is overseeing a joint programme of work to complete the review of the TB Plan and to develop a TB Plan Proposal for submission to the Minister of Biosecurity.

The PGG has an independent Chair (Dr Helen Anderson). The other members of the PGG are the Chief Executives of DairyNZ (Campbell Parker), Beef+Lamb New Zealand (Alan Thompson), and Deer Industry NZ (Rhys Griffiths) and the Chief Veterinary Officer of the Ministry for Primary Industries (Mary van Andel). The PGG also includes observers from the Department of Conservation (Stephanie Rowe) and TBfree/OSPRI, (Sam McIvor and Simon Andrew).

Technical expertise and support

The PGG has been supported by a Review Advisory Group providing technical expertise. The independent chair is Stu Hutching, a biosecurity specialist. Members are: Dairy NZ (Carol Barnao), Beef+Lamb New Zealand (Will Halliday), Deer Industry NZ (Emil Murphy), MPI (John Walsh), Department of Conservation (Ben Reddiex), OSPRI (Simon Andrew and Mark Neill).

1 http://www.legislation.govt.nz/act/public/1993/0095/latest/DLM314623.html?src=qs

The secretariat consists of Project Lead Jonathan Rudge and Review Co-ordinator Shannon Ross.

The PGG's review and recommendations have been informed by several independent technical, science, and financial reviews of the 2016 TB Plan and its progress over the last nine years. These are available on the website www.tbplanreview.co.nz.

Overview of information in this document

This document contains a large amount of information, as the review of the TB Plan needs to meet a number of requirements in the Biosecurity Act and the supporting statutory National Policy Direction on Pest Management. These requirements broadly relate to ensuring high-quality work, fairness and efficiency in funding arrangements, and use of an open consultation process to test the Proposal and the analysis and rationale supporting it.

In considering the document, it is important to note the following key aspects of the information provided:

- *The Proposal* – the Proposal itself is the collection of proposed changes to the TB Plan. The TB Plan is set by regulation by the Minister for Biosecurity. The following section – Summary of the Proposal – sets out the Proposal in terms of proposed amendments to the TB Plan (including identification of the overall contents of the TB Plan even if not proposed to change).

  The TB Plan sets the overall framework, and the rules and requirements, to be met during implementation. The TB Plan does not, however, prescribe the wide range of operational detail that is left to the management agency to address.

- *Analysis and rationale supporting the Proposal* – the document includes analysis used to inform the TB Plan expenditure level; estimated timeframe for objectives to be met; and setting of funding shares. Other options, besides the proposed TB Plan, were also identified and carefully considered by the PGG as part of this analysis.

- *Implementation of the TB Plan* – this Proposal discusses how the TB Plan will be implemented. The PGG recommends that TBfree Ltd is maintained as the management agency responsible for the operational delivery of the TB Plan.

The management agency, TBfree NZ (OSPRI), will be required within three months of the new TB Plan coming into effect to provide an updated National Operational Plan to the Minister of Biosecurity, who may disallow it in part or whole. When developing the National Operational Plan, TBfree NZ (OSPRI) will draw heavily on the analysis and rationale supporting the proposed new TB Plan. The National Operational Plan is a standard annual feature of implementing the TB Plan and must be made publicly available.

SUMMARY OF THE PGG PROPOSAL

The PGG review of the TB programme has found that, although there have been some operational, financial, and technical challenges over the past nine years since the shift to the eradication objective, the programme is making good progress, remains technically/scientifically sound, and is on target to deliver the 2040 objective of vector freedom and eradication by 2055, albeit with additional costs to that forecast in 2015. This was informed by a wide range of independent reviews and analyses of the science, technical, financial basis of the TBfree programme commissioned by the PGG. A summary of the outcomes of these reviews is provided on pages 21-23 and in the accompanying reports provided on the Plan Review website, tbplanreview.co.nz.

Key features of the PGG proposal

The PGG is proposing that the primary objective of the TB Plan remains the eradication of bovine TB from New Zealand (i.e. from livestock, possums, wild deer and pigs, and ferrets) by 2055, with the following key milestones:

Freedom from possums by 2040
Freedom from livestock by 2040

The proposed secondary objective of the TB Plan is to ensure that the national annual TB infected herd period prevalence does not exceed 0.05% throughout the term of the plan.

The PGG is also proposing that the 0.0001% statistical measure of freedom is replaced with '95% confident that infection would have been detected if the prevalence were above a threshold of one infected farmed deer or cattle in one million in New Zealand'. This is because the 0.0001% measure is not possible without extensive (and highly expensive) ongoing surveillance sampling well beyond the 2040 freedom milestones.

The proposed objectives will be achieved through focusing on eradication of the disease in the most infected possum populations first and adopting a more targeted risk-based approach to disease management. This would involve three elements:

1. Ensuring the possum population is free of TB by 2040. This is the point of 'statistical freedom' of disease from possums, i.e. where we are 95% confident that the disease is gone from possums and no longer able to infect livestock.
2. Steady decline in the number of infected cattle and deer herds maintained on average at 0.05% or less of herds nationally per year until the disease is eradicated from possums.
3. Complete eradication of TB from New Zealand, where TB is considered eradicated from all wildlife by 2055. This is expected to take a further 12 – 15 years after the declaration of TB freedom in possums and will involve low-level monitoring and verification, with potentially a very occasional mop-up of livestock infection.

Livestock freedom milestone (pages 21,22, 24)

The PGG is proposing to amend the current 2026 livestock freedom milestone to freedom from livestock by 2040. A milestone of zero infected herds is not possible while reservoirs of the disease remain in the possum population. This is due to:

- ongoing likelihood of infection by wildlife sources (primarily possums) until the disease has been eradicated from possums
- occasional outbreaks as a result of undetected in-herd infection (recrudescence), which takes time after declaration of freedom in the herd to be confident TB is no longer present.

Instead, the number of infected herds is expected to fluctuate throughout this period (i.e. between 2026 and 2040).

Prioritising the most infected possum population (pages 24, 25)

The proposed approach focuses on delivering the national objective of eradication of TB from New Zealand as soon as technically possible by prioritising activities that will remove the disease from the vector population and treatment of TB

source areas (large scale, often deep bush), alongside ongoing management of the infected herds (**vector-focused approach**).

A fundamental element of this approach is the prioritisation of landscape scale vector control to target the infected possum populations that present the greatest risk to achieving the programme eradication objectives in a timely manner. This approach requires the use of aerial 1080 as the optimal and only proven tool for vector control in difficult-to-access backcountry areas of New Zealand, in particular in these areas in the Central North Island. Highly infected vector areas in the South Island would continue to be prioritised, and ongoing vector control will progressively clear the Vector Risk Areas elsewhere in the North and South Islands.

The rationale for the vector-focused approach and its impacts compared to other options considered by the PGG, including the current herd protection focus, is discussed on pages 24, 25 and in the accompanying Options Analysis Report.

Proposed operational changes to support achievement of the TB Plan objectives (pages 25, 32-36)

The PGG supports TBfree's approach to engage and partner with affected parties and the wider community on its planned operations and wider programme. This is particularly important in areas where there are varying levels of landowner acceptance of the use of aerial 1080 for vector control. This includes TBfree working with iwi/hapū and other landowners to build their capability and tools to align TBfree's vector control operations to their environmental goals and align the programme's objectives. There is further information on this on page 25.

Disease management measures such as setting of movement control areas, determining and declaration of vector freedom will follow the approaches set out in the National Operational Plan, with the exception of the approach and level of TB testing.

- An increasingly targeted risk-based approach to TB testing will be used with no, or a reduced level of, surveillance testing. This involves a criteria-based targeted testing approach in surveillance areas instead of the current routine testing approach, and decoupling livestock testing requirements from Disease Control Area statuses.
- TB testing in surveillance areas will become more targeted to herds at risk, using assessment criteria including the volume of animal movements from high-risk areas, herd size, production type, and/or NAIT compliance.
- Some TB testing may still be required for some time after all infection is eliminated from wildlife, to ensure latent animals are detected and removed.
- Refinement of the herd classification system.

Discussion of these proposed operational changes can be found on pages 32-36.

Cost of the Plan

The estimated cost of the plan is $721 million over 30 years. This involves $60 million per year for the next nine years of the TB Plan, followed by three years at an average of $29 million/year, then four years at $14.7 million/year. The costs of post livestock/possum clearance surveillance are estimated at $2.8 million/year for the remaining 14 years of the TB Plan.

An additional $120.8 million in funding is required after 2030/31 than that forecast in 2015. The key drivers for the difference in funding needed is that the 2015 forecast did not account for inflationary pressures and assumptions made of significant financial efficiencies as a result of introducing risk-based testing of livestock which did not occur.

Benefit Cost analysis (pages 37-41)

The benefit costs analysis (BCA) of the vector-focused approach provides a benefit cost ratio of 9.58:1 (i.e. $9.58 of benefit from each dollar invested by farmers and the Government). Further information on the BCA is provided on pages 37-41 and the separate BCA Report.

Funding of the Plan (pages 41-43)

The PGG proposes that the current 40:60 Crown: Industry split in funding of the TB Plan continues, including current intra-industry share arrangements – Crown 40%, Beef 14.5%, Dairy 43.5%, Deer 2%.

Five-year review

The current funding commitments from farmer levy organisations and the Government of $60 million a year will cover the costs for the next five years. But given the tight economic climate, the Government is not in a position at this point to commit to a higher level of funding beyond 2031.

The PGG therefore is proposing to include in the TB Plan an intention for funding to be reviewed in five years. In the interim, the funders will work together over the next four years to develop an enduring funding arrangement that reflects the tight fiscal and economic environment. This will involve considering any cost efficiencies through the impact of pivoting to the vector targeted approach and technological advances (noting that with the exception of potential use of Bulk Tank Milk testing there are no significant technical advances on the horizon).

Summary of the proposed amendments to the TB Plan order

Clause	Heading/Matter	Proposed Amendments
1	Title and commencement	No change
2	Interpretation	• Define "buffer control zones" and add "incursion/outbreak" definition relevant to clause 5A (Principal measures)
3	National Bovine Tuberculosis Pest Management Plan	No change
4	Pest	No change
5	Objectives of plan	• Retain 2055 eradication objective • Remove 2026 cattle and deer freedom milestone • Amend the 2040 possum freedom milestone to '*Freedom from tuberculosis in cattle, deer and possums by 2040*' • Replace 0.0001% statistical measure of freedom with '*95% confident that infection would have been detected if the prevalence were above a threshold of one infected farmed deer or cattle in one million in New Zealand*" • Update secondary objective to '*Ensuring the annual infected herd prevalence stays at or below 0.05% throughout the term of the plan*'
5A	Principal measures to implement plan	No change
6	Management agency	No change
7	Term of plan	
8	Powers used to implement the plan	No change
9	Plan rules	No change
10	Obligation to notify TBfree NZ of place where herd is kept	No change
11	Obligation to provide facilities and assistance for restraint of animals	No change
12	Identification of animals with bovine tuberculosis	No change
12A	Identification of cattle and deer for testing	No change
12B	Declarations	No change
12C	Form and content of declarations	No change
12D	Retention of declarations	• Amend to 12 months to align with ASD requirements
12E	Sales	No change
12F	Meaning of movement	No change
13	Restrictions on testing and treatment of animals	No change

Clause	Heading/Matter	Proposed Amendments
14A	Obligation of persons performing ante- and post-mortem examinations to submit specimens for investigation	No change
14B	Obligation of persons in charge of verifying compliance with ante- and post-mortem examination procedures	No change
15	Obligation of laboratories to provide results	Amend to enable TBfree to link a sample to a herd entity and owner (currently only states the person who collected the sample is required)
15A	Obligation of operator of commercial slaughter premises	No change
16	Obligations to supply information	
17	Obligation to report suspected presence of bovine tuberculosis to TBfree NZ (OSPRI)	No change
17A	Release of pigs into wild state	Remove 17A (2) as unclear and unnecessary. This is covered under the Wild Animal Control Act 1977
18	Compensation	No change
19	Funding of plans	No change
20	Application of funds	No change
21	Actions that may be taken by local authorities	No change
NEW	Review of the TB Plan	Add a requirement to complete a review of the review of the plan and funding model by 30 June 2031.

DEFINITION OF TERMS

Elimination	Is the act of removing infection from the target population, that is, the process rather than the end result.
Eradication	The complete absence of *Mycobacterium bovis* from any species within New Zealand.
Breakdown	Refers to TB being diagnosed in a Clear or Suspended status cattle or deer herd.
Infected herd annual period prevalence (also herd infection rate)	Is the number of cattle and deer herds classified as infected at the start of the financial year, together with the number of cattle and deer herds found infected during the financial year, divided by total cattle and deer herds, expressed as a percentage.
Infected herd point period	Is the number of cattle and deer herds classified as infected at a point in time – used by TBfree for public communications, e.g. there were 15 infected herds on 30 June 2025.
False positive reactor	Is an animal that subsequently is not confirmed to be infected with TB. This means that one of the tests it had (usually the skin TB test) was a false positive.
Livestock TB freedom	95% confidence that the surveillance system would have detected infection if it were present at a period prevalence over 0.05%. Where the period prevalence is calculated as the number of herds identified at the beginning of a 12-month period + all new incident infected herds/ total number of herds at risk.
Management agency	Is defined in the Biosecurity Act as "a management agency responsible for implementing a national pest management plan". The management agency for the TB Plan is TBfree NZ (OSPRI), a subsidiary of OSPRI New Zealand.
Movement Control Areas (MCA)	Defined geographical areas used under the current TB Plan to control the risk of TB transmission through cattle or deer movements from areas with the highest wildlife infection risk, being those areas where infected herd annual period prevalence (as a proxy for wildlife infection risk) is greater than 1%.
National Animal Identification and Tracing Scheme (NAIT)	The National Animal Identification and Tracing scheme (NAIT) is a mandatory New Zealand scheme which has been established to create an electronic identification system for animal identification and lifetime traceability. The scheme requires all cattle and deer to be identified with an approved permanent NAIT device within 180 days of birth or prior to movement.
National Operational Plan (NOP)	The set of operational measures and polices developed by the management agency to give effect to the Minister's decision and the TB Plan Order. The NOP is required under s100B of the Biosecurity Act 1993 to be produced by the management agency within three months of the TB Plan Order (or amended Order) coming into effect. It must be reviewed by the management agency annually, with a report on performance and any amendments provided to the Minister. The NOP cannot place any statutory obligations on farmers or other stakeholders.
Passive surveillance	The use of data from different sources to provide inference about the likelihood of presence or absence of TB in wildlife. These data may come from unplanned incidental observations (such as the detection of TB in pigs or deer by recreational and commercial hunters or possum fur trappers) or from information collected for other primary purposes (such as the use of slaughterhouse inspection of cattle and deer for TB, and the use of livestock testing data collected to determine TB presence in livestock, not wildlife *per se*).
Plan Governance Group (PGG)	Established by funding parties to lead the TB Plan Review. Is responsible for preparing and submitting the Proposal to the Minister.
Proof of concept	Proof of concept is a realisation of a certain method or idea to demonstrate its feasibility.

Probability of freedom	The probability that TB has been eradicated from the possum population in a defined area.
Proposal	Means a proposal to create, amend, revoke, replace, or leave unchanged a National Pest Management Plan under the Biosecurity Act 1993. The contents and other requirements of a proposal on review of a national pest management plan are outlined in sections 105D and 59-67 of the Biosecurity Act 1993.
Residual Trap Catch Index	A measure used to determine the relative density of possum populations in a given area based on the number of possums captured per 100 traps laid (according to a specific design), expressed as a percentage. This has widely been replaced by the Bite Mark Index (BMI).
Reactor	Means an animal that is positive to an approved TB test or tests, and which is directed to slaughter. Such animals are to be identified with official Reactor ear tags up to the time of slaughter.
Spillover host	A spillover host cannot independently and indefinitely maintain TB within a population solely by transmission within the species concerned. Spillover hosts typically (in New Zealand) become infected by interacting with infected possums or some other host, but only very occasionally pass on the disease to another animal of the same species as itself. Some species can be true maintenance hosts at very high density (when there is lots of opportunity for transmission between individuals) but not at the low densities at which they usually occur in the wild. That is believed to be the case for wild deer, feral pigs, and ferrets, the three main spillover hosts in New Zealand.
Stopping rule	This refers to the accepted level of confidence that tuberculosis (TB) infection is no longer present in the local possum population, at which point no further routine vector control activities are undertaken. Once this level of confidence is achieved, the Vector Risk status of the area can be revoked. Provided no additional evidence of infection is detected, only surveillance activities are likely to be carried out in the area, if required for assurance purposes. For most areas, this confidence level is currently set at a 95% probability of TB freedom. At this level, there is still a 5% chance that infection persists in the residual possum population and local herds could be at risk of TB infection. Where this is detected, further possum control will be required.
Surveillance	The process of conducting formal field surveys to try to detect the continued presence of TB in possums. It includes direct necropsy surveys of possums (usually by trapping) and/or necropsy of sentinel species such as pigs, ferrets, and deer, which are known largely to be spillover hosts in which the presence of TB indicates the probable presence of TB in possums.
TB	Used as an abbreviation for bovine tuberculosis. *Mycobacterium bovis* is the bacterium that causes the disease of bovine tuberculosis (and is the 'pest' managed by the proposed TB Plan).
TB Management Areas (TMA)	TMAs are a contiguous area with broadly similar: • habitat and geography • level of control and surveillance • disease history and risk.
TB Plan	The set of objectives, measures and operational policies established to manage bovine TB in New Zealand. It is given effect to through the TB Plan Order and operationalised through the National Operational Plan (a requirement under s100B of the Biosecurity Act. References to the 'current TB Plan' mean the TB Plan as currently enacted and implemented through the TB Plan Order and the National Operational Plan. References to

	the 'proposed Plan' mean the TB Plan as amended if the changes set out in this proposal were to be approved.
TB Plan order	Is the Biosecurity (National Bovine Tuberculosis Pest Management Plan) Order 1998 that gives effect to the regulatory elements of the TB Plan.
TB freedom	A defined geographic area (e.g. a Vector Risk Area or New Zealand) is considered to become free of bovine TB when it becomes free of unacceptable risk of infection in wildlife. The level of acceptable risk is specified by the calculated probability that TB is no longer present – the 'Stopping rule' set by the Board of TBfree on the advice of technical and scientific experts (currently 0.95). At that level, one in 20 Vector Risk Areas could be declared free but still contain TB. There would therefore be some residual outbreaks in areas declared free that would require a low level of 'mop up' activity after the declaration of freedom and revocation of Vector Risk Area status. Can also be known as 'statistical freedom' of TB in possums.
Vector Control Zone (VCZ)	A defined geographical area in which activities are undertaken to control the populations of wild animals that are known vectors for bovine tuberculosis.
Vector Free Area (VFA)	A defined geographical area where bovine tuberculosis is not maintained in the wildlife populations.
Vector Risk Area (VRA)	A defined geographical area where bovine tuberculosis is being maintained in the wildlife population as indicated by either epidemiological information from infected cattle and deer herds, or the finding of tuberculosis in wildlife animals that are classed as bovine tuberculosis maintenance hosts.
Works surveillance	Refers to inspection of carcasses for TB at cattle and deer slaughter premises.

INTRODUCTION

Control of bovine tuberculosis (TB) in New Zealand is carried out under a National Pest Management Plan under the Biosecurity Act 1993 (Biosecurity Act) managed by the management agency TBfree Ltd (a subsidiary of OSPRI, hereafter referred to as "TBfree). The Biosecurity (Bovine Tuberculosis National Pest Management Plan) Order 1998 (TB Plan) provides for the exercise of legal powers and the setting of rules to achieve the objectives of the TB Plan.

The TB Plan was last reviewed following notification of an amendment Proposal by the Minister for Biosecurity in September 2015. An Order in Council amending the TB Plan came into effect on 1 July 2016.

The Minister for Biosecurity is required under section 100D of the Biosecurity Act to start a review of the TB Plan by 1 July 2026. The review must be on the basis of a proposal prepared by the Minister or any other person and must identify whether the proposal is to amend, revoke, revoke and replace, or leave unchanged the plan or part of the plan.

The review provides an opportunity for the TB Plan to be updated and improved to take into account progress, improved scientific knowledge, and technical developments. It also provides an opportunity to consider financial arrangements that support the TB Plan and the economic circumstances within which the TB Plan will be delivered.

This Proposal has been prepared by the specially constituted TB Plan Review Governance Group (PGG) comprising representatives of funding parties, TBfree and wider stakeholder interests. The PGG is recommending that, subject to consultation, the amendments in this Proposal be put in place by 1 July 2026.

The consultation requirements of the statutory review process require that funders and other interested parties, including the wider public, can make their views known and influence decisions about the final determination of the proposed TB Plan.

Strategic context

The TB Plan is implemented through a mix of regulatory and non-regulatory instruments (regulation, operational policies, funding agreements, and area-based plans. Figure 1 sets out the expected high-level framework for management and implementation of the TB Plan by TBfree.

The TB Plan sets out the principal objective (i.e. to deliver an overall economic benefit), intermediate outcome (the specific approach to management of the disease) and the high-level measures for the eradication of TB. It also sets out the performance measures TBfree needs to report against.

The National Operational Plan (NOP) describes the objectives and targets of the TB Plan at a more granular and area-specific level and provides measures of progress towards the achievement of these objectives, including the indicators and reporting requirements for each of the performance measures. It also sets out the statutory technical policies and control tactics and methods for implementing the TB Plan.

The TB Plan is delivered by the management agency, TBfree, through a nationally co-ordinated programme that manages the disease in all domestic herds through:

- on-farm TB testing and meat works inspection
- culling of infected animals
- livestock movement controls, and
- possum population management.

Possum control requires systematic, large landscape control of NZ's possum population to eradicate the disease from possums and involves a mix of ground and aerial control operations, and wildlife surveys. The annual operational plan and TB Management Area Plans are developed and overseen by TBfree epidemiologists and technical advisors. Possum control activities are undertaken by specialist pest control contractors on the basis of competitive tendering.

Funding of the TB Plan

Funding for the TBfree programme comes from the Government and the dairy, beef and deer farming industries. Under the current Funding Agreement, the Government contributes 40% of the funding for the TBfree programme, subject to Cabinet approved appropriations. The remaining 60% comes from the dairy, beef and deer farming industries through:

- the dairy milk solid levy
- levies on all cattle slaughtered
- levies on Deer Industry NZ (DINZ) meat and velvet
- levies on live export of cattle and deer.

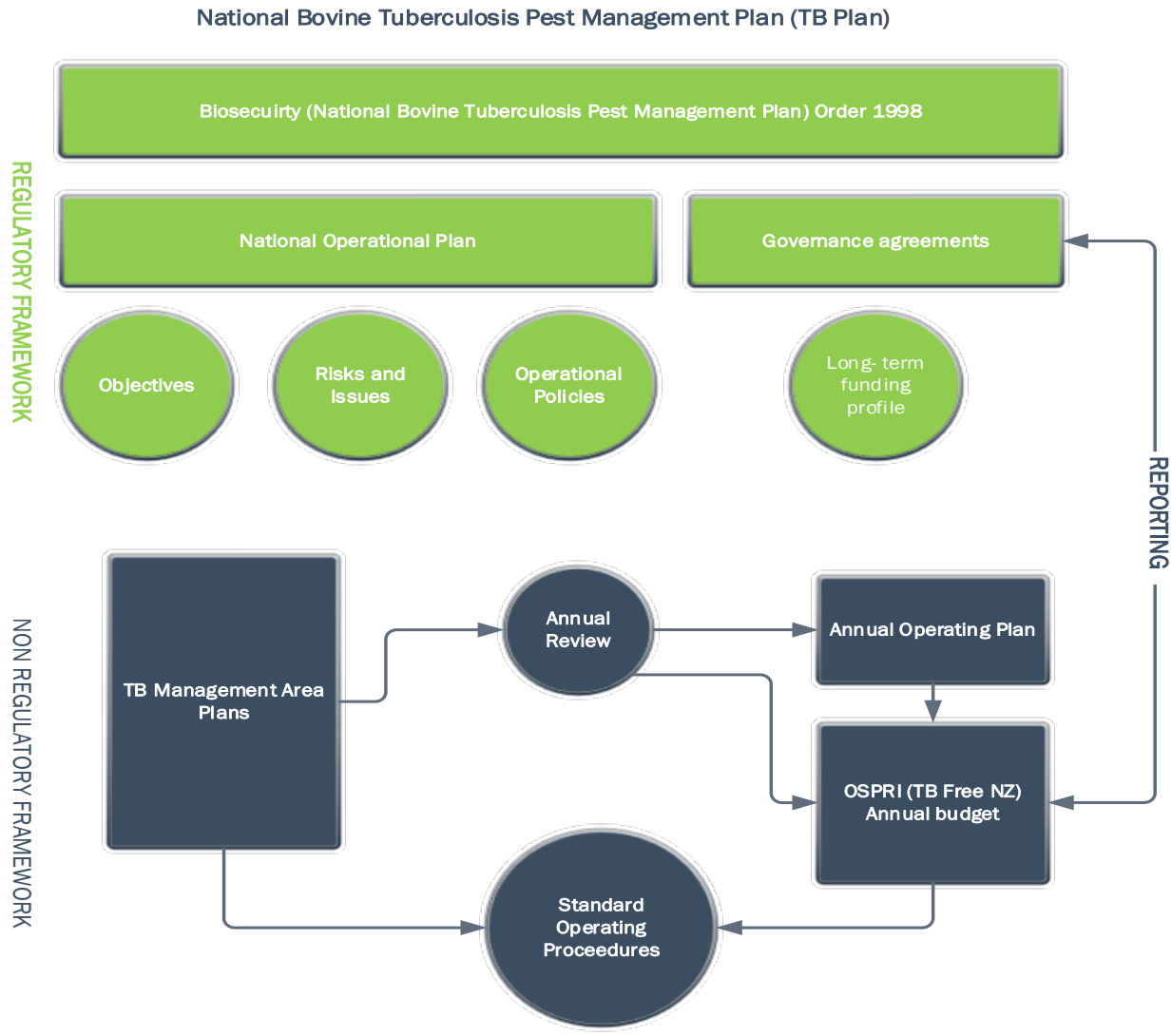


Figure 1 The Statutory and Operational hierarchy of the National Pest Management Plan.

Mycobacterium bovis and its adverse effects

The subject organism of the proposed TB Plan, *Mycobacterium bovis*, is the bacterium that causes the disease of bovine tuberculosis (and is the 'pest' to be managed in accordance with the proposed TB Plan).

Mycobacterium bovis can infect humans as well as a range of domestic and wild animals. TB is particularly significant as a disease of farmed cattle and deer in New Zealand, and if left unchecked would cause unacceptable adverse animal welfare effects, result in significant production losses, and a possible market access issue for export animals and animal products.

There are also potential reputational knock-on effects if New Zealand were not considered to have effective biosecurity arrangements in place for TB.

The adverse effects of TB and the wider social, economic, health and environmental benefits of managing TB are discussed in more detail in benefit cost analysis and discussion on the wider effects of the proposed TB Plan.

No other organism will be controlled under the proposed TB Plan, except as described in the section on "*Proposed measures to achieve proposed objectives*" which notably include large-scale possum control and a range of disease control and surveillance measures in livestock and other wildlife.

Rationale underpinning the Proposal

The TB Plan Proposal described in this technical document has been prepared to inform the statutory review of the TB Plan under section 100D of the Biosecurity Act (the Act), which requires the Minister to review the TB Plan after 10 years of implementation since it was last updated in 2016.

This document outlines proposed amendments to the TB Plan and changes to the current approach which have been updated and improved to take into account progress, improved scientific knowledge, and technical developments. It has been developed with consideration of the wider biosecurity and animal welfare obligations and animal health issues that cattle and deer farmers must address and manage on a daily basis. If implemented, the changes are expected to provide for more cost-effective control of TB in cattle and deer herds, to:

- prevent, avoid and manage animal health implications relating to TB infection
- prevent, avoid and manage livestock production losses and associated costs of TB infection to industry
- support market and consumer assurance requirements
- maintain and build on the significant gains made in managing TB
- realise cost-savings and gains in overall effectiveness from a single national programme – without duplication in separate industry or regional programmes. This enables economies of scale in the design and delivery of operations. It also enables a skilled workforce and wide-ranging organisation capability to be built and maintained, in order to address the challenges posed by TB across New Zealand.

There is a range of secondary benefits of the TB Plan including control of non-native pest animals (e.g. possums and ferrets) which also reduces adverse effects of these animals on biodiversity and environmental values.

Why a national plan remains the most optimum approach

The Biosecurity Act requires a proposal for a national pest management plan to describe why a national plan is more appropriate than a regional pest management plan.

The current TB Plan is derived from the original TB Plan (then called a 'Strategy'), which first came into force in 1998.

A National Pest Management Plan is appropriate because the organism *Mycobacterium bovis* affects more than one region and, as the cause of TB, the organism:

- has, or is likely to have, a significant effect on economic well-being
- is unlikely to be successfully eradicated without significant use of central government (Crown) resources and significant industry resources managed on behalf of cattle and deer sectors by national organisations
- is relevant to New Zealand's international obligations[2].

Additional reasons why a national pest management plan for TB is appropriate are:

- a nationally coordinated approach is needed and eradication or management of the organism through a national plan is expected to be more cost-effective than other means, including the exercise of powers under Part 6 or Part 7 of the Biosecurity Act

2 The OIE Terrestrial Animal Health Code.

- it is essential to establish formal long-term funding arrangements, secure commitments from affected parties to act (e.g., in a particular way or at a particular time) and, in doing so, to develop the management approach through the statutory process established by the Act
- it is necessary to provide for compensation other than provided for by section 162A of the Biosecurity Act 1993 (in this case under section 100I of the Act)
- pest management plan rules are required and it is necessary for the rules to apply throughout New Zealand (or parts of New Zealand)
- funding by way of a levy under section 100L of the Biosecurity Act is required (i.e., at least to maintain the current cattle slaughter levy)
- where the management agency is a body other than a government department, the statutory Plan process means government and other stakeholders can be assured about the acceptability and accountability of the body to funders and those subject to management provisions under the Plan.[3]

A national plan offers advantages for the control and eradication of TB. As TB in New Zealand is a wildlife-borne disease, control measures must extend well beyond individual farms and must be applied on a broad scale irrespective of land ownership, land use, or regional boundaries. Nationally consistent regulations on livestock testing and movement, herd registration and animal identification, along with nationally collated disease control records and information systems, are essential for management of in-herd infection and to prevent herd-to-herd infection.

National planning and coordination of disease and vector control measures enables achievement of agreed national objectives. The affected livestock industries are nationally integrated, and any adverse trade effects associated with TB would impact on the industries at a national level. Therefore, a national plan shares industry costs and benefits in an appropriate manner, and funding can be applied from national, rather than regional, industry sources (although regional contributions can still be made on behalf of landowners in regions or to reflect regional benefits of TB control). Where regional or local variations are appropriate (as with herd testing policies) these can readily be applied within a national Plan framework.

Proposed duration of the plan

The PGG proposes the term end of the current TB Plan remains 30 June 2055. The proposed amended TB Plan will include a provision for a review of progress and funding before 30 June 2031, and the 10-yearly reviews required under section 100D of the Biosecurity Act.

Engagement with stakeholders to date

A TBfree Review Advisory Group (RAG), made up of representatives of industry bodies, MPI, DOC and OSPRI, was used throughout the Proposal development process to provide strategic and technical advice to the PGG. A key function of the RAG is to ensure broader stakeholder issues and concerns are identified, canvassed within their organisations as appropriate, and addressed early in the options and Proposal development process.

The PGG Chair met with industry funder organisation Boards, leadership of MPI, the OSPRI Board, and the Chairs of the OSPRI TBfree committees to discuss the review.

3 As indicated elsewhere in this document, it is proposed that TBfree New Zealand Limited, a fully owned subsidiary of OSPRI New Zealand Limited, will continue to be the management agency responsible for implementing the proposed national plan.

CONTEXT

Bovine tuberculosis (TB) is a serious disease of domestic cattle and deer in New Zealand and is also found in wild possum, deer, and pig populations. TB usually affects the lymph nodes of infected cattle and deer, and ultimately will become generalised especially in the lungs, but may also spread to other organs, including the udder. This can result in open weeping abscesses, mastitis and significant loss in weight.

Figure 2 Image of TB lesions in animals (From left: significant lesion in axilla of possum; the majority of lesions in pigs are found in the lymph nodes of the jaw; generalised TB with multiple lesions attached to rib cage.)

While in the early stages affected animals may not show signs of clinical disease, if left unchecked TB may spread throughout a herd. It can also spread to other herds through stock movements between farms. Many individuals may be infected without showing signs of disease, but the infection lies dormant and may be activated in later years when the immune system is weakened.

Possums are the main wildlife carriers of TB in New Zealand and contact with infected possums is the main cause of herd infection. A number of other wildlife species (such as ferrets, pigs and wild deer) have been shown to be spillover hosts of TB.

Risk to humans

Bovine TB can also cause TB in humans, most commonly affecting the lungs (pulmonary TB) causing chronic coughing, spitting of blood, fever, night sweats and weight loss. In some cases, infection may spread to other organs, including the central nervous system, lymph nodes, skin, bones and joints.

Transmission of TB to humans in New Zealand was most commonly through the consumption of TB-infected raw milk. Today, pasteurisation of milk and existing high food safety standards for meat products ensure minimal public exposure to the disease. There is an increased risk for farmers and hunters from handling infected animals. There have been four human cases of New Zealand sourced bovine TB recorded in the last five years.

The history of TB and control in New Zealand

Bovine TB probably arrived in New Zealand in the middle of the 19th century through introduction of infected cattle. As with most developed nations, New Zealand progressively embarked on cattle TB control measures during the mid-to-late 20th century. By 1970 all cattle herds were under regular TB testing or post-mortem inspection for the disease, along with compulsory slaughter of test-positive suspect TB cases and partial quarantine of infected herds.

Although TB was effectively eradicated from cattle populations in regions such as Northland, Taranaki, and mid-Canterbury by the 1980s, unexplained failures in control had become apparent in other areas from the late 1960s – most notably the West Coast of the South Island, the Wairarapa and central North Island.

These failures were eventually linked to localised infection in populations of the Australian brush-tail possum (*Trichosurus vulpecula*). The transmission of the disease from possums to farmed cattle and deer is by direct and close interaction between these animals in the field, usually associated with farmland directly adjacent to bush habitat allowing possums to migrate onto farm pasture.

In the 1970s, government-driven possum control resources were therefore largely reallocated to areas with major TB problems. This led to sharp declines in livestock infection levels. However, government funding was mostly withdrawn in 1978, owing to a combination of complacency, public austerity and a spike in fur prices which encouraged belief that fur hunters would control the problem at no cost to the public purse.

The result of this was a gradual and then exponential increase in livestock TB infection through the 1980s, peaking at 1,694 infected cattle and deer herds in June 1994. This represented a herd infection rate of 3.9%, far higher than in most other developed countries, creating a potential risk to the marketability of New Zealand beef, dairy and venison exports. The geographic range of infection in possums and other wildlife – in areas termed Vector Risk Areas (VRAs) – also continued to expand to cover 39% of New Zealand's land area by 2004.

Since the 1990s, the TB control programme has focused on three important components:

1. Testing cattle and deer for TB and slaughtering infected animals.
2. Minimising the between-herd spread of infection by quarantining infected herds and by requiring pre-movement testing of cattle and deer from areas where prevalence of infection is high.
3. Controlling possums in areas where they are found to be infected.

Progress to date

Since the resurgence of TB in the 1980s, significant investment has been made by both farmers and government. Around $1.9 billion has been invested in TB control in the 27 years since 1998. This investment, along with farmer cooperation, has seen great results, with the number of infected herds reducing from 1,694 in June 1994, to just 15 in June 2025 (see Figure 3).

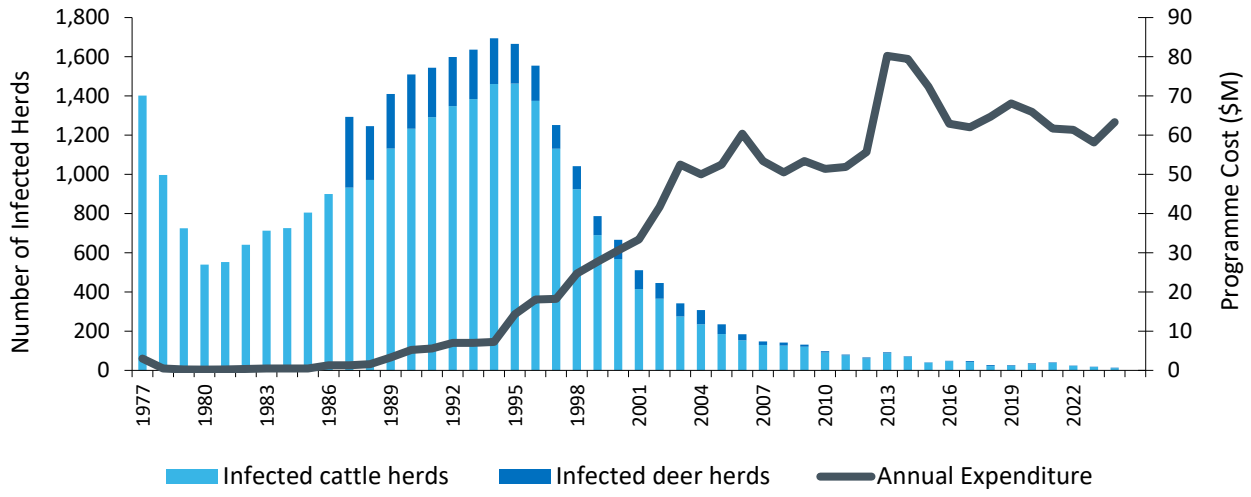


Figure 3 The number of infected cattle and deer herds and expenditure on managing TB from 1977 to 2025

Around 1200 herds (less than 2%) are in Movement Control Areas, where farmers face restrictions on stock movements to avoid the spread of TB.

The land area harbouring TB-infected possums has also reduced substantially, with a further 2.17 million hectares being declared TB-free since 2016 when the current plan focusing on eradication came into effect.

There is now about 6.1 million hectares remaining in VRAs as shown in the map below. (Figure x).

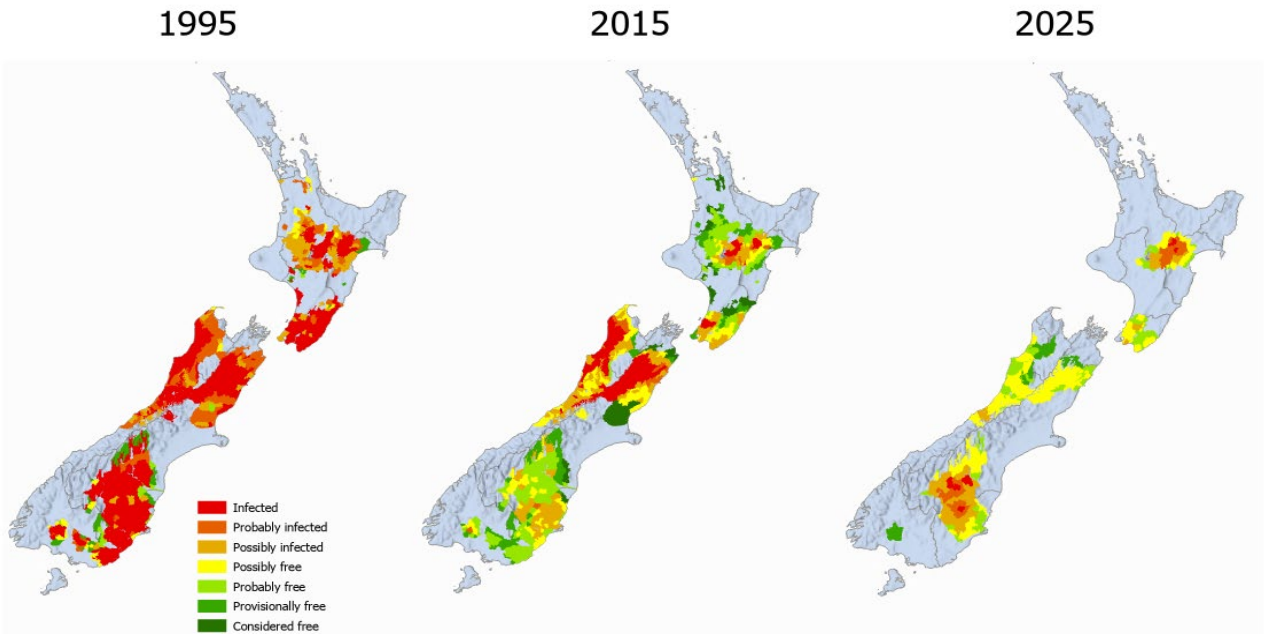


Figure 4 TB infection across New Zealand from the 1990's to 2016 when moved to eradication to now. Red indicates TB is present, dark green means a high probability that area is free of TB, grey means the area was considered to be free of TB in 1990

What would have happened if no action was taken in 1998

If there had not been a National Pest Management Strategy/Plan implemented in 1998, the disease would likely have spread relatively quickly from the distribution of infected possums that existed at the time (in possums and livestock being infected by possums). Within 10 years (1995-2005), the disease would be widespread in possum populations and many herds would be at risk of TB infection. Most of the farming areas of New Zealand would have endemic TB infection in local possum populations by 2015, see figure 5.

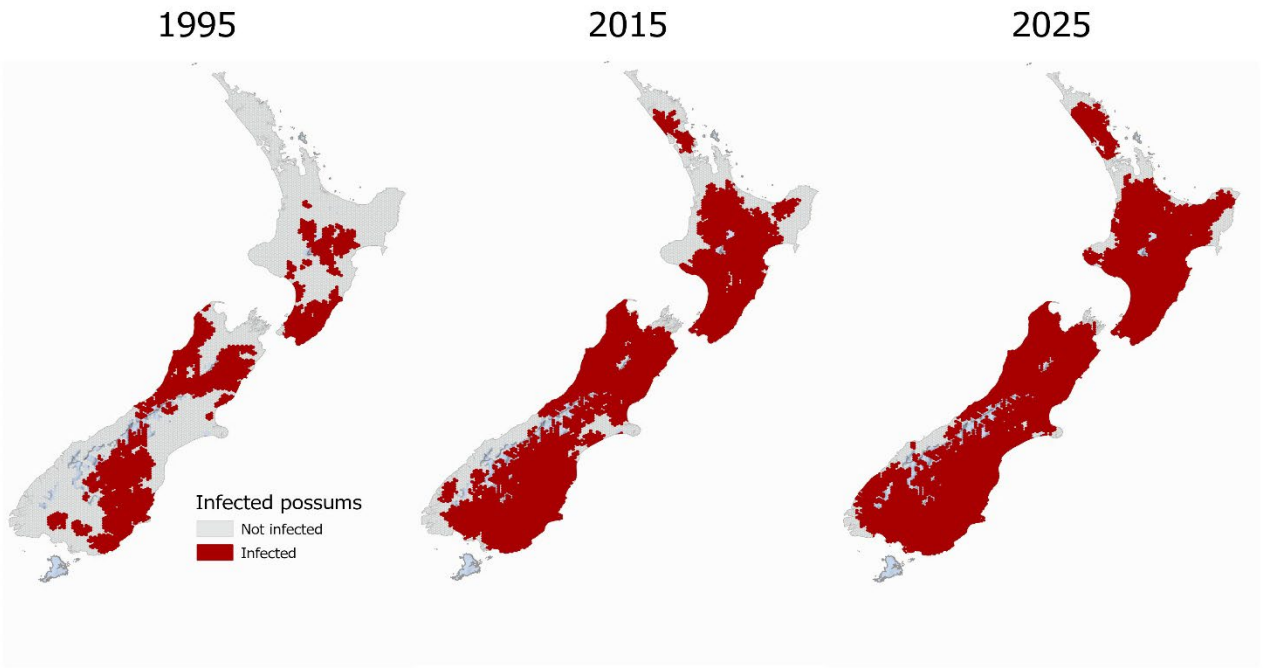


Figure 5 Spread of infected possums if no intervention since 1997

In reality there would likely have been some form of programme in place or veterinary service providers to assist farmers with herd management. Some regional councils may have implemented pest control programmes, likely with the support of industry good bodies. The disease would have spread through the country but at a slower rate than if there were no intervention.

The impact of the TB Programme on cattle and deer farmers

New Zealand farmers have had to deal with the impacts of TB infection in their herds since the first cattle were introduced. Since the establishment of control programmes to manage and control the disease in the 1960s, farmers have had to deal with the impacts of the programme rules and implementation. Farmers have played their part cooperating with the programme to clear infection from their herds and from their local area with possum control activities.

The impact of the TB Programme has been much greater than just mustering animals for testing and the low of test positive animals. When many farmers were infected in a region there was a local degree of acceptance and understanding from their peers. However, where TB showed up in the region for the first time, the owners of infected herds sometimes experienced negative commercial and personal impacts in their local communities.

As the programme progresses toward the goal of eradication, the impacts on the few farmers that experience infection on their farms, more often than not through no fault of their own, are likely to be significant.

The following summarises some the more material impacts that farmers experience under the TB Programme.

Farming Enterprises

Business opportunities will be influenced by impositions created by TB management controls such as Movement Control Areas (MCA). Farmers within the MCA are required to present their animals for skin TB testing within the 60 days preceding a planned movement to any location other than directly to slaughter.

Many farmers within the current MCA rely on movement of stock for grazing or for sale to be finished elsewhere. The risk of positive disease detection could reduce the options available to the farmer and where a positive result is identified there may be no option but to send animals directly to slaughter at a loss. There have been situations where this has happened in the past. The TB Plan makes no allowance for compensation above the "Fair Market Value" for the individual animals that react to a test.

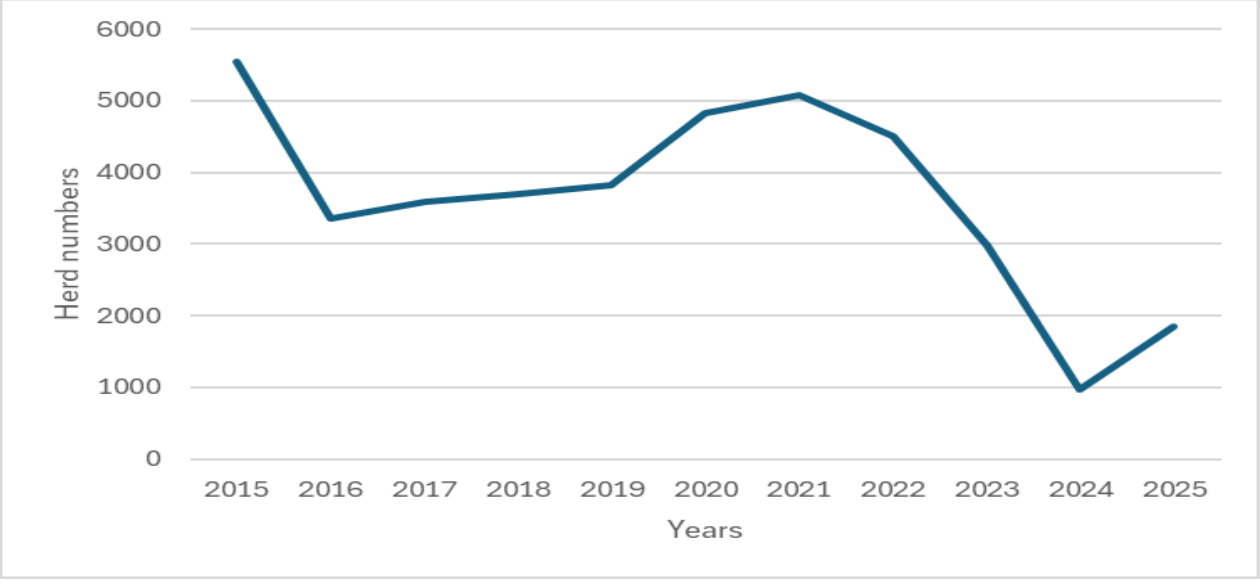


Figure 6 Number of farms within Movement Control Areas over the last 10 years

Graziers with in-calf dairy heifers, farmers selling weaners and store stock, and where a farmer is unable to finish stock for slaughter are examples where movement restrictions have large impacts on individual farmers. Where the TB risk remains high, farmers may have to completely change their farm management model and, in some cases, cattle and/or deer farming may no longer be a viable financial proposition for their property.

There has been a steady decline in the size of the MCA throughout NZ over the years, which has reduced the imposition of pre-movement testing on cattle and deer farmers. However, the Hawke's Bay, Harihari and East Taupo areas are examples where MCA have expanded recently to manage the risk of disease spreading via stock movements.

Land Value

Where a region has a higher rate of bovine TB, this can have an impact on land values due to limitations on suitable types of enterprises, and the potential risk of TB is a disincentive to purchasers. All farms in an area with intractable infection that is not addressed could be penalised in terms of stock values, lost sales, grazing options and land value.

Although there is compensation for animals taken as TB reactors (see discussion on page 51), there is no compensation for any business losses, associated costs, or lost opportunity costs for farmers with TB-infected herds. This differs from the approach used for the Mycoplasma bovis "response" to date which has created a disparity that has been noted by farmers. The PGG considered this issue and does not recommend changes to the compensation arrangements under the TB Plan.

Consequential impacts of TB breakdown in a cattle or deer herd

The consequential losses associated with TB Programme restrictions as a result of TB infection in livestock can be considerable and include but are not restricted to:

- inability to sell four-day-old calves, weaners, and cull cows
- inability to sell excess colostrum
- loss of genetic improvement in herd
- difficulty sourcing off-farm grazing options,
- sharemilkers, decreased value of main asset (herd)
- sharemilkers being "stuck" as unable to move whilst herd infected
- sharemilkers' inability to find another contract as C1 status herd
- extra feed requirements because carrying extra stock
- labour issues (employing staff)
- additional mustering, yarding and assistance costs associated with the requirements to TB test herd whilst infected.

Indirect impacts

Farmers located in a region that currently does not have local infection indirectly benefit from the impacts sustained by other farmers to contain and eliminate infection. Where insufficient disease management and control is applied there may be negative impacts for those farming in distant locations. This introduces additional risks to farming in general.

International context

The World Organisation for Animal Health (WOAH) sets international recommendations (standards) for the safe trade of animals and animal products related to risks associated with animal diseases and diseases that can spread from animals to humans.

WOAH recommends fresh meat and meat products from animals that have been inspected (as described in Chapter 6.3) for bovine TB are safe commodities and as such do not require any further TB controls from importing countries regardless of the infection status of the animal populations of the country, zone or herd of origin.

For milk or milk products (from bovids), WOAH recommends that importing countries require veterinary certification to show that such products come from: a herd free from TB infection OR that they were subjected to pasteurisation OR any combination of control measures with equivalent performance as described in the Codex Code of Hygienic Practice for Milk and Milk Products.

New Zealand dairy and meat exports meet the WOAH recommendations. As such, they are not dependent on the TB Plan – which significantly minimises any negative trade impacts that could be associated with bovine TB.

A small number of importing countries specify that meat must not be derived from TB-positive animals e.g. Russia and China. There is little trade with Russia, and for China the animals must be free based on the official control programme under the New Zealand Biosecurity Act. The New Zealand Government is renegotiating the China meat protocol and will be seeking alignment with the WOAH meat recommendations.

It is remotely possible that should New Zealand's situation change to one where there is a high incidence of herds with TB, commercial importer/exporter contracts may elect to specify TB-related conditions of their own, but in so doing they would be acting in a manner that is contrary to WOAH recommendations.

Eradicating TB from possums

The TB Plan has had the objective of eradicating bovine tuberculosis from New Zealand since 2016. Eradicating the disease from possums (the vector) is critical to achieving this objective as while TB infection remains in the vector population, there will always be ongoing risk of reinfection of livestock on nearby farms.

As a result, managing and controlling our possum population is a major part of the TBfree programme. The pest control work is designed to reduce the number of possums that can carry and spread TB to farmed livestock. Extensive research and proof-of-concept programmes between 2005 and 2015 have shown we can expect to eradicate TB from an area if we reduce the number of possums to a low and even level. This means below five possums per 10 hectares, for a period of at least five years. A low number like this means the disease:

- can't be maintained within the population
- will disappear from both possums and other wildlife in the area.

Data gathered from pest control operations is used to guide future planning and measure progress towards eradicating TB. The data includes:

- the possum control history of an area
- possum population density
- the presence or absence of TB in possums and other wildlife in an area
- TB testing results from any cattle and deer herds in the vicinity.

The data is used to estimate the probability that the possum population in an area is free of TB. It guides planning for any further pest control activities. For example, if there's a high probability of TB freedom in possums in an area:

- control operations will be replaced by wildlife disease surveys, with the surveys ongoing until OSPRI is sure that TB is no longer present
- TB testing in livestock may be reduced and carcasses inspected at slaughter instead — this will provide the monitoring needed to detect any recurring or residual TB infection.

Proof of Freedom model

The Proof of Freedom (POF) model was developed by the scientifically based Proof of Concept research programme undertaken by TBfree between 2005 and 2016. The POF model provides a high degree of confidence that TB has been eradicated in possum populations within a defined geographic area. The output of the POF model guides decisions on the need for further vector control or surveillance activities and supports the decision to cease active management at the appropriate time.

The POF model estimates the probability that previous possum control has been sufficient to eradicate TB from a defined area. This analysis includes a continual assessment of the coverage of possum habitat to ensure that there are no gaps in surveillance information.

Once a threshold of confidence is reached, additional wildlife surveillance and/or control activities are initiated to provide empirical evidence to support that TB is indeed absent. This 'threshold' is based on expert opinion and uses information of disease trends in wildlife and local livestock as well as control activities completed to date.

When can an area be declared TB-free?

Once the POF process determines an area has achieved a 95% or higher probability of TB eradication in possum populations, cases are submitted to an expert scientific panel (which includes two members independent of OSPRI) before a declaration of TB freedom can be made.

When the panel is satisfied that the entire possum population within the area of interest has been adequately suppressed to break the TB disease cycle and that the reinvasion risk has been addressed, the panel will make a recommendation to the TBfree Board for the revocation of the vector risk status. If this recommendation is approved by the Board, the area will be re-classified as a Vector Free Area (VFA) and declared TB free.

On-going monitoring of Vector Free Areas

The high level of confidence attained through the Proof of Freedom process reduces the risk of future wildlife related infection in livestock, but continued monitoring of livestock and passive surveillance of wildlife species is required to provide assurance that the correct decision has been made. In the unlikely event of a recurrence of wildlife-related TB infection there is a mitigation plan for each revoked area.

The optimal tool for eradicating TB from possums

Aerial application of 1080 (sodium fluoroacetate) bait for possum control is a key tool for achievement of the TB Plan objectives. Although there has been sustained investment in research on alternatives to 1080 and other delivery mechanisms over the last 25 years, aerial 1080 remains the best possum control tool available to deliver rapid, effective and large-scale control over landscapes where the terrain or vegetation cover prevent reasonable access for workers on the ground.

The environmental effects of 1080 use have been extensively studied for several decades. The evidence is clear - professionally delivered 1080 operations are a safe and effective possum control method, with very little risk to native wildlife or the wider environment.

Despite this, there continues to be some public debate and concern over possible adverse effects of the use of aerial 1080. It is a concern for a number of landowners in areas with highly infected possum populations (e.g. in the Central North Island). It is important that these public and landowner concerns are recognised and addressed. This includes:

- strict application of best practice standards to all operations to ensure full regulatory compliance, effective consultation with affected parties and communities of interest, and minimisation of any adverse effects
- continued focus on technical improvements in aerial 1080 use, such as bait design, application methods, and ongoing monitoring of environmental effects
- working with landowners including iwi/hapū to align TBfree's vector control operations with their own goals and objectives for environmental management on their land
- cooperation with DOC and other parties to maximise biodiversity benefits from TB control operations
- carefully planned and managed communications and engagement with the public, stakeholders and communities of interest about the need for and benefits of targeted 1080 application for TB control and biodiversity.

The current TB Plan

The current TB Plan, which has been in place since 2016, was a significant pivot to the eradication of the bovine tuberculosis from New Zealand altogether, with the new objectives of:

- Biological eradication of TB from New Zealand by 2055 to address the adverse effects of bovine tuberculosis on the economic wellbeing, the environment, and human health with the key milestones of:
    - TB freedom in livestock by 2026 – although the intention in the 2015 Proposal was for this milestone to reflect that cattle and deer herds would be largely free of TB infection by 2026, with potentially a very small number of isolated breakdowns which would require mopping up, this was subsequently drafted in the NPMP order as an absolute.

- TB freedom in possums by 2040 - the point of 'statistical freedom' of disease from possums, where there is confidence, at an acceptable level of certainty that the disease is absent from possums, which are then no longer able to infect livestock.

Complete biological eradication of TB from New Zealand, where TB is considered eradicated from all wildlife, would take a further 12 – 15 years after the declaration of TB freedom in possums and will involve low-level monitoring and verification, and the very occasional mop-up of residual or previously undetected infection.

- Ensuring the infected herd annual period prevalence stays at or below 0.2% on average to minimise the adverse effects of bovine tuberculosis on economic wellbeing, the environment, and human health throughout the term of the TB Plan (i.e. to 2055).

Delivering the eradication objective involved reprioritising vector control activity in 2016 to target first:

- all the Vector Control Zones with current or recent infection (since 2012) in livestock or wildlife
- all of the areas where infected possum populations were unmanaged and those areas that were still infected areas where eradication was expected to take the longest.

Learnings from recent TB outbreaks

Following the evidence of a significant outbreak in the Hawke's Bay in 2020, the TBfree programme pivoted to a balanced approach for eradication through a programmed "Health Check" for the TB Plan in conjunction with OSPRI's shareholder representatives. This saw priorities shift towards herd protection from vector-sourced infection, in alignment with the 2026 TB freedom from herds milestone, while still working at the reduction of the Vector Risk Area (VRA) of New Zealand.

This change in prioritisation involved greater focus on suppressing possum density in buffer areas to prevent spread of the disease out of neighbouring areas with known infected possum populations (i.e. the core areas) and allowed the outbreaks in the Hawke's Bay and in Harihari on the West Coast to be brought under control relatively quickly.

There are still core areas that require the initiation of a comprehensive landscape-based eradication strategy and the challenges with access to some areas of the country that were present in 2016 remain.

2025 TB PLAN REVIEW

The PGG has reviewed the TB programme and considered that, although there have been some operational, financial, and technical challenges over the past nine years since the shift to the eradication objective, the programme is making good progress, remains technically/scientifically sound, and is largely on target to deliver the 2040 objective of vector freedom, albeit with additional costs to that forecast in 2015.

Independent assessments of the TB Programme

The PGG view was informed by a number of independent reviews it commissioned on the:

- ability to deliver the 2026 livestock freedom milestone
- technology/science underpinning the eradication objective
- scan of emerging technologies
- financial assumptions used in the 2015 TB Plan Review.

Review of the 2026 livestock freedom milestone

SPADE Solutions were commissioned to review the 2026 TB freedom in livestock milestone. It noted that the 2015 PGG Proposal to the Minister defined the 2026 livestock key milestone in qualitative terms, aligned with WOAH international standards accounting for small numbers of ongoing TB breakdowns. However, the drafting of the legal instrument (i.e. the 2016 TB NPMP) applied a quantitative statistical criterion to this milestone, and these requirements have been formulated in a way that is not technically and financially feasible to prove.

SPADE Solutions recommended that the TB freedom in livestock definition in the NPMP is amended to reflect practicality. It also recommended New Zealand to declare TB freedom from cattle and deer to WOAH to signal achievement of this status.

Technology/science review of TB Plan Programme

Manaaki Whenua Landcare Research (MWLR) was commissioned to:

- review the implementation of the 2016 TB Plan and assess progress towards milestones
- provide a scientific review on whether there had been any changes in the science underpinning the case for TB eradication
- assess whether the technical approach to eradication was still valid.

MWLR key findings are that the TB Programme is largely on track, the science and technological approach remains sound, but there are potential improvements to the Proof of Freedom (POF) approach which may enable faster and more cost-efficient achievement of eradication of the disease from possums. Specifically, MWLR found that:

- progress towards zero infected livestock herds (as a proxy for TB freedom in livestock) has slowed over recent years due to some large TB outbreaks which means the 2026 target date is now at risk of not being met
- progress towards the VRA reduction milestone (as a proxy for TB freedom in possums) is largely on track to meet the 2040 milestones provided the rate of reduction is sustained at the current rate
- key changes from the 2016 plan revision have been implemented in a timely manner except for risk-based testing (RBT), which was delayed by data availability and IT infrastructure issues
- The strategies developed in the NPMP have been proven capable of delivering the outcomes required; the main risk to the programme appears to be the resourcing of these strategies.
- there have been no significant changes in science since the last TB Plan review that challenge the foundations of the 2016 TB plan for eradication
- the TB eradication objectives probably can be met using existing pest control tools, provided the social licence for those tools is maintained
- TBfree may be taking an over-conservative approach to declaring TB freedom by underestimating the success of aerial 1080 control in the POF process.

MWLR was also commissioned to review the Vector Operations Cost Model (VCOM), which is used to forecast the annual progress towards TB freedom via reduction in total hectares of VRA. MWLR endorsed the use of the VOCM for the purposes of comparing different strategic options for the TB Plan Review and recommended that TBfree consider further refinements to enable its use in operational planning.

The full MWLR reports are available at www.tbplanreview.co.nz.

Scan of emerging technologies

More than 20 types of technologies were examined, including a variety of molecular diagnostics, immunological assays, imaging technologies, sensors and tracking devices, aerial surveillance platforms, emerging computational and analytic devices and methods, wireless connectivity systems, therapeutic approaches, genetic modification, augmented and virtual reality, and pest trapping systems.

The scan identified a number of newer technologies that may be the most relevant for disease diagnosis, wildlife vector surveillance, and control practices over the next decade. The technologies were categorised by whether they are already mature, and their use can be easily scaled in New Zealand (“Scale”), whether additional testing and refinement is required (“Trial”), or whether a longer period of development or adaptation is likely (“Develop”) as set out in Table 1 below.

Table 1 Summary of scan of potential new technologies to support delivery of the TB Programme

Category	Technology
Scale	PCR and Next Generation Sequencing for *Mycobacterium bo*vis infection confirmation, including bulk testing of milk (TBfree research project already underway) Drones and thermal imaging to estimate possum numbers in less-forested areas
Trial	More sensitive and specific assays and biosensors Augmented Reality training for carcass inspections eDNA using alternative primers and hybrid capture Next generation sequencing for *Mycobacterium bovis* epidemiological analyses Acoustics for forest surveillance Low earth satellite connectivity Low light solar power for devices
Develop	Automated AI-assisted carcass inspection eRNA for detecting viable *Mycobacterium bovis* More rugged trail cameras for extreme conditions Sensor networks for forest surveillance More effective herd testing system using AI models Risk assessments for surveillance & control strategies using AI models

Review of the 2015 financial assumptions

PWC were commissioned to review the financial assumptions that were used to model the funding of the 2016 TB Plan. They found a number of the assumptions to be only partially valid or not valid, of which two have had a material impact on the delivery of the programme. These are:

- The 2015 forecast costs did not take into account inflation. This was a deliberate decision by funders at the time that inflationary pressures should be offset by efficiencies through technological developments. This was on the basis of the significant advances made in the previous 15 years, in particular the development of more efficient systems for delivering aerial 1080 operations.
- Although there have been refinements, for example increased use of GPS to improve accuracy of delivery of aerial bait, these have not been of the scale to deliver the same sort of efficiencies that resulted from the earlier technological advances.
- Introduction of risk-based testing (RBT) over the first three years of the programme would deliver significant cost savings which would be invested in vector control. Due to ongoing challenges with the interoperability between the TB programme disease management information system and NAIT, the introduction of RBT was not put into place.

Taken together these significantly impacted the funding available for the vector control programme over the last 10 years; in particular the ability to sustain the targeted vector eradication approach while managing expected occasional outbreaks (e.g. Hawke's Bay and Harihari breakdowns).

The PWC review also noted the ongoing challenges related to the social licence to use aerial 1080, in particular as the most effective method for disease eradication in difficult to access areas, which is beginning to impact delivery of the programme in some areas (discussed below).

OVERVIEW OF OPTIONS AND KEY PROPOSALS

The following options have been developed on the basis that:

- annual funding is capped at the current level of $60 million/year
- the forecast costs include inflation at 2.5% per annum, which is the historical average annual inflation rate in New Zealand over the last 15 years.

Our Proposal for managing bovine TB in New Zealand

The proposed objectives of the TB Plan would be

- Eradication of TB from New Zealand by 2055.
- Ensuring the annual infected herd prevalence remains at or below 0.05% throughout the term of the plan.

It is proposed to remove the 2026 livestock freedom milestone for the eradication objective. As discussed above, a milestone of exactly zero infected herds by 2026 is not practically sustainable until the disease is no longer present in the wildlife vector – currently forecast to be achieved by 2040 – as there is still a risk of "leakage" until the disease is eradicated. This is due to:

- ongoing likelihood of reinfection by wildlife sources (primarily possums) until the disease has been eradicated from the principal vector (possums)
- occasional outbreaks as a result of undetected in-herd infection (recrudescence), which takes time after declaration of freedom in the herd to be confident TB is no longer present.

Instead, the number of infected herds is expected to fluctuate throughout this period (i.e. between 2026 and 2040).

The proposed objectives will be achieved through focusing on eradication of the disease in the most infected possum populations and adopting a more targeted risk-based approach to disease management. This would involve three elements:

1. Ensuring the possum population is free of TB by 2040. This is the point of 'statistical freedom' of disease from possums, i.e. where we are 95% confident that the disease is gone from possums and no longer able to infect livestock.
2. Steady decline in infected cattle and deer herds maintained on average at 0.05% of the national herd (~75,000 herds) or less per year until the disease is eradicated from possums.
3. Complete eradication of TB from New Zealand, where TB is considered eradicated from all wildlife by 2055. This is expected to take a further 12 – 15 years after the declaration of TB freedom in possums and will involve low-level monitoring and verification, with potentially a very occasional mop-up of livestock infection.

The PGG also proposes that the 0.0001% statistical measure of freedom is replaced with '95% confident that infection would have been detected if the prevalence were above a threshold of one infected farmed deer or cattle in one million in New Zealand". This is because the 0.0001% measure is not possible without extensive (and highly expensive) ongoing surveillance sampling well beyond the 2040 freedom milestones. The combination of targeted surveillance of livestock and wildlife, responsive control in the unlikely event of isolated outbreaks, and providing time (15 years) for low-level infection in spillover hosts to die out naturally is sufficient to give confidence of freedom.

Proposed approach (vector-focused)

The proposed approach focuses on delivering the national objective of eradication of TB from New Zealand as soon as technically possible by prioritising activities that will remove the disease from the vector population and treatment of TB source areas (large scale, often deep bush), alongside ongoing management of the infected herds.

A fundamental element of this approach is the prioritisation of landscape-scale vector control to target the infected possum populations that present the greatest risk to achieving the programme eradication objectives in a timely manner. This

approach requires the use of aerial 1080 as the optimal and only proven tool for vector control in difficult-to-access backcountry areas of New Zealand, in particular in the Central North Island.

Highly infected vector areas in the South Island would continue to be prioritised, and ongoing vector-related activities will progressively clear the Vector Risk Areas elsewhere in the North and South Islands.

Secondary considerations are to:

- maximise the value of available funding for vector control in the near term (i.e. to mitigate the impact of inflation on the value of funding available for vector control), especially where it may require the use of more expensive tools/methodologies
- reduce the risk of spread of infection due to the nature of the topography from known highly infected areas.

Disease management measures such as setting of movement control areas, determining and declaration of vector freedom will follow the approaches set out in the National Operational Plan, with the exception of the approach and level of TB testing.

- An increasingly targeted risk-based approach to TB testing will be used with a reduced level of surveillance testing. This involves a criteria-based targeted testing approach in surveillance areas instead of the current routine testing approach, and decoupling livestock testing requirements from Disease Control Area statuses.
- TB testing in surveillance areas will become more targeted to herds at risk, using assessment criteria including the volume of animal movements from high-risk areas, herd size, production type, and/or NAIT compliance.
- Some TB testing may still be required for some time after all infection is eliminated from wildlife, to ensure latent animals are detected and removed.

Impact

The modelling forecasts that it will take 12 years (2036) to clear infection from vectors and 13 years (2037) to have no infected herds (see figure 7).

There will be an increased risk of some herd infections with this option compared to the current programme, as funding is prioritised to vector control work. The time to detect herd infections may also increase, as a result of less frequent testing of fewer herds.

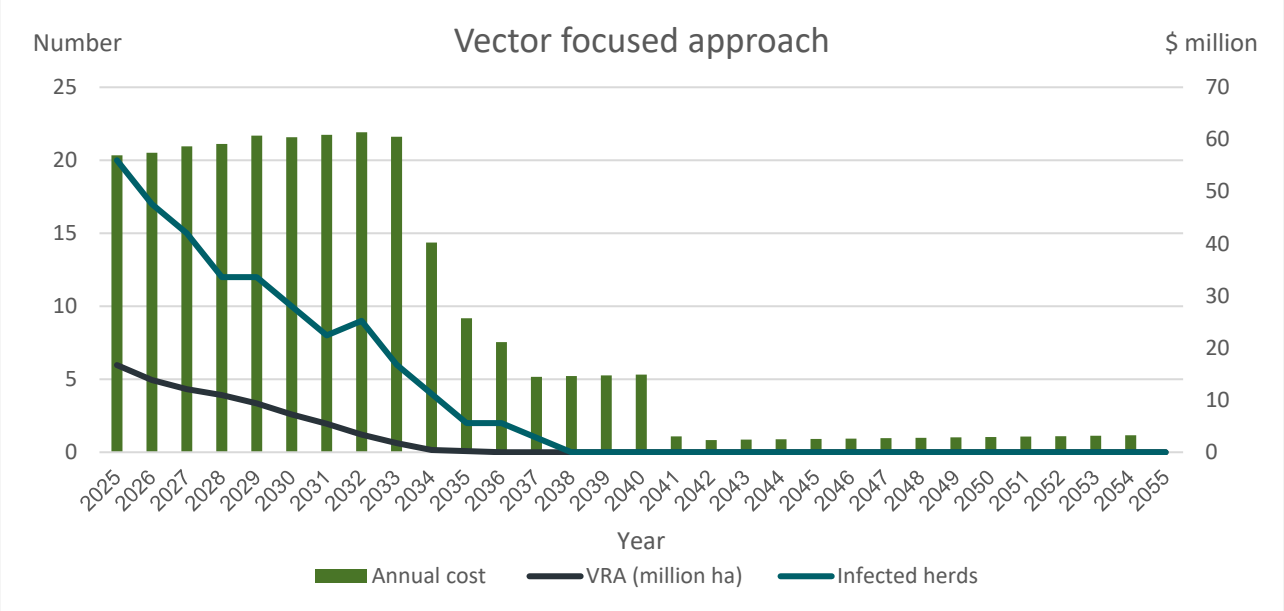


Figure 7 Projected decline in Vector Risk Areas and number of Infected herds compared to forecast annual expenditure under vector focused approach to eradication of bovine TB from New Zealand (i.e. the PGG Proposal)

Cost of Preferred Option

The estimated cost of the plan is $721 million over 30 years. This will require annual funding of $60 million per year for the next nine years of the TB Plan, followed by three years at an average of $29 million/year, then four years at $14.7 million/year. The costs of post livestock/possum clearance surveillance are estimated at $2.8 million/year for the remaining 14 years of the TB Plan.

This includes provision of $0.67 million per annum for 12 years for vector control costs associated with managing potential outbreaks. This will minimise the impact of the costs of managing these outbreaks on planned vector control operations (as occurred with the outbreak in Hawke's Bay). The provision will be regularly reviewed by OSPRI to take into account the likelihood of outbreaks diminishing over time as the area of infected possum populations reduces.

Importance of landowner support

Under the proposed approach, aerial 1080 is expected to be used in approximately 20% of the programme's vector control operations across the country. However, the proportion of aerial 1080 control needed in the Central North Island VRA is significantly higher than other parts of the country due to the large area of inaccessible backcountry. Aerial 1080 is the optimal tool for vector control on 615,000 hectares of the 1,063,000 hectares of VRA in this region, i.e. ~ 60% of the area needing active vector control.

In the Central North Island VRA, there are varying levels of landowner acceptance of the use of aerial 1080 for vector control. It is more effective for TBfree to gain the cooperation of land managers wherever possible than undertake an operation where there is a material level of opposition to the operation.

Under the proposed approach, TBfree would actively engage and consult with affected parties and the wider community on the planned operations and wider programme. This has the greatest chance of gaining support, or at least acceptance from affected landowners, by building on existing relationships to get the best outcome for landowners as well as the TB Programme.

This involves TBfree engaging with landowners to understand their point of view, clearly articulating the purpose of the TBfree operation, the rationale for its preferred use of aerial 1080, and providing landowners, iwi/hapū, and other affected parties a reasonable opportunity to set out their concerns and work with TBfree to address these. For example, this could involve TBfree working with iwi/hapū and other landowners to build their capability and tools to align TBfree's vector control operations to their environmental goals. This might involve:

- undertaking ground control in some areas where aerial 1080 is the optimal tool where ground control can achieve and sustain the reduction in the number of possums at the level required to eradicate the disease
- investing in landowner 'infrastructure' to sustain the gain including:
    - facilitating development and implementation of iwi/hapu environmental plans which include pest control objectives
    - training of iwi/hapu and other groups, for example in pest control, planning, monitoring capability
    - term-limited funding for trap and bait lines in VCZ where safely possible.
- working with regional councils, DOC, iwi/hapū and others to put in place long-term programmes to sustain the gains once substantive TBfree vector control programme ends
- contracting of local pest control operators (for ground control operations and surveillance).

As part of this engagement, TBfree will need to be very clear about the need to deliver the programme within what is becoming a shrinking window of time and funding.

Why the proposed option?

The PGG considered a range of options including to 'Do Nothing' (i.e. end the plan with no further coordinated management of the disease), revert to a containment approach (i.e. holding the current gains) and a range of eradication options.

The PGG considers that neither 'No Control' nor 'Containment' are tenable options.

Stopping the TB programme now would see an increase in the number of infected herds, which could reach 150 by 2035 and approach 20,000 herds by 2055. Figure 8 illustrates the expansion in infected possum populations across New Zealand over time if the TB Programme is stopped. See Appendix A for description of the impact if management of the disease stops.

'No Control' does, however, provide baseline for the benefit costs analysis of the other options (i.e. the 'counterfactual').

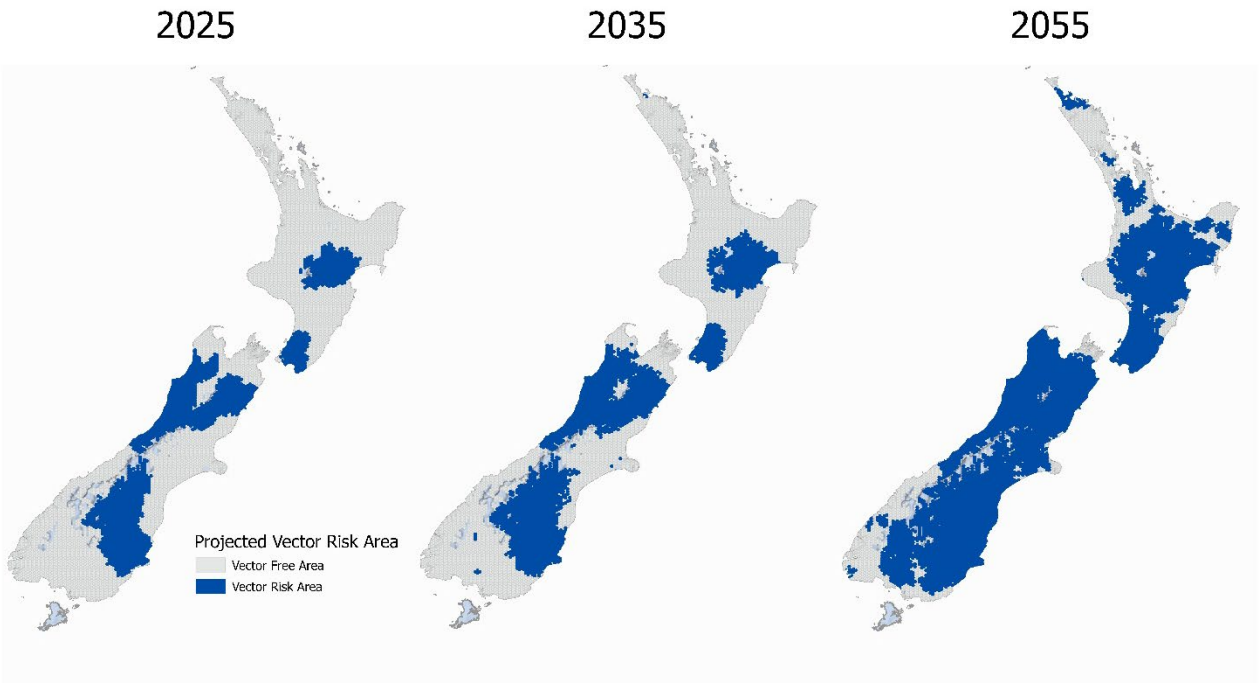


Figure 8 Projected increase in infected possum poulations if the TB Programme is stopped.

While the containment option would have lower annual costs in the near term, the higher costs of ground control for buffering the current Vector Free Areas, managing ongoing outbreaks, and the impact of inflation means that programme costs start to exceed the current $60 million/year cap by 2033. The TB Programme would also need to continue in perpetuity at an ever-increasing cost.

Alternative options

There are two alternative eradication options – focusing on herd protection (i.e. the Status Quo) and using alternative approaches to aerial 1080 in areas where opposition to the use of aerial 1080 severely impacts the ability to deliver the programme in the timeframes and with the operational frequency needed to deliver disease eradication in the possum population.

Option 2 Status Quo (no change)

The Status Quo focuses on the protection of herds from vector-sourced infection while managing down the disease in existing infected herds. The Programme prioritises annual vector control activity to suppress possum density in buffer areas to prevent spread of the disease out of neighbouring areas with known infected possum populations (i.e. the core areas).

Given the limit on annual funding, the prioritisation of vector control in buffer areas has had the effect of reducing the amount of vector control that can be undertaken at landscape scale to target removing the disease from infected areas and so extending the timeframes for achieving the eradication objective. Vector control in buffer areas is more costly as it is more dependent on the use of more expensive ground control methods. This results in a significantly higher cost of the programme, est. $1,004 million, compared to the other eradication options.

Impact

The modelling forecasts that it will take 18 years (2042) to clear infection from vector population and 22 years (2046) to have no infected herds under the Status Quo. Farms would be subject to additional testing requirements until 2041. It is likely the programme would need to continue beyond the current 2055 timeframe to provide confidence the disease is absent from wildlife.

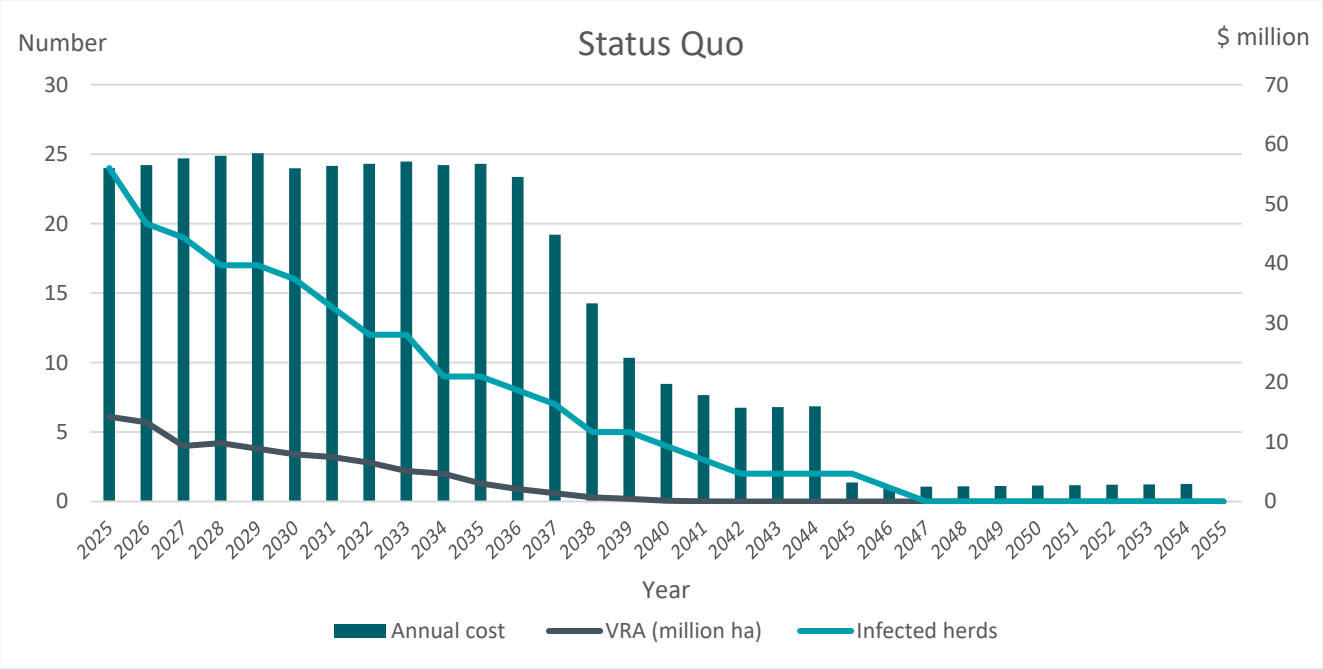


Figure 9 Projected decline in Vector Risk Area and infected herds compared to annual expenditure for the Status Quo

Cost

The total cost of implementing the TB Plan for this option is estimated as $1,004 million. This will require annual funding of $60 million per year for the next 14 years of the TB Plan, followed by three years at an average of $31 million/year, then three years at $18.7 million/year. The costs of post livestock/possum clearance surveillance is estimated at $2.8 million/year for the remaining 10 years of the TB Plan.

This includes provision of $1.66 million per annum for 17 years for vector control costs associated with managing potential outbreaks. The provision will be regularly reviewed by OSPRI to take into account the likelihood of outbreaks diminishing over time as the area of infected possum populations reduces.

Option 3 Alternative tools - Ground control where use of aerial 1080 is constrained

This option is similar to the preferred option. However, under this option TBfree will use a combination of different methodologies and phasing of control activities in areas where there are constraints on the use of aerial 1080.

Eradication of TB from possums is based on the proven efficacy of aerial control to eliminate TB infection. This is particularly pertinent for hard-to-access and rugged backcountry areas of New Zealand where coverage is likely to be incomplete. The proposed alternative vector control methods are effective in areas suited to ground control but their effectiveness in areas best suited to aerial control has not been proven. This presents a significant risk to the achievement of the eradication of disease from these areas, as reservoirs of infected possums are likely to remain in those areas not treated**.**

Even in areas where ground control is feasible in parts of these remote areas, there are often material logistical and capacity challenges with undertaking ground control operations at landscape scale necessary to deliver the level of impact required by the POF model.

Impact

The modelling forecasts that it will take 14 years (2038) to clear infection from vectors and 16 years (2040) to have no infected herds. It is possible that there will be zero or near zero herds prior to 2040 but the modelling takes into account the potential for latent infections to emerge.

There will be an increased risk of some additional herd infections with this option compared to the current programme, as funding is prioritised to vector control work. The time to detect herd infections may also increase, as less frequent testing of fewer herds will occur.

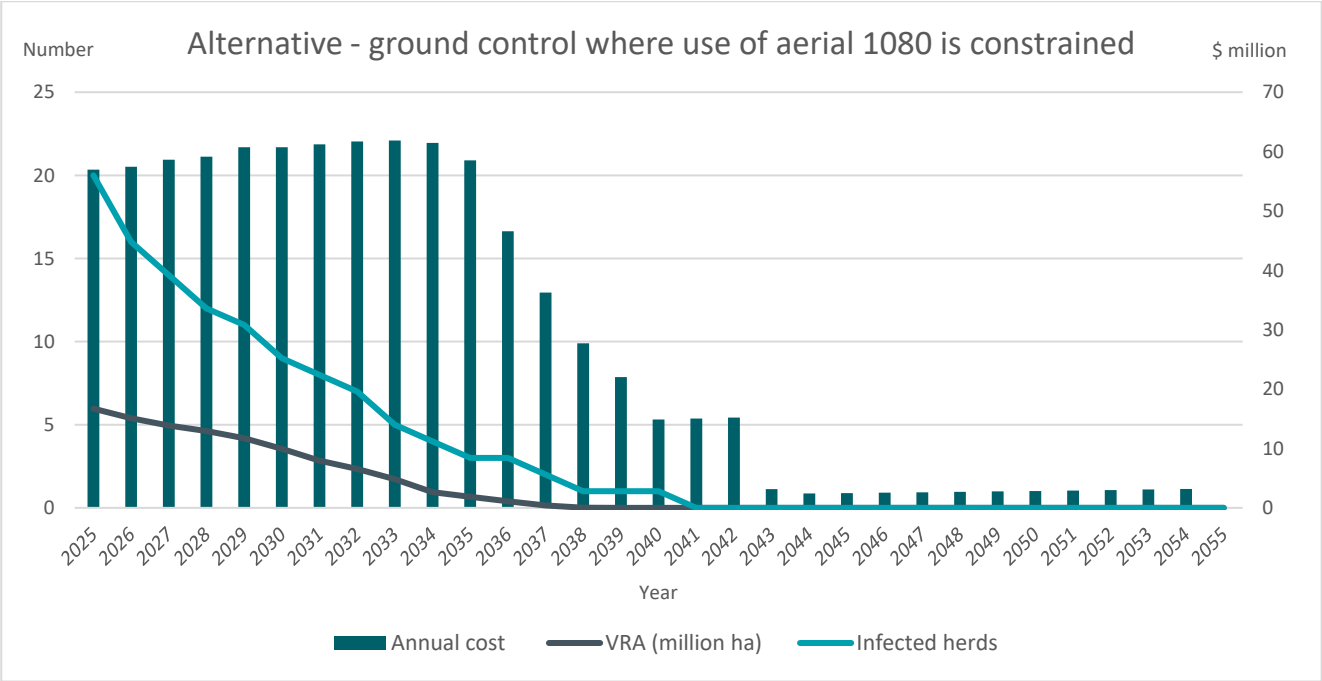


Figure 10 Annual cost, infected herd numbers, and area of VRA reduction using ground control where use of aerial 1080 is constrained

Cost

The cost of this option is $870 million. This involves annual spend of $60 million/year for the next 11 years, followed by four years at an average of $33 million/year, then an average of $15 million/year for three years. Post livestock/possum clearance surveillance is estimated at $2.8 million/year for another 12 years.

This includes provision of $1.33 million per annum for 12 years for vector control costs associated with managing potential outbreaks. The provision will be regularly reviewed by OSPRI to take into account the likelihood of outbreaks diminishing over time as the area of infected possum populations reduces.

Given the risk for reinfection from the 'refuges of infected possums' there will be scope for vector control to continue beyond the forecast eradication date, with associated additional costs.

Summary of the comparative advantages of each option

Table 2 below summarises the key elements of each of the options. Fuller analysis of the options is set out in the accompanying Options Analysis document.

Table 2 Key elements of the Optimal options discussed

	VECTOR FOCUSED	ALTERNATIVE TOOLS (ground control where use of aerial 1080 is constrained)	STATUS QUO (Herd Protection)
Objective	Eradication of bovine TB from cattle, deer and wildlife in New Zealand. *Mycobacterium bovis* is no longer present in New Zealand.		
Primary measure(s)	95% confident that infection would have been detected if the prevalence was above a threshold of one infected farmed deer or cattle in one million animals in New Zealand. Freedom from cattle, farmed deer and possums <0.05% period prevalence until vector free.		Freedom in livestock by 2026. Freedom from possums by 2040. Freedom = statistical likelihood of TB being detected 0.0001%. < 0.2% period prevalence of infected herds through lifetime of TB Plan.

	VECTOR FOCUSED	ALTERNATIVE TOOLS (ground control where use of aerial 1080 is constrained)	STATUS QUO (Herd Protection)
Key attributes	Optimal tool is used for eradicating disease in possums, including aerial 1080 in difficult to access backcountry.	Use of ground control in difficult to access backcountry where there is limited support use of aerial 1080.	Focuses on the protection of herds from vector-sourced infection while managing down the disease in existing infected herds over time.
Key risks and mitigation	Opposition to some aerial operations resulting in delays to programme and potential loss of OSPRI's licence to operate. Loss of social licence to use aerial 1080 impacts other pest control programmes.	Use of unproven methodology resulting in back country is likely to result in reservoirs of infected possums which reinfects neighbouring areas.	Use of unproven methodology resulting in backcountry is likely to result in reservoirs of infected possums which reinfects neighbouring areas.
	Investment in aligning TBfree objectives with landowners.	Ongoing buffering of areas, research into alternative tools.	Ongoing buffering of areas, research into alternative tools.
Vector freedom	2036	2038	2039
Years to herd freedom	2037	2040	2046
MCA testing requirements end	2033	2035	2038
Costs	$721m	$870m	$1,005m
NPV (Costs)	$259m	$297m	$323m
NPV (Benefit)	$2,485m	$2,477m	$2,486m
BC ratio	9.58	8.35	7.69

Figure 11 below provides a comparison of the decline in the number of herds affected by MCA testing requirements under each option (i.e. proxy of farms materially impacted by programme activities).

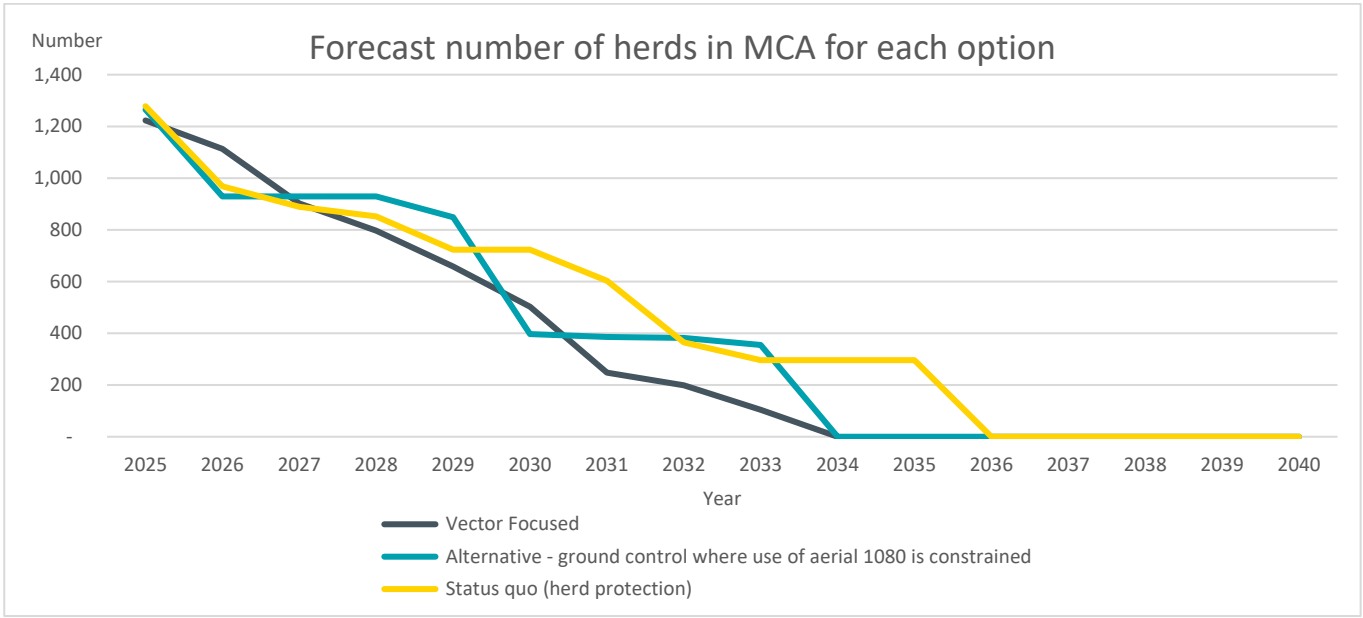


Figure 11 Comparison of the forecast number of herds affected by MCA testing requirements for each option

In addition to the management activities required to support usual TB testing requirements under a MCA, there can be additional costs incurred by farmers. For example, there can be a delay of up to month from the time a decision is made to move an animal and getting a clear result that allows the animal to be moved. Although this can be mitigated to some extent by forward planning of normal farm trading, where this is in response to external factors such as drought there can be additional costs incurred in that month (e.g. buying in feed, loss in condition resulting in lower market price).

A key element of the analysis was an assessment of the options (illustrated in Table 3 below) against a set of core criteria:

- How well does it meet the objectives of TB management in New Zealand?
- What is the ratio of benefits to costs of each option?
- Is the option affordable and are the necessary funding arrangements acceptable?
- Is the option feasible (technically, politically and considering compliance) and what is the likelihood of success?
- What are the resources and/or skills required to implement the option and are they available? Does the option impact resources in any other way?
- Palatability/acceptability.

Table 3 Summary of the comparative advantages of each option

	Strategic Fit	Benefit: Cost	Affordability and funding arrangements	Feasibility	Resources	Palatability/ Acceptability
Option 1 Vector focused	●●●	●●●	●●●	●●●	●●●	●●
Option 2 Alternative	●●●	●●●	●●	●	●●	●●●
Option 3 Status quo	●●	●●	●	●●●	●●●	●●

● *indicates the options meet the criterion more or less equally – the greater the number of bullets the stronger the option meets the criterion*

PROPOSED PLAN OBJECTIVES

Eradicating TB from New Zealand requires the disease to be managed in both the livestock and the wildlife population. The proposed primary objective of the TB Plan is the eradication of bovine TB from New Zealand by 2055 (i.e. from livestock, possums, wild deer and pigs, and ferrets). Key milestones are:

- Freedom from possums by 2040
- Freedom from livestock by 2040

The proposed secondary objective of the TB Plan is to ensure that the national annual TB-infected herd period prevalence does not exceed 0.05% throughout the term of the plan.

The proposed statistical measure of freedom is replaced with '95% confident that infection would have been detected if the prevalence were above a threshold of one infected farmed deer or cattle in one million in New Zealand'.

How the TB Plan objectives will be achieved

Regulatory measures

The principal measures to achieve the new TB Plan objectives are proposed to remain the same as for the current TB Plan (clause 5A), that is:

a. Detection of TB infection through testing herds and vectors.
b. Slaughter of TB-infected livestock.
c. Vector management in VRAs and buffer zones.
d. Livestock movement controls.

No additional measures are proposed to be included in the TB Plan Order.

Non-regulatory measures

TBfree NZ (OSPRI) and industry bodies would also continue their information sharing and advocacy activities to encourage farming practice that positively contributes to achieving the TB Plan's objectives.

However, we now have more and better information and data; deeper knowledge; improved analytics and better decision-making tools – all of which contribute to the cost-effectiveness of operations to eradicate and manage TB so that better outcomes are achieved for the investment. This has enabled a number of significant changes in the proposed operational approach used to implement the current plan:

- Evolution of risk-based disease testing, from large coarse risk zones to a carefully designed methodology to accurately determine which herds need disease testing and how often.
- Evolution of risk-based vector control, moving from broadly defined areas zoned for treatment to a more tailored approach. This results from improved understanding of specific control measures required to prove freedom.
- Development of targeted slaughter surveillance based on potential disease risk over the next three to five years to supplement the MPI meat inspection programme.
- Updating the long-term strategic planning approach to include more specific time-bound metrics relating to clearing highly infected possum populations as soon as practically possible.

These changes will help to ensure the benefits to farmers from the TB Plan are realised sooner. The proposed approach to disease management in livestock and in wildlife is described below. Full details and policies for the implementation of these measures will be documented in an update to the TBfree National Operational Plan, to be prepared as required by Section 100B of the Biosecurity Act.

Disease management in livestock

The TB disease control measures in livestock are based on:

- Application of approved diagnostic tests to cattle and deer for disease surveillance and for the identification of infection within herds.
- Eradication of infection within herds, through mandatory slaughter of animals suspected of infection.
- Surveillance for disease in herds via routine post-mortem inspection at slaughter (i.e. at regular slaughter for food production).
- Controls of cattle or deer movements from areas or herds with higher risk of infection.
- Depopulation.

It is proposed to modify the current approach of applying these control measures to more closely and accurately target the infection and management of the disease at herd level. This may involve:

- TB testing being applied to herds only where TB risk factors determine necessity (methodology explained below) – this will be phased in with any savings invested in vector control.
- Increased frequency of TB testing for herds that receive animals originating from previously infected herds.
- Reduction in overall number of TB tests undertaken nationally.
- Requirement of high level of accuracy in NAIT movement data.
- Change to format of herd TB risk status (currently: I,S & C1-C10) to reflect key risk factors.

As the programme moves closer to clearing infection in possums across a significant geographic area of the country, TBfree may elect to depopulate management groups or entire herds where the risk of residual infection is considered to warrant this. The intent of depopulation is to minimise the risk of reinfection of vector populations and/or transmission to other herds.

Criteria used to determine whether this approach is appropriate will be set out in the National Operational Plan. These will likely include the number of TB cases within the groups, history of infection, risk of animal movements, local area risk and stage of the programme (e.g. VRA status).

This programme may also place long-term restrictions on a premise or herd to manage the risk of persistent infection, and transmission from herds that are not depopulated.

It is expected that applying these measures, alongside minimising infection from wildlife, will allow infected herd rates to continue to fall to zero by 2040.

A new approach to livestock testing

National surveillance for TB is achieved through both on-farm testing and slaughterhouse inspection. Ensuring adequate detection from both components is important to minimise any delays in detection.

The structure of the current routine testing programme in farmed cattle and deer herds is primarily based on the risk to domestic herds from wildlife TB infection (i.e. in the VRAs). Areas with the greatest wildlife infection within these, e.g. the Movement Control Areas, are subject to the most intensive TB testing regimes (i.e. greater testing frequency, more age-groups tested, and pre-movement testing).

Testing requirements are progressively reduced (lesser frequency, higher age-groups) the further the herd is away from the VRAs, i.e. from the special testing areas (annual and biennial testing) through to the surveillance areas. While surveillance areas have no TB vector risk, the current TB Plan rules still require breeding herds in these areas to test at a minimum frequency of five yearly.

This TB testing regime has been effective through the various strategies/plans up to this point. However, with the current low level of infection, this testing approach is now considered to be more intensive than necessary. For example, TB testing in surveillance areas consumes over 30% of the cattle TB testing resource, yet there is no TB vector risk present in these areas. Maintaining this degree of herd TB testing has not prevented movement-related TB breakdowns from occurring in

surveillance areas, however detection is still required for movement-related breakdowns to find infection in a timely manner to prevent both within and between herd spread of infection.

Extra effort has been put into known infected herds, both whilst infected and post-clearance to reduce the risk of recrudescence (undetected in-herd infection) and spread via trading.

Work is underway in three areas:

(i) To assist with understanding the effectiveness of the current surveillance system and what impact any changes would deliver in disease risk and cost, a Scenario Tree Model statistical tool has been developed.

(ii) To help direct on-farm TB testing in dairy herds, there is a trial of the Enferplex Bulk Tank Milk (BTM) test being undertaken in 2024/25 to see if it works under New Zealand conditions as a screening tool. If effective, BTM results could be used to support ongoing reductions of routine whole herd tests for low-risk dairy herds.

(iii) Linking NAIT and OOMS data to allow for targeted testing, where herds are assessed for risk annually and ranked for TB test allocation.

What will be the outcome of the new TB testing approach?

It is expected that the new approach will optimise TB testing in a way that will reduce testing in low-risk herds and focus testing resource on herds most likely to have TB or that present the highest risk of spreading it. This means that some herds may receive regular testing, while others may be monitored only through slaughter surveillance.

The new approach is currently being piloted, and it is anticipated that this may result in up to half the number of tests being completed in surveillance areas in 2025/26. It is too early to forecast the longer-term amount of surveillance testing. Any reduction in testing that results from targeted testing will allow for additional funds to be used for vector control.

As we continue to decrease on-farm testing, we will increasingly rely on slaughter surveillance to detect TB. Some initial research and analysis have shown that there is value in identifying animals that are at higher risk for TB at slaughter, to help inspectors know when a lesion needs to be submitted for testing.

More work will be done over the next few years to find ways to operationalise targeted testing for slaughter surveillance, which may include requiring a granuloma submission programme. If there were a case for a granular submission programme, OSPRI would work with processors, industry bodies, and regulatory agencies to ensure the impact on processor operations and market access obligations were minimised.

Changes to the TB Herd Classification

The shift to targeted testing has implications for the TB herd status system.

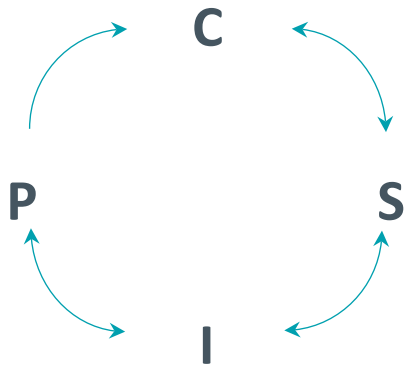
The primary purpose of the herd status system is to convey the TB disease risk of a herd. Another important aspect of status has been to signal to farmers the risk associated with the disease history of the herd. It is also relevant for trade with potential consequences for eligibility of products such as meat, live animal, and germplasm exports based on trade conditions negotiated by MPI.

Problems with the current TB Herd status system

The success of the TB programme means there is significantly less TB in New Zealand cattle and deer herds and there are now relatively discrete areas where the disease persists in livestock and possums. With the changes to targeted TB testing process, many herds in low-risk areas will no longer be routinely tested and as a result will cease to increase their status index over time (i.e. won't progress through C1-C10 status) even though the herd is considered to be clear of TB. This can be confusing and misleading for farmers.

Simplified TB herd status system

As a result, it is proposed to introduce a simpler herd status system as set out below in Figure 12:



Where:

C: Clear

S: Suspended (pending further testing)

I: infected – Case managed herds

P: Provisionally clear (1 - ~3 years (equivalence to C1)) – Case managed herds

Figure 12 Proposed herd status system

This system is more straightforward and easier for farmers to understand what their current status is and what herds are under investigation or case management.

Farmers are still encouraged to take an interest in the areas that livestock are coming from as there are areas that are still classified as Vector Risk and neither the old nor the new C-status system provide any information about this.

Disease management in wildlife

Overall, the general direction of vector control under the updated TB Plan will focus on:

- known sources of TB infection and areas where the disease is maintained by inadequately controlled possum populations
- areas with the highest likelihood and extent of TB infection in wildlife
- areas requiring the greatest time to achieve local eradication.

There would be no vector control activity in areas where there is considered to be no TB in wildlife present, but TB testing and works surveillance would continue as required by the targeted testing policy for disease management and surveillance.

What does it mean on the ground?

In practice, a number of factors need to be considered and weighed up to make the best possible decisions for vector control choices. In addition to updating the boundaries of VRAs to reflect current knowledge, OSPRI is likely to consider the following key factors in operationalising the TB Plan:

Vector considerations

- Estimated population of TB-infected wildlife (particularly possums).
- Likelihood of wildlife-to-herd infection given local circumstances and geography.
- Likelihood of infection spread to wildlife in other areas (and impact in those areas).

Herd considerations

- Recency and extent of wildlife-related herd infection (a predictor of re/new infection).
- Number of herds at risk in proximity of control area.
- Risk to herds elsewhere given the area's animal movement profile (supported by NAIT movement data as a predictor of future movement-related risk).

Investment considerations

- Urgency of starting to complete eradication by the TB Plan's end date, given a cycle of control over time is typically needed to achieve eradication.

- The role and interplay of testing, recognising that risk-based testing and vector control are complementary tools in working toward eradication.
- Expected cost to complete eradication, taking into account all control options and requirements for work through until eradication.

TBfree NZ (OSPRI) would also have greater flexibility in how it applies the high-intensity control tools (i.e. potentially reduce their application) as informed by monitoring and assessment of possum population density.

The appropriate use of these tools is expected to materially reduce vector control costs and lead to earlier declaration of TB freedom in VRA (with associated reductions in costs to farmers).

Planning for success

OSPRI will need to develop and implement a long-term strategy for vector control to achieve the objective of TB freedom in possums by 2040 within the funding parameters. This will involve identifying the critical milestones, targets and measures that set out a realistic and practical pathway on which it can develop and deliver more specific multi-year vector control plans.

The strategy and multi-year operational planning process will enable OSPRI to take an active and adaptive approach to delivering its vector control programme, and so ensure it remains on track to deliver the expected vector and livestock freedom objectives. This needs to include OSPRI's approach to delivering vector control where there is restricted/limited access to areas with highly infected possible populations within the timeframes and funding available.

The long-term strategy, milestones, targets, and measures will also provide the basis for the TB Plan funders to track progress and hold OSPRI to account through regular annual reporting and review process, including a formal review of progress and funding by funders in 2029/30. These processes will ensure funders understand and engage with OSPRI on any material variations from planned programme targets and objectives in a timely way.

BENEFITS AND COSTS OF THE PROPOSAL

The benefit cost analysis (BCA) of the proposed plan was made against a baseline of 'No Control' counterfactual where the only interventions are pasteurisation and works surveillance (i.e. requirements under food safety legislation). There would be no organised testing or vector control. This is consistent with Treasury guidance[4] which describes the counterfactual required for regulatory proposals as the…

> "*situation that would exist if the decision is not made, if the policy does not go ahead. It is sometimes described as the "do nothing" or as the "do minimum" scenario. It is important to characterise the counterfactual accurately and to use it consistently, as the benefits and costs of the policy alternatives are measured against the counterfactual*".

Under the 'No Control' baseline the number of infected herds would start to increase after 13 years (see figure 11).

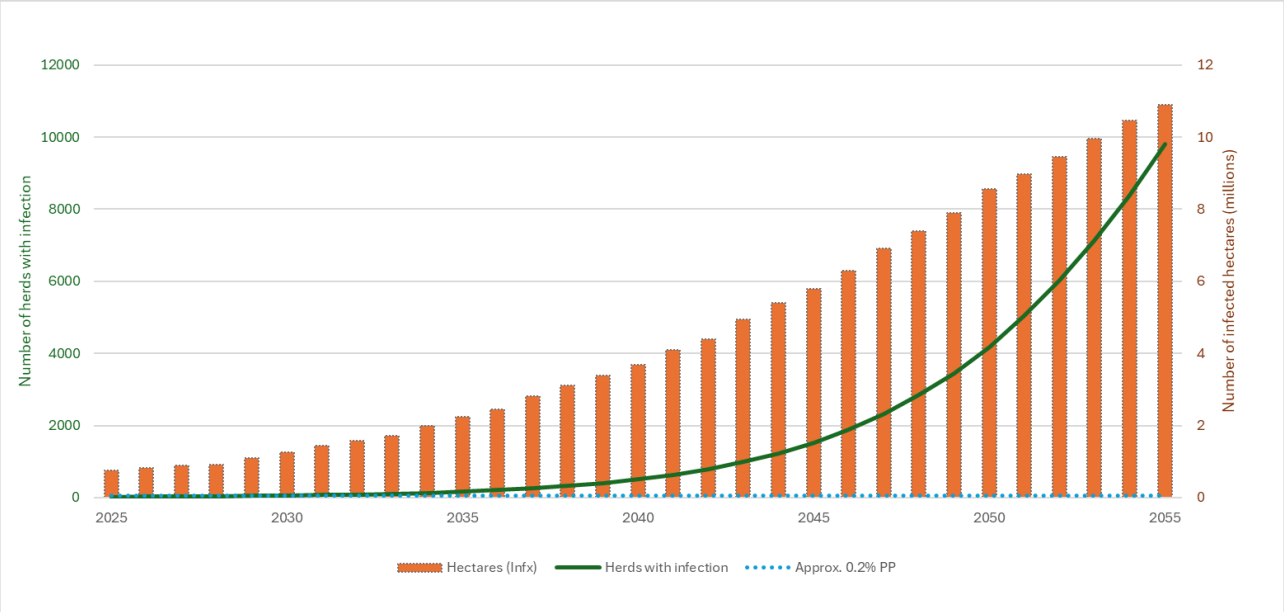


Figure 13 Number of infected herds and infected hectares by year for "Do Nothing" Option

The increase in number of infected herds rises more quickly in dairy animals than it does in beef and deer. This is a result of the significant amount of inter-herd movement that occurs in this sector. The beef industry also sees a material, but less dramatic, rate of increase in number of infected herds, which is largely result of movement of livestock between dairy and beef sectors.

Vector-related infections in all sectors steadily rises as the number and dispersal of possum infected with TB increases.

Methodology

Although it is accepted that such a 'no control' scenario would never be allowed to occur, with industry acting to manage TB long before the disease gets out of control, using a 'no control' baseline does allow the full benefits and costs of each of the options to be calculated and attributed to beneficiaries. This analysis requires an understanding of the:

a. impact and costs of
   i. vector control on the spread of TB,
   ii. disease management interventions on the spread of TB in livestock
b. the inter-relationship between vector infection and livestock infection.

[4] "Guide to Social Cost Benefit Analysis" (March 2015) https://www.treasury.govt.nz/sites/default/files/2015-07/cba-guide-jul15.pdf

Modelling eradication of TB in vectors

The Vector Operations Cost Model (VCOM) is a spreadsheet model developed by OSPRI to simulate delivery of the vector eradication programme under different scenarios (i.e. the options). It was used to provide empirical projections for vector control and related costs were developed based on the predicted cost per hectare (ha) of achieving TB freedom for each of the vector control zones (the current management areas) in VRAs, based on the current probability of TB freedom for each area.

Details on how the model works is provided in the accompanying Options Analysis document at www.tbplanreview.co.nz.

Manaaki Whenua Landcare Research (MWLR) was commissioned to independently review the VOCM. They found that it adequately captures the high-level behaviour of the Proof of Freedom process when applied to multiple VCZs. They advised they considered it fit-for-purpose in comparing differing financial and strategic scenarios of vector control. The MWLR review can be found at www.tbplanreview.co.nz.

Modelling impact of disease management interventions (Scenario Tree Model)

A statistical model was developed by MWLR using NAIT and TB data to simulate TB infection spread, using livestock herd locations and movements in New Zealand (Scenario Tree Model). The model was designed to assess different surveillance strategies, such as changing the frequency of testing in certain areas or introducing new diagnostic tests. The STM compares the number of TB animals present after a certain number of years between different surveillance strategies, and how many of those animals might be detected by the Programme.

Outcome of the BCA

Eighteen benefits of the proposed TB Plan have been identified. Three cost-offsets were also identified; these recognise the costs some parties incur to participate in the TB Plan, such as presenting stock for disease testing.

Taking these benefits and costs into account, the present value of the benefits arising from the proposed option is estimated at $2.288 billion over 30 years. The present value of costs of the TB Plan over this period is $0.259 billion. This gives a Benefit Cost ratio of 9.58:1.

A more detailed discussion of these benefits and cost offsets is provided in the accompanying document (BCA analysis).

Analyses were also carried out for the two alternative plan options.

Table 4 Summary of key BCA outputs for each option

	Vector focused	Alternative	Status Quo
BENEFITS			
- Total benefits (NPV)	$2,485 million	$2,477 million	$2,486 million
- Financial/Economic	$2,288 million	$2,285 million	$2,280 million
- Health/Social	$34 million	$34 million	$34 million
- Environment	$163 million	$158 million	$173 million
- Indirect costs	-$17 million	-$21 million	-$26 million
COSTS			
- Direct Costs	$721 million	$870 million	$1,004 million
- Direct Costs (NPV)	$259 million	$297 million	$323 million
BC RATIO*	9.58:1	8.35:1	7.69:1

* Benefit (NPV)/Cost (NPV)

Anticipated benefits

The main benefits of the managing bovine TB compared to a baseline of no control, where the number of infected herds would quickly rise, are:

- financial/economic – including protection of the industries from lost livestock production and value and reduced operational costs from having infected herds
- human health and social – protection of human health and improved social, financial and economic options for rural landowners
- enhanced environmental and ecosystem health.

Financial/Economic

TB infection in cattle and deer herds incurs significant cost and impacts on farm management and profitability, mainly through reduced sale values and reduced opportunities for moving stock for grazing or herd relocation. There are a number of financial and economic benefits from eradication which include:

- Production saved as a result of lower numbers of infected cows and hinds on farms meaning higher fecundity and productivity.
- Carcass value loss saved as a result of declining number of animals condemned for TB at slaughter.
- Reduced impact of possum grazing on pasture and other feed (while vector control is being undertaken in an area and for a number of years after being declared vector free).
- Increased ability to select and retain superior genetic animals from not having to cull TB-infected animals as part annual cull (especially relates to dairy and velvet herds).
- The value of the real options available to landowners through the ability to change land use in the future will increase as the level of TB among herds declines.
- Impact on forestry production output and costs saved by commercial forest operations as a result of possum control for TB control in commercial forest areas in VRAs.

Current food safety standards and requirements in New Zealand are not dependent on the TB Plan and are sufficient to meet international regulatory export standards (e.g. meat inspection and pasteurisation). This means it is highly unlikely that overseas countries would impose a regulatory trade barrier on New Zealand beef, dairy or deer due to bovine TB. However, it is possible that overseas consumer demand would fall in some markets if disease levels in livestock increased to an unacceptable level (i.e. if there was to be a very high, and rising, incidence of herd TB relative to other exporting countries).

Human health /social

Herd TB infection can be a very costly and stressful event for farmers. Low herd infection rates under an effective TB control therefore generates valuable mental health benefits for farmers and their families, and this has been factored into the cost benefit analysis. These include:

- Human mental health benefits. The prevalence of bovine TB impacts on the number of farmers, members of farming families, close associates and others in the community who suffer serious stress due to financial uncertainty, strains and the social stigma attached to the disease.
- Human physical health gains. These are relatively minor as even if TB is poorly controlled, pasteurisation of milk and existing high food safety standards for meat products would ensure minimal public exposure to the disease. There could, however, be greater exposure risk for farmers and hunters from handling infected livestock, possums or game animals. If TB infection rates increased among farmed animals then there would also be greater potential for TB to be contracted through drinking raw milk.
- Reduced resources required to deal with managing or resolving disputes and litigation as a result of from the spread of bovine TB and infected vectors.

Environmental benefits

Reducing possum numbers also produces significant wider environmental benefits by reducing the impact of uncontrolled possum browsing on native flora and fauna as well as plantation and catchment protection forests, with a flow-on effect of

protecting endangered species and environmental wilderness and also enhancing people's (and native animals' habitat) experience of the natural environment. These include:

- A benefit in terms of improved flora and fauna eco-systems and greater biodiversity while an area is actively under vector control. Over time, this benefit attenuates and eventually disappears after TB-related pest control has ceased.
- The extent and location of damage from run-off and erosion as a result of damage to erosion control planting by possums in VRAs which are under active control.

Anticipated costs

The estimated cost of the plan is $721 million over 30 years.

The costs for the proposed TB Plan are split into two categories:

- Direct costs.
- Indirect costs – the costs to farmers of having a TB Plan imposed.

Cost estimates are based on projections of current costs and include the impact of expected reductions to both TB prevalence and VRA size as well as efficiency savings. Ultimately, however, these would be constrained by available funding.

Direct costs

The direct costs of the TB Plan consist of:

Vector control – the direct costs of the possum control programme.

Testing – these costs include testing of cattle, laboratory costs and include wild animal surveillance and management costs.

Disease management – staff and administration costs associated with the database for allocation of testing, compensation for reactors and depopulation of non-reactors and infected herds (where necessary).

Operational costs TBfree NZ's (OSPRI) costs of delivering the vector control and testing programmes (e.g. planning, veterinarians and epidemiologists, contract management, etc).

Research – these costs are incurred in researching and developing practical solutions to controlling and eradicating TB to continue to improve the TB Plan's cost-effectiveness and timely delivery. PGG considers that it is important that investment in research continues at similar levels as currently ($2 million per year) while significant infection exists in livestock and possums, but also with a focus on developing and taking up new and more cost-efficient surveillance tools for post clearance.

Corporate support – these costs include communication, costs associated with levy collection, administration, OSPRI committees, OSPRI corporate costs, TB Plan review and funding expenses. Initially approximately $6 million per year, these costs are expected to decline gradually in proportion to the reduction in disease management costs.

Indirect costs

The indirect costs are those that arise for farmers from the TB Plan being imposed, such as:

- on-farm mustering costs
- herd management
- carcass value losses – test reactors slaughtered.

These indirect costs amount to $17 million (NPV) over the next 30 years, which have been incorporated in the cost benefit analysis.

Benefits achieved from the investment made to date

Over $1.9 billion has been invested by farmers, landowners, local and central government since 1998 (~$2.8 billion in 2025 dollars) which has delivered a number of benefits as the number of infected herds has reduced from a peak of 1,694 in 1994 to 15 in June 2025, including:

- productivity/production benefits
- human health benefits – both physical and mental
- improved trade access due to disease control (relevance has declined over time over time as the disease came under control especially after 2010-17 when moved from 4% to <%0.2 PP)
- development of disease management infrastructure and systems (e.g., surveillance, testing, traceability)
- improved biodiversity outcomes in vector control areas.

There has also been a significant reduction in the area of TB-infected possum populations from over 10 million hectares in 1994 to six million hectares – a key source of infection for livestock – and a lower impost on farmers over time as the area under movement controls and testing requirements has reduced.

Benefits since the change to an eradication objective in 2016

The investment of $570 million over the last nine years since 2016 has delivered $93 million in realised benefits and $938 million in enabled benefits.

Realised benefits are benefits that have been achieved in the past as a result of historical investment into TB management since FY16/17 until present. They are calculated based on the actual inputs provided for this time period. Both direct benefits and avoided costs benefits can have a realised benefit portion. The key realised benefits over the last nine years are:

Biodiversity	$63 million
Farmer and community wellbeing	$12 million
Reduced impact of possum grazing	$16 million

The value of the realised benefits was partly offset by $45 million of the following associated realised indirect costs of the programme in this period:

On-farm mustering	$14 million
Herd management	$25.5 million
Carcass value losses – test reactors slaughtered	$5.5 million

The realised benefits from the investment since 2016 up to now will be eroded over time in the absence of continued management of TB at current levels.

Enabled benefits are avoided cost benefits enabled by historical TB management actions to date that will be realised in the future. Enabled benefits require continuous investment into the programme; if investment stops or falls short of the target, an enabled benefit may not be realised, may be smaller than expected, or may be realised later than expected. The key enabled benefits over the last nine years are:

Production saved	$345 million
Real option value	$268 million
Carcass value loss saved	$227 million

Proposed allocation and funding of costs

The cost of the TB Plan has increased from the $1.12 billion forecast in 2015 over its lifetime, with an additional $120.8 million now required over the 25 years starting from the 2031/32 financial year.

The increase in funding required is driven by the need to fund vector control activities at a maximum level for three more years than forecast in 2015 (i.e. now out to 2033/34), with additional lower levels of funding required for vector control after that out to 2040. There is, however, no impact on the timeframes for delivering disease freedom from possums by 2040 or eradication from New Zealand by 2055.

The TBfree programme will not achieve the 2040 livestock and possum freedom milestones, and so ultimately the 2055 eradication objective, if additional funding is not secured.

The key drivers for the difference in funding needed is that the 2015 forecast did not account for inflationary pressures and assumptions made of significant financial efficiencies as a result of introducing risk-based testing of livestock which did not occur. The 2015 forecast cost adjusted for annual inflation rate of 2.5% is $1.41 billion (i.e. $290 million more). Given the $60 million annual cap, it would also have required an additional five years of funding of vector control activities at a maximum level (i.e. to 2036/37). The possum freedom milestone would also likely have been pushed out from 2040.

The Crown, Beef+Lamb NZ, DairyNZ, and DINZ remain committed to the current principles for funding the Plan:

- Current 40:60 Crown: industry share of funding of the TB Plan
- Cap of $60 million/year
- Current intra-industry funding arrangements.

The current funding commitments meet the TB programme requirements for the next five years, after which the level of funding available from the Crown declines in line with the appropriation made in 2016 (i.e. the Crown appropriation was made in the context of the forecast funding profile to deliver the programme which forecast a reduction in programme costs in 2031). This results in a corresponding reduction in industry funding of the TB Plan to maintain the 40:60 Crown: Industry split.

However, given the current fiscal operating environment, the Crown is not in a position to commit additional funding for the TB Plan at this time. This has a consequential reduction in the contribution of the industry funders to maintain the 40:60 cost share (see Figure 13).

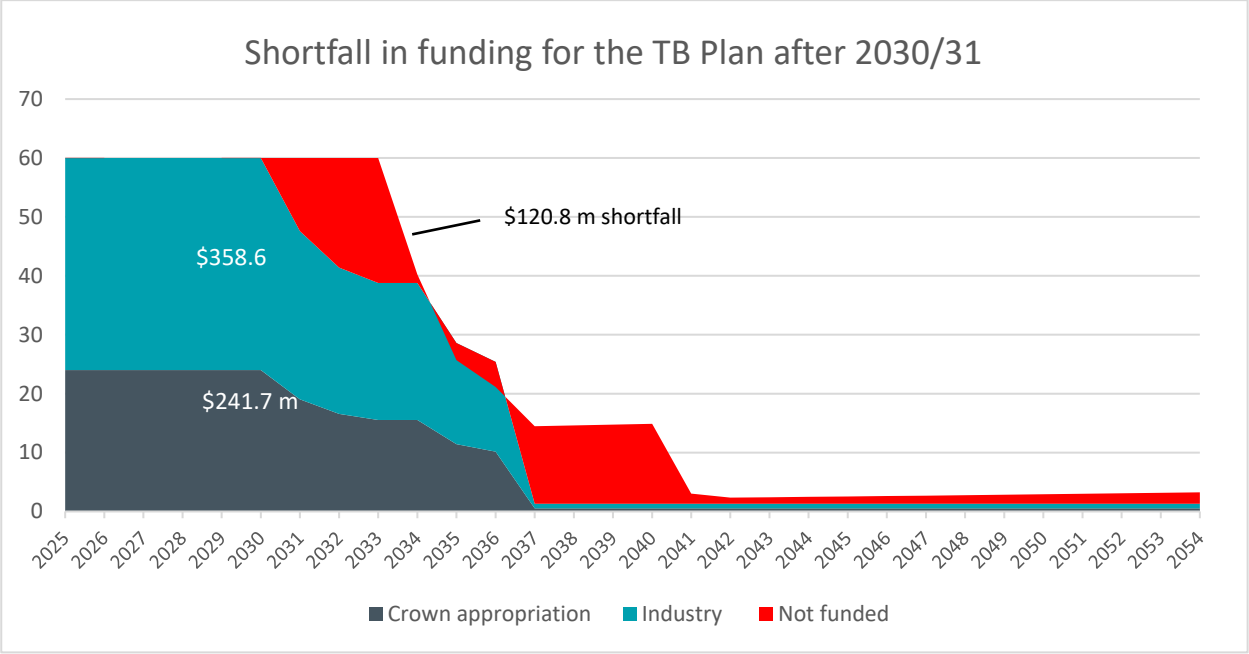


Figure 14 TB Plan funding shortfall if 40:60 cost share maintained to reflect the current Crown appropriation

Five-year review

The PGG is proposing to include in the TB Plan an intention for funding to be reviewed in five years to confirm what further investment is needed to achieve eradication by 2055.

In the interim, the funders will work together to develop an enduring funding arrangement that reflects the tight fiscal and economic environment. This will involve considering any cost efficiencies through the impact of pivoting to the vector targeted approach and technological advances (noting that with the exception of potential use of Bulk Tank Milk testing there are no significant technical advances on the horizon).

Industry contributions

The 60% industry funding share of the TB Plan comes from the dairy, beef and deer farming industries. This comes through:

- the DairyNZ milk solid levy
- levies on all cattle slaughtered – both dairy and beef
- levies on Deer Industry NZ (DINZ) meat and velvet
- levies on live export of cattle and deer.

How much each industry contributes towards that 60% can change from year to year, depending on their relative size and value. Levy amounts are adjusted every year to match each industry's contribution. Currently revenue from the live export of cattle and deer is negligible as a result of the ban on the export of live animals by sea.

The current industry contributions and levy rates as of 2024 are:

	Annual amount	Share		Levy
		Overall	Intra-industry	
Industry total	$36 million*			
Beef	$8.5 million**	14%	24%	$4.50/head
Dairy	$11.1million** $14.5 million**	43%	73%	$12.25/head 0.8 cents/kg milk solids
Deer	$0.9 million**	2%	3%	3c/kg venison 28c/kg velvet
Live export	-	-	-	$11.50/head

* Forecast, ** Actuals – noting actual slaughter numbers, venison and velvet production vary annually

The Biosecurity (Bovine Tuberculosis – Cattle and Deer Levy) Order 2016 sets out:

- how industry contributions work
- the process for setting levies.

No changes to the industry funding arrangements are proposed. However, the proposed five-year review will need to consider the TB Plan Cattle and Deer Slaughter Levy rates. This is required as the number of dairy animals slaughtered each year is gradually declining and, as a result, the levy for dairy animals may exceed the $15/head maximum set in the Cattle and Deer Slaughter Levy Order within the next five years.

WIDER EFFECTS OF IMPLEMENTING THE NPMP

TB Plan effects on Māori

As a group, Māori make up a significant proportion of rural landowners and, in general, Māori agribusiness benefits from the control of TB to the extent that all farming does. However, it is recognised that some of the benefits for individual farms and Māori farmers collectively may vary from farming in general because of variations in the mix of farm operations and locations.

The effects of the proposed TB Plan on the relationship of Māori and their culture and traditions with their ancestral lands, waters, sites, waahi tapu and taonga manifest through local and regional vector control programmes, particularly where these programmes are carried out on Crown or Māori-owned land.

Māori concerns and interests include:

- the impact of vector control methods on non-target species (particularly species valued for food (mahinga kai) or medicinal purposes (rongoa)), water quality or human health and safety
- the possible disturbance of waahi tapu or other sites of spiritual or cultural significance during the course of vector control work
- restrictions on hunting, maintaining access to rongoa, etc
- the secondary benefits of possum control, which may enhance the well-being of forests, native wildlife and taonga species
- whether and how the concept of 'mauri' is accounted for in programme planning and implementation
- access by tangata whenua to valued items associated with vector control (e.g., feathers and bones from any birds affected by toxins).

Māori concerns and interests will continue to be addressed at a local level in relation to individual operations. TBfree NZ (OSPRI) has developed protocols for consultation with tangata whenua at a local level to ensure any adverse effects of vector control operations on the relationship between Māori and their ancestral lands, waters, sites, waahi tapu and taonga are avoided or minimised and to determine how best to account for the concept of mauri in programme planning and implementation.

These protocols reflect the then Environmental Risk Management Authority[5]'s (ERMA) August 2007 decision and recommendations on the Reassessment of 1080, which made a number of recommendations for improved engagement with Māori in planning and decision-making around pest control. Research work undertaken by TBfree NZ (OSPRI) has involved, and would continue to involve, collaboration with Māori researchers and tangata whenua.

Recreational access

There is an impact on tourism operators/recreational users of land through localised restriction of access to land after vector control activities. OSPRI consults with key stakeholders including local tourism operators, DOC, local councils, etc to identify measures to mitigate impact, for example adjusting timing of the operation to enable seasonal access and limiting operations in some areas of the wider operation.

Control technologies

As outlined below, the TB vector control programme does have a range of environmental effects. Even though the management of pest animals is not an explicit objective of the proposed plan, the programme reduces pest populations of possums on a wide scale, in both farm and forest environments. It may also reduce populations of ferrets, wild deer and wild pigs in selected locations.

5 ERMA, now Environment Protection Agency.

TBfree NZ's (OSPRI) investment in research and development builds tools, knowledge and understanding about the role of pests in the New Zealand environment. Partnerships in research have benefited New Zealand's wider science and conservation sector in their biodiversity protection activities.

Effects of possum control technologies on the environment

One of the major tools for possum control is the use of 1080 poison (sodium fluoroacetate). Aerial baiting is the best option for controlling possum populations over large areas of rugged terrain where ground methods become physically and logistically difficult to deploy. This means that aerial 1080 is the preferred tool for approximately 20% of the remaining 6.1 million hectares of vector control areas. Ground-based methods, using 1080 and other toxins or traps, will be used on the remaining 80% of vector control area.

Assessments of environmental and economic effects of 1080

1080 use has generated public concerns about possible adverse environmental effects from its use, particularly in large-scale aerial operations. A considerable body of research and review has been completed over several decades to address those concerns.

Extensive research and monitoring shows that 1080 is a safe, effective, and a very efficient tool for controlling possums. This research is thoroughly documented in the scientific literature and also reflected in the findings of the ERMA decision.

ERMA's reassessment found that the economic and environmental benefits of using 1080 for possum control outweighed any adverse effects. ERMA made a number of rulings and recommendations for improvements in operational standards, mandatory public reporting of operational information, research and better processes for communications and consultation on 1080 operations. These rulings and recommendations have been implemented by TBfree in its operational planning and consultation, delivery, and reporting on vector control operations.

The use of 1080 has also been reviewed by the Parliamentary Commissioner for Environment (PCE). The Commissioner's report (2011) notably emphasised significant benefits from aerial 1080 baiting for indigenous biodiversity, through providing simultaneous multi-species predator control (of possums, rats and stoats). Greater use of 1080 in aerial application, and reduced regulatory constraint on this use, were recommended.

DOC has identified significant conservation benefits from TB Plan possum control operations.

Continued use of 1080 within TB Plan

Toxin use in New Zealand is carefully regulated. The safeguards for the use of 1080 and other toxins in possum control, mostly under the Hazardous Substances and New Organisms Act 1993, will continue to be applied. These include requirements to obtain approval for most 1080 operations from the local Medical Officer of Health, Environmental Protection Agency or DOC. Other safeguards may also be applied through consent processes under the Resource Management Act. TBfree NZ (OSPRI) would continue to ensure there is:

- strict application of standard operating procedures to all operations to ensure full regulatory compliance, effective consultation with affected parties and communities of interest, and minimisation of any adverse effects
- continued focus on technical improvements in aerial 1080 use, such as bait design, application methods, and ongoing monitoring of environmental effects
- cooperation with DOC and other parties to maximise biodiversity benefits from TB control operations
- carefully planned and managed communications to the public, stakeholders and communities of interest about the need for and benefits of targeted 1080 application for TB control and biodiversity management.

Ongoing research into wildlife control

The proposed eradication plan is reliant on the use of aerial 1080 as an essential component of a suite of wildlife control tools. There is also ongoing research being undertaken into alternative technologies that may become useful in the future. However, at this point there are no alternative possum control tools for large remote, backcountry areas that are better than aerial 1080, or are close to product registration.

Allowing for innovation and the outcomes of research will mean that there remains the potential for the introduction of any new proven technologies in both the toxin and application area into the future.

These research activities will be undertaken in cooperation with other agencies in order to maximise any research efficiencies and enhance the potential for improved understanding of methods of wildlife control from both a TB management and biodiversity perspective.

Effects of wild deer control on the environment

Under certain circumstances, wild deer populations may be targeted for control where they may be acting as TB disseminators, and populations may be lethally sampled for TB surveillance purposes. Deer are unlikely to be targeted on a large scale.

Current deer control technology includes helicopter or ground shooting. Adverse environmental impacts are expected to be negligible, and certainly less than any adverse impacts arising from possum control operations. Standard 1080 poisoning operations for possums cause some mortality of deer.

In situations where wild deer are highly valued for hunting, and where deer are not considered to be important in the epidemiology of bovine TB, consideration may be given to the use of deer repellent in 1080 baiting operations, adjusting timing to enable seasonal access, and limiting operations in some areas of the wider operation. Over the past five years, OSPRI has invested around $3.5 million in deer repellent to mitigate hunter impacts and enable continued access to approximately 250,000 hectares of both public and private land for aerial 1080 control.

Reducing deer populations in some areas may also deliver benefits to the wider wild deer population (i.e. reducing over population and poor welfare) and reduce the growing impact of wild deer grazing on pasture.

Effects of wild pig control on the environment

Wild pigs can be useful indicators of the presence of TB in possums because of their scavenging habit. They may be targeted on a limited scale, through shooting, with minimal environmental effect. However, as with the control of any pest animal, there may be some consequential environmental benefits.

Effects of ferret control on the environment

In some VRAs, ferret populations are also infected with TB and ferret control is required on a significant scale in these areas to prevent infection of cattle and deer herds. However, scientific and observational evidence indicates that in most parts of New Zealand ferrets are not a maintenance host and therefore do not require the same level of control as possums over wide areas.

Because they are scavengers, ferrets are useful indicators of TB infection in possums at prevalence levels lower than can be found by other methods. For this reason, ferrets are likely to be targeted in surveys designed to look for evidence of TB in wildlife, either for the purpose of optimal targeting of possum control, or to assist in determining proof of freedom of TB in wildlife.

Ferret control involves targeted baiting or trapping strategies, which in themselves are likely to have little environmental effect, but the ecological impact of reducing ferret numbers is another matter. Ferret populations may interact with populations of stoats, feral cats, rats and prey species in a complex and unpredictable fashion.

Managing the impact of aerial 1080 on wildlife

There is extensive evidence of the benefit for native species of the use of aerial 1080 to control introduced predators, including possums[6]. Long-term studies have recorded demonstrable benefits for native species populations that have been extensively monitored for several decades, such as kiwi, whio, kōkako, rock wren, long- and short-tailed bats, threatened plants, and the health of the forest canopy. However, there are a few native species at greater risk from aerial 1080 and that need to be carefully managed, such as kea.

OSPRI mitigates the impact of its aerial 1080 operations by using the most up-to-date knowledge. An example of this is the development and implementation of the *Aerial 1080 in Kea Habitat Code of Practice*.

[6] https://www.doc.govt.nz/our-work/national-predator-control-programme/monitoring-results-for-native-species/

The Aerial 1080 in Kea Habitat Code of Practice ensures that agencies conducting aerial 1080 operations optimise the use of aerially applied 1080 to benefit kea through predator control, while minimising negative impacts on kea populations.

The Code of Practice (COP) outlines compulsory performance standards. These standards require appropriate kea mitigation measures to reduce risks to kea during aerial 1080 operations and sometimes mandate monitoring activities such as kea survivorship and predator abundance monitoring.

OSPRI partnered with DOC, Te Rūnanga O Ngāi Tahu, Zero Invasive Predators (ZIP), and the Kea Conservation Trust (KCT) to undertake joint research projects to help increase the understanding of the impacts of aerial 1080 operations on kea and refine and develop new techniques that would allow for aerial 1080 operations to occur while limiting the impacts on kea. So far, this research has tested bird-repellent additives to 1080 baits, the "scrounge" effect of kea learning to scavenge or be fed by humans, new predator control tools using meat rather than cereal baits, and the optimum timing for aerial 1080 operations to benefit kea nesting success. This collective research effort has led to changes in the DOC Kea Code of Practice, which was most recently updated in 2024.

OSPRI continues to work closely with DOC technical staff for each operation inside kea habitat. To date, all operations have met the criteria of the COP, allowing them to be successfully delivered.

Effects on human health

Bovine TB can cause TB in humans, most commonly affecting the lungs (pulmonary TB) causing chronic coughing, spitting of blood, fever, night sweats and weight loss. In some cases, infection may spread to other organs, including the central nervous system, lymph nodes, bones and joints. Individuals may be infected without showing signs of disease, but the infection lies dormant and may be activated in later years when the immune system is weakened.

Transmission of TB to humans in New Zealand was most commonly through the consumption of TB infected raw milk, but also occurred on physical contact with infected animals, for example meat workers and possum hunters would develop skin lesions after processing or skinning infected animals.

The reported incidence of human infections dropped markedly with the introduction of milk pasteurisation and effective TB control programmes in the 1950s and 60s. The organism is destroyed by heat and therefore there is no risk from pasteurised milk. The risk of contracting bovine TB from meat is extremely small, particularly as the organism is killed on cooking.

Incidences of human bovine TB remained at around 8.8 infections per year in the early 1990s. The number of cases has since fallen following introduction of the current TB Programme. Currently, the incidence of human bovine TB infection is around 0.5 infections per year (i.e. one every two years).

In the absence of a TB Plan, it can be expected that there would be a gradual increase in incidents of infection in farmers and meat workers as they increasingly come into contact with clinically infected animals on the farm and at the meat processors. There would also be an increase in infection in possum hunters as the infection levels increased in possum population.

PROPOSED USE OF POWERS TO SUPPORT IMPLEMENTATION

It is proposed that clause 8 of the TB Plan, which specifies the Biosecurity Act powers available to implement the TB Plan remain unchanged, namely:

- The powers conferred on an authorised person:
  - section 106 – Power to require assistance
  - section 109 – Power of inspection
  - section 111 – Entry in respect of offences
  - section 113 – Power to record information
  - section 114 – General powers
  - section 118 – Power to seize evidence
  - section 119 – Power to seize abandoned goods
  - section 121 – Power to examine organisms
  - section 121A – Power to apply article or substance to place
  - section 122 – Power to give directions
  - section 123 – Power to vaccinate, etc
  - section 130 – Declaration of restricted place
- The powers conferred on a management agency:
  - section 128 – Power to act on default
  - section 131 – Declaration of controlled area

PROPOSED CHANGES TO THE TB PLAN

The PGG proposes to amend the TB Plan objectives as follows (discussed in detail above):

Clause	Proposed change	Rationale
Clause 5 Objectives of plan	Amend 'biological eradication' to 'eradication'. Remove 2026 cattle and deer freedom milestone. Amend 2040 possum freedom milestone to '*Freedom from tuberculosis in cattle, deer and possums by 2040*'. Replace 0.0001% statistical measure of freedom with *'95% confident that infection would have been detected if the prevalence was above a threshold of one infected farmed deer or cattle in one million animals in New Zealand*". Update secondary objective to 'Ensuring the annual infected herd prevalence stays at or below *0.05%* throughout the term of the plan'.	Provide greater clarity of actual outcome when read in conjunction with the proposed new measure. TB freedom in cattle and deer as defined by the statistical measure is not possible until infection of possums is cleared. The introduction of the statistical 0.0001% measure is not possible without extensive (and highly expensive) ongoing surveillance sampling well beyond the 2040 freedom milestones. The combination of targeted surveillance of livestock and wildlife, responsive control in the unlikely event of isolated outbreaks, and providing time (15 years) for low-level infection in spillover hosts to naturally die out is sufficient to give confidence of freedom. Sharpens the performance measure for TBfree (i.e. a reduction in annual infected period prevalence from 0.2% - the WOAH freedom threshold which has been met since 2015).
New Clause - Review of the TB Plan and funding model within next five years	The TB Plan funders will review the TB Plan, or relevant parts of, no later than five years after 1 July 2026. The review will include assessment of: • progress towards achieving NPMP milestones and metrics set in the National Operational Plan • funding requirements. The review may result in recommendations to the Minister on changes to and/or funding of the Plan.	To enable resolution of funding shortfall and to ensure TB programme on track, in particular to clear disease in the most highly infected populations in the Central North Island and Central Otago.

There are also a small number of technical changes to the TB Plan proposed as set out below:

Clause	Proposed change	Rationale
Clause 5A Principal measures	Add response to incursions wherever they might occur	The current reference restricts activities to tuberculosis vector risk areas and buffers associated with these areas. TBfree should have explicit ability in the plan to control and survey VRAs where areas are considered to be free of possum populations with TB for the purposes of proving absence.

Clause	Proposed change	Rationale
12 D Retention of declarations	Amend to 12 months to align with ASD requirements.	Remove ambiguity and inconsistency between Biosecurity Act and Animal Products Act requirements.
15 laboratories to provide results	Add requirement to include sufficient information to identify the origin of the sample. Proposed wording: (1) If a tissue specimen is sent to a laboratory in accordance with clause 14, 14A, or 14B, the laboratory must provide TBfree New Zealand with the results of the investigation, **the origin of the animal from which the sample was collected, the person responsible for the animal (capture of or management of)** and the name of the person who collected the sample**.**	Currently all that is required by the plan is the name of the person who collected the sample. TBfree needs to be able to link a sample to a herd/ owner wild animals submitter and origin location of animal.
17A Release of pigs	Remove 17A (2) as unclear and unnecessary. This is covered under the Wild Animal Control Act 1977,	Implies wild pigs could be released on to land administered under other Acts. Difficult to enforce. Keep 17A (3) allowing OSPRI to release pigs for research purposes.

The remaining provisions and rules in the TB Plan are considered still to be necessary and fit for purpose to support the achievement of the TB Plan's proposed new eradication objective.

COMPLIANCE

TBfree NZ (OSPRI) and authorised persons from other agencies work with farmers to achieve voluntary compliance with the TB Plan rules. Where non-compliance occurs, the current TB Plan only allows for prosecution, where a breach of TB Plan rules is proven, with a maximum penalty of $5000 for an individual and $15,000 for a corporation. As it is resource intensive to collect evidence that proves non-compliance and to prosecute for offending against TB Plan rules, prosecution for relatively minor non-compliance is not in the public interest. This means that minor offending is often left unaddressed, and some farmers face no consequence for non-compliance with TB Plan rules.

Infringement offence schemes are suitable for addressing comparatively minor breaches of the law, which warrant more than a warning but less that the full sanctions of the criminal law, and do not require the prosecution to prove intent.

INFRINGEMENTS UNDER THE BIOSECURITY ACT

The Biosecurity Act includes an infringements scheme, whereby offences provided in the Act may be specified as infringement offences in regulations. The maximum infringement fee that may be set is $1000, with the fees going to the issuer of the infringement notice.

The relevant offence in the Biosecurity Act is s 154N(18) which states that it is an offence not to comply with the rules in a National Pest Management Plan, where those rules specify that a contravention of the rule creates an offence against the Act. Each of the rules in the TB Plan (clauses 10-17A) already specify that failure to comply with the rule is an offence against this section of the Act.

Infringements for non-compliance are issued only when there is clear evidence that a farmer had information, support and assistance to allow for an informed and correct decision to be made but chose a path of non-compliance. A “notice to

remedy" would be issued to the farmer when the problem is identified, and the infringement would be issued only if corrective action had not been taken. Infringements do not result in a criminal conviction.

COMPENSATION FOR LOSSES

It is proposed that there is no change to the current compensation arrangements set out in TB NPMP and the National Operational Plan. In summary:

1. Compensation will be payable to the owners of cattle or deer which are directed to slaughter by TBfree, under the following circumstances:
    i. The animal has tested positive to an approved test or tests for bovine tuberculosis and TBfree has issued a direction to slaughter.
    ii. Movement to slaughter is the only permitted or practicable option for an animal following the imposition of restrictions on the movement.
    iii. Movement to slaughter is the only permitted or practicable option for an animal as a direct result of the implementation of this plan.
2. TBfree will make necessary arrangements for transport and slaughter of animals eligible for compensation and shall meet the cost of these arrangements unless alternative arrangements have been agreed with the owner.
3. Compensation and any associated transport and slaughter costs will not be payable when:
    i. The owner wishes to slaughter cattle or deer which have been positive to an approved TB test, but still to be re-tested.
    ii. The owner chooses to slaughter and retain the animal for home consumption.
    iii. The owner has not complied with any legal directive or other legal obligation under the TB Plan/NPMP.
4. When compensation is payable, it will be at the rate of 100% of Fair Market Value irrespective of any diagnosis of TB.
5. Fair Market Value is determined under processes agreed between TBfree and DairyNZ, Deer Industry New Zealand and Beef+Lamb NZ as set in the TB Plan.

PROPOSED MANAGEMENT AGENCY

It is proposed that TBfree New Zealand Limited, a fully owned subsidiary of OSPRI New Zealand Limited, would continue to be the management agency responsible for implementing the proposed national TB Plan. Organisations representing the TB Plan funders – Beef+Lamb NZ, DairyNZ, Deer Industry NZ, and Ministry for Primary Industries – continue to support TBfree NZ (OSPRI) in this role as they have the necessary competence and expertise in their employees and contractors to deliver on the TB Plan.

All groups that are directly affected by the proposed TB Plan, and/or contribute funding to it, are stakeholders. Stakeholders' interests would be represented through the company Directors, shareholdings, membership of the OSPRI Stakeholders' Council or by the Government.

Accountabilities

TBfree NZ (OSPRI) would be accountable to the responsible Minister for the management of the TB Plan and to the Ministry of Primary Industries for the prudent expenditure of Crown funds.

The directors of TBfree NZ (OSPRI) are also accountable to the company shareholders and, through them, to farming and other stakeholders for the conduct of the TB Plan and the prudent use of the funds they contribute.

Implementation of the TB Plan

In the course of implementing the current TB Plan, TBfree NZ (OSPRI) has developed effective capacity and systems for disease and vector control planning, databases and information systems, contract management, research management, financial planning and management of contributors' funds, communications and stakeholder relations. TBfree NZ's (OSPRI) skills, knowledge and capability to deliver a national Plan are maintained at a very high level.

The major tasks for the management agency would include but not be restricted to:

- preparation and implementation of a National Operational Plan (as required by section 100B of the Act)
- managing contracts for delivery of necessary services and monitoring the performance of contractors
- maintaining a system for regulatory management and enforcement of the TB Plan rules and accompanying regulations under the Act in collaboration with MPI
- providing farmer support, continuing education and communications
- maintaining and managing systems and databases to support operational delivery and performance monitoring and reporting
- providing information and reports to the Minister, the OSPRI Board of Directors, shareholders, funders, strategic partners, other interested parties and the public
- ensuring that there are sufficient numbers of suitably trained people for appointment under the Act as authorised or accredited persons by the relevant Chief Technical Officer
- ongoing review of policies and procedures consistent with the evolution of TB disease and its control (noting that operational disease and vector control work in the field is implemented mainly by external service providers under contestable, performance-based contracts)
- ensuring compliance with relevant health, safety and environmental standards and regulations.

PROPOSED MONITORING AND MEASUREMENT OF PROGRESS

The successful implementation of the NPMP will be assessed against achievement of plan objectives within the following cascading hierarchy:

- The statutory objectives and associated milestones contained in NPMP.
- The National Operational Plan objectives and targets set out in the National Operational Plan.
- TB Management Area (TMA) objectives and targets within each Area Disease Management Plan (set annually).

OBJECTIVES	MEASURES	TARGETS
TB Plan Objectives	Presence of disease in wildlife	Absence of disease in wildlife by 2055
	Presence of disease in livestock	Absence of disease in livestock by 2055
TB Plan Intermediate Objectives (Milestones)	Presence of disease in possums	TB freedom in possums by 2040
	Presence of disease in livestock	TB freedom in livestock by 2040
National Operational Plan Objectives	Presence of disease in possums/region/time	Annual targets for VRA hectare reduction met nationally
	Presence of disease in livestock/region/time	Annual targets for infected herd reduction met nationally
TMA Objectives	Presence of disease in possums/TMA/time	Annual targets for VRA hectare reduction by VCZ met
	Presence of disease in livestock/TMA/time	Annual targets for VRA infected herd reduction by VCZ met

A formal process for review and reporting on the achievement of objectives, milestones and targets has been developed for each level within the planning hierarchy. This includes quarterly Board reporting. Progress towards the achievement of the secondary objective of the NPMP, i.e. to contain the disease in livestock to a national herd prevalence of less than 0.05% until such a time as the disease is fully eradicated, is tracked nationally and reported in the annual National Operational Plan review and the OSPRI Annual Report.

Further Key Performance Indicators, e.g. herd TB breakdown/clearance rates, numbers of reactor animals and their status at post-mortem, and pest management activity measurements, are reported on as required under governance and funding agreements between TBfree New Zealand and its funders/stakeholders and within the OSPRI Annual Report. This ensures that stakeholders and the wider public are informed on progress relative to milestones and targets.

The TB Programme governance and funding agreements will also be updated to include more specific metrics to allow the OSPRI Board and TB Plan funders to more closely track progress on delivery of the modelled objectives and milestones. This will be closely tied to, and inform, multi-year and annual operational planning. This should allow OSPRI leadership to understand, respond to, and report on any material variations from planned programme targets and objectives in a timely way. It will also provide the basis of the planned review by the TB Plan's funders of progress and funding arrangements in 2029/30.

OTHER STATUTORY CONSIDERATIONS

Unusual administrative problems or costs

No unusual administrative problems or costs are expected in recovering the costs allocated to any of the persons whom the plan would require to pay the costs.

Coordination with other plans

It is not envisaged that other pest management plans for TB will be proposed. However, TBfree NZ (OSPRI) would continue to consider opportunities to coordinate implementation of the proposed national TB Plan with regional pest management plans – particularly plans related to TB vector species.

At a national level, coordination would be achieved through working with government agencies (MPI, DOC, Ministry for the Environment) and non-government organisations (e.g. Predator Free NZ Trust). At a regional level opportunities would include:

- operational and management synergies with possum or other pest management plans carried out by regional councils
- effective transitions to regionally led programmes in areas where TB is considered to have been eradicated from wildlife; and possum control or other wildlife control is no longer a TB control requirement.

TBfree NZ (OSPRI) would also continue to work cooperatively with the Department of Conservation around pest control operations carried out under other legislation (e.g., the Wild Animal Control Act 1977 and Conservation Act 1987).

Proposed local authority actions and contributions

No direct contribution to the TB Plan's funding is required from local authorities. TBfree NZ (OSPRI) will, however, work proactively with local authorities to coordinate vector control activities with local pest management programmes to maximise the value and efficiencies for both parties.

This would include potentially providing support for vector control operations other than priority eradication operations where additional contributions of funding or resources are made by other parties. Such support would usually be conditional upon evidence that the operations are epidemiologically and ecologically sound and are mutually beneficial – or at least would not detract from TBfree NZ's (OSPRI) priority operations.

TBfree NZ (OSPRI) would also work closely with local authorities to ensure the appropriate consents are obtained and observed.

Proposed disposal of receipts

Subject to the provisions of the Biosecurity Act, any receipts arising in the course of implementing the plan would be fed back into the programme funds.

Application to the Exclusive Economic Zone

The proposed TB Plan would not apply to the Exclusive Economic Zone as defined by the *Territorial Sea, Contiguous Zone, and Exclusive Economic Zone Act 1977*.

Application to roads

Ground and aerial vector control activities may on occasion affect roads and land adjoining to roads. Where this occurs, landowner and local authority permissions are obtained, along with any required consents and approvals as required under the Resource Management Act and the Hazardous Substances and New Organisms Act 1993.

National Policy Direction

The PGG considers the information set out in the Consultation materials including this technical document, the supporting information listed below, alongside the analysis of feedback from the consultation, will ensure the Proposal to the Minister will meet the requirements of the National Policy Direction for Pest Management 2015.

SUPPORTING INFORMATION AVAILABLE TO SUBMITTERS

Benefit Cost Analysis

Options Analysis

Assessment of whether the technical approach to eradication is still valid (MWLR)

Investigation into any potential changes in science underpinning case for eradication (MWLR)

Review of implementation of the plan since 1 July 2016 and forecast delivery to 2026 (MWLR)

Review Vector Operations Cost Model (MWLR)

Review of epidemiological assumptions and parameters for options modelling (Graham Mackereth)

Review of the 2026 programme milestone (Spade Solutions)

Scan of emerging technologies (Day One Futures)

This information is available on www.tbplanreview.co.nz or on request from the TB Plan Secretariat.

APPENDIX A: DESCRIPTION OF NO CONTROL

1. The no control option (which us also used as the counterfactual for the BCA) assumes no intervention of any form including

    - No vector control.
    - No testing.
    - No management of the disease on farm.
    - No follow-up of infection detected at slaughter.

2. Under a no control scenario the model forecasts that infected herds may reach 0.2% period prevalence (~170 infected herds) by 2033. This is an internationally recognised threshold for livestock freedom. Remaining below the 0.2% period prevalence was an objective adopted at the last TB Plan review.

3. No control also results in a slow but steady increase in the hectares of land with infected possums. By 2055, it is anticipated over 10,000,000 hectares will contain TB-infected possums (up from an estimated 1,000,000 ha in 2025). DOC and other possum control activities by Regional Councils and community groups for biodiversity purpose may slightly slow the spread of disease in some areas to a limited extent.

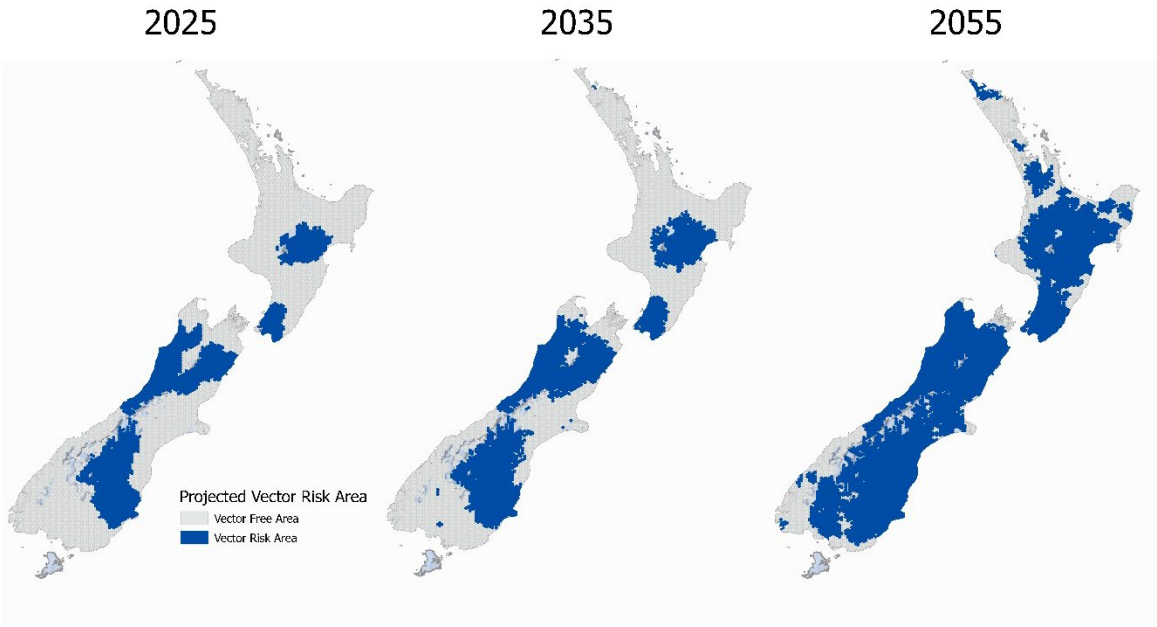


Figure 1 Increase in vector risk area (ie presence of infected possums) if no vector control from 2025

4. Infected herd numbers continue to grow at an increasing rate as a result of infection from livestock movement and the increasing spread of infected vectors to reach the 1990's peak of 1,000 infected herds by 2040.

5. In reality, if there was no organised programme to manage the disease a number of ad hoc responses would likely happen, e.g. farmer and/or processor led management of the disease in livestock, Industry Good body initiatives, Regional Councils which have significant livestock farming undertaking vector control, etc. Previous experiences in 2009 and 2014 to model such an ad hoc scenario has proved very challenging. However, the BCA does include avoided cost benefits of some of these that arise from management of the disease in the containment and eradication options.

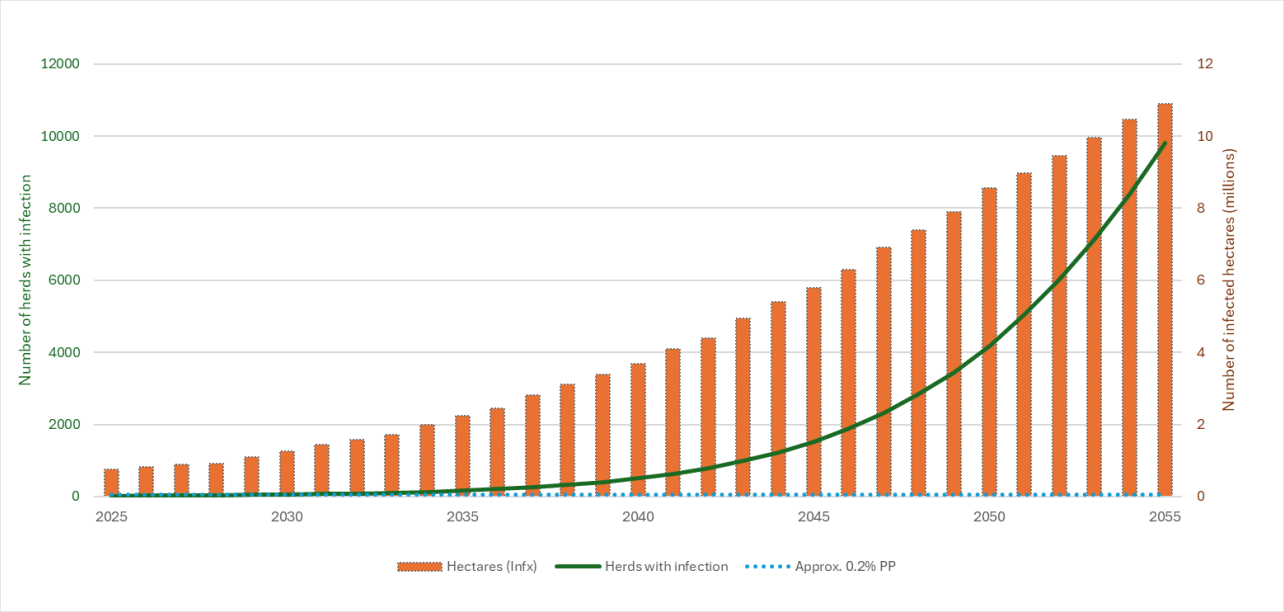


Figure 2 Number of infected herds and infected hectares by year for "Do Nothing" Option

APPENDIX B OVERVIEW OF OPTIONS

	Vector Focus	Alternative	Status Quo
OBJECTIVE	Eradication of Bovine TB from livestock and wildlife in New Zealand. *Mycobacterium bovis* is no longer present in New Zealand.		Eradication of Bovine TB from livestock and wildlife in New Zealand. *Mycobacterium bovis* is no longer present in New Zealand.
PRIMARY MEASURE(S)	95% confident that infection would have been detected if the prevalence were above a threshold one infected farmed deer or cattle in one million in New Zealand. Less than 0.05% period prevalence.		Statistical likelihood of bovine tuberculosis being present in the population of the livestock and possums is assessed by TBfree New Zealand as being no greater than 0.0001% throughout the preceding 12-month period. Eradication from wildlife based on no detected infection in the 15 years post eradication from possums
- General	Reduction of areas harbouring infected possums and infected herds – reaches end point for investment sooner and reduction in TB testing over time.		Reduction of areas harbouring infected possums and infected herds – longer tail of herd infection than other eradication options.
- Financial limits	Annual cost of programme does not exceed $60 million/year – this impacts the amount of vector control that can be undertaken each year.		
	$60 million/year followed for nine years, followed by three years at average of $29 million/year, then four years at $14.7 million/year. Post livestock/possum clearance surveillance for 14 years @ $2.8 million/year.	$60 million/year followed for 11 years, followed by four years at average of $33 million/year, then three years at $15 million/year. Post livestock/possum clearance surveillance for 12 years @ $2.8 million/year.	$60 million/year for 14 years from 2025 followed by three years at average of $31 million/year, then three years at $18.7 million/year. Post livestock/possum clearance surveillance for 10 years @ $2.8 million/year.
- Programme coverage	6.1 million ha steadily declining to zero at vector freedom, with ongoing post-clearance surveillance testing across a limited area of the country.		
- Vector control	$33 million/year for next nine years then rapid reduction to no vector control over following three years.	$33 million/year for next 11 years then rapid reduction to no vector control over following four years.	$30 million/year for next 14 years then rapid reduction to no vector control over following four years.

	Vector Focus	Alternative	Status Quo
	Includes provision of $0.67 million per annum for 12 years for additional vector control costs associated with outbreaks (2 outbreak @ $8 million).	Includes provision of $1.33 million per annum for 15 years for additional vector control costs associated with outbreaks (3 outbreak @ $8 million).	Includes provision of $1.66 million per annum for 17 years for additional vector control costs associated with outbreaks (5 outbreak @ $8.5 million).
- TB Testing	Targeted TB testing – a criteria-based targeted testing approach in Surveillance areas instead of the existing routine testing approach. Livestock testing requirements are decoupled from Disease Control area statuses.		TB testing is maximised for early detection and aggressive case management, in alignment with current testing policy in the NOP 2021.
- Surveillance	Surveillance testing in accordance with NOP. Some TB testing may still be required for some time after all infection is eliminated from wildlife, to ensure latent animals are detected and removed.		Surveillance testing in accordance with NOP.
- Years to vector freedom	12	14	18
- Years to herd freedom	13	16	22
- MCA			
BENEFITS			
- Financial/Economic	$2,288m	$2,285m	$2,280m
- Health/Social	$34m	$34m	$34m
- Environment	$163m	$158m	$323m
- Indirect Costs	-$17 million	-$21 million	-$26 million
COSTS			
- Direct Costs	$721m	$870m	$1,005m
- Direct Costs (NPV)	$259m	$297m	$323m
- NPV	$2,485m	$2,477m	$2,486m
BC Ratio	9.58	8.35	7.69

	Vector Focus	Alternative	Status Quo
ASSUMPTIONS			
	Mixed VC tool approach enables access to previously blocked areas.	Mixed VC tool approach enables access to previously blocked areas.	Mixed VC tool approach enables access to previously blocked areas.
	Additional funding available for increased vector control.	Additional funding available for increased vector control.	TB wildlife (possum) source areas can be reasonably treated with sufficient coverage and at an appropriate time.
	TB wildlife (possum) source areas can be reasonably treated with sufficient coverage and at an appropriate time.	TB wildlife (possum) source areas can be reasonably treated with sufficient coverage and at an appropriate time.	
	Resources available to complete work.	Resources available to complete work.	