The *Mycoplasma bovis* Programme

An independent review 2021

Report of the Independent Review into the
Mycoplamsa bovis Programme

By:
Professor Nicola Shadbolt ONZM (Chair)
Professor Caroline Saunders ONZM
Doctor Roger Paskin
Mr Tony Cleland

Working with and supported by:
John Martin and the Secretariat Team
with Gareth Chaplin of Morrison Low

Effective date 23 July 2021

Dated 3 September 2021

ISBN: 978-1-99-101980-6 (online)

This publication is also available on the Ministry for Primary Industries
website at http://www.mpi.govt.nz/news-and-resources/publications/

The *Mycoplasma bovis* Programme

An independent review 2021

Acknowledgement and thanks

The Review Panel would like to acknowledge the dedication and effort of personnel who have been involved in work to eradicate *Mycoplasma bovis* and who, over the past four years, have worked to control the disease while building a system more capable of eradicating it. The public service relies on ordinary people to step into confronting and ill-defined situations and overcome them. The expectation is they will fix problems and deliver certainty while restoring public confidence in the role of government.

Not surprisingly, given the nature of the disease and scope of the effort, many of those people were initially inexperienced or lacked the necessary training. Over time, they have gained skills and experience, leading to the eventual success of the programme. Their experience, and the changes they put in place to improve the effectiveness of the programme, provides a compelling case for increased preparedness.

The *M. bovis* Review also acknowledges the impact the eradication has had on farmers and the farming community. As the eradication programme scrambled to develop the tools and organisation it needed to do the job, many farmers were faced with dealing with a system that was initially not fit for purpose. The effect on farmers, their families and staff was significant. While undergoing the testing and culling of highly prized herds would never be easy, early shortcomings in biosecurity preparedness made this process more challenging and traumatic than should have been the case. The submissions provided by those who endured the early years of the Programme paint a vivid picture and provide a compelling case for improved preparedness.

It also appropriate to acknowledge the New Zealand public who have funded most of the response, in partnership with the livestock industry. Members of the public have a reasonable expectation that when a biosecurity response is required, it will be professionally conducted and meet its objectives. Over the past four years, the *M. bovis* Programme has developed to where this is now the case. If current progress is maintained, New Zealand is on track to become the first country in the world to eradicate *M. bovis*.

The Review Panel appreciates the many people who have taken the time to talk to the Review team, answer questionnaires, write submissions or otherwise share their knowledge. The Panel has endeavoured to be accurate and fair in its observations and reflections.

In analysing the lessons from the *M. bovis* Programme, the many decisions and actions that were taken and are yet to be taken, the Panel admires:

- the ambition to eradicate;
- the commitment of those involved in the programme so far.

Finally, the Panel acknowledges the input and advice of the combined team led by John Martin that supported the Review. They know who they are.

Mycoplasma bovis by the numbers (as at 23/7/2021)

$635.9M

spent to date out of an $856M budget

2,288,668 samples

have been processed

172,422 cattle

have been culled

2,610 compensation claims

have been processed

$208.7M

of compensation has been paid

39 days

on average for a compensation claim to be processed

- Compared to 120 days in 2018

152 staff

from MPI currently working in the programme

241 staff

from MPI were working in the programme at it's peak

- Not including approximately 200 contractors

267 farms

have been Confirmed Properties

80 days

on average spent as a Restricted Property

- Compared to 189 days in 2018

2,342 farms

have been placed under a Notice of Direction

25 days

on average spent under Notice of Direction

- Compared to 125 days in 2018

Contents

Tables

Figures

Executive summary

Purpose of the Review

The 2019 National Plan for *Mycoplasma bovis* (*M. bovis*) sets out three clear goals:

i) to eradicate *M. bovis* from New Zealand;

ii) to reduce the impact of the disease and the eradication programme for everyone affected; and

iii) to leave New Zealand's biosecurity system stronger.

An independent review panel was charged by the *M. bovis* Governance Group with conducting a forward-looking review to inform biosecurity readiness and response to future animal disease incursions. This report has been prepared by the review panel for the *M. bovis* Governance Group

The objectives of the Review are:

i) to identify and retain critical knowledge and capabilities developed during the response;

ii) to consider lessons learnt from the *M. bovis* Programme that will help strengthen our readiness and response to future animal disease and pest incursions, now and in the future;

iii) to support the Governance Group's strategic planning and support efforts to strengthen the biosecurity system (Goal 3 of the National Plan).

The Review scope Terms of Reference are provided in Appendix 1.

Eradication of *M. bovis* is on track

New Zealand is currently on track to eradicate *M. bovis*. This is a remarkable achievement and should be celebrated.

To put the response into perspective, as of mid-2021, the eradication effort has required the depopulation of 267 properties, from a total of over 24,000 commercial cattle farms. Over four years, 172,000 cattle have been culled, while in the same period over 12 million cattle were commercially processed. However, for some affected farmers the losses were irreplaceable and difficult to accept, particularly where culled animals were the result of years of selective breeding. Figure E.1 shows the distribution curve of infected properties using hypothesised infection dates from 2015 to 2021.

The response to *M. bovis* is the largest incursion response ever conducted in New Zealand. The biosecurity system and its people had to respond, in real-time, to a situation of great complexity with a disease that is hard to identify. That we are on track to successful elimination is a credit to all involved.

No response will ever follow a predictable plan, but, in 2017, the readiness and response system was not as well prepared as it was thought to be. The *M. bovis* eradication programme had to evolve and overcome a range of issues with data and tracing problems, untested partnership arrangements and uncertain science. It has achieved all of this through strong leadership and the determination and professionalism of programme staff, industry partners and the livestock farming sector.

The Panel found that the response to *M. bovis* was a significant test of the capacity and capability of the livestock sector and the Ministry for Primary Industries (MPI). Given that *M. bovis* is a relatively slow-moving disease with minimal impacts on trade, the lessons learnt from managing this incursion should be treated as a significant opportunity to strengthen New Zealand's biosecurity preparedness.

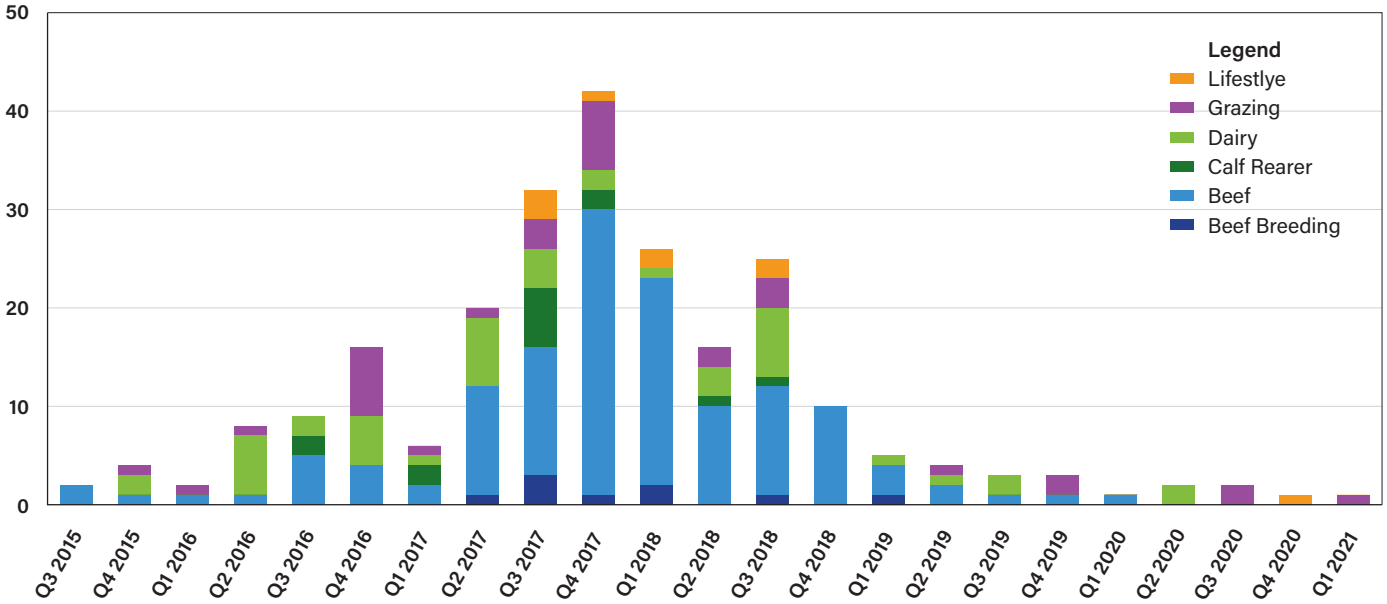


Figure E.1: Epidemic curve of confirmed infected properties by main recorded production type.

Editor's Note: *Epidemiologists are still working to identify the infection date of 38 farms, which are missing from Figure E.1, but it is likely these infection dates will follow a similar distribution curve as the farms shown above.*

All the recommendations and observations should be read in the light of our hard-won success. The Panel is confident that the lessons learnt from *M. bovis*, if acted upon, will enable New Zealand to have a far stronger biosecurity preparedness platform for future animal disease incursions.

A guide to the report

The response to *M. bovis* evolved significantly over time, so the Panel chose to assess the performance of the Programme across three broad stages:

- **Stage 1:** July 2017 to May 2018: Response, covering the initial investigation and delimiting survey;
- **Stage 2:** June 2018 to April 2019: Decision to eradicate and then set up a formal programme;
- **Stage 3:** May 2019 to present: Current governance arrangements were established.

The Panel has addressed the Terms of Reference through the lens of preparedness, using five themes that form the basis of this report:

- governance and leadership;
- structure and processes;
- information systems;
- capability and capacity;
- trust and confidence.

To the best of their ability and in the time available, Panel members are confident their reflections and recommendations are grounded in facts, evidence and experience. Appendix 8, Methodology, sets out the analytical approach in more detail.

Key Reflections

Governance and leadership (see Chapter 1)

Chapter 1 explores the path and evolution of governance during the Programme. The principles of what good governance looks like were developed by the Panel based on its collective experience.

In doing so, Panel members drew on governance guidelines provided by the Office of the Controller and Auditor-General,[1] from the framework set out by the Government Industry Agreement for Biosecurity Readiness and Response (GIA)[2] and guidance published by the New Zealand Institute of Directors.

The Review Panel found it is critical that effective governance arrangements for an animal disease incursion must be in place and well exercised, if the combined resources of the Crown and New Zealand's primary sector are to be effectively marshalled to address future incursions.

Before *M. bovis*, MPI and industry groups had taken considerable steps to address the need for greater shared ownership of overall biosecurity management and had created the GIA arrangement.

However, the question of how complex animal biosecurity incursions would be governed was a "work in progress" and had not been adequately tested. Consequently, the Review Panel found the governance capability in place at the time *M. bovis* was detected was not fit for purpose. The first iterations of *M. bovis* governance were less than effective, because partners had to establish roles and responsibilities and learn to work together to lead the Programme while it was being established.

The Review Panel identified that the *M. bovis* governance process went through three iterations:

i) 2017 to May 2018: Response – response oversight structure led by MPI with no formal basis for industry involvement. Industry groups were involved but did not have sufficiently defined decision rights.
ii) May 2018 to May 2019: Eradication programme – simplified leadership arrangement with MPI, DairyNZ and Beef + Lamb New Zealand representatives chaired by MPI. This was referred to as "governance" but decision-rights and funding arrangements took time to finalise and were not sufficiently bedded in.
iii) May 2019 – to today: "Reset" – a governance group displaying good governance principles and practices was established under an independent chair with industry fully represented.

1 Controller and Auditor-General New Zealand. *The basics.* https://oag.parliament.nz/good-practice/governance/the-basics. Accessed 27 October 2021.
2 The Panel acknowledges that the *M. bovis* industry partners did not formally sign up to the Government Industry Agreement for Biosecurity Readiness and Response (GIA) agreement until late 2018.

The May 2019 "reset", created the conditions to enable governance roles and functions to be exercised appropriately. The implementation of a 10-point plan resulted in new governance arrangements, in line with best-practice recommendations for good governance.

Since 2019, roles and functions have matured, decision-rights and access to information have been clarified and good governance processes achieved. The current arrangements, which include industry as full partners, an independent chair and clear decision-rights over the Programme, are far more functional, and levels of trust and confidence in governance are higher. It is important the hard-won lessons of *M. bovis* are not now lost.

Regarding value for money

Assessments[3] of the value for money and management of the Biosecurity Response Services Agreement have been previously commissioned by MPI. The evidence heard by this review about these matters is largely consistent with MPI's findings.

Structure and processes (See Chapter 2)

Chapter 2 discusses how the *M. bovis* response was organised, led and delivered. The success of responses to animal disease incursions is heavily dependent on the responding agencies, industry partners and livestock farmers being adequately prepared. Experience has led many countries and international standard-setting organisations, such as the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO), to place great emphasis on the importance of preparedness for these events.

Adequate preparation requires all participants to have clear and well-understood roles and responsibilities. Biosecurity responses require access to stress-tested plans, policies and processes necessary to carry out disease control activities. Preparedness also includes making arrangements for the support of those affected by the response and protecting the wellbeing of staff tasked with its implementation. Experience has shown that, in 2017, when *M. bovis* was confirmed, MPI and the livestock industry were unprepared to tackle a large-scale response to a cattle disease outbreak. Too few staff were well trained or experienced and many processes and policies required to manage the response and its impacts on staff and farmers did not exist or were ineffective. Arrangements among industry partners to step up to the challenge presented by *M. bovis* were embryonic and under-resourced.

The *M. bovis* Programme also revealed various issues around training, consistency of decision-making (particularly around movement control and compensation claims) and challenges in managing staff and contractors. These issues created bottle-necks and frustration for all concerned. Sufficient support was not always provided to farmers or staff, particularly early on in the response.

Compensation is an area where perhaps the most marked improvement in operational delivery has occurred, including the implementation of the DairyNZ and Beef + Lamb New Zealand Compensation Assistance Team (DBCAT) to help farmers complete compensation claims.

In many aspects, the *M. bovis* Programme has evolved to being an exemplar of good practice for biosecurity response practices, as defined by the OIE and FAO. It has become this way through a challenging process of trial and adaptation, and it is critical these hard-won lessons are embedded in the biosecurity system for the future.

Information systems (see Chapter 3)

Decision-makers require access to timely and accurate information to effectively manage a biosecurity incursion response. Most of the nations New Zealand compares itself to have comprehensive farm demographic databases, and a system of mandatory electronic tracing covering major at-risk species. The Panel found that the absence of a comprehensive farm database and an effective stock-tracing system were known, long-standing issues. MPI and the wider livestock sector need to work together to develop a comprehensive farm demographic database that will

3 KPMG Review of *M. bovis* Expenditure 2018, and KPMG Review of *M. bovis* Expenditure 2019. Reports commissioned by MPI and the *M. bovis* Programme.

provide up-to-date and accurate farm location, farm and livestock owner and manager information.

It was widely known before 2017 that the National Animal Identification and Tracing (NAIT) system had significant challenges, and levels of compliance in recording stock and stock movements through NAIT were low. Failure to record livestock movements poses a significant challenge to a biosecurity response and needs to be urgently addressed by the livestock sector. The Panel repeatedly heard in interviews that farmers who have previously been affected by *M. bovis* are now more careful to record animal movements and have generally become much more aware of minimising biosecurity risks in their day-to-day farming operations. These individual lessons are hard won and must be taken on by the livestock sector to be better able to withstand future disease incursions.

When *M. bovis* was detected in 2017, MPI did not have a system for managing the data needed to manage a livestock response. An improvised solution (the Animal Response Database) was hastily developed, but relatively few staff were trained in its use. This led to the widespread adoption of spreadsheets as a management tool, with consequent fragmentation of information and lack of an overall picture of response activities. The Panel identified that the Programme was hampered by lack of interoperability between various data systems and organisations.

In 2019, an information management system called Tiaki was developed using an off-the-shelf customer relationship management tool. This greatly helped the management of the *M. bovis* Programme, but the functionality needed for epidemiological analysis (among other requirements) has not yet been developed.

The Review Panel commissioned a deep dive report (see Appendix 4) that revealed, despite significant recent gains (including the Tiaki system and improvements to NAIT functionality), the current levels of interoperability remain below minimum acceptable standards. The Panel established that the inability to share information with farmers and supporting agencies continues to frustrate in the *M. bovis* Programme. The Panel finds that interoperability is hampered by:

a) farm information being collected by several organisations for different purposes in different formats;
b) information being stored on non-compatible databases;
c) farm demographic information being incomplete;
d) differing interpretations of the legislation that governs information sharing.

The Panel established that the *M. bovis* Programme was, and partly still is, hindered by poor industry-wide compliance in the recording of animal movements. This slowed the response and increased the number of affected farmers. The Panel is convinced that the biosecurity system must be strengthened through a planned programme of improving animal tracking compliance, the accurate recording of farm data, the reliability of the information system and the ability to share that data through different information systems.

Capability and Capacity (see Chapter 4)

International organisations, such as the Food and Agriculture Organisation of the United Nations (FAO) and the World Organisation for Animal Health (OIE), provide guidance on biosecurity preparedness capabilities, and this should serve as a guide to New Zealand. The Review looked at experience and best practice models and created the following framework to guide its analysis (Figure E.2).

OIE Minimum Requirements	People, with skills and training in appropriate disciplines
	Laboratory Capacity
	Simulations and Exercises
	Plans
Leadership and Management Competencies	Response Governance
	Response Leadership
	Strategic Communications
	Epidemiologists
	Maintenance and Training

Critical Capabilities	Ethos: Shared Mission, Culture and Values
	Industry and Community relationships
	Information Management/Intelligence
	Farming and Farming Systems Knowledge
	Logistics
	Systems

● Figure E.2: Components of a capable and prepared response system

The livestock biosecurity system needs a core of skilled professionals trained and experienced in biosecurity responses, including specialists in areas such as response leadership, epidemiology, intelligence and diagnostics. The Panel observed that MPI's capability in some of these areas was limited at the start of the *M. bovis* response, and a pipeline does not appear to be in place for training of new specialist staff, to ensure capability is maintained.

Along with a core of full-time specialists, the biosecurity system needs the ability to draw on a reserve of trained and skilled people when a response occurs. People interviewed by the Panel often reported a reliance on untrained staff and seconded staff whose training did not adequately prepare them for the roles they were undertaking.

The Panel found that many of the components of an effective system were in place in July 2017, but some skills were in short supply, not all were drawn on early enough, and arguably some regional resources were not drawn on sufficiently. The Panel was also told it took time and the intervention of senior leaders (from partner and contracted organisations and MPI) for relationships and roles to smooth out and run well.

The Panel is aware that issues between MPI and contracted service suppliers emerged early in the *M. bovis* Programme. As a solution MPI created a panel, with several providers potentially able to be called on to deliver response services. It is acknowledged that clarity of expectations, cost and performance were hard to achieve in contracted relationships.

However, it is also clear that established and well-maintained relationships with partner organisations are critical to support response activities.

It is not clear that creating a panel of arm's-length relationships (as it was explained to the Panel) provides sufficient incentives for partner organisations to build, train and maintain specialist capabilities, especially if uncertainty exists that those services will be funded or called upon. This area may benefit from further thought. The Panel sees a need for this new system to be rigorously tested in realistic animal disease exercise scenarios, to ensure the new approach works.

Industry organisations could play a significant role in providing the ability to "scale up", as could MPI staff in other roles within the organisation. Building a "reserve" of people trained and practised in response roles will require sector-wide support under the leadership of MPI. Significant capabilities also exist in the wider rural sector, such as veterinarians and farm advisers who could be more effectively used in an incursion response if arrangements were made in advance.

Technical knowledge of farming systems is a critical capability for effective delivery of a biosecurity response, and many frontline staff early in the response visibly lacked farming knowledge. Farmers and some industry organisations also felt this knowledge was lacking in more senior levels in MPI, decreasing farmer confidence in the response.

The animal health biosecurity system requires constant testing to remain effective and deliver relevant lessons that lead to improvements. While MPI has a programme of simulations and exercises, the most recent large-scale foot and mouth disease simulation was in 2012, or five years before the *M. bovis* incursion. The Panel considers that large-scale exercises must be conducted more frequently and involve the wider pastoral sector.

The Panel wishes to draw to the attention of the *M. bovis* Governance Group to several earlier reviews and exercises that have resulted in recommendations for improvement. Most recommendations were accepted and several were implemented. However,

it is understood that each implementation has been overtaken by a new response event or operational priorities. Consequently, it is disappointing to note there is insufficient evidence that earlier reviews have resulted in systemic strengthening of New Zealand's livestock biosecurity response capability. The Panel considers that improving and maintaining the biosecurity system should be elevated to a permanent and ongoing priority, and reviewed and reported on regularly.

Trust and Confidence (see Chapter 5)

The Panel commissioned a deep dive expert assessment of the effectiveness of communications and engagement during the Programme (see Appendix 3). This assessment established that strategic communications capability reporting directly to governance was not used. This is a separate communications function that specifically looks at the effect the Programme is having on people, staff and communities. Consequently, strategic communications advice to governance on response engagement was lacking.

The initial lack and importance of a strategic communications plan, aligned with and supporting the national strategy and controlled at the governance level was highlighted. The deep dive assessment established that an increased appreciation exists of the importance of good communications, and an increased focus, driven by governance, on tone and style.

The deep dive assessment found that farmers did not distinguish between formal communication channels and face-to-face communication with response officials. The assessment found that communications tended to be transactional and task driven, with insufficient attention paid to human dimensions and the need to listen to farmers through feedback channels. The Programme also did not effectively engage on social media, leaving a vacuum that others filled with misinformation.

The Panel discovered that participants at different stages of the Programme typically had different experiences. Early participants found engaging with the Programme deeply frustrating, field staff were often inexperienced, decision-making was cumbersome and inflexible, and a cautious interpretation of the Privacy Act prevented information sharing. All these factors created barriers to honest conversations and good levels of trust. Farmers who experienced the Programme later, were still frustrated by aspects of how things worked, but many obstacles had been removed by the end of 2019.

The deep dive communication review (appendix 3) and a farmer survey conducted by the independent review (appendix 2) found that farmers' experiences improved as the Programme matured. Better use of face-to-face and informal channels would have allowed more effective engagement, particularly because farmers saw local response staff as the face of the Programme.

Strategic oversight, visible leadership, and a planned approach to engaging with stakeholders, both within and external to the Programme, would have strengthened relationships between all parties. Clear communications that told the story of "why", with an understanding of everyone's roles and responsibilities, would have ultimately improved trust and confidence in the Programme's outcomes.

The Panel is convinced a strategic, long-term approach to the communication of important messages regarding livestock biosecurity in peacetime must be adopted. Messages about the strategic "why?" of biosecurity, the importance of on-farm preparedness and the need to develop system readiness should be delivered and understood. This approach must include the ability of the industry sector to inform the biosecurity system and for the livestock biosecurity system to inform the livestock sector. The goal should be to develop the necessary levels of social licence and understanding in the animal biosecurity system so that, when an incursion occurs, levels of trust and confidence are high to act as required.

A timeline of key events is provided after Chapter 5.

Recommendations

This report has been prepared for the M. bovis Governance Group, and these recommendations reflect the lessons learnt from the M. bovis Programme. They are aimed at embedding changes that will result in a stronger biosecurity system capable of dealing with animal disease incursions.

While the first recommendation is for the M. bovis Governance Group, the following recommendations are aimed at preparing the livestock sector to deal with future biosecurity incursions. They affect farm operators, livestock industry board rooms, the wider animal farming sector and MPI. Because several of these recommendations encompass findings discussed in multiple chapters, they have not been separated into chapter-specific segments but kept as a holistic overview of the proposed systemic improvements.

The Panel recommends the following:

M. bovis Governance Group

1) Agree on how the M. bovis Governance Group will prioritise, support, communicate and monitor the implementation of these recommendations with other industries and partners.

Improving livestock sector biosecurity governance

2) Develop standing governance of livestock disease preparedness, made up of MPI and industry organisations, with an independent chair, and governance roles that include:
   a) reporting to the Minister for Biosecurity;
   b) understanding and communicating risks to animal health;
   c) overseeing and reporting publicly on a rolling programme of preparedness evaluations, including commissioning full-scale field exercises to be held at least every three years, with smaller-scale exercises and simulations held on an annual basis;
   d) improving livestock disease preparedness.

3) Develop and resource the livestock disease preparedness function within MPI with the leadership, structure, capacity and capability to deal with large-scale, complex animal disease incursions. Design attributes should include:
   a) leveraging off the decision to establish a Chief Veterinary Officer (CVO) role to enable MPI to meet the expectations of the OIE, by strengthening the role of the CVO so it has the authority and powers to deliver technical leadership across the livestock disease readiness and response system;
   b) operational leadership and response management expertise;
   c) a "team mentality", with both full-time and part-time response and diagnostic staff and industry counterparts training and working together to build relationships;
   d) a trained cadre of response professionals who exercise regularly to build in-depth confidence and strength;
   e) a network of people outside of MPI with key skills that can be called on when required (for example vets and farm advisers) and organised regionally to leverage relationships and local knowledge;
   f) named individuals with specific biosecurity response skill sets;
   g) preparedness demonstrated through regular training activities, exercises and other development opportunities;

h) an engagement strategy, including a governance-led communications plan that builds trust and confidence in New Zealand's livestock biosecurity system;
i) hosting of a centre of excellence for livestock disease readiness and response, including the Diagnostic and Surveillance Services Directorate, relevant industries and strategic partners (for example, AsureQuality, veterinarians, OSPRI).

4) Develop a national contingency plan for animal diseases, supported by a full suite of standard operation procedures, manuals and templates for systems, processes, roles and responsibilities and subject these to regular external audit. Elements of the plan should include:
   a) consolidated, comprehensive and publicly available response plans for major high-risk disease events;
   b) documentation of the roles and functions of all parties involved in response management and well understood communication plans developed in peacetime that align to international standards or broader crisis management frameworks;
   c) compensation claim assessment and payment procedures, including a DBCAT-style service in any future large-scale animal health response;
   d) farmer welfare and recovery plans that will provide clear communications and the human support resource needed in an evolving animal disease crisis;
   e) independent science capability to identify priorities aimed at accelerating the eradication of the animal disease and to develop a science plan to guide research and funding decisions;
   f) incentives within MPI, other government agencies and industry organisations to develop and maintain people to a high level of competence. The competencies need to be specific and tested in regular training exercises.

5) Develop and resource a data strategy across the livestock biosecurity system that enables ongoing collection of essential data and allows the interoperability and appropriate sharing of data across core biosecurity systems. This must include:
   a) developing a farm demographic database (or collection of integrated databases), made mandatory through legislation and given appropriate ongoing support. This must include up-to-date farm location information, farm and livestock owner and operator contact information, and animal numbers and location information;
   b) expanding requirements for mandatory, electronic movement recording to include all movements of groups of foot and mouth disease-susceptible species farmed within New Zealand, including sheep, goats and pigs;
   c) developing and maintaining an incursion management system that can be used for livestock biosecurity responses that will integrate with other appropriate databases (for example, NAIT and the Laboratory Information Management System), and that has the required functionality to provide a common operating picture during an incursion response;
   d) engaging with farmers, industry bodies and readiness and response agencies to ensure these systems function effectively and are regularly tested.

Chapter 1

Governance & leadership

Purpose

This chapter describes how the *Mycoplasma bovis* Programme was governed throughout its duration. It provides an assessment against a best practice framework and makes suggestions on how the lessons learnt from the *M. bovis* Programme can be embedded in future preparedness arrangements.

It discusses how governance processes and practices evolved during the response, through the transition to the formation of a formal programme, and finally to the "reset" in 2019, where the current governance arrangements were put in place.

What is good governance?

For this chapter, the Review has based its assessment of what good governance looks like on guidance provided by the Office of the Controller and Auditor-General,[4] and from the framework set out by the Government Industry Agreement for Biosecurity Readiness and Response (GIA).[5] The Review has also been informed by guidance from the New Zealand Institute of Directors.

Governance is the system by which an organisation or project is directed and controlled, and is objectively different from management. It exists to ensure all parties understand and perform their functions during a response, and it provides oversight of system performance. In the biosecurity sphere, governance also includes ensuring that the system is well tested during "peacetime".

Eight elements of good governance (Office of the Auditor-General)

The Office of the Auditor-General (OAG) provides the following guidance:

Every governing body needs to:

- *have a clear purpose and to stay focused on it;*
- *have clear roles and responsibilities that separate governance and management;*
- *lead by setting a constructive tone;*
- *involve the right people;*
- *invest in effective relationships built on trust and respect;*
- *be clear about accountabilities and transparent about performance against them*
- *manage risk effectively; and*
- *ensure that you have good information, systems, and controls.*

How well did the *M. bovis* Programme perform against the Office of the Auditor-General criteria?

The following assessment in Table 1.1 shows how the *M. bovis* Programme governance has tracked against the OAG guidance during the major phases of the response and Programme.

Table 1.1: Governance assessment against Office of the Auditor-General guidance during major phases of the Programme and response

Elements of good governance	2017-18	2018-19	2019-Present
Have a clear purpose and to stay focused on it	Amber	Amber	Green
Have clear roles and responsibilities that separate governance and management	Red	Amber	Green
Lead by setting a constructive tone	Amber	Red	Green
Involve the right people	Red	Red	Green
Invest in effective relationships built on trust and respect	Amber	Amber	Green
Be clear about accountabilities and transparent about performance against them	Red	Amber	Green
Manage risk effectively	Red	Red	Amber
Ensure you have good information, systems and controls	Red	Red	Amber

Key: red is weak performance, amber is acceptable and green is good.

Introduction

On 17 July 2017, *M. bovis* was identified by a veterinarian at a single property in South Canterbury. The veterinarian called in the not-negative diagnosis of an unwanted disease, and the Ministry for Primary Industries (MPI) moved to contain the incident and set up a response.

The initial structure of the response was based on existing processes and procedures. MPI was well versed in managing responses, and was concurrently managing two other significant incursions during 2017.

While MPI had considerable experience in other types of biosecurity response, it had not been required to respond to a significant animal disease for some time. *M. bovis* represented a different sort of disease from those for which biosecurity management plans had been developed. *M. bovis* was challenging to detect, and information about spread mechanisms and organism persistence in the environment was lacking.

4 Controller and Auditor-General New Zealand. *The basics.* https://oag.parliament.nz/good-practice/governance/the-basics. Accessed 27 October 2021.
5 The Review Panel acknowledges that the *M. bovis* industry partners did not formally sign up to the GIA agreement until late 2018.

Epidemiologists and animal health specialists from MPI, and biosecurity staff from AsureQuality (AQ),[6] were called on to discuss next steps. MPI identified that affected industries had an important role, so relevant industry stakeholders were asked to engage. This initial group was referred to as "response governance" but their actual role appears closer to an advisory group with decisions primarily made by MPI.

The initial response was led from within MPI and the approach was highly operational. MPI adopted a command-and-control structure, and all decision-making was routed through the Director Readiness and Response (Figure 1.1). This is consistent with government emergency management processes, outlined in the Co-ordinated Incident Management System (CIMS) mandated for use by all government agencies.

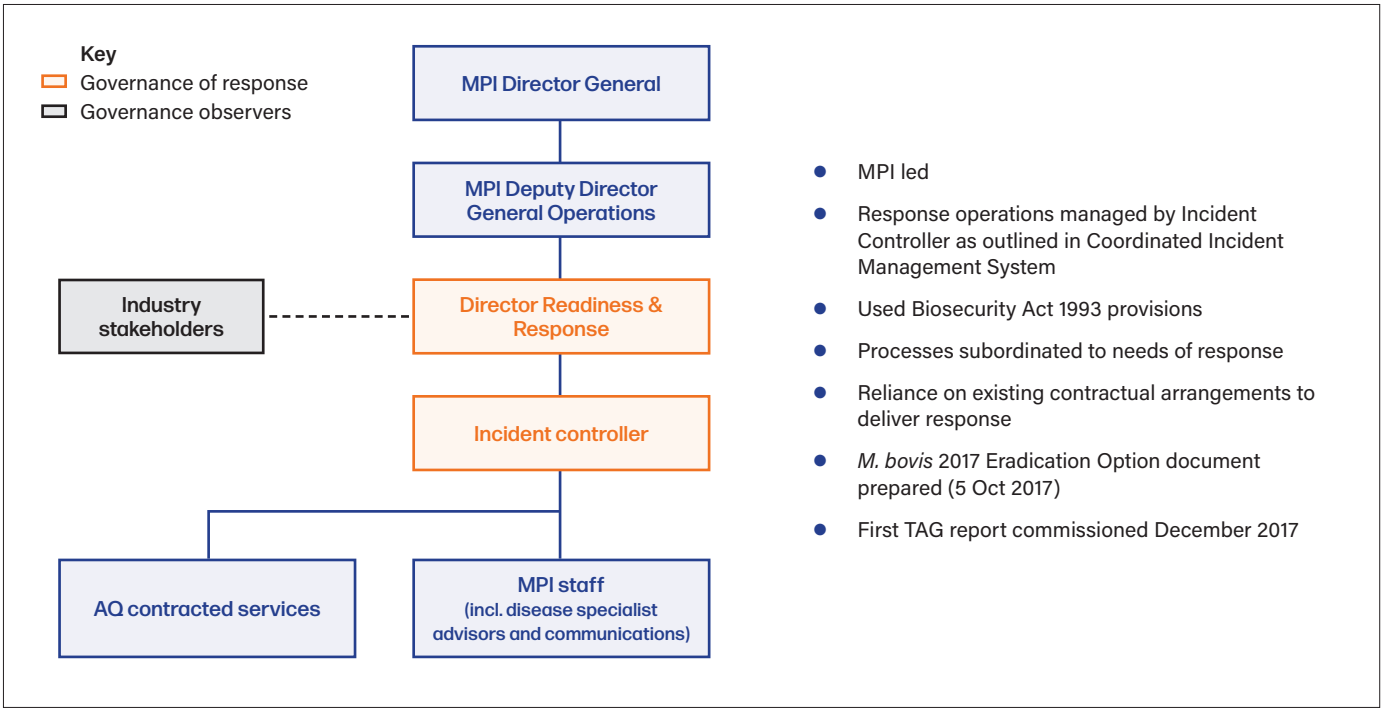


Figure 1.1: Initiation and early stage of *M. bovis* Programme (July 2017 – May 2018)

The response to *M. bovis* was initiated by MPI under the Biosecurity Act 1993. MPI is the regulator and leader of the biosecurity system. It exercised powers under the Act to set up the response, and consulted industry stakeholders as it did so.

MPI recognised early that it was important industry partners were engaged in the response, but no formal basis existed for MPI to do so. While the Biosecurity Act 1993 had a set of co-ordination mechanisms through the GIA, the livestock sector groups had not yet formally become GIA signatories. Roles, functions and relationships for how stakeholder parties would work together with MPI were not agreed and had not been routinely practised.

In the early days of the response, MPI felt a disconnection existed between the support that farmers and industry partners should have been providing to the response and their sometimes-critical stances during this stage. This was often noted by interviewees:

> *"MPI thought they were delivering a programme for farmers, farmers thought it was something being done to them by the government"*

Senior MPI leaders and industry participants interviewed stated that the response grew from nothing, to over 400 staff, within a year of initiation.

6 AsureQuality is a state-owned enterprise contracted by the Ministry for Primary Industries (MPI) to deliver various services in an incursion response.

The response quickly became the largest-ever biosecurity response established in New Zealand.

On reflection, senior MPI staff accepted they had underestimated the complexity of the task and the level of shared commitment to response management. They also identified that significant issues existed with role clarity and relationships between MPI, its contractor AQ, and industry stakeholders:

"We started in crisis mode, had to impose order and structure, but we stayed in that role too long, didn't empower people on the ground, very command and control"

"Role clarity between GIA partners wasn't in place"

Equally, industry partners felt that MPI was a confusing organisation to work with and was difficult to engage with meaningfully:

"The mergers and restructurings of MPI changed the culture, sometimes it was easier for an outsider to make connections between business groups in MPI than for staff."

"Not sure how inclusive MPI was – 'not sure whether they're allowed to tell us' always a constraint."

"MPI Biosecurity was perceived as resistant to opposing views, felt that they were threats or 'disloyal'."

During this period, significant uncertainty existed about the science and spread of *M. bovis* and the best course of action. MPI commissioned a technical advisory group (TAG) to provide an independent source of advice on the science and epidemiology of the response. The TAG met in December 2017 and reported in February–March 2018. The TAG proved useful in providing an ongoing place for expert advice, but the response continued to move faster than the TAG could effectively report.

In December, a new cluster of infection was detected in Southland, and subsequently infected stock were traced throughout Canterbury and to several properties in the North Island. High-level decision-making was hindered by uncertainty as to whether it was feasible or desirable to attempt the eradication of *M. bovis* from New Zealand. Because of the costs involved, this was a decision that would need to be taken by Cabinet, in conjunction with industry groups. Uncertainty as to the desired outcome hampered decision-making until the eventual Cabinet decision to attempt eradication in May 2018.

During this stage of the response, decision-making was highly centralised and heavily focused on addressing operational challenges. With hindsight, MPI underestimated the scope and complexity of managing the *M. bovis* response as it rapidly increased in scale.

As the direction of the response moved towards the decision on eradication, engagement with partners took on two new functions:

- to confirm that industry was committed to supporting that course of action; and
- to agree a binding funding arrangement that would mean industry would contribute to funding.

Establishing a programme (May 2018 to April 2019)

In May 2018, after consultation with industry, Cabinet jointly committed with DairyNZ and Beef + Lamb New Zealand to attempt to eradicate *M. bovis*.

MPI, DairyNZ and Beef + Lamb New Zealand agreed to enter an agreement under the GIA framework, which formalised relationships and funding arrangements, and to sit as the Governance Group for what became the *M. bovis* Programme.

Government was the majority partner and would pay 68 percent of the costs, while industry (represented by DairyNZ and Beef + Lamb New Zealand) agreed to pay

32 percent. The oversight structure that had existed before the decision to eradicate was repurposed and simplified to the Governance Group comprising chief executives from the industry organisations. The group was chaired by MPI's Deputy Director-General (DDG) for Biosecurity. Figure 1.2 outlines the governance structure for the Programme from May 2018.

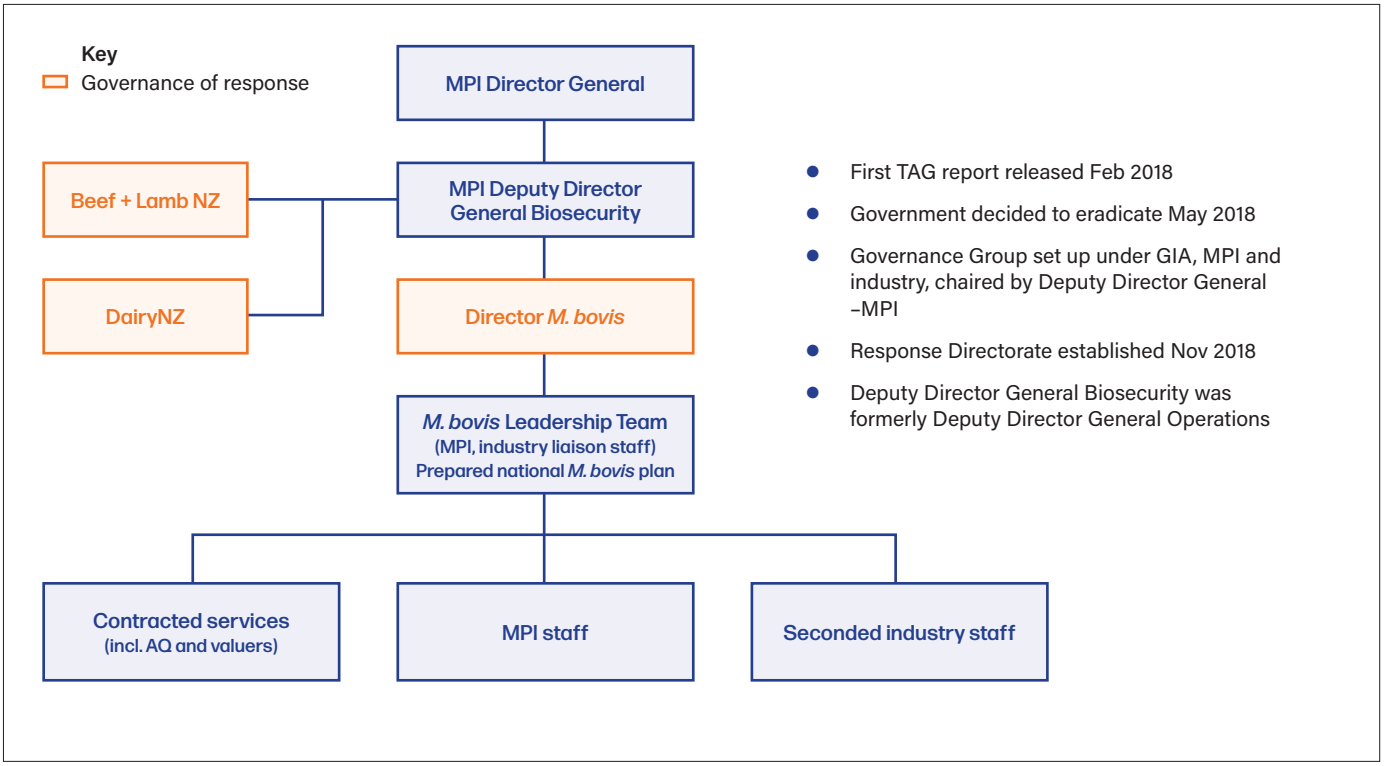


Figure 1.2: Governance of the *M. bovis* Programme from May 2018

With eradication of the disease now the agreed goal, the Programme rapidly gained momentum. At this point, the Programme was described by those in it as "attempting to build a bridge as it is being crossed".

The Programme moved fast, but it became clear it was scaling unevenly, with pressure being placed on key staff and farmers whose properties needed depopulation. The Programme continued to rely on the CIMS-based command-and-control approach. It struggled to scale up, adapt to facts on the ground, and respond to the varying circumstances of individual farmers. These matters are addressed in detail in other chapters.

The Governance Group was itself establishing new and untested relationships, roles and functions, and was learning how to operate as it went along. While members had agreed to participate in an operational agreement (OA) under the GIA framework, discussions had focused on cost-sharing. Matters of role and function were progressively developed in response to operational needs, with the OA being signed in June 2019.

"Transparency took a long time to happen at a governance level."

Feedback from industry respondents was that MPI was reluctant to share decision-making rights with governance. This became an increasing concern, particularly when operational decision-making seemed to be slow, bureaucratic and unresponsive to local needs or conditions.

Feedback from MPI was that governance partners seemed happy to criticise processes and actions but were not as committed to mutually agreed decisions as they had expected. The lack of well-developed and practised response capabilities continued to be felt.

"We made a lot of assumptions about what was in place, but it was never properly tested."

The Strategic Science Advisory Group

An independent stream of strategic scientific advice about research needs of the Programme

A notable achievement during this period was the establishment of the *M. bovis* Strategic Science Advisory Group. This group was convened to:

- identify science priorities aimed at accelerating the eradication of *M. bovis* in New Zealand; and
- develop an *M. bovis* science plan to guide research and funding decisions.

A $30 million budget from the *M. bovis* Programme was set aside to fund a work programme aimed at providing advice to governance, with the work programme to be signed off at governance level.

The *M. bovis* Science Plan was approved in principle by governance on 24 December 2018.

By Christmas 2018, the Governance Group was becoming concerned that facts on the ground were contradictory to the information being reported by the Programme.

Industry leaders started to hear from their own channels that stock movements were not being traced promptly, that numbers of potentially affected properties were increasing, and this was not being formally reported to governance. Simultaneously, Programme managers and their counterparts in AQ were struggling to recruit and deploy large numbers of new staff to keep up with rising numbers of infected properties.

Bringing issues to a head: the backlog and "surge"

In April 2019, a significant backlog in unprocessed cases was revealed, meaning not all stock movement from infected or at-risk properties had been followed up and recipient farmers interviewed ("cased" in the Programme's terminology). The backlog built up over preceding months, without the awareness of Programme management, due to the fragmented nature of information collection and reporting processes, and lack of capacity in the disease management function (classified under the CIMS model as "Intelligence").

Overall, confidence in the Programme was low among farmers and the industry organisations represented on the Governance Group.

On 12 April 2019, the Chief Executive Officer of DairyNZ wrote to the Director-General of MPI formally seeking information on the casing backlog to be provided at the next meeting of the Governance Group. DairyNZ commissioned an independent assessment of the performance of the Programme,[7] while the Programme also commissioned a report by MPI's Chief Science Adviser.[8]

Over ANZAC weekend in April 2019, the new Director-General of MPI decided a revised approach was needed to run the Programme or it would risk losing the social licence to continue. He proposed a 10-point plan for the "reset" of the current Programme. The 10-point plan:

1) established strengthened governance arrangements
2) established clearer management arrangements
3) established programme effectiveness processes and elevated reporting lines
4) established success measures and metrics for the Programme
5) established performance reporting indicators and reporting framework
6) created a remedial action plan with a daily review of leading indicators
7) commissioned an independent review by the Chief Science Adviser of the Programme
8) convened a TAG to review the Programme strategy and approach
9) created a unified approach to communication with farmers
10) established a programme charter for how partners would work together and share responsibility for achieving eradication.

7 Paskin, R, OMNI Animal Health Consultancy (2019) Mycoplasma bovis *in New Zealand: A review of case and data management.* Report commissioned by DairyNZ. Ministry for Primary Industries; Wellington.
8 Roche, J, Ministry for Primary Industries, Office of the Chief Science Advisor (2019) *Report on* Mycoplasma bovis *casing and liaison backlog.* Ministry for Primary Industries; Wellington.

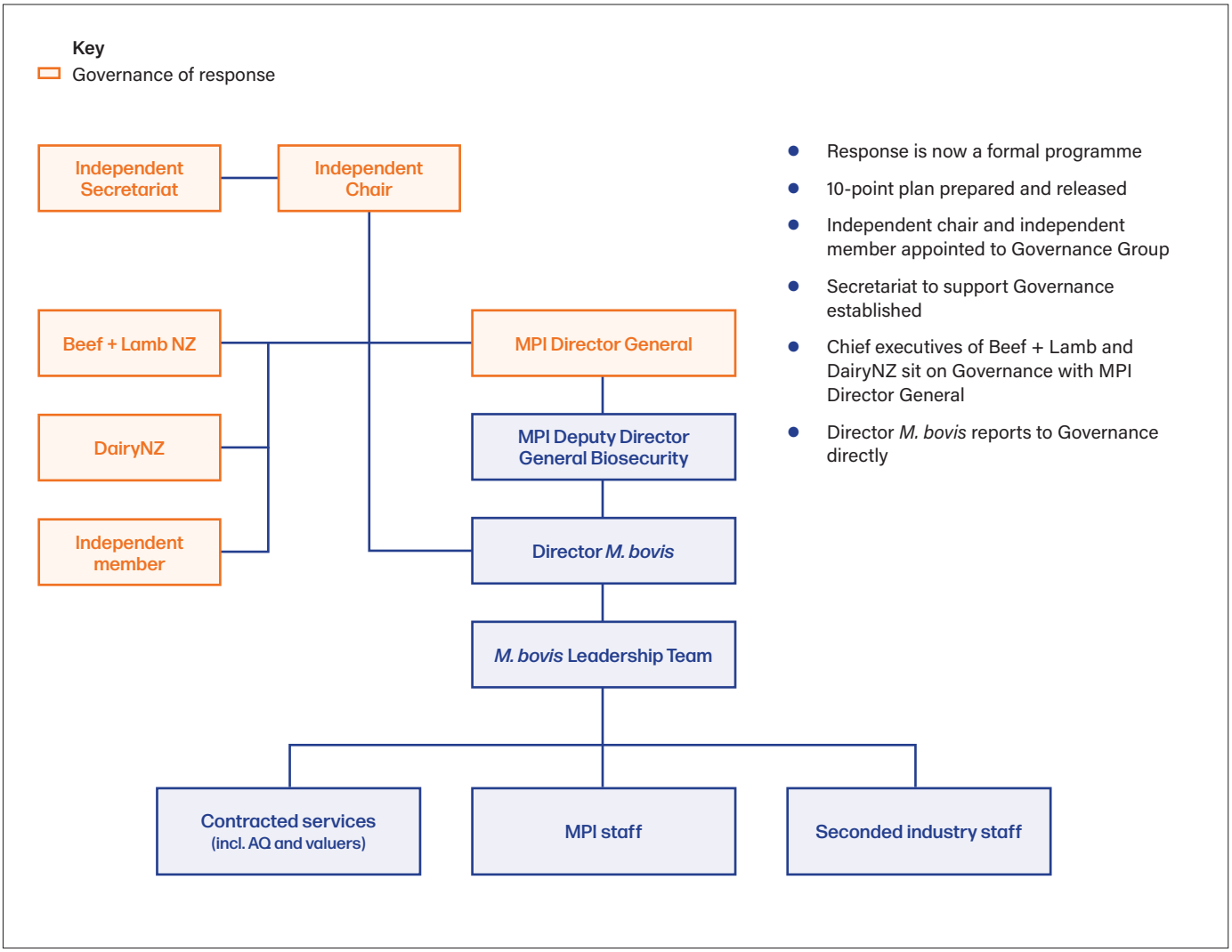


Figure 1.3: *M. bovis* Programme reset: May 2019 to present

These changes were agreed with partners in May 2019. The Governance Group was re-established with the appointment of an experienced independent chair to lead it. The group comprised the Director-General of MPI and chief executive officers from Beef + Lamb New Zealand and DairyNZ.

The Governance Group established a formal relationship with the TAG. This gave it a source of independent technical advice it could use to form an overall view on the Programme's performance. An additional independent governor with disease control and biosecurity experience was added to the Governance Group. An experienced MPI adviser was appointed as a one-person secretariat to the Governance Group, with responsibility for gathering information the Chair requested to enable effective oversight of the Programme.

From this point, the Governance Group focused on overseeing the performance and strategic direction of the Programme.

Interviewees almost universally agree the current arrangements are far more functional, that information has flowed more smoothly, and levels of trust and confidence in governance of the Programme are higher:

"Took a lot of churn through various settings, the 'Surge', and having an independent chair to get best practice."

"Good relationships lead to success."

Contract management, procurement and financial control systems

Biosecurity response delivery had been arranged over previous years so that MPI maintained its regulatory powers, leadership role and scientific capabilities. Operational delivery was largely organised through arm's-length contractual relationships through the service provider AQ.

Observations from *M. bovis* interviewees

The Review heard testimony from a range of respondents. Consensus was strong among interviewees that the relationship between MPI and AQ, responsible for delivering to the Biosecurity Response Services Agreement, became increasingly strained during the Programme. It is clear that MPI and industry partners became concerned at the costs being incurred, and did not have sufficient awareness of the scale and scope of activities being undertaken under the existing contractual arrangements.

Conversely, AQ staff felt they were carrying out the response as instructed and the costs invoiced to the Programme accurately represented the cost of delivering the Response services asked of them.

At the request of the Governance Group, MPI commissioned two independent assessments[9] of the value for money and management of the Biosecurity Response Services Agreement during the response to *M. bovis*. The evidence heard by this review about these matters is largely consistent with the assessments' findings.

The Panel sees no need to reiterate these at length but, in summary, the reviews found that:

- broadly, response expenditure reasonably reflected value for money;
- contracting arrangements, reporting and oversight were not fit for purpose;
- both sides made considerable efforts in good faith to reduce costs and increase transparency.

The Panel has made recommendations in other chapters about the importance of active maintenance and oversight of response capabilities and delivery arrangements. Making sure these processes are embedded and under active management is something that governance should retain oversight of with respect to ensuring preparedness.

Reflections

The Review Panel believes animal health disease emergencies are different from most other kinds of emergency management, and are among the most complex. They are similar to human epidemic or pandemic events. The main characteristics include:

a) A disease outbreak is not confined to one place or necessarily a single point in time.
b) No clear breakpoints exist between initiation, response and recovery, these phases may be occurring all at once in various locations at any point in time.
c) Tracing, epidemiology, laboratory diagnostics and data analysis are critical inputs.
d) The number of people, sectors and industries likely to be affected can be far broader and persist over much longer timeframes.

Disease management frameworks, therefore, need to be adequate to address this level of complexity.

M. bovis revealed both the strengths and weaknesses of previous animal disease planning

Previous planning and training for an animal disease incursion was based on foot and mouth disease (FMD). The expectation was that, in the event of an FMD incursion, the entire sector would have immediately gone to a "war-time" footing and done whatever was necessary. The Panel also understands a long-standing view was held that if New Zealand was prepared for FMD, it would be more than capable of dealing with a lesser threat.

9 KPMG Review of *M. bovis* Expenditure 2018, and KPMG Review of *M. bovis* Expenditure 2019. Reports commissioned by MPI and the *M. bovis* Programme.

M. bovis was the first large-scale animal disease the sector had faced for many years, and the fact it was "not FMD" may have significantly coloured how MPI and the livestock industry responded. Expectations about industry partners and other government agencies dropping all other work to focus on the biosecurity threat were not met.

Governance arrangements for an animal disease incursion had not been well established or exercised before *M. bovis*

MPI and industry groups had taken considerable steps to address the need for greater shared ownership of biosecurity management. They created the GIA arrangements to provide a forum and process for overseeing preparedness (readiness) and how to operate together in the event of an incursion response. At the time *M. bovis* was detected, in the livestock sectors only NZ Pork and MPI had signed the GIA Deed. This meant relationships between MPI and the dairy and beef industries were being managed bilaterally, outside of a formal partnership agreement.

A condition of the Government agreeing to eradicate *M. bovis* in May 2018 was that industry bodies signed up to a cost-sharing arrangement under the GIA. As a result, DairyNZ and Beef + Lamb New Zealand became signatories to the GIA. The GIA provided a mechanism through the Biosecurity Act 1993 to seek approval from farmers for a biosecurity levy to pay for the *M. bovis* response. Part of the value proposition for farmers in paying the levy was the recognition of joint decision-making rights as partners in a biosecurity response.

While a governance group was established made up of the funding partners, delivery of the Programme continued to be driven by the response model. The Governance Group did not receive substantial independent reporting on the progress of the Programme, meaning governance was not well-equipped to provide effective strategic oversight and direction for the Programme.

After challenges in Programme delivery emerged in the opening months of 2019, the Director-General took the opportunity to reflect on the governance of the Programme. In May 2019 MPI and the two industry partners agreed on a 10-point plan and formal "reset".

"Reset" in 2019 and appointment of independent chair created conditions that enabled governance roles and functions to be exercised appropriately

The appointment of an independent chair, the "reset" and the 10-point plan created the framework for an effective governance oversight function for the *M. bovis* Programme. Reporting to the Governance Group has been streamlined to focus on the main Programme metrics. The Governance Group receives detailed quarterly epidemiology reports and has the space to consider the longer-term future of the Programme. One area where the Governance Group does not appear to have become heavily engaged is strategic communications, which are still being managed at an operational level.

As governance roles and functions mature, it is important hard-won gains and lessons of *M. bovis* are not lost

It has been a challenging journey for industry and MPI to reach the maturity of governance relationships that now exist. It is important the clarity of roles and functions of the parties, the relationship between industry and regulator and the shared commitment to outcomes are not lost.

The Panel considers the current arrangements are working well, and the lessons learnt will need to be embedded and maintained for New Zealand to retain its state of readiness to respond effectively to future livestock biosecurity emergencies

Structure & processes

Purpose

This chapter assesses the processes and organisational structures that were initially present, consequently developed and that underpin the current effectiveness of the Programme. Discussion also covers the structures and processes that need to be maintained or developed to ensure a stronger biosecurity readiness and response system.

A timeline of key events is provided after Chapter 5.

Introduction

The conduct of a biosecurity response is complex, challenging and stressful. It puts great pressure on the agencies, industry and farmers who have to bear the brunt of the response. It also stresses the organisations that carry out the process of managing the incursion and the staff tasked with its implementation.

To present this information in a digestible way, the chapter is structured so the initial sections cover the Panel's assessment of what preparedness should look like. Through the evolution of the Programme, it considers the high-level structural and process changes that occurred.

Structure and process preparedness

Of the many aspects of animal health emergency preparedness and response that the World Organisation for Animal Health (OIE) and Food and Agriculture Organization of the United Nations (FAO) provide guidance on, the Panel has chosen to focus on seven and has added another: maintaining the wellbeing of staff. These eight areas are:

1) strong technical leadership;
2) decision-making process;
3) clear roles and functions for response management;
4) trustworthy and timely information and intelligence;
5) maintenance of preparedness;
6) compensation;
7) powers clearly stated and derived from legislation;
8) staff wellbeing.

Strong technical leadership

The existence of a legally empowered and technically independent chief veterinary officer (CVO) with a clear chain of command is an expectation of international standards, including the OIE Code[10] and the FAO's Good Emergency Management Practice (GEMP) guide.[11] This provides direction and focus for delivering preparedness and strong and credible leadership during outbreak responses.

Similar arrangements exist elsewhere; the Chief Medical Officer is a senior medical doctor taking leadership within the Ministry of Health. The Panel considers it best practice for the country's government veterinary services to be under similar leadership. This creates an environment where technical knowledge is valued or expected in leadership roles and a team of experienced official veterinarians becomes established. This team both inspires junior entrants into the profession and serves as a "pipeline" for succession in senior leadership roles, such as the CVO, or representation in relevant multilateral forums

Decision-making process

The GEMP guide is clear that effective, timely and evidence-based decision-making is a core requirement for successful responses. This requirement is important in a response environment where decisions have to be made quickly, often with incomplete information and the potential to impact on the lives of both the affected parties and members of staff.

Response decision-makers need to be provided with the powers, information and support to enable them in their role. Clear delegations are needed for local controllers to allow decisions to be made to meet the demands of the response.

Clear roles and functions for response management

The GEMP guide provides advice on structures required to execute an animal health response. It recommends a three-tier structure referred to as gold, silver and bronze commands. It recommends within the silver and bronze commands that a modular command system should be established, known as the Incident Command System. The main elements of this system are: modular structure, scalability, integration of logistics and operations, and multidisciplinary elements. Table 2.1 outlines the GEMP structure.

10 World Organisation for Animal Health (2019) *Terrestrial Animal Health Code, Volume 1, General Provisions* (28th edition). World Organisation for Animal Health; France, Article 3.2.2, p 112.
11 Honhold, N; Douglas, I; Geering, W; Shimshoni, A; Lubroth, J (eds) (2011) *Good Emergency Management Practice: The Essentials – A guide to preparing for animal health emergencies* (2nd edition). FAO Animal Production and Health Manual No. 11. Food and Agriculture Organization; Rome, p 71.

Table 2.1: Good Emergency Management Procedures (GEMP) – structure

GEMP Command Level	Function
Gold	National emergency committee, made up of the highest level of policy-makers, implements national policy
Silver	Consists of the national (animal) disease control centre, which is usually headed by the Chief Veterinary Officer and comprising senior government veterinarians responsible for implementing the contingency plan nationally
Bronze	Consists of the local (animal) disease control centres, which are normally headed by a senior government veterinarian. They are responsible for implementing the contingency plan locally and the instructions received from the national (animal) disease control centre and for ensuring field activities are undertaken fully and correctly with all tasks recorded, allocated and their completion noted.

Trustworthy and timely information and intelligence

See Chapter 3, Information systems.

Maintenance of preparedness

The GEMP guide provides direction on how responses ought to be prepared for and conducted. It places strong emphasis on preparedness through thorough planning, which results in clear contingency plans for effective control of high-threat diseases. Responses should be enabled, informed and guided by a credible set of emergency plans.

Compensation

Compensation is a cornerstone of any control policy. The biosecurity system depends on voluntary compliance, passive surveillance and early reporting of incursions. One of the main mechanisms to encourage and protect this early reporting of incursions is an already determined fair and reasonable compensation process covering losses stemming from the exercise of powers under the Biosecurity Act 1993.

For compensation to be effective, it needs to be paid promptly after losses are incurred. Contingency planning should consider in advance how compensation can be easily and quickly disbursed to those who are eligible.

Powers derived from legislation

Flexible supporting legislation is recognised by the GEMP manual and OIE[12] as essential to underpin the day-to-day activities of the Competent Authority. An effective and clearly understood regulatory regime ensures the participation of farmers and others in activities such as livestock movement recording, and mandates the delivery of emergency animal health responses. The legislation provides the power to inspect properties and animals, impose movement controls and treat, vaccinate or cull animals.

Staff wellbeing

It is a legal requirement in New Zealand to support staff to ensure their wellbeing and safety are appropriately protected. In New Zealand, the Ministry of Health provides guidance at the personal[13] and organisational[14] levels for preventing and managing stress in emergency responders. Table 2.2 outlines the Panel's assessment of the Programme's performance against best practice elements of disease incursion response during the three stages of *M. bovis*.

Table 2.2: Panel assessment of how the Programme has performed against best practice elements of disease incursion response during the three stages of M. bovis

Elements of best practice disease incursion response	2017-18	2018-19	2019-Present
Strong technical leadership	red	red	green
Decision making process	red	amber	amber
Trustworthy and timely information and intelligence	red	red	amber
Clear roles and functions for response management	red	amber	green
Maintenance of Preparedness	red	red	green
Compensation	red	amber	green
Powers derived from legislation	green	green	green
Staff Wellbeing	red	amber	green

Key: red is weak performance, amber is acceptable and green is good.

12 World Organisation for Animal Health (2019) *Terrestrial Animal Health Code, Volume 1, General Provisions* (28th edition). World Organisation for Animal Health; France, Article 3.1.2, p 111.
13 Ministry of Health (2010) Coping personally – *information for health staff and volunteers.* https://www.health.govt.nz/our-work/emergency-management/coping-stress-and-anxiety/coping-personally-health-staff-and-volunteers. Accessed 28 October 2021.
14 Ministry of Health (2010) *A guide for emergency response workers and their managers.* https://www.health.govt.nz/our-work/emergency-management/coping-stress-and-anxiety/guide-emergency-response-workers-and-managers. Accessed 28 October 2021.

Evolution of the Programme

Response – July 2017 to April 2018

M. bovis was first detected through the dedicated work and prompt reporting of a practice veterinarian operating within her day-to-day role. It later became clear the infection had been present in the country for at least 18 months before detection, but, for a disease like *M. bovis* where few specific clinical signs can be expected on most infected farms,[15] it took a while to detect. From the outset, the detection was considered extremely serious and a biosecurity response was initiated.

The period that followed, known as the response, involved tracing of historic animal movements and placing associated properties under surveillance, as well as seeking to manage the effects on the farmers involved and expectations of industries and the farming public. The early stages of an exotic disease incursion response are frequently hectic and characterised by high levels of uncertainty, as was the case with the response to *M. bovis*. Two other incursions[16] were being managed at the time, which meant resources were already stretched.

The hectic pace of operations and turmoil of the response stage reduced as staff settled into their roles and their familiarity with the issues increased. However, where staff were rotated out to different roles and new people were brought in, a consequential reduction in effectiveness resulted due to the limited training and supervision available. Appropriate support to deal with this environment was often not given to staff, as this interviewee noted:

"There was no instructions/operations manual, legal notices and forms were limited and needed constant rewriting, it appeared people were making it up as they went along. There was no command and control structure... there was no intel and statistics, there wasn't even a map!"

The response had difficulty managing the increasing numbers of case farms detected and held under movement controls, where no certainty existed about what their eventual fate would be. Clarity was only provided when the decision to eradicate was made in May 2018.

The response was based on the CIMS framework,[17] and this structure was largely maintained following the decision for the response to become a directorate in June 2018.

Before the *M. bovis* response, a small, temporary team in MPI had been created to deal with compensation claims resulting from other biosecurity responses. Dealing with *M. bovis* brought challenges. From the outset, it was clear the system was not mature enough to deal with the volume and complexity of the compensation claims, as well as the variability of the individual farmer situations. It lacked the resources and ability, especially pastoral farming knowhow, to help farmers navigate the compensation systems, and the staff administering the system lacked training and support.

"We weren't that well prepared as a Ministry for a compensation regime of that scale."

Notable improvements made during this period:

With the importance of biosecurity highlighted to farmers, DairyNZ and Beef + Lamb New Zealand canvassed their levy payers[18] seeking a mandate to join the GIA framework. Both organisations received a mandate[19] from farmers and joined the Government Industry Agreement.

15 See Appendix 5, Science of *Mycoplasma bovis*, for more information.
16 These involved responses to the myrtle rust and *Bonamia ostreae* incursions.
17 National Emergency Management Agency (2021) *Coordinated Incident Management System (CIMS) third edition.* https://www.civildefence.govt.nz/resources/coordinated-incident-management-system-cims-third-edition/. Accessed 28 October 2021.
18 Deer Industry New Zealand also sought a mandate from its members at the same time. Noting the crossover where many deer farmers also own sheep and/or beef cattle, this made sense from an efficiency perspective.
19 At the time of the consultation (December 2017), a future decision to seek to eradicate *M. bovis* was not anticipated by any of the response partners.

Establishing the Programme – May 2018 to April 2019

Following the decision to attempt to eradicate the disease, the response transitioned to a full-time, large-scale activity, delivered by a new directorate of MPI, with a significant increase in resources. The creation of the directorate allowed for more sustainable arrangements for financial management and recruitment or retention of staff.

Accompanying the establishment of the directorate was the development of the *M. bovis* National Plan.[20] This was finalised in July 2018 and set out the goals, structure and roles and responsibilities for all parts of the Programme, including the National Control Centre (Wellington) and regional offices in Invercargill, Ashburton, Oamaru and Waikato.

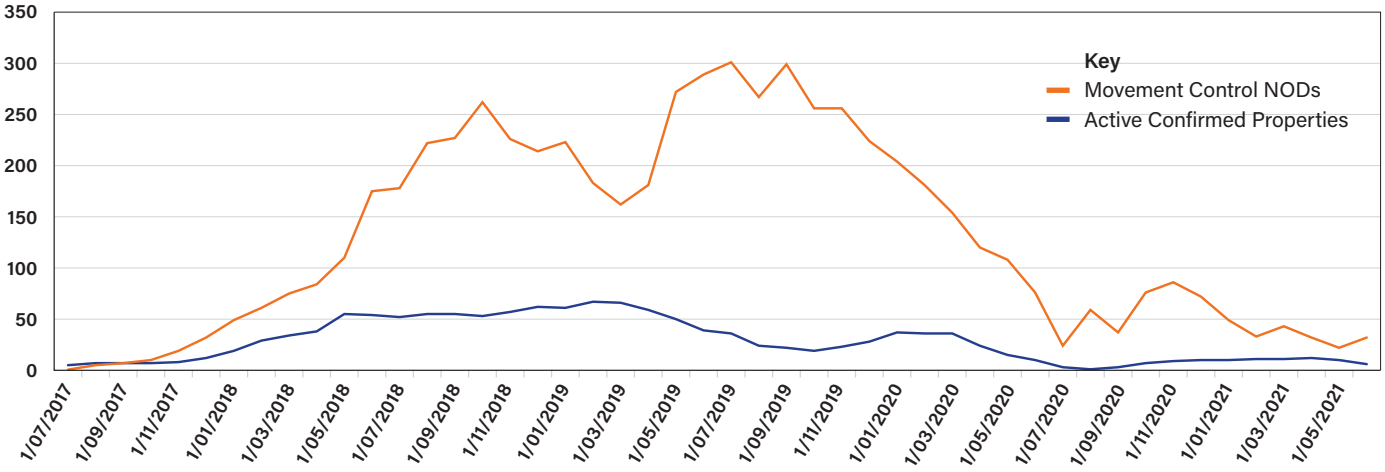
At the beginning of July 2018, when the Plan was released, 53 properties had been infected, of which 41 had not been depopulated, cleaned and disinfected. By July 2019, this had increased to over 170 infected properties (Figure 2.1).

The Programme expanded allowing for more tracing, and more farms were subsequently placed under surveillance and/or movement controls. The lack of clear processes and resources led to extended delays for farmers awaiting test results. The problems this created for their businesses, stock and wellbeing led them to direct significant frustration at the Programme.

The blue line in Figure 2.1 shows the number of Active Confirmed (that is, infected) Properties since the detection of *M. bovis*. The orange line shows the number of farms placed under a Notice of Direction (NOD) imposing movement controls while the farm was tested for the presence of *M. bovis*. The figure shows the rapid scaling up of operational activities over 2018, and a peak of activity being reached in 2019. Throughout late 2019 and early 2020, Active Confirmed Properties and movement control NODs declined steadily, and the level of Active Confirmed Properties has been consistently low since then.

As the Programme entered its second year, the situation was exacerbated when more and more stock traders and large terminal beef farms, particularly in the North Island, were traced.

Operational policies and processes developed to deal with dairy farms and smaller beef enterprises were frequently found to be inadequate when dealing with these businesses. For example, the requirement to muster stock for a census, while easy for a dairy farm milking the herd twice a day, is a substantial logistical issue for a bull beef finishing farm raising 40 or 50 separate mobs of cattle dispersed over many kilometres.



● Figure 2.1: Farms under NODs imposing movement controls and confirmed infected properties on a monthly basis since confirmation of disease in 2017.
Note: The data will differ slightly from some public figures previously released as property definitions and reporting parameters have changed over time.

20 Biosecurity New Zealand (2018) Biosecurity Response National Response Plan: Phased Eradication of Mycoplasma bovis. Biosecurity New Zealand; Wellington.

Decision-making was concentrated to a few people based in Wellington. The evidence is clear of the huge commitment by these people to ensure the Programme's effectiveness. However, as the Programme grew, it stretched their capability and capacity. Delegation was problematic, potentially placing the authority for technically demanding operational decisions into the hands of relatively few staff, who often did not have the relevant level of understanding, training, capability or time necessary to make such decisions. This had a negative effect on response efficacy and efficiency.

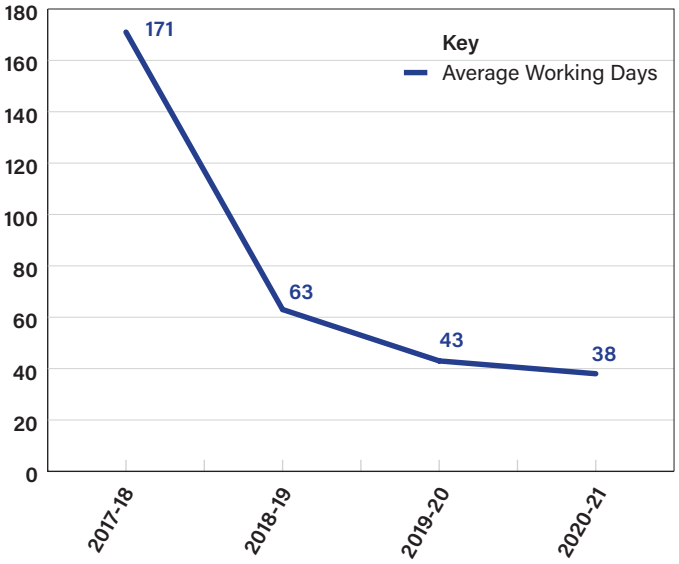
The compensation team was scaled up to meet demand. The Programme was unable to increase management and support capability in step with demand. As a result, the team recruited to assess and process claims found themselves with limited support.

To support farmers with the compensation process, the DairyNZ and Beef + Lamb New Zealand Compensation Assistance Team (DBCAT) was set up, with support from the Programme and industry partners. While managed from within the Programme, DBCAT is made up of industry professionals who were trained in the nuances of the compensation system and its requirements, to support farmers with their claim submissions. It is clear from the testimony collected by the Review this team had a large and positive effect on the compensation process as a whole:

"...that Compensation Assistance Team (DBCAT) made an enormous difference to the ability of the farmers to access that compensation and it did alleviate a lot of the welfare concerns that we had."

Over time, systems and process were developed, the size of the compensation team expanded, and staff became familiar with various farming systems. In addition, models were developed to calculate predicted future milk production and live weight gain. Crown Law developed precedents for the treatment of claims, and approval delegations were revisited to simplify the approval of claims. In addition, DBCAT's work improved the completeness of compensation claims received, so the need to go back to farmers seeking more information was reduced.

The results of the improvements in the compensation system can be clearly seen in Figure 2.2.



- Figure 2.2: Average time taken to close *M. bovis* compensation claims over time. Note: Since 2018/19, the payment of non-complex claims (mainly for the value of culled stock) typically happens in around half the time indicated in the figure above.

Notable improvements made during this period:

Changes to surveillance and testing were implemented, to reduce the overall timeframes for providing final results back to farmers.

M. bovis Compensation team was expanded.

DBCAT (DairyNZ & Beef + Lamb NZ Compensation Assistance Team) was established, jointly funded by the Programme.

Regional recovery managers and regional vet techs were established in each of the regions, to help farmers manage difficult situations and find the fastest and easiest way through the challenges they faced while under, or recovering from, regulatory controls. Farm recovery plans were now being developed for every new farm confirmed to have M. bovis and for other affected farms when needed.

Notable improvements made during this period (cont):

Ability to move animals under NOD and RP Notices – the Programme changed its policies so that, under certain circumstances, farmers were permitted to move animals that were under a movement control to a different property provided the controls were similarly applied to the new farm or block. This was designed to help farmers in difficult situations, such as where animals were either unable to be fed or were on land unsuitable for their ongoing management.

Transitional NODs were developed as an instrument to make sure only the known infected parts of properties and suspected cattle were placed under Restricted Place notices and subsequently culled.

An active surveillance liaison team was formed to support farmers placed under Active Surveillance.

Active Surveillance mustering payments were instituted (February 2019) to support (particularly beef) farmers complying with response requirements to bring animals in for testing and census. A farm advisory fund was established (March 2019) for funding professional business advice for farms that had been depopulated (up to $5,000 for professional advice).

The *M. bovis* National Plan was reshaped in April 2019 with three goals of the plan defined as:

- **Goal 1** – Eradicate *M. bovis* from New Zealand
- **Goal 2** – Reduce the impact of the disease and the eradication Programme for everyone affected by *M. bovis*
- **Goal 3** – Leave New Zealand's biosecurity system stronger

Reset – 2019 to present

As noted, in early 2019, it became apparent a substantial backlog of farms required follow-up action. The Programme responded to the backlog immediately and effectively, resulting in a "surge of activity" that became generally known as "the surge".

January 2020 saw the establishment of a regional office in Northland to manage the growing numbers of traces onto beef farms in the North Island.

With the previous three years being spent scaling up to deal with the disease, August 2020 saw the Programme start to scale down. This reflected the decline in numbers of farms under surveillance and movement controls and the need to be "right sized" to deal with forecast case numbers. Changes made were:

- The Programme was to reduce from 199 to 162 full-time equivalent staff by October and then to 124 by July 2021.
- A flatter management structure was introduced, to improve accountability for the Programme's functions.
- The dedicated Northland and Oamaru regional offices were downsized, with operations being primarily run out of Christchurch and Hamilton by North Island and South Island managers.
- A case management approach was developed to provide an end-to-end service and contact point for farmers.

Analysis against the eight aspects of preparedness

Before and during the first four years of the *M. bovis* Programme, MPI had no formally recognised CVO and no single leader responsible for livestock biosecurity readiness and response who would have provided the link between the Programme and wider MPI biosecurity structure, as well as preparing MPI for a future incursion.

Initially, the Programme suffered from a lack of technical expertise in senior positions. Veterinary technical experts made tremendous efforts to drive the best outcomes for disease control and the farmers these activities inevitably affected. The clear improvement in Programme delivery following the backlog is believed to have been strongly influenced by the lead epidemiologist

The *M. bovis* Programme 2018 backlog – the "surge"

The *M. bovis* Programme "surge" (outlined in further detail in two separate reports into the event[21 22]) was caused by backlogs in the tracing and casing of risk properties in the Programme. Although the Director-General of MPI was formally advised of this in April 2019, the backlog (around 1,400 "cases") had been building over several months. The backlog was caused by a combination of the following factors:

- high workloads caused by the detection of many new infected properties;
- siloed structure that discouraged collaboration and communication across the Programme;
- a cumbersome, centralised decision-making process;
- an inadequate process for effectively tracing and casing farms swiftly and reporting on the results efficiently;
- a lack of a common data management platform and 'single source of truth', which promoted an over-reliance on spreadsheets;
- poorly trained staff, with insufficient technical capability for the roles they were tasked with performing.

To address these issues, the following changes were made:

- A new team of people was brought in to help work through the backlog. A major focus was on improving the manual processes that had contributed to the backlog. This would eventually result in the implementation of Tiaki, a purpose-built data management system for use in the *M. bovis* Programme, which was a major improvement driven by the learnings gained from this event.
- The Programme structure was changed to reduce the overall number of direct reports to the Programme Director. The lead epidemiologist began to report directly to the Programme Director.
- A highly experienced government veterinarian was recruited to lead the disease control group within the Programme. Regional offices received revised sets of delegations of power and better access to technical advice. By the end of 2019 and early 2020, specifications had been developed for each stage of the Programme to allow regional decision-making. The compensation process improved through speeding up assessments and decision-making.
- Feedback was canvassed from farmers through workshops held in Wellington and the regions. The Programme responded by making changes to address some of the bigger challenges experienced by farmers.

21 Roche, J, Office of the Chief Science Adviser, Ministry for Primary Industries, (2019) Report on Mycoplasma bovis *casing and liaison backlog*. Ministry for Primary Industries; Wellington.
22 Paskin, R, OMNI Animal Health Consultancy (2019) Mycoplasma bovis *in New Zealand: A review of case and data management.* Report commissioned by DairyNZ. Ministry for Primary Industries; Wellington.

reporting directly to the Programme Director and the recruitment of a highly experienced former government veterinarian. These experts also directly supported the Programme Director in discussions on technical matters with Programme governance

Panel reflections

Early in the response, the Programme had too few technical staff to set direction, make and implement operational decisions and build trust and confidence among staff, farmers and wider stakeholders. This situation is inconsistent with the expectations of the GEMP manual and OIE.

The Panel noted the skill, dedication and achievements of the few technical specialists who were within the *M. bovis* Programme. The contribution of this group of veterinary epidemiologists, field vets, data scientists, intelligence experts and diagnosticians underscores the essential role technical expertise plays in disease responses and the progress of the eradication effort.

The appointment of a CVO within Biosecurity New Zealand is a welcome measure. However, the Panel is aware this role, as currently defined, is primarily concerned with providing a figurehead for professional co-ordination across technical specialists and has no operational, legal or policy-setting responsibilities. It is hoped the role will be empowered to allow the development of a renewed emphasis on livestock disease incursion preparedness.

Decision-making process

In the early stages of the Programme, operational decisions seemed to be made at the highest level. Centralised decision-making resulted in long delays

Eradicating *M. bovis* – Technical accomplishments of a world class team

No country has ever sought to eradicate *M. bovis*. This means no blueprint existed or analogous approach was described in the literature from elsewhere that could be built upon. Since its detection in 2017, the Programme's veterinary epidemiologists, field vets, data scientists, intelligence experts and diagnosticians have developed and implemented a variety of innovations in pursuit of eradicating *M. bovis*. Notable achievements are described below:

- development of a sampling protocol for tonsillar swabbing: a world first in seeking to diagnose *M. bovis* infection in otherwise healthy cattle;
- optimisation of ELISA testing for accurate assessment of herd infection status;
- development of systems and processes to use NAIT (and other) data at scale, involving millions of cattle movements across New Zealand for several years, to inform tracing activities;
- application of scenario-tree modelling to inform surveillance requirements for future confidence in the absence of disease and later recognition of disease freedom;
- design and implementation of bulk tank milk surveillance across all milking dairy farms in New Zealand;
- design and implementation of a national beef and dairy dry stock surveillance programme, with samples collected on farms, at meat processors, and at entry to a large South Island feedlot;
- development of a system for collection, collation and analyses of Programme activities to facilitate detailed reporting of performance indicators to governance
- influential support provided by Programme epidemiologists to the Government's COVID-19 response.

for farmers and delivery of Programme effects. Other issues contributing to inefficient decision-making, particularly in early in the response, were the structures maintained by both MPI and AQ. This created uncertainty and allowed back channels to develop, with senior decision-makers personally managing relationships with particular farmers.

Panel reflections

Before the "surge", decision-making in the Programme was slow and not sufficiently transparent. The Panel considers this was due to:

- challenges associated with the development of situational awareness to enable decisions;
- a lack of plans and policies;
- centralised decision-making; and
- too few technical specialists.

Over time, and following the surge response, a steady improvement in decision-making across the Programme was achieved. The Panel attributes this to:

- improved situational awareness;
- continued improvement in the development and standardisation of policies, processes and specifications;
- recruitment of experienced leaders, particularly in the disease control function;
- advice being given directly by the lead epidemiologist and disease control leader to the Programme Director;
- empowerment of regional leaders to make decisions, supported by co-located veterinary and farming experts;
- improved understanding of farm systems and how that applied to the individual; and
- reduction in the numbers of confirmed properties and farms under movement restrictions.

For the success of future responses, operational decision-making processes must be structured to empower staff at the lowest appropriate level (with the requisite technical, regional and operational knowledge) to make decisions.

Clear roles and functions for response management

To establish whether the roles and functions of response management are clear, the Panel reviewed published plans and other documentation relating to emergency preparedness that good practice requires to be publicly available. The Panel asked for this information to be provided. In many cases, MPI was unable to either retrieve key documentation, confirm that documentation was current or had been used to manage the response.

Coordinated Incident Management System

CIMS is New Zealand's official all of government framework for managing and structuring incident management responses. CIMS is an excellent model for inter-agency and cross-agency crisis response. It gives all involved a "common language" and structure to work within, which is very important when multiple agencies are involved. The main attributes for managing responses recommended by the GEMP manual are reflected in the CIMS structure, but CIMS does not specifically cater for animal health specific functions such as surveillance, depopulation and biosecurity, as referenced within the GEMP manual. One interviewee noted:

> *"MPI is sold on CIMS but it needs modification for animal health responses. At present, we have technical people supporting CIMS managers and arguably it should be the other way around to be more science-led. There are significant differences between an animal health response and a bush fire."*

Panel reflections

The Panel is unable to confirm that roles and functions within the biosecurity system are clear, up to date, have been promulgated and are available in the public domain.

In using CIMS as a crisis response framework, it should be tailored to align with the needs of an animal health response. Including the functions of epidemiology, organism management, compensation,

farmer welfare and trade and market access should be considered when adopting CIMS.

Maintenance of preparedness

The Panel reviewed repeated critical testimony of the lack of processes and role clarity for staff early in the response. Initial responders were, in some cases, provided with role cards describing the broad functions they were expected to fulfil, but further details were seldom available. Role clarity for staff improved as the response matured and was, in part, facilitated by the 2020 restructure.

The response was let down through a lack of pre-existing manuals, policies and plans. Further, evidence shows that operational plans,[23] previously believed to be sound, were found wanting when attempted to be used in the early stages of the *M. bovis* response.

In 2009, MPI had developed the Biosecurity Response Knowledge Base[24] (BRKB), which included detailed process maps, templates and checklists designed to support biosecurity decision-making and operational activity. During the *M. bovis* response, the BRKB was not used, few staff members knew it existed, and even fewer had been trained on any of its content.

Panel observations

The response suffered from a lack of access to adequate, tested and socialised contingency plans and operational manuals. Where processes were in place, they were not always adhered to, or were found to be of limited value. This observation reinforces a recurrent issue identified by the Panel of an urgent need for MPI and partners to regularly practise and test the many facets of response preparedness. In so doing, staff can become familiar with their roles, and the efficacy of plans and policies can be established and, if necessary, improved. It is preferable for these things to occur in "peacetime", rather than in a major biosecurity emergency.

In the Panel's view, MPI was substantially underprepared to execute an animal health response of the scale presented by *M. bovis* in 2017–2018.

Compensation

At the start of the *M. bovis* response, the compensation team was not resourced to deal with the large and growing number of claims. This was added to by the lack of experience in practical application of the legislation. This, especially early in the response, resulted in an often frustratingly slow pace of claims processing. The slowness was often compounded by highly bureaucratic processes, with claim sign-off levels based on cumulative values, meaning large farms often cleared the higher sign-off thresholds immediately, resulting in all subsequent claims, even for small amounts, having to go through the entire sign-off process again.

DBCAT was introduced to provide dedicated support to farmers when making claims for compensation. An independent panel, with farming expertise, was also established by MPI to advise it on the merits of complex claims where MPI and the claimant had been unable to reach agreement.

Panel reflections

It is clear to the Review Panel that huge progress has been made in speeding up the assessment and decision-making process regarding compensation. This, coupled with a far greater understanding of the section 162A provisions in the Biosecurity Act 1993, and a better grasp of the specifics of affected farming systems, has resulted in a much more streamlined process. What is crucial, however, is that these learnings are embedded in a sustainable way, and the work to build on these learnings is continued.

Reassuringly, it appears to the Review Panel that MPI has taken on board steps to implement a more robust compensation process in the future.

"...we're wanting to establish a permanent compensation function... that is fit for purpose, has the requisite skill sets that are required, that gives consideration to a future state, how we scale up and scale up quickly and what the models might be in order to do that."

23 For example, operational plans relating to on-farm depopulation and carcase disposal.
24 Publicly available at: http://brkb.biosecurity.govt.nz/.

It is also clear to the Review Panel that a DBCAT-style team should be part of any large livestock biosecurity response in the future, to provide support to affected parties in compiling their claims. This would help ease the high levels of stress placed on affected parties, and support them in getting their businesses back to normal as soon as possible, thereby maintaining the incentive to report diseases that New Zealand's biosecurity system relies on.

Powers derived from legislation

The Biosecurity Act 1993 meets the main requirements for animal health legislation recommended by the GEMP manual and provides the necessary powers required. The Programme would have been more successful earlier had the level of compliance been higher from farmers with requirements to record movements of cattle in NAIT.

Compliance

The success of incursion responses depends on MPI being able to effectively execute disease control measures that frequently require farmers and others to do or not do things they otherwise would as part of their everyday business activities, for example, move cattle to grazing. As discussed, compensation is provided for, in part, to encourage people to comply with legal directions that may otherwise financially disadvantage them.

However, in addition to this incentive to comply, some material disincentive also needs to be in place for non-compliance. In the regulatory environment, this usually involves the threat of infringement fines or prosecution, as occurs at the border for travellers bringing undeclared risk goods into the country.

In an incursion response, no infringement framework (short of full prosecution) is available to enforce compliance with directions or notices issued under the Biosecurity Act 1993. At the border, infringement fines can be issued on the spot for low-level offending. No similar regime is available to use in responses where people refuse to comply with legal notices.

Therefore, for low-level non-compliance or refusal to cooperate, the Programme was forced to enter into lengthy negotiations with farmers. This delayed disease investigations and meant farms were under movement controls for longer, costing the Programme more operational resources and creating more impacts for the farm business (many of which remain compensable).

The Programme took longer to control the disease due to the significant hinderance to tracing caused by poor compliance with NAIT requirements to record animal movements. The *M. bovis* Programme has benefited from recent enforcement of NAIT requirements for farmers to ear tag and register cattle movements, with penalties if they do not. This has resulted in an improvement towards more complete and accurate data about stock movements to inform disease tracing.

Panel reflections

The response to *M. bovis* has tested the systems and processes that the Biosecurity Act 1993 enables. The Panel understands that MPI will consider whether changes are necessary to the Act.

The Panel has not identified any fundamental issues with the legislation.

The Panel has observed that the relative inexperience of MPI and partners in working within the legislation, particularly operationalising the compensation regime, was surprisingly difficult and took a long time to get right.

The Panel also notes that other powers, such as those relating to mass deployment of vaccinations and area-based restrictions on livestock movements may form necessary components of livestock disease responses in future, and the *M. bovis* response has not required these. The Panel believes that testing the legal aspects of disease control and other response interventions should also form part of good preparedness planning.

Staff wellbeing

Working in a response, of any type, is a demanding environment. The potentially serious impacts on affected farmers are becoming more widely recognised but this is not always so for response personnel. Prolonged time spent working in a highly pressured,

stressful and arduous environment is challenging, even for well trained and prepared people.

"...there's a part of me with the benefit of hindsight... think it took a good 3 to 4 months to kind of feel normal again... as an organisation we probably need to be a bit more proactive around it (support for staff)."

Panel observations

Appropriate training for a response should include how to deal with people in crises, particularly if the staff member will have regular contact with affected members of the public. In addition, response planning must consider the need to rotate staff, monitor excessive hours, debrief after contact sessions, and provide access to appropriate support.

Notable progress has been made over the course of the Programme's lifetime in this regard.

Reflections

The Panel concludes that, throughout the period the *M. bovis* Programme has been in operation, the commitment to improve has been high and significant resources were expended on seeking to do so.

The overall structure that MPI and its GIA partners adopted for the *M. bovis* response was in keeping with international best practice. However, the lack of clear veterinary leadership within MPI (which would have provided the foundation for a clear and determined response) is contrary to the GEMP manual and OIE International Standards.

The use of the CIMS model to conduct large biosecurity responses needs to be extended and adapted to cater for the particular requirements of animal health emergency responses.

The Panel welcomes the recent innovation within Biosecurity New Zealand of appointing a CVO. However, the Panel notes the position is currently largely advisory in nature, not invested with operational responsibilities for readiness and responses services and is without direct reports.

The lack of support provided during the *M. bovis* Programme to staff resulted in worryingly high rates of burnout and turnover. The Review Panel hopes that this learning is taken on board by the system, so these staff experiences are not repeated in future responses.

"I have had the privilege to work with some truly great individuals, but sadly we've lost many of them who've either been burnt out or burned by the poor staffing levels and therefore the increased demand on them and sadly those skills we've lost for future responses."

Clear documentation of policies, strategies and procedures covering the whole of animal health is an OIE requirement; the Panel notes that pieces of critical documentation appeared missing or incomplete. Worryingly, no single comprehensive FMD response plan is in place that is publicly available as is current international best practice. The Panel has concluded that either the documentation does not exist or difficulties with document storage and management prevented it being provided.

Chapter 3

Information systems

Purpose

This chapter covers the way information systems affected the delivery of the *M. bovis* Programme, and how these systems can be improved to strengthen the biosecurity system.

A long-standing issue...

The Panel knows that the long-standing issues with information systems have been highlighted in previous reviews. These involve the challenges associated with collecting, storing and sharing data, the processing and management of data once collected, and its analysis and use to inform decisions.

Commenting on the state of the then Ministry of Agriculture and Forestry's information system arrangements in 2002, the Office of the Auditor-General[25] (OAG) stated: "current Information Technology (IT) arrangements do not enable these locations to share data, thereby creating the potential for compromising the successful management of incursion responses".

An OAG audit in 2013[26] noted: "Biosecurity operations have not followed sound information governance practice... Many biosecurity responses rely on the use of stand-alone spreadsheets and databases for capturing and analysing information, but this introduces risks".

An OAG follow-up audit[27] in 2015 noted: "The Ministry does not have an integrated information system".

Those reports clearly highlight how long the biosecurity system has struggled with information management issues. The *M. bovis* Programme provides stakeholders with a real-time case study of how these issues affect a large-scale animal biosecurity response.

While the effect on the *M. bovis* Programme has been significant, the issues highlighted in this chapter would be much more serious in the event of a fast-moving outbreak like foot and mouth disease. It is hoped the experience of *M. bovis* shows the need to invest appropriately in information systems and their interoperability.

25 Audit Office (2002) *Report of the Controller and Auditor-General – Ministry of Agriculture and Forestry: Management of Biosecurity Risks.* Audit Office; Wellington.
26 Office of the Auditor-General (2013) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions.* Performance Audit Report. Office of the Auditor-General; Wellington.
27 Office of the Auditor-General (2015) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions – follow-up report.* Office of the Auditor-General; Wellington.

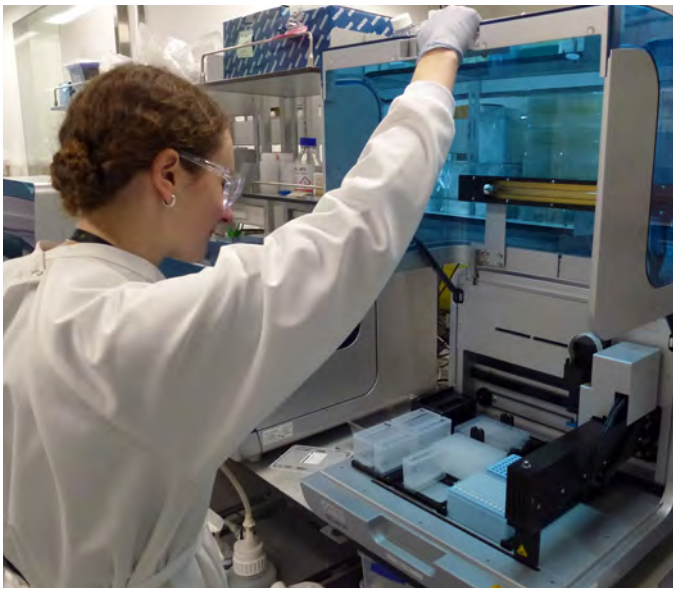
Introduction

Response decision-makers require access to timely and accurate information to effectively manage a biosecurity incursion response. In a biosecurity incursion, the need to provide the right information to the right person at the right time is crucial.

In recognising the importance of accurate information, and the framework required to gather it, the Review commissioned a "deep dive" into the current state of biosecurity information systems[28] as they were applied to *M. bovis*. This assessment provided recommendations on how to improve information systems for *M. bovis* and the biosecurity system as a whole. This information systems deep dive is attached as Appendix 4.

What should preparedness look like?

The OIE provides several guidelines relating to information systems best practice.[29] These guidelines cover surveillance, traceability and data management along with other areas. The guidelines, combined with the practical experience of the *M. bovis* Programme, have been used to help determine what a best practice biosecurity information system should look like.



28 See Appendix 4, Information Systems Deep Dive Report.
29 World Organisation for Animal Health. *International Standards.* https://www.oie.int/en/what-we-do/standards/. Accessed 29 October 2021.

This information was then used to compare against what happened and then form recommendations.

Farm demographic databases and traceability

To manage a response effectively, several pieces of information are required to be continuously collected as part of business-as-usual activities in "peacetime". These include, but are not limited to:

- farm location;
- farm owner or manager (and their contact details);
- livestock owner (and their contact details);
- farm boundaries;
- stock numbers, species type and location; and
- movement information of animals.

Operational information in a response

As well as these farm and livestock related data points, the operational activities of a response also require the efficient collection and storage of other pieces of data, including:

- legal notices issued and current status;
- farmer welfare status;
- laboratory information (eg, samples and test results);
- case manager identity and contact information;
- numbers and categories of animals affected;
- the size of the overall population at risk;
- task and activity tracking.

This information is used to track and trace potentially affected animals, assess the risk of disease exposure, and guide the operational activities of the response. It should be accurate, complete and readily accessible to perform response activities. It also needs to be easy to update when required.

Important attributes of a biosecurity information system include:

- reliable data collection and management processes;
- collection and reporting of information in a format that facilitates analysis;
- clearly defined and standardised procedures that follow the scope, performance criteria and desired outcomes, and are supported by the legal framework;
- networked information systems that contribute to effective decision-making.

The importance of high-quality, interoperable information and data was clearly outlined in the deep dive information systems assessment:

> *"Effective management of data and information, along with the proper leveraging of expertise, supports the formation of a common operating picture with which to make appropriate and timely response decisions."*[30]

Because "information systems" is a broad topic, the Panel considered the guidance around disease management from the OIE and FAO, and the testimony from interviews, to develop a series of core information systems themes. These themes form a framework that, if addressed, will have a material impact on the levels of future preparedness. The themes are as follows:

- interoperability;
- farm demographic databases;
- livestock traceability;
- management of operational information;
- availability of information.

Table 3.1 sets out how well the Programme performed against the above information system themes.

- Table 3.1: How well did the *M. bovis* Programme perform against these themes?

Elements of best practice for information systems	2017-18	2018-19	2019-Present
Interoperability	🔴	🔴	🔴
Farm demographic databases	🔴	🔴	🔴
Livestock traceability (cattle)	🔴	🔴	🟠
Livestock traceability (other livestock species)[31]	🔴	🔴	🔴
Management of operational information	🔴	🔴	🟠
Availability of information	🔴	🔴	🟠

Key: red is weak performance, amber is acceptable and green is good.

30 See Appendix 4, Information Systems Deep Dive Report.
31 Deer are also included in the National Animal Identification and Tracing (NAIT) system and can be expected to have levels of traceability similar to that of cattle.

Interoperability

Definition

Interoperability is the extent different information systems, devices and applications (tools) can access, integrate and co-operatively use data in a co-ordinated manner. This can be within and across organisations, and across regional and national boundaries.

The core building block of interoperability is a set of agreed, fit-for-purpose data standards. All other information systems need to be built on this baseline to simplify the interoperability and accessibility of information. Without this, the interoperability of the various systems becomes reliant on retroactive, temporary solutions. Where different databases with different purposes are used, their interoperability with overlapping databases needs to be seamless.

Interoperability is a crucial requirement in an area as diverse, fast paced and detailed as biosecurity responses. Ultimately, it is irrelevant how suitable the functionality is for each individual system if none of them can integrate with each other appropriately. As stated by the deep dive information systems assessment:

"All data and information and the systems that facilitate access to them need to be interoperable and consistently applied, thereby supporting a common, trusted view of biosecurity status."[32]

Assessing interoperability

The Panel commissioned the development of an interoperability maturity model to objectively assess the current level of information system interoperability (Table 3.2). Four attributes are used to determine the interoperability maturity level:

- procedures: what policies and procedures enable systems to exchange information;
- data: what information formats, data protocols or databases enable the exchange of information;
- infrastructure: what environment enables systems interaction; and
- applications: what set of applications enable information exchange, processing or manipulation.

Table 3.2: Interoperability – Maturity model levels

Level 4: Enterprise Desired	Level 4 is a top-level perspective that includes enterprise data models and procedures, where data is seamlessly shared among the applications that work together across domains in a universal access environment. The "virtual" workspace uses shared applications operating against an integrated information space. This level of interoperability would allow all participants from all sectors of the biosecurity response system to seamlessly share private and complex information. It removes the opportunity for duplication and enables better informed decisions.
Level 3: Domain	Level 3 is a domain perspective that includes domain data models and procedures where data is shared among the independent applications that may begin to work together in an integrated fashion. Systems and applications are interconnected but generally operate on a single functional set of data. This is where information moves uniformly between those involved in a biosecurity response and the meaning of the data is preserved and unaltered.
Level 2: Functional Minimum	Level 2 is the ability of independent applications to exchange and use independent data components in a direct or distributed manner among systems. Level 2 systems must be able to exchange and process complex files.
Level 1: Connected Current	Level 1 is physical connectivity providing direct interaction between systems. Level 1 systems have an established electronic link characterised by separate peer-to-peer connections; the interactions are between discrete systems. The receiving IT system does not necessarily need to be able to interpret the exchanged data, it must simply be able to acknowledge receipt of the data.
Level 0: Isolated	Level 0 is human intervention to provide interoperability where systems are isolated from each other. Level 0 systems need to exchange data or services but cannot directly interoperate.

32 See Appendix 4, Information Systems Deep Dive Report,

Interoperability – *M. bovis* experience

Information systems in the livestock sector have been designed for specific purposes, generally without consideration of interoperability. Some interoperability between systems used across the *M. bovis* Programme has been developed. For example, the Laboratory Information Management System (the laboratory reporting software used by MPI's laboratory) automatically sends sample results to the respective case in Tiaki (Tiaki is a purpose-built data management system for the *M. bovis* Programme, based on the Salesforce off-the-shelf customer relationship management software package). However, interactions between systems mostly require human intervention. The current state of the implementation of Tiaki requires a considerable amount of human input to collate, view and use information from different systems. For example, bulk tank milk testing results entered into Tiaki still require manual checking and updating by Programme staff.

Also, several issues have occurred with integrating various systems used across the sector. As one example, data transferred from MINDA (a herd management system owned by the Livestock Improvement Corporation and widely used in the dairy industry) to the National Animal Identification and Tracing programme (NAIT)[33] has previously resulted in corrupting of information stored in NAIT. This is an issue that still has not been fully resolved.

Many of the farm demographic databases currently used within New Zealand, the laboratory and response systems, and other farming-related sources of information have a different way of defining and categorising farms, their owners and managers, the livestock and its attributes. They record information in a different way or cannot integrate with each other. Even when complementary data categories exist, numerous difficulties have occurred in physically integrating the different systems used.

Information is provided to many of these databases on a voluntary basis, or for different purposes, meaning the data is usually incomplete and often out of date.

Considering all of the issues together, the overall assessed maturity level of the animal disease response system in New Zealand sits between Level 0: Isolated and Level 1: Connected.

Farm demographic databases

Before the outbreak of an exotic disease, it is vital for the biosecurity system to have access to accurate, complete and timely demographic information about the location of farms and livestock across New Zealand.[34] This includes farm boundaries, stock types, and owner and manager contact details. This demographic data supports disease surveillance activities and response planning.

Data integration may also provide the opportunity for other organisations, such as government agencies, councils and industry bodies, to use the information gathered for broader purposes. This is on the basis that appropriate consent is obtained and the protection of farmer privacy is maintained.

Farm demographic databases – *M. bovis* experience

New Zealand has no single comprehensive farm demographic database. The *M. bovis* Programme sought to use numerous systems as a source of information about farm locations and farmer contact information, including, but not limited to: FarmsOnLine, AgriBase, NAIT and the Animal Response Database. This disparate collection of systems, owned by several parties, was used for a various purposes including contacting potentially affected farmers, drawing up the boundaries for legal notices, and to help understand the potential risk regarding further spread of *M. bovis*. In the Programme, incomplete information, insufficient functionality, poor integration and inadequate information hampered decision-making and disease control. As one interviewee explained:

33 NAIT records the location and movement of individual cattle and deer between farms and other locations, and the contact details for the Person in Charge of Animals. The system is managed by OSPRI, a not-for-profit organisation owned by the livestock industries that is accountable to the Minister for Biosecurity. OSPRI also manages a national pest management plan to eradicate bovine tuberculosis in New Zealand.

34 Van Andel, M (2019) *Extrapolating incomplete animal population and surveillance data for use in national disease control: Examples from Myanmar and New Zealand.* PhD thesis, Massey University, Palmerston North.

"I remember turning up on one property and the owner had died 5 years ago, just as example of really bad information, and also systems that didn't allow for regular updates... (updates) didn't seem to happen very often... In those days with NODs, you were more likely to turn up with the wrong information, than the right information."

"The frustration of understanding animal movements, and kind of understanding what is on farm to start with, it has put us on the back foot in terms of this response, and if you're looking at something bigger, it would put us more on the back foot, or it would mean we'd have to hit it with a hammer, rather than a scalpel."

Livestock traceability

Inefficiency in tracing leads to more properties and animals being exposed to disease, potentially compromising a disease control and eradication programme. A system of tracing needs to be continuously active so that, should a potential incursion be detected, detailed movement records are already available to trace forwards to where the disease may have spread to, and backwards to establish where it came from.

Figure 3.1 shows the need for accurate tracing in New Zealand is especially pressing. The figure shows the movements recorded in NAIT for a single day (excluding animals moved to slaughter). It is worth noting not all relevant animal movements will have been recorded for that day. NAIT only records movements for cattle and deer, not all movements are required to be recorded and not all farmers record the movements that are required.

Livestock traceability – *M. bovis* experience

The *M. bovis* Programme relies on the NAIT system for tracing the movements of individual cattle.

Early in the response, disease control was hampered by incomplete NAIT movement records, due to poor compliance with reporting requirements. This deficiency resulted in a large amount of time-consuming manual tracing. NAIT compliance improved through the process influenced by a dedicated NAIT review (published 29 March 2019), followed by amendments to the 2012 NAIT Act in December 2019.

Enforcement of NAIT reporting requirements by MPI since 2019 is perceived to have strongly influenced the subsequently observed improvement in compliance. A large proportion of the Programme's public messaging has focused on the importance of maintaining good NAIT records. To encourage compliance with the system when the immediate commercial incentives for doing so are few, means an active enforcement regime remains essential.

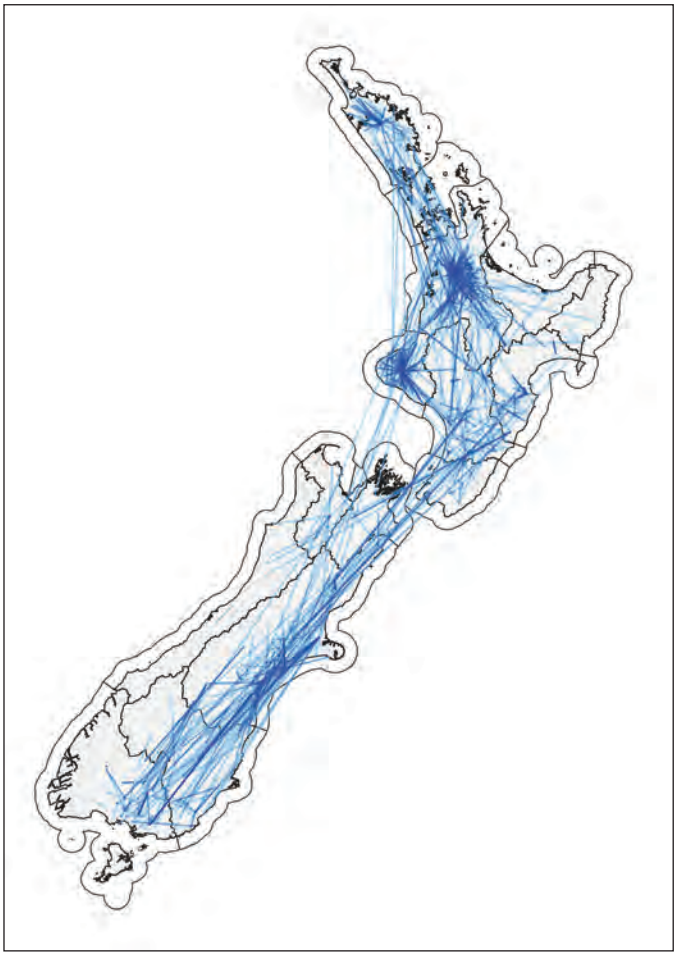


Figure 3.1: Non-terminal National Animal Identification and Tracing movements on 13 May 2021

Case for good data

The consequences of non-compliance with National Animal Identification and Tracing (NAIT) regulations observed by the Programme are outlined below.

An infected dairy farm with particularly bad record-keeping was detected through bulk milk surveillance. Forty-seven connected farms had to be placed under movement controls and a further 29 were subjected to testing without movement controls being imposed. The financial cost to the Programme of these downstream activities was over $850,000, with additional burdens placed on the affected farmers.

The NAIT programme requires farmers to register cattle, apply ear tags and record most movements of these animals between properties.

M. bovis is primarily spread between farms through the movement of infected animals. Having accurate and complete records of animal movements should make control and eradication relatively straightforward. The *M. bovis* experience showed and continues to show that, in many cases, records are not complete or accurate. Consequences of poor NAIT compliance include the following.

Inability to establish the source of infection: knowing a source of infection is important because it allows prioritisation of movement controls and narrowing of animal movements to follow up. Where the infection source cannot be established, the Programme adopts a precautionary approach, imposing movement controls and testing a much larger number of potentially infected properties. This increases the number of farms that require investigation, with accompanying costs and impacts on other farms.

Untraced infected animals: incomplete movement recording means infected animals are not traceable. Culling of these animals depends on them being detected using bulk milk tank surveillance or testing associated with other risk movements. This, at best, causes additional farms to be placed under movement controls and tested, which affects farmers and farming activity, and at worst can result in the unchecked spread of infection.

Requirement for on-farm census: farms identified as being at risk must be tested. Those farms require a census to obtain an accurate list of animals on the farm. This allows the identification of source properties for animals and the location of other trace animals. If NAIT records were routinely accurate, censuses would not be needed. The census process is inconvenient for farmers and particularly frustrating for those who do maintain good records. It is also costly for the Programme.

The Panel understands that the rate of compliance with NAIT has been steadily increasing since *M. bovis* was detected, following concerted efforts by MPI, OSPRI and industry organisations. The Panel believes this is a vitally important part of New Zealand's preparedness for any future incursion and proposes that broadening farmer awareness of the consequences of non-compliance should be a priority for MPI and the cattle industries.

Management of operational information in a response

A biosecurity response needs a system for managing response activities, containing information that is easily updated and widely accessible to response staff. This system should be able to integrate information from farm demographic and tracing databases, with accurate records of response activities that have occurred on farms, including their regulatory status, test results and information about relevant operational circumstances.

MPI previously had an information management system (the Incursion Response System or IRS) designed for use on large-scale animal disease responses. However, it became obsolete and was decommissioned a few years before the *M. bovis* outbreak. As one interviewee explained:

> *"The prior database that we had (the Incursion Response System)... was kind of never really used... one of the fundamental problems of an incursion response system is that if people aren't using it in their day to day job, it falls into disuse, in terms of it may work well, but nobody knows how to use it."*

Management of operational information in a response – *M. bovis* experience

The lack of a centralised information system for response management created issues for staff at the start of the Programme. Consequently, an improvised solution, the Animal Response Data Base (ARDB), was set up early in the response by MPI and AsureQuality staff. The ARDB incorporated farm-related information from AgriBase (such as spatial information, physical address, farm type, farm size, owner and key decision-maker and so on), combined with important operational response information (legal instrument status, boundaries, casing details, test results, animal movements from NAIT and so on).

The ARDB did not have the capability for detailed workflow and task tracking or the reporting required for the operational management of a long-term, complex biosecurity response. Nor were staff seconded into the response familiar with the ARDB, which was built at short notice and without much consideration of providing an intuitive user interface. New staff did not receive significant training or support in using the new database. These shortcomings became an increasingly pressing problem when the response activities scaled up. The lack of familiarity with the ARDB resulted in widespread use of ad hoc solutions (primarily spreadsheets) to fill functionality gaps. The lack of an information management system being used to track workflows was one of the main causes of the casing backlog (the "surge") between November 2018 and April 2019.

> *"There was nothing basically (when I arrived in the Response) it was spreadsheets, and that was partly how the problems that caused the "Surge" were able to occur."*

The *M. bovis* Programme introduced a new response information management system, called Tiaki, with Phase 1 launching in August 2019. Tiaki enables end-to-end workflow tracking, assignment and reporting, integration with various databases, as well as enabling various levels of access to different users. It does not currently have the functionality required for epidemiological analysis, which is now conducted elsewhere in an analytical data store.

Availability of information

Clear and effective communication of relevant information to affected parties also needs to be at the centre of an effective disease response. A common language must be agreed along with a set of expectations that allow access to information by stakeholders who use the information system.

Availability of information – *M. bovis* experience

Despite improvements, accessing information continues to be a challenge for the *M. bovis* Programme. This lack of

a trustworthy information source caused numerous issues for response staff and led to inefficiencies and errors in operational activities, particularly early in the Programme.

> *"One farm had stock killed under oral instruction from the ICP [Incident Control Point] manager. This ICP manager didn't document this and then left AQ and no records [were] kept. The farmer sought compensation for these animals, but there was no record of the notice to destroy the stock... We eventually found out the wrong stock were destroyed on the wrong farm."*

Various non-technical issues also presented barriers to appropriately sharing information. The Review received testimony regarding how perceived privacy issues (in particular) prevented Programme staff, industry partners and farmers from sharing or receiving relevant information. In some instances, it appears Programme staff were unsure what information could legally be shared and took an extremely precautionary approach. This sometimes resulted in external organisations and Programme staff being unable to provide adequate support to affected farmers.

Reflections

Farm demographic databases

The Review Panel considers that, if New Zealand is to be effectively prepared for a future fast-moving disease outbreak, a full and accurate list of all livestock farms (and relevant supporting information related to those farms) must be available. Clear responsibilities also need to be developed regarding who is responsible for updating and maintaining this information. Provision of information into a single database, or collection of interoperable databases, needs to be made mandatory, to ensure trust and confidence that data is sufficiently complete to be effectively used in a response.

Livestock traceability

While improvements in NAIT compliance are encouraging, the Panel is concerned that completeness and accuracy of the NAIT data is still presenting challenges for disease control, particularly because of the poor quality of older data in NAIT, collected when compliance levels were low. This information is still important for tracing activities. Poor tracing data presents a critical risk to the success of any future response to a disease incursion, especially if the disease in question is fast moving (such as FMD).

Another obvious shortcoming of electronic animal tracing in New Zealand is the limited range of species covered. Currently, it is only mandatory for cattle and deer movements to be recorded in NAIT. This means a large proportion of species susceptible to FMD commonly farmed within New Zealand (mainly pigs, sheep and goats) are not covered by a mandatory electronic tracing system.

The speed and scale required as part of an FMD response would need a comprehensive, accurate and streamlined electronic system for tracing movements of all main at-risk species. Work needs to be done to introduce practical ways of electronically recording movements of these animals. Well-reported issues about the electronic tags used in the NAIT system could potentially be exacerbated by any mandatory species expansion using this system. However, this may be avoided by using other tracing methods, for example, group level tracing, or emerging technologies.

The Panel is encouraged by recent moves by OSPRI to facilitate electronic recording of Animal Status Declarations,[35] which can potentially create a centralised repository of electronic movement records of sheep, goats and pigs. However, it is currently permissible to continue using the pre-existing paper-based system of reporting. Animal Status Declarations are also a provision under the Animal Products Act 1999, so are not necessarily tailored or available for use in a biosecurity response. For New Zealand to be appropriately prepared for an FMD outbreak, electronic tracing of affected species has to be made mandatory, and the information must be readily available to responders in biosecurity incursions.

35 Required to be provided under the Animal Products Act 1999 when food producing animals change ownership, to support official assurances about the safety and market eligibility of livestock products.

Along with these proposed enhancements, key performance indicators (for example, how many affected animals can be traced within 48 hours) also need to be developed to accurately assess the efficacy of the system. Further work needs to be done by MPI and OSPRI in this area for the desired state of preparedness to become a reality.

Management of operational information in a response

It is clear to the Review that the introduction of Tiaki substantially affected the day-to-day operations of the *M. bovis* Programme. Being able to accurately record, track and manage operational activities is vital to a successful incursion response. However, Tiaki is currently only customised to the needs of the *M. bovis* Programme, and the Panel understands MPI has not yet decided if it will adopt it for wider use.

> *"There is no response coordination system apart from Tiaki, which is still not fully commissioned and can only be used for M. bovis. In the event of an FMD or Xylella fastidiosa response (or any other major response) this would be a significant problem."*

Work is needed to determine whether any additional functionality is required to build on Tiaki (or an equivalent system), to generate a "common operating picture" including tables and maps of epidemiological data. Work is also needed to ensure Tiaki, or an equivalent, is suitable for use in all biosecurity responses.

Availability of information

A clear understanding of exactly what information sharing is allowed, and with whom, is essential for ensuring all affected parties can be given the information and support they need.

The Panel is concerned that privacy considerations, perceived or otherwise, hampered Programme staff, industry partners and relevant supporting organisations from communicating with affected farmers. One farmer commented:

> *"I was rung up, by whoever it was, to say that a neighbour had had an issue... so then we had to talk through that. That was a bit of a rigmarole, because (the person who made the call from the Programme) was not actually allowed to tell me who we were talking about, so the only way they could tell me was to clearly describe the piece of fence line and then ask me whether I felt confidence in that piece of fence line, whether it was stock proof or whatever."*

This issue, and its effects, was expressed to the Review in numerous interviews. It is clear that MPI and other system stakeholders need to develop a common understanding of what information can be shared in a biosecurity response, and how legal requirements around privacy and confidentiality can be met without impeding response operations. It is also important to remember that confidence in the preservation of anonymity is fundamental to encouraging early reporting of disease.

Role of Ministry for Primary Industries

MPI, as the lead agency for the biosecurity system, has the mandate to resolve these issues. As the information systems deep dive states, the biosecurity system needs to:

> *"Engage with biosecurity stakeholders, led by MPI, to design a strategic approach to data and information that emphasises and supports explicit governance and decision-making, data process and resource interoperability, operational agility and scalability, and fit for purpose data quality."*[36]

36 See Appendix 4, Information Systems Deep Dive Report.

Chapter 4

Capability & capacity

Purpose

This chapter outlines the capability and capacity requirements New Zealand needs to prepare for and respond to a range of biosecurity threats to animal health. The Panel looked at the capability and capacity issues that emerged during the *M. bovis* Programme and response, what improvements have been made, and assessed how these lessons can be applied to the requirements to respond to future biosecurity incursions.

Defining capability and capacity

The Panel has chosen the following definitions for "capability" and "capacity".

Capability the ability to perform a function or task.

Capacity the number of tasks or functions that can be performed, and ability to sustain this over time.

Both depend on the people, infrastructure, and systems available combining effectively.

What should preparedness look like?

This chapter draws on international guidelines to inform the design of best-practice capability and capacity required for preparedness and response to livestock disease incursions. The main sources for comparison are the FAO GEMP guide and accompanying GEMP checklist,[37] with additional references where applicable to the relevant OIE International Standard.

Preparedness should be recognised as one of the main functions of a country's biosecurity system. Preparation is required for all the subsequent steps in the disease management cycle to be effective. It is best practice to have:

- a national disease emergency planning committee;
- an established command structure and responsibilities;
- access to appropriate legal powers;
- agreed sources of funding;
- a compensation policy;
- available vaccines and other critical supplies;
- undertaken a risk analysis to identify and prioritise potential disease risks; and
- prepared, practised and refined contingency plans and operational manuals.

The Panel assessed these elements of best practice and has developed the framework in Figure 4.1. The Panel has reviewed documentary information and testimony from interviews and survey data to form a view of future capability and capacity requirements

OIE minimum requirements	People with skills and training in appropriate disciplines
	Laboratory capacity
	Simulations and exercises
	Plans
Leadership and management competencies	Response governance
	Response leadership
	Strategic communications
	Epidemiologists
	Maintenance and training
Critical capabilities	Ethos: shared mission, culture and values
	Industry and community relationships
	Information management and intelligence
	Farming and farming systems knowledge
	Logistics
	Systems

● Figure 4.1: Components of a capable and prepared response system

The Panel's view of the Programme's performance against this framework during the three stages of the *M. bovis* Programme and response was used to guide analysis throughout this report and is shown in Table 4.1. The assessment is not about the work or performance of individuals at any point. The assessment has been designed for the Governance Group's use, as it seeks to address the preparedness of New Zealand to successfully manage future biosecurity incursions. The Panel has been advised it is not the *M. bovis* Programme's role to conduct animal health disease simulations and exercises, so this area is not assessed (n/a).

37 Honhold, N; Douglas, I; Geering, W; Shimshoni, A; Lubroth, J (eds) (2011) Good Emergency Management Practice: The Essentials – A guide to preparing for animal health emergencies (2nd edition). FAO Animal Production and Health Manual No. 11. Food and Agriculture Organization; Rome.

Table 4.1: Panel's assessment of the Programme's capability and capacity performance

Elements of best practice for capability and capacity	2017-18	2018-19	2019-Present
OIE minimum requirements			
People with appropriate training	🟠	🟠	🟢
Laboratory capacity	🟠	🟢	🟢
Simulations and exercises	n/a	n/a	n/a
Plans	🔴	🟠	🟠
Leadership and management competencies			
Response governance	🔴	🟠	🟠
Response leadership	🟠	🟠	🟢
Strategic communications	🔴	🔴	🔴
Epidemiology	🟠	🔴	🟢
Maintenance and training	🔴	🟠	🟢
Critical capabilities			
Ethos: shared mission, culture and values	🔴	🔴	🟠
Industry and community relationships	🟠	🔴	🟠
Information management and intelligence	🔴	🔴	🟠
Farming and farming systems knowledge	🟠	🔴	🟠
Logistics	🔴	🟠	🟢
Systems	🔴	🔴	🟠

Key: red is weak performance, amber is acceptable and green is good.

Core minimum requirements (as set out in OIE International Standards)

Human resources – an OIE requirement

For animal disease preparedness and response, people capability significantly affects the performance of the organisation. Having the right people with the right competencies at the right time is crucial.

Many different skills are needed during emergency responses to a livestock disease. Some must be acquired in advance of a response, making the development of existing staff and recruitment of other skilled people essential during "peacetime". In other cases, expertise and labour may have to be found during the response. In either situation, the required skills need to be well-defined so suitable people can be obtained quickly.

Laboratory capacity – an OIE requirement

Laboratory services are needed to diagnose the presence or absence of disease for surveillance in peacetime and during responses to incursions. Contingency plans must contain details for increasing laboratory testing capacity during a livestock disease response, where the numbers of samples required to be processed can vastly exceed those required during peacetime. This capacity is best provided locally to get rapid results, provided testing can be performed accurately with the resources available. This may require contractual arrangements with suitably capable laboratories inside or outside of the country, and these should be in place in peacetime.

In New Zealand, diagnosis of exotic animal diseases is carried out by MPI's Animal Health Laboratory at Wallaceville, Upper Hutt, which serves as a diagnostic reference laboratory and does not routinely carry out high volumes of tests for a single organism. Consequently, the ability to scale up diagnostic capability rapidly in an emergency is required.

Plans – an OIE requirement

Plans for preparedness, contingencies, recovery and operational manuals should not be treated as static documents. They need to be regularly reviewed and updated as warranted by changing circumstances and technical knowledge. To help in this approach, documents should be prepared in forms that can be readily changed, and a document identification process should be used to track the progress of versions.

Simulations and exercises – an OIE requirement

Simulations and exercises are necessary for testing and refining plans, including the operational manuals (for example, standard operating procedures), in advance of any disease emergency. They are also an important method of building capability for emergency disease responses and for training individual staff.

The scenarios devised for exercises should be as realistic as possible, using real data where feasible (for example, about the location of livestock farms, saleyards and movements of animals between them). Exercise scenarios may cover one or more phases during the outbreak and various outcomes. However, neither the scenario nor the exercise should be overly complicated or long. It is best to test just one system at a time (for example, operation of a local disease control centre).

Simulations should involve officials and other stakeholders and may be done purely as a paper exercise, through mock activities, or a combination of both. At the completion of each simulation, a "post-mortem" should be held to review the results. This review should identify further training needs, as well as required modifications to the plans used as part of the simulation.

Leadership and management competencies

Response Governance

Governance of the *M. bovis* Programme is covered in depth in Chapter 1 of this report.

Response leadership

Leadership of responses to livestock disease incursions requires people who can understand and bring together the individual elements needed to manage the response effectively. Response leaders should be operationally focused and have the following capabilities:

- be familiar with biosecurity concepts and practices;
- have informal networks and be able use them;
- understand systems and be able to ensure they run smoothly;
- know how to get things done and provide solutions;
- know when to step back and fully diagnose a problem or situation;
- be able to delegate tasks and responsibilities and oversee a large team;
- bring outside stakeholders into the response and take the response out to stakeholders;
- lead from the front;
- be able to build trust among response staff and the wider community.

This type of leadership is often built from competencies and soft skills that have been gained, tested and developed through experience. Efficient livestock disease biosecurity response leadership requires skills beyond the level needed in less technical leadership positions. These skills need to be cultivated effectively ahead of time.

Strategic communications

The maintenance of support for a livestock disease biosecurity response among affected farmers, industry sectors and the wider community is critical to an effective response. It is, therefore, important these responses have access to experienced communications professionals, who are familiar with the New Zealand livestock sector and have expertise in crisis communications. These people can then effectively determine the strategic goals and direction of response communications. A strategic communications capability is required to ensure effective connectivity between parties in a response, to oversee the operational demand for outward messaging, and ensure the impact and effectiveness of the messaging, and appropriate reinvestment or course correction, is kept under active review.

Communications is discussed in detail in Chapter 5. It is clear, however, that the people involved in managing the operational activity of a response do not have time to reflect on how well the trust and confidence of the community in the response is being maintained. This is an important consideration for governance.

Epidemiology and disease management

Veterinary epidemiology is arguably the core competency in the context of livestock disease biosecurity responses. It is the study of the spread of pests and diseases among farmed animals. MPI has a small team of veterinarians with specialist epidemiological training based primarily at Wallaceville, Upper Hutt, making up the Biosecurity Surveillance and Incursion team. Their day-to-day work involves investigating reports of suspect exotic diseases from the public, overseeing ongoing surveillance and providing technical support to responses as required.

In the event of a response, epidemiologists perform multiple roles. They are principally concerned with the oversight of disease investigation, the collection and processing of samples, and the design of control measures. A further critical function is to analyse what the information from sampling and testing means in terms of the spread and control of the disease. Their work is central to response management.

Maintenance and training

In "peacetime", it is critical that systems and processes are developed and tested, and the skills, logistics and management structures required for successful responding are continuously maintained and improved. This also involves ensuring a professional team of adequately trained staff are in place who understand their roles and can operate effectively together to manage a response.

Retaining existing staff and developing the pipeline of skilled people required so the next response will have the ability to be established effectively is critical to preparedness.

Capabilities that underpin an effective response system

Ethos, shared mission, culture and values

Critical professional skills need to be maintained and valued if New Zealand is to have an appropriate foundation to respond effectively. It is important to recognise that the ethos, values and abilities of people who are professionally skilled in the management of livestock diseases may be quite different from those who deliver protective services, or those who specialise in data analysis. All are needed, and all share a deep commitment to protecting New Zealand, but it makes sense to recognise and respect particular domain knowledge.

Industry and community relationships

Chapter 5 discusses the need for trusting relationships in a response. It is critical that key relationships are in place and have been tested before a response is declared. Strong previous relationships make it much easier to undertake an effective response.

Response management depends on having a relationship culture that facilitates voluntary reporting of issues and problems. Good livestock industry and community relationships also allow the people responsible for maintaining preparedness to understand where skills and expertise lie within regions and communities, making it easier to access services and personnel when required.

Information management

Because Chapter 3 discusses the information system needs of responses to livestock diseases in detail, they are not repeated here. However, it is important to recognise the need for trained and experienced personnel to operate any information management system. Issues of information flow became apparent early in the response. The need for effective information management during responses, when volume and urgency are high, is significant.

Farming and farming systems knowledge

Farming (or forestry or fisheries) knowledge is not a necessary requirement for most roles in MPI, but this competency is required within the Ministry as a whole and, more particularly, within Biosecurity New Zealand. Technical knowledge of farming systems is a critical capability for effective operational activities.

Logistics

Logistics refers to the services, equipment and "hardware" needed to conduct a biosecurity response. Given the vast number of potential incursions, it is clearly unfeasible to maintain stockpiles of equipment to cover every contingency, or to pre-position them around the country. At best, MPI and sector groups need to identify the risk posed by the high-impact pests and invest where necessary to manage this.

If response stores are purchased, it is critical they are monitored and replaced as their use-by dates approach, where applicable. This requires a logistical structure that has oversight and responsibility for biosecurity stores, with an identifiable point of accountability.

For high-impact incursions, particularly those involving fast moving livestock diseases, it is appropriate to develop a logistics plan specifying the quantities of resources needed, where they will be obtained from, delivered to and by whom. Beyond this, the most effective means of preparation is ensuring purchasing systems are fast and flexible enough to quickly order urgently needed materials and have them delivered within acceptable timeframes.

Human resources

It takes many years to develop personnel with the skills, experience and ethos needed to meet the demands of a livestock disease biosecurity response. Response personnel may be required to perform their duties in extremely difficult situations. They must also be able to build trust, negotiate and cope well with ambiguity.

Exercises and simulations

New Zealand has undertaken a series of preparedness exercises and participates in exercises managed by partners. Table 4.2 lists relevant exercises that have occurred in the previous 10-year period. The list is not intended to be comprehensive and focuses on the animal disease-related activities undertaken over the past decade. Exercises that test the whole system (for example, information technology, chain of command, roles and linkages) appear to be infrequent, and no indication can be seen that exercises involve field operations and function-specific requirements. It also seems little emphasis has been placed on testing traceability and tracing systems, while these are generally of major significance in a response to a livestock disease incursion.

● Table 4.2: Exercises relevant to New Zealand's preparedness for livestock disease incursion responses

Year	Exercise	Objective
2012	Taurus II	Large-scale foot and mouth disease (FMD) response simulation, including field activities
2014–15	Odysseus series of exercises in Australia	Ministry for Primary Industries (MPI) sent observers
2014	Exercise Bodkin	Desktop – review of Incursion Response System (IT package)
2014	All-of-government FMD seminar	One-day workshop with government agencies to discuss FMD and capabilities
2014–15	Exercise Aquarius/Scorpio	Tactical exercise for National Biosecurity Capability Network staff using an FMD narrative (100–150 participants)
2015	Exercise Orion	Epidemiology training and testing of tools
2015–16	FMD carcase disposal planning	Develop and test operational plans with key regional councils and other stakeholders
2016	FMD vaccine drill	Test importing and distribution arrangements
2016	FMD workshop	MPI and meat industry planning to address stock in transit in event of FMD
2016	Exercise Akuaku	On-farm validation of disposal, destruction and disinfection plans
2017	Exercise Taurus III (cancelled)	Major FMD simulation – cancelled due to diversion of resources to *M. bovis*.
2019	Whakatau Korero	Multi-agency government and industry event (workshops plus exercise) to refine FMD planning

Note: This does not include livestock industry-run exercises over the same period.

Follow-up activities in relation to exercise findings are also unclear. Exercise Bodkin is understood to have concluded that MPI's Incursion Response System (a data management system for responses) needed to be

upgraded, and staff were largely unfamiliar with how to operate the system. These issues do not appear to have been addressed before *M. bovis* was detected, and the system had already been decommissioned.

The Panel considered the recommendations from reviews that undertaken of New Zealand's preparedness.

- OAG 2002, Ministry of Agriculture and Forestry: Management of Biosecurity Risks (final report and Case Study 7 FMD preparedness);[38]
- OAG 2013, Ministry for Primary Industries: Preparing for and responding to biosecurity incursions;[39]
- State Services Commission, the Treasury and the Department of the Prime Minister and Cabinet 2013, Performance Improvement Framework Review of the Ministry for Primary Industries;[40]
- OAG 2015, Ministry for Primary Industries: Preparing for and responding to biosecurity incursions – follow-up report;[41]
- Martin Jenkins 2020, Biosecurity New Zealand Response System Review.

All the reports noted persistent issues with recommended improvements being crowded out by business-as-usual requirements. Pressure from responding to new incursions was taking precedence over learning from previous experience, and ensuring systems and processes were being progressively updated. The reviews reveal a pattern of reduced capability over the past 20 years. In 2002, the Auditor-General's review found that New Zealand was well placed and undertook a programme of annual exercises. Recommendations focused on preparedness and maintaining consistency across biosecurity.

By 2013 and 2015, the reviews point to gaps in the system, initiatives and recommendations being started with good intentions but being deprioritised due to competing alternative demands.

It is notable that, when *M. bovis* was detected, it had been five years since the most recent large-scale FMD exercise with a significant field operations component.

A major exercise was planned for late 2017 but this was postponed due to the demands of the *M. bovis* response.

Given that FMD has been identified as the single largest biosecurity threat to the New Zealand economy, this seems a low level of simulation activity.

> *"I think the simulations are a useful exercise. It sounds like good management, but it was good luck – we did one in November 2019 around a pandemic. We learnt some things from that exercise that we definitely applied. So, I think you can never be over prepared."*

Observation of *M. bovis*

Response Governance

Chapter 1 discusses governance issues in detail.

Leadership of the *M. bovis* Programme and response

Best practice requires New Zealand to have a team of effective and experienced leaders to draw on to manage responses. This would allow New Zealand to manage simultaneous responses or to manage an extended livestock biosecurity response by rotating key personnel through the most important roles. This reduces the risk of loss of business continuity and harmful effects on the wellbeing of staff associated with burn-out.

The role of leader of the response and Programme was a particularly high-profile and demanding role. It had broad responsibilities, including leading a rapidly expanding programme, dealing with media enquiries, fronting farmer meetings, reporting upwards to MPI leadership and liaising with industry partners. The Panel observes that the frequency of rotation of staff in this role was insufficient, given the magnitude of its requirements and the high-pressure operating environment.

38 Office of the Auditor-General (2002) *Report of the Controller and Auditor-General – Ministry of Agriculture and Forestry: Management of Biosecurity Risks.* Office of the Auditor-General; Wellington; Office of the Auditor-General (2002) *Management of Biosecurity Risks: Case Studies – Preparedness for an Outbreak of Foot and Mouth Disease.* Office of the Auditor-General; Wellington.
39 Office of the Auditor-General (2013) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions.* Performance Audit Report; Office of the Auditor-General; Wellington.
40 State Services Commission, the Treasury and the Department of the Prime Minister and Cabinet (2013) *Performance Improvement Framework: Formal Review of Ministry for Primary Industries.* State Services Commission, the Treasury and the Department of the Prime Minister and Cabinet; Wellington.
41 Office of the Auditor-General (2015) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions – follow-up report.* Office of the Auditor-General; Wellington.

This suggests MPI may not have had a sufficiently large pool of suitably qualified response leaders to allow for rotations in and out of the lead role, to provide opportunities for rest and recovery. The Panel believes that response and Programme leadership was not adequately supported by the three response partners.

The Panel is not aware of specific efforts within MPI to recruit, train and mentor a flow of dedicated response leaders. It appears the assumption is that people with a range of skills related to incursion responses would organically develop skills and experience and "grow into" leadership roles.

This may be the case, but it relies more on chance and good fortune to produce the right number of people with the right skills at the right time. Consideration needs to be given to developing a recruitment and training "pipeline" specifically aimed at producing a new generation of response leaders.

Epidemiology and disease management

Initially small, this team provided the main technical capability during the first year of the response and assisted in communicating the "science" of *M. bovis* to farmers and the wider public. It presented at around 50 regional workshops in the first year, which is a significant undertaking. This is reflected in feedback from team members

> *"There was a finite number of people with the technical skills. There was no opportunity to upskill other people as (Incursion Investigation is) a technical role. There was finite epidemiological knowledge. After 9 months (of responding) they were burnt out. No one could come in and pick up – there was no reserve capacity. We're not the only country that has that problem – UK has capacity built in, but it's a big commitment."*

After a year, the members of MPI's specialist Biosecurity Surveillance and Incursion team were exhausted and felt their normal day-to-day roles were being neglected. Their managers felt they did not have the capacity to continue providing technical stewardship to a rapidly expanding eradication programme. This group largely withdrew from active involvement in the *M. bovis* Programme, leaving a substantial capability gap.

To fill this gap, various technically qualified contractors provided epidemiological support to the Programme from mid-2018 until around mid-2019. However, no close working relationship existed between these technical specialists and Programme leadership. The result was that the epidemiologists were unable to guide the direction of the response and became deeply siloed.

The risks of this approach were not fully appreciated until early 2019, when it became clear a large backlog of farms requiring further investigation had built up.

An ex-DEFRA[42] veterinarian with substantial leadership experience was recruited in mid-2019 to lead a newly formed disease management team, supported by relatively inexperienced yet capable and well-qualified epidemiologists. This has been credited by many interviewees as "turning around" the effectiveness of the Programme and shows the importance of having the right technical competencies and management skills in key roles.

Information management and intelligence

M. bovis highlighted shortcomings around information management in the pastoral farming sector as it relates to biosecurity. Chapter 3 details these issues in depth, building on the deep dive information systems review conducted by the Office of the Chief Data Steward (Appendix 4).

The Panel found that the absence of a specific "disease control and epidemiology" function in the CIMS model meant this function was slotted into the organisational space normally occupied by the Intelligence function. This meant the tasks of collecting and analysing data about the Programme's performance (rather

42 MPI's UK equivalent, the Department for Environment, Food and Rural Affairs.

than the disease outbreak, which is the role of the epidemiologists) that would normally be carried out by an intelligence team were not adequately managed, because the epidemiologists had neither the capacity nor training to carry out this work. An intelligence specialist was recruited from outside the biosecurity sector in late 2018, and an intelligence function established within the Disease Control team in early 2019. The mid-2019 "reset" saw a separate intelligence team being established reporting to the Programme Director.

Communications

Chapter 5 details the issues associated with the communications function. The Programme's communications capability developed over time to where it can now publish key messages and respond to day-to-day communications issues that may stem from media, social media or public enquiries.

The Panel has observed that a strategic communications capability was never deployed to build a background level of support for the *M. bovis* Programme. The eradication of *M. bovis* is a national strategic goal that required a strategic communications capability to support it. Despite this, the Review found no evidence of capability to create a master plan that would have infused operational communications efforts with an appropriate agenda. Following the decision to attempt eradication, some interviewees noted that communications were focused on day-to-day operational matters, while the overall objective and rationale for eradicating *M. bovis* were not continually reinforced.

The Programme requires a sufficiently well-resourced strategic communication capability that can provide the high-level messages necessary to support animal biosecurity responses, develop the support of communities for biosecurity and develop an understanding of the parties involved. Relationships with industry organisations and their own communications staff need to be maintained on an ongoing basis to ensure biosecurity is understood and owned by all. Communications depend on the development of relationships between MPI and the wider sector.

The communications capability also needs to be appropriately linked to response management and governance, so messaging can be quickly developed, approved and released. The need to have communications material reviewed and approved by multiple levels of management early in the *M. bovis* Programme hampered the ability to respond promptly to developments on the ground.

Farming and farming systems knowledge

Understanding livestock production systems is a fundamental requirement at all levels of response management and operations, including determining compensation. It provides essential context and an appreciation to participants about the value, practicality and appropriateness of activities that may be required, and the plans and policies needed to implement them. Familiarity with farming also makes response staff more confident in dealing with farmers and means they are more credible at first impression, thereby engendering trust and confidence.

At local disease control centres, access to liaison and other operational staff with farming and, in particular, local knowledge, allows for more effective problem solving, communications and stakeholder engagement. It was observed in *M. bovis*, at both field and regional level, that many vets have a strong knowledge of farming systems developed in their professional careers working in rural practices.

The Panel notes that the lack of knowledge about farming systems among field staff was one of the most frustrating aspects of the response for farmers to deal with. In the early stages, experienced MPI vets and AQ field staff with farming knowledge were used to manage affected farms but, as the numbers grew, more staff were recruited to meet the growing need. Attracting capable staff with farming experience into temporary, relatively lowly paid response roles in the regions, in a tight labour market, became a significant challenge. In many cases, the urgent need to recruit the numbers of people trumped the need to have the right people with farming knowledge.

In 2018, it was recognised that increasing numbers of farmers were having particularly bad experiences with the Programme, so a dedicated recovery and welfare team was established. This comprised staff from across MPI, AQ and the industries with solid knowledge of pastoral farming and whose role it was to help farmers "manage through" the impositions of the Programme. In time, all affected farms would have the option of a recovery plan providing for a structured return to normal operations (where desired).

> *"MPI needs to appreciate the value of [a] well-trained field force and fund and manage it to good effect. This has been lost over the years."*

As a partnership, the Programme also benefitted from the direct input of industry partners, where DairyNZ and Beef + Lamb New Zealand provided staff and/or identified capable farm systems experts who were directly involved in response operations at the regional level. At the National Disease Control Centre, industry partners maintained a full-time presence, advising on communications, policy and the Programme's development. The Panel notes that the relatively small size of this presence, when compared with the number of MPI officials, meant the Programme has always looked and felt like an MPI undertaking rather than a shared endeavour. The Panel observes that the more industry staff are involved in disease control programmes, the more farmer-centric they are likely to be.

The *M. bovis* response highlighted that MPI had relatively few people with a strong understanding of farm operations and systems, and the ability to interact in a confident way with affected farmers. The value of industry liaison staff has been significant in this regard, but the ability to maximise the benefit has been constrained by their limited numbers.

Maintenance and training – developing preparedness

The Panel notes that preparedness and training are critical functions. The Panel also notes the many initiatives over the years to build systems and develop the response manuals to support effective response activities.

It is clear from studying previous recommendations from reviews that these initiatives have consistently petered out. Systems and processes were set aside and forgotten, and training deprioritised.

Training MPI staff to undertake secondary roles in an incursion response appears to have focused heavily on preparing to participate in the CIMS structure. While completing a short course or online training module may help a person understand how CIMS should work, it is of limited value when responding to a livestock disease outbreak.

Laboratory services

Laboratory services are essential for an effective response to a livestock disease outbreak. These are discussed below as a separate function, rather than being divided into human resources and materials. A laboratory can only function with both sufficiently trained staff and the equipment and materials they need to carry out the necessary diagnostic tests

Laboratory services during the M. bovis *Programme*

- MPI's Animal Health Laboratory (AHL), as New Zealand's reference laboratory for suspected exotic pests and diseases of animals, routinely tests relatively small numbers of samples for a wide range of organisms.
- The *M. bovis* response required AHL to scale up from performing 1,000 to 2,000 business-as-usual (BAU) samples per week to overseeing a programme testing 10,000 to 20,000 *M. bovis* samples per week on top of its BAU testing.
- This required expanding AHL capacity and contracting other laboratories to take over the more routine testing.
- The scaling up of laboratory capacity and rapid development of genomic testing would not have been possible without the high calibre of technical staff at AHL and their close relationships with other laboratories in New Zealand and overseas.

During the *M. bovis* response, the Animal Health Laboratory (AHL) needed to develop the capability for testing large numbers of samples for a single organism, while continuing its other diagnostic work.

This was initially achieved through purchasing and hiring more equipment (for example, ELISA plate readers), streamlining processes, and seconding and hiring more staff. Two dedicated *M. bovis* diagnostic teams were set up in late 2018 so other diagnostic work could continue without undue interruption.

Early in the response, experienced staff were seconded from Crown Research Institute laboratories and brought in from counterpart labs in Australia, under the International Animal Health Emergency Reserve. The calibre of these staff was high, and they were a valuable technical resource, but their visits were not long enough (typically two weeks) for them to be a significant source of additional labour.

The more repetitive nature of *M. bovis* testing meant recent graduates and "generic" lab technicians could be trained to effectively carry out testing, once processes were developed.

An AHL specialist toured regional offices to train field staff in sample labelling and handling, and this helped raise the quality of samples received.

AHL initially trialled two commercially available ELISA test kits and ordered the better-performing one. High demand from New Zealand resulted in the supplier reformulating the kit in mid-2018, meaning the previous validation no longer held. Revalidation showed performance of the new test kit performed worse under New Zealand conditions. Fortunately, AHL specialists were aware through industry contacts of a recently developed third option being commercialised, and trials on pre-production samples showed it was superior to the alternatives. Since August 2018, New Zealand has relied on this new test kit.

From early 2018, AQ was contracted to take over the bulk of ELISA testing, with AHL assuming a training and quality assurance role as well as confirming all positive samples. This sub-contracting was possible

because the testing could be carried out at lower levels of biocontainment, unlike some exotic diseases. In November 2020, the private SVS veterinary laboratory began carrying out ELISA testing on blood serum samples from beef surveillance. The industry-owned MilkTestNZ laboratory also carries out mass *M. bovis* screening, as part of a surveillance programme on routine milk samples submitted to dairy companies.

MPI's laboratory has been the primary provider of polymerase chain reaction (PCR) testing used by the Programme to confirm suspect samples.

Genomic analysis began in late 2017 with 16 samples from the original cluster. Despite no established protocols, the work quickly confirmed the samples were all closely related, pointing towards a single recent introduction.

PCR-positive swabs are currently sequenced at AHL for initial genotyping. The information is then passed on to specialised teams at Massey University and the University of Melbourne who use different modelling approaches (SCOTTI, BEAST) to assess the relationships between new samples and the existing "family tree" of New Zealand *M. bovis*. Taken together with tracing data, this can suggest routes of infection and indications of when different properties became infected.

AHL experienced challenges with managing data and information flow, because systems were not set up to manage the scale of the work. Tracking of samples and reporting of results were manual processes and therefore time consuming, with a risk of human error. This has been an ongoing drain on resources.

Logistics

The *M. bovis* Programme was conducted using readily available materials. These were sourced from veterinary suppliers (sampling equipment), workplace safety suppliers (personal protective equipment) and industrial chemical suppliers (cleaning and disinfection chemicals).

Only the testing laboratories needed highly specialised equipment, and some capital purchases were made by MPI to assure the increased throughput could be maintained.

New Zealand has become the major global user of *M. bovis* ELISA test kits. Once a preferred test kit was selected in 2018, a supply contract was signed with the manufacturer.

Structures and processes

Having effective structures and processes in place is an important part of building capacity and capability. Structures and processes are discussed in Chapter 2 and the material covered is not repeated here.

Building capacity

Within MPI

MPI has a headcount of over 3,000 permanent staff. Arrangements are in place to second staff into major biosecurity responses, and scope is available for this to be significantly expanded. However, two requirements are needed for this to be effective:

1) It must be built into the capability planning of the wider organisation that staff are available to participate in responses as required, and staff and managers incentivised to make this an opportunity for those staff who wish to participate.
2) Staff who are identified as available for responses must receive comprehensive role-based training so they can "hit the ground running" when called into a response. They need to be involved in regular refresher training and participate in exercises and simulations to build familiarity and confidence with response processes and personnel, not just provided an with overview of the response framework.

Panel reflections

The Review observed that the *M. bovis* response showed that the standard human resources and recruitment processes MPI maintains, while suitable for servicing a large ministry, are not agile enough to support the increase of resources needed in an emergency. These processes must be sufficiently flexible to change or

terminate arrangements in keeping with the needs of the response. The existing processes need to be streamlined so they can operate functionally in the fast-paced environment of a response.

The Panel observed that in some equivalent government organisations, the assumption is that staff will hold a secondary response role in addition to their "day job", and staff time for training is allocated accordingly. Even without going to these lengths, there is scope to involve more MPI staff in response preparedness.

"Lack of MPI staff with a sound understanding of MPI systems. I often seemed to be the only MPI person that has been with MPI any length of time and could quickly help new staff through the complexities of MPI and allow them to get on with their more specialist role effectively."

Whole of government

Assistance from other government agencies in the management of a large-scale biosecurity threat is an essential part New Zealand's all-risks approach. However, that support is likely to be variable and only forthcoming in the event of a major incursion with significant economic or human health effects. While the New Zealand Defence Force contributed some planning staff, and advice was received from agencies such as the National Emergency Management Agency with specific competencies, MPI noted a lack of willingness from most agencies to provide seconded staff. This may possibly have been because *M. bovis* was not deemed a higher priority than the business as usual work being carried out by other departments.

"The response could also have benefitted by being supported more at a higher level and at all levels across SOEs [state-owned enterprises] with an All of Government approach to release staff with the right competencies to support the Programme."

This was mirrored at the 2019 FMD table-top exercise, Exercise Whakatau Korero. The exercise evaluator reported that the level of awareness to achieve the requisite response capacity remains a problem.

"It was disappointing that representatives of other agencies were not sufficiently aware of the threat a significant biosecurity incursion would pose for New Zealand at all levels of society. There was no evidence that their agencies as yet had in place readiness plans, nor that they had assessed the probable impact on their agency's domain of influence and the possible challenges to their agency's business continuity capability during a FMD emergency response."

Contracted service providers

In the New Zealand biosecurity system, MPI relies on service providers for most operational delivery functions. From 2009 to July 2020, this was primarily delivered by AQ, via a master services agreement with accompanying statements of work specifying what would be delivered in relation to different responses.

During the *M. bovis* response, challenges in the relationship between MPI and AQ emerged in several areas. While these are referenced elsewhere, it is worth mentioning them specifically here. These challenges included:

- insufficient detail and lack of performance criteria being included in statements of work;
- difficulties in communication from response management in Wellington to field personnel because of dual chains of command for AQ and MPI staff in field offices;
- difficulty in recruiting short-term staff with the requisite skills and experience;
- stretched management capability in AQ because of the scaling-up of the response, meaning some sub-contractors (for example, in cleaning and disinfection) appeared not to have been adequately trained and supervised.

"Managing the 'statement of work' with AQ took at least 2 days per week. Contract arrangements were ambiguous, with no penalty clauses, specifications unclear."

"Much urgent work was done by AQ, but statement of work didn't clearly define scope."

As part of the restructure implemented by November 2020, the Programme brought several services previously delivered by AQ in house, which in many cases involved directly employing staff previously employed or subcontracted by AQ.

In July 2020, MPI announced it would modify its response arrangements and end the single-source arrangement with AQ. Instead, a panel of five response providers (one of which is AQ) was appointed. MPI's intention is to pre-contract some response work specifically with different providers and have a contestable approach to bidding for response work.

Panel reflections

The Panel has not received detailed advice from MPI on how these contracting arrangements will work. Potential risks would appear to be in timeliness of response, if a bidding process must be followed, and the potential for suppliers not to invest heavily in developing response capability given the lack of certainty that they will secure regular work from MPI.

The Panel recognises that AQ staff managed some highly challenging parts of the Programme, and many of their staff were highly regarded by MPI, industry organisations and farmers.

Industry partners

Under the GIA, industry groups partner with the Crown to jointly manage the risk of biosecurity incursions where they agree their interests are affected. In return for joint decision-making rights, industry groups agree to contribute funding and personnel to these responses. Industry partners have staff with detailed sector and industry knowledge, and some also have technical skills valuable to livestock disease biosecurity responses. It is unclear to the Panel to what extent industry organisations are integrated into MPI response training programmes.

"Part of our preparedness is to work out what we will do in a response. The next step that flows from that is to assess our plan and question how well trained are the people in the designated roles – do they need training etc?"

Industry partners have played a significant role in the *M. bovis* Programme after the decision to eradicate in May 2018 and signing of GIA agreements in June 2018. However, the number of staff contributed has been relatively modest compared with the size of the Programme. An issue many industry secondees have mentioned is the expectation that they will continue working on their BAU jobs. This has led to high individual workloads and stress levels and reduced the degree of industry input into the Programme.

When an industry group commits to a GIA, greater recognition is needed of the potential for staff to be called on in a response. Systems and processes need to be in place to allow people seconded into a response to focus on that role, with their "day job" responsibilities managed elsewhere within the industry organisation.

"...[we weren't] awfully useful for M. bovis because we tried to deliver all of our BAU at the same time as doing M. bovis and so a key thing that has come out of this is that you need to do a bit more thinking. We used to have the mindset if you were prepared for FMD you would be squared away for anything and that's not what's happened. There is a bit for us to think about there. I believe there is scope for us to have more training across the organisation in biosecurity."

Panel reflections

Many interviewees noted that the Programme could have made greater use of existing rural professionals, such as veterinarians and farm advisers, who had existing knowledge, credibility and networks of contacts. By way of example, the DBCAT compensation advisory service was based on experienced farm advisers contracted part-time to help farmers with compensation claims. This service has generally received high praise from farmers who used the service, and it is considered to have helped in making the compensation process far easier for farmers to navigate. The recovery team was also successful in recruiting people with a rural background and professional skills.

"There has to be that trusted network of people who you can call on and who will drop their stuff and be available and know what to do and provide rural intelligence, because this is the bit we did struggle with in those early days."

Finding additional capacity

Other sources

Biosecurity response planning was heavily influenced by FMD, and assumptions about a pool of workers, for example, employees from meat processors, becoming available to the response following major disruption to exports did not eventuate in the *M. bovis* response.

Both MPI and AQ were able to establish an initial response from dedicated response staff and people pulled in from other parts of their respective organisations. The response to *M. bovis* quickly grew beyond a scale where this was possible, and large numbers of external staff had to be recruited, generally on short-term contracts.

"We had to bring on a lot of people because we were up to about 250 at the peak. AQ has about 1700–1800 people in New Zealand normally and all of those people have a day job. We have a core Biosecurity team of 10–12 people who were mostly available to do this work. We did use some of our own staff, contractors and industry people as well. There was a range of places people came from."

Panel reflections

The lack of familiarity with farming practices was raised in almost all interviews with affected farmers and appears to have had a significant negative impact on farmer confidence in the Programme. This factor seems not to have been fully appreciated by MPI in response planning.

"Really good people working in the response with the right attitude and smart, but without the understanding of the industry and the context, dynamics and human behaviour that goes on in those industries."

On-farm delivery

As the Programme grappled with implementing new requirements, value for money was not always achieved. This was visible to fiscally prudent farmers and became a source of concern and frustration. While independent assessments[43] of budget expenditure have concluded that, in the main, costs incurred were appropriate, stories about inefficiency circulated among the farming community undermining confidence in the response.

A Southland farmer commented

> *"It took over two months from the last stock leaving until cleaning got started. The contractors would turn up in vans from Canterbury about 3pm on Monday, work for an hour then go to town for the night. After three pretty average days, they'd do an hour or so on Friday morning then go back home for the weekend."*

Another farmer stated

> *"The cleaning process was a joke. They had four people cleaning three troughs a day – you could make plenty of new ones in that time. The system was hopeless... nobody wanted to listen to me when I tried to tell them this."*

Building new capacity

Skilled networks

Critical skills likely to be needed in a large animal disease outbreak need to be identified as do the people who are best placed to contribute to a response. International experience suggests a focus of readiness and response should be on identifying professionals who already have the broad skill set required and providing incentives for them to join a "biosecurity reserve".

Benefits should also be provided for targeted personnel , such as paid professional development, networking opportunities with peers, and status from association with a response capability. In return, they must commit to making themselves available for specified periods when needed for a response. The focus should be on named individuals who can receive training on an annual or biannual basis, participate in simulations and develop a relationship with MPI's response professionals and other colleagues undertaking similar roles.

Panel reflections

In the years preceding the *M. bovis* Programme, an attempt had been made by MPI (via AQ) to develop a National Biosecurity Capability Network (NBCN). This would theoretically identify pools of staff with appropriate skills in other organisations and make them available in the event of a major incursion. Memorandums of Understanding were signed with several organisations, and some high-level joint training exercises were held. However, it is unclear to what extent any field staff were trained. The NBCN was not used to any significant degree during the *M. bovis* Programme, possibly because the capability had not been sufficiently developed.

A 2013 report from the Office of the Auditor-General noted:

> *"3.7 The National Biosecurity Capability Network is a sound idea but, after three years, has not yet delivered what was envisaged. There are opportunities to reconsider how this, and the Ministry's arrangements with AsureQuality, should work in future."*[44]

The Panel believes the concept of the NBCN is sound and represents perhaps the only feasible way New Zealand can build and maintain the level of response capability necessary for an FMD response. It is unclear if recent changes to partnering arrangements for biosecurity readiness planning and response service provision satisfactorily consider these requirements.

43 As addressed in Chapter 1, Governance and leadership.
44 Office of the Auditor-General (2013) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions.* Performance Audit Report. Office of the Auditor-General; Wellington, p 23.

Chapter 5

Trust & confidence

Purpose

This chapter covers the way the Programme sought to communicate, both externally and internally.

It describes what a best practice engagement framework looks like and assesses the Programme against this framework. It also looks at the resultant impacts of the Programme on the trust and confidence of affected parties, staff and the wider community.

Why does communication and engagement matter?

Animal disease emergency responses directly affect people in highly stressful ways. An animal health response involves the use of emergency control powers, the restriction of activity and the destruction of property. A response will have large impacts on the people directly affected, the people who work on the response, and the wider community in which the response occurs.

Effective communication and engagement is critical. It performs various functions:

- It forms a constructive relationship with a farmer to explain what will happen, in a timely and factually accurate manner.
- It engenders trust by explaining why the actions are being undertaken.
- It maintains confidence by showing people that:
  - they matter; and
  - the response is well managed and will succeed.

The amalgamation of these functions is what creates effective communication and engagement. It is not enough to be transmitting information, even if it is accurate, if it is not expressed in ways that the audience recognises as authentic to them. It will not maintain trust or confidence if it is not nested in a shared belief in the goals of the programme. It provides the foundation for a successful response.

Developing preparedness through communications and engagement

The Panel was provided with information on international guidance to managing effective communications. The Panel looked at:

- the FAO Good Emergency Management Practice: The Essentials, advice on planning relating to communication and community engagement;[45]
- International Standards Organisation (ISO)[46] and the British Standards Institute (BSI)[47] standards related to crisis management with engagement and communications components;
- Australia's Department of Agriculture National Biosecurity Communication and Engagement Strategy 2020.

The Panel was also provided with a report (the 'Litmus report') of detailing survey information from farmers' experiences in the Programme that had been commissioned separately by the *M. bovis* Programme's Governance Group. [48]

The Panel explored the issues of stakeholder engagement and communications in interviews. It also commissioned surveys of affected farmers and Programme staff.[49] The Panel decided it needed an independent expert assessment of the Programme's communications and commissioned a specialist analysis report in the form of a deep dive review.[50]

Communications

Elements of a best practice emergency response communications strategy

Taken together, the elements of a best practice communications strategy must include:

1) strategic oversight;
2) visible leadership;
3) established relationships with sector participants before an emergency event;
4) clear communications of the "why";
5) clear decision-rights, roles and functions;
6) messaging tailored to the needs of the parties (for example, farmer-centric communication);
7) clear instructions or advice on what is happening, what is to happen and when;

45 Honhold, N; Douglas, I; Geering, W; Shimshoni, A; Lubroth, J (eds) (2011) *Good Emergency Management Practice: The Essentials – A guide to preparing for animal health emergencies* (2nd edition). FAO Animal Production and Health Manual No. 11. Food and Agriculture Organization; Rome.
46 ISO 22361, Security and resilience – Crisis management – Guidelines for developing a strategic capability, which will provide guidelines for developing a strategic capability for crisis management.
47 The British Standards Institute offers PD CEN/TS 17091, Crisis Management – Building a Strategic Capability.
48 Litmus (2021) *Understanding farmers' stressors during their time in the M. bovis Programme.* Research report. Ministry for Primary Industries: Wellington. Biosecurity New Zealand Technical paper No: 2021/16
49 For survey results, see Appendix 2, Independent Review Survey Results and Analysis.
50 See Appendix 3, Communications Deep Dive Report.

8) linkage to the decision-making framework or powers being used;
9) feedback channels so the effectiveness of the message and messaging is reviewed and adjusted.

Strategic oversight

It is hard for people involved in delivering a response to reflect on how it is being received. Strategic advice to governance on response engagement is a separate communications function that specifically looks at the effect the Programme is having on people, staff and communities. Direction from governance allows delivery to refocus, re-prioritise and respond to changing circumstances as they arise. A communications strategy would have been a significant part of governance direction. In the case of *M. bovis*, the Panel is aware that, while members of the Governance Group requested a communications strategy, the requirement was lost amongst operational priorities.

Visible leadership

Visible leadership that can front issues, make decisions and engage with stakeholders is necessary to an effective response. It provides a face, a visible point of contact, and demonstrates accountability, all critical to maintaining trust and confidence.

Established relationships with sector participants before an emergency event

Building and maintaining good relationships is vital at both a national and regional level.

A response will work better if established relationships are in place, in particular, where different professional skills are involved.

Clear communications of the "why"

It is necessary that participants and stakeholders have a clear understanding of the objectives of a programme and why these are important or have been chosen.

Clear decision-rights, roles and functions

Everyone needs to clearly understand who is responsible and allowed to speak for the Programme. Those with management roles need to have clear messaging, and this needs to be updated regularly. Changes, or issues, need to be surfaced and resolved quickly.

Tailored communications

Effective communications choose the language and approach to suit the needs of the recipient. The engagement needs of a working farmer whose business is also their home is different from the needs of a veterinarian, a response controller or local councillors.

Clear instructions and advice

Communication must accurately convey technical knowledge and the precise regulatory powers that are being used. Ideally consistency will be maintained, but where changes are being made, messaging needs to be clear about what the change is and why it has been changed.

Linkage to the decision-making framework

Messages about the use of powers must be accurate, consistent and demonstrate that they are acting within the scope of the legislation.

Feedback channels

An effective communications strategy should involve actively listening to and empathising with the other parties, and be able to "course correct". Programme management and governance need to regularly review effectiveness.

What happened during *M. bovis*

What the response set up (July 2017 to April 2018)

The response team understood the need for effective communications to support the Programme. In 2017 the communications capability was small (two full-time equivalent staff) and immediately put to work on responding to the demands of operational delivery. This team worked under extreme pressure as the weight of media pressure increased in line with the expanding response. The *M. bovis* response managed engagement through two workstreams:

- communication – responsible for developing and delivering content and collateral through key channels

such as the media, emails, advertising, mail-outs and website; and supporting Ministerial communication;
- liaison – responsible for the face-to-face engagement with affected farmers through initial contact then through the farmer's relationship with Incident Control Point (ICP) managers.

The Panel is aware that previous exercises and reviews had identified the importance of effective communications strategies.[51] Best practice guidance had been prepared for an FMD outbreak. This guidance was not known to the *M. bovis* communications team. The focus of communications was entirely driven by the needs of operational delivery.

Eradication phase, May 2018 to April 2019

Communications remained operationally driven during the post-eradication decision period (May 2018). In this time, the team ramped up, gained additional capacity and worked to address the slow flow of information from the response. At one period, the team was not physically located with the response. Interviews suggested that processes to share problems and issues as they emerged were not always timely and effective.

Programme "reset", May 2019 to present

Post-reset, appreciation of the importance of good communications increased, as did a focus, driven by governance, on tone and style. However, the Governance Group was not serviced by a strategic communications capability reporting directly to it. Various initiatives were rolled out to engage directly with farmers and stakeholders that were fronted by Governance Group partners directly.

Most respondents appreciated the visibility of senior management to those affected by the Programme, although it was noted this increased visibility has risked the creation of back-channels to seek information or circumvent Programme decision-making.

Table 5.1 outlines the Panel's assessment of best practice communications across the three stages of the Programme.

- Table 5.1: How the Panel assessed elements of best practice communications across the three stages of *M. bovis*

Elements of best practice Communications	2017-18	2018-19	2019-Present
Strategic oversight	🔴	🔴	🔴
Visible leadership	🔴	🟠	🟢
Established pre-existing relationships	🔴	🔴	🟢
Clear communication of "why"	🔴	🔴	🟢
Clear decision-rights, roles and functions	🔴	🟠	🟢
Messaging tailored to the needs of the audience(s)	🔴	🟠	🟢
Clear instructions and advice	🟠	🟠	🟢
Linkage to powers	🟢	🟢	🟢
Feedback channels	🔴	🔴	🟠

Key: red is weak performance, amber is acceptable and green is good.

Stakeholder's experience of communications

Farmers

In interviews, farmers did not draw a distinction between written communication and face-to-face experiences. For many farmers, their interpretation of "communication" from MPI was the personal interaction they had with members of the liaison team, or others like their ICP manager. This terminology is derived from the CIMS model, and neither farmers nor Programme staff found it reflected the role ICPs undertook.

ICP managers played a major role in managing direct communications; however, they often felt unsupported by AQ, as their employer, and the Programme generally. The turnover rate of ICP managers was high. They also had challenges in getting answers from "Head Office" on process, timelines and test results within reasonable timeframes, which hampered their ability to support farmers during their involvement in the Programme. Communication

51 The review of FMD preparedness by the Office of the Auditor-General in 2013, see Office of the Auditor-General (2013) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions.* Performance Audit Report; Office of the Auditor-General; Wellington and the follow-up review by the Office of the Auditor-General in 2015, see Office of the Auditor-General (2015) *Ministry for Primary Industries: Preparing for and responding to biosecurity incursions – follow-up report.* Office of the Auditor-General; Wellington. The Performance Improvement Framework review of MPI, see State Services Commission, the Treasury and Department of the Prime Minister and Cabinet (2016) *Performance Improvement Framework: Review of the Ministry for Primary Industries (MPI).* https://www.publicservice.govt.nz/assets/Legacy/resources/MPI-PIF-final-copy-29-March.pdf. Post-exercise reviews of Taurus I and Taurus II FMD exercises, and report on Waiheke Island FMD response (2005).

issues resulted in farmer frustrations, resentment, and scepticism and distrust of the Programme.

The deep dive communication review and the on-line farmer survey conducted during the Review found that farmers' experiences improved as the Programme matured.[52]

"Trust and confidence" matter here. A livestock biosecurity system that farmers do not believe in, or feel ownership of, cannot work. The Panel suggests MPI and its partners look to achieve an appropriate balance between informing and supporting and enforcing regulatory compliance.

Programme staff and partners

The Panel sought feedback from within the Programme and industry partner organisations on the effectiveness of information exchange.

The Panel found that internal communications were inconsistent at the beginning of the response, and that the quality of internal communications materially improved over time.

DairyNZ and Beef + Lamb New Zealand had concerns at the difficulty in getting information from the Programme. This difficulty was either because no one knew what the answers were or a perception that the Programme could not or should not share information freely with industry partners.

The Panel found communication improved as the Programme matured after the 2019 reset. Reporting improved at the governance level and openness increased from all partners to share their views, with more transparent reporting to the Governance Group.

Local support for affected farmers and families: Rural Support Trusts

Rural Support Trusts (RSTs) provided practical help and support during the *M. bovis* Programme. RSTs indicated they were deeply concerned about the mental health implications of the Programme for affected farmers, and for staff engaged in face-to-face contact with farmers. The RSTs were invaluable but not a total solution to the need for providing support to farmers going through a livestock biosecurity disease response. RSTs are organised on a regional basis and varied in their capability and capacity.

Veterinarians, farming professionals and other stakeholders

Testimony was mixed from interviewees from across the farming sector, including a representative from the New Zealand Veterinary Association. Veterinarians, in particular, felt they had been excluded from working in or supporting the Programme. They felt they had skills that would have been valuable for helping farmers to understand the technical disease management issues, and for the Programme to have a better appreciation of the reality of farming systems from a livestock disease management perspective.

The Panel reflected that, for future animal disease responses, Biosecurity New Zealand, possibly through its newly appointed CVO, needs to work more closely with private vets. This would build better mutual understanding of their perspectives and roles and establish clear responsibilities of private and public service vets in a livestock biosecurity response.

Farm advisers, bankers, equipment suppliers, rural contracting firms and other service providers could all potentially have been drawn on to form a pool of locally known and trusted people that future animal health biosecurity responses could draw on.

Best practice and information collected during the Review suggests that local relationships are critical to effective delivery. The relative lack of an active local presence or local engagement is an issue that deserves governance consideration.

Federated Farmers and other rural advocacy organisations

Federated Farmers was one of the industry organisations in the room when the decision was made to eradicate.

Federated Farmers felt that early governance worked well until the formal decision to attempt eradication was made and the new GIA partnership was adopted. It saw *M. bovis* as an important issue where it needed to show industry

52 For a copy of the review, see Appendix 3, Communications Deep Dive Report. For survey results, see Appendix 2, Independent Review Survey Results and Analysis.

leadership, but, as the Programme developed, Federated Farmers became a stakeholder rather than a partner.

The Panel observes that the *M. bovis* response has struggled to find an appropriate way to work with Federated Farmers and other rurally based organisations such as Rural Women New Zealand. These organisations are not funding partners but do have industry advocacy responsibilities, which tends to encourage an arm's-length relationship. However, because these organisations are regionally based, they have deep relationships with farming communities at all levels. These organisations could have played a greater role in supporting farmers and providing effective feedback channels to Programme leadership and governance. The compensation team worked closely with individual Federated Farmers officeholders in some regions and helped in developing some communications messages.

Assessment of the use of communication channels

Traditional media and communications channels were predominantly used during the Programme. Letters, media releases, Ministerial communications and proactive and reactive media interviews were all heavily used.

The Programme communications capability was used a lot but was largely targeted to operational delivery needs and then increasingly to managing complaints and issues as they arose.

The deep dive communications assessment noted that the Programme communication roles were defined as separate from liaison, a distinction unimportant for farmers, who expected accurate and authoritative face-to-face communications.[53]

The deep dive assessment also observed that, regardless of the good reasons for delays, from a farmer perspective, the absence of timely, transparent communication from the Programme led them to draw conclusions about competence and responsiveness of Programme management. This increasingly led farmers to rely on informal social networks to share information. These channels, including social media, were inadequately monitored or responded to by the Programme, and Programme communications remained reliant on more traditional communication channels.

A real-time strategic communications capability may have identified these matters earlier and enabled governance to consider different approaches to strengthen trust and confidence in the Programme.

Key findings from the deep dive communications review

The communications deep dive review found that effectiveness of communication during the *M. bovis* response was hampered because of the following:

1) Ineffective governance of the communication workstream either contributed to, or failed to mitigate, inadequate communications strategy and planning.
2) Communication plans were not developed early enough and did not align with international standards or broader crisis management frameworks. The objectives were too broad, the plans were not fully implemented, and the plans and activities were not measured for effectiveness.
3) Sector partners and community-based skills were not engaged effectively in the critical early months and ongoing years of the *M. bovis* response. Vets were an example of a logical partner, who felt they were not communicated with appropriately. Rural Support Trusts and other community organisations were established relatively late.
4) Resource constraints were not well managed, creating additional pressures on planning and implementation delivery.

For a full copy of the deep dive assessment report, see Appendix 3.

SenateSHJ, the communications agency that was contracted by the independent review to assess Programme communications and prepare the deep dive communications report, created a traffic-light table to set out and prioritise the main themes and their likely impact

53 See Appendix 3 for a copy of the deep dive assessment report.

on future communications strategies during a response, to provide a framework for preparedness activity (Table 5.2).

- Table 5.2: Advice on priority actions for developing an effective communications capability to manage future livestock biosecurity responses

High impact	• Dedicated, communication-focused governance role • Scenario-led communication plans prepared in advance that are principles-based and have clearer articulations of the roles and responsibilities required to deliver an effective response • Team resourcing and capability • Pressure testing communication plans in realistic rehearsals • Aligning communication plans to international standards (ISO or BSI) • Engaging earlier and more effectively with rural stakeholders • Significantly increasing communication team size in the early stages of a response • Better alignment of communication with the overall response approach i.e., communication plans aligned to response milestones
Medium impact	• Adopting social and digital communication tools • Greater range of communication channels deployed • Peer-to-peer content e.g., case studies, videos of farmers talking to farmers • Stakeholder registers to map influential / respected local stakeholders on a regional basis • Deeper understanding of farming and the farm calendar within the response communication team • Improved feedback and inter-team communication to ensure stronger alignment and understanding across aspects of the response • Strengthening media relationships to deepen understanding of biosecurity issues in advance of a crisis.
Low impact	• Availability of more senior spokespeople (DDG or DG level) • Reduced layers of sign-off on key documents – streamlined process with autonomy for sign off clearly designated to the response team • Using "peacetime" to reinforce messaging on best practice behaviours required of farmers e.g., use of NAIT • Identifying additional social media capability that could be stood up quickly during a response e.g., via an external provider.

- SenateSHJ, Mycoplasma bovis *Communication Deep Dive Report*. See Appendix 3.
Note: BSI = British Standards Institute; DDG = deputy director-general; DG = director-general; NAIT = National Animal Identification and Tracing; ISO = International Standards Organisation

Engagement

How well did the *M. bovis* Programme engage with farmers and stakeholders?

Effective stakeholder engagement is critical to an effective biosecurity response. Figure 5.1 shows the elements of the engagement cycle for gaining trust and confidence.

- Figure 5.1: Trust and confidence engagement cycle

The components of an effective animal health biosecurity response programme require that all participants share an understanding of the programme's purpose. They need to believe the programme will be effective and that the cost of participation will not cause them personal harm. These conditions create the trust necessary to allow effective collaboration.

It is clear to the Panel these conditions were not present at the start of the *M. bovis* response, and insufficient attention was paid to stakeholder engagement for at least the first 18 months.

The Panel has been advised that Programme leadership felt tightly constrained by privacy issues and a legal obligation not to share information. The Panel is unable to determine whether this is the nature of the legislation or whether the way MPI chose to interpret privacy obligations was particularly conservative.

Almost inevitably, informal farmer networks started sharing information about what they perceived as poor programme management and communication. These informal social networks are well embedded in rural communities and the farming sector. This channel was neglected by the Programme and may have become a critical, but flawed, source of information for farmers who feared infection, the spread of the disease or the consequences of becoming an infected property. Table 5.3 outlines the Panel's reflections of the three trust and confidence factors in relation to the *M. bovis* programme.

● Table 5.3: Panel's reflections across three trust and confidence factors of engagement in relation to the *M. bovis* response

Factor	Panel reflections
Shared objectives	It was clear all parties to the *M. bovis* response had joint interests, but the level of understanding and commitment to livestock biosecurity and the roles and functions that needed to be performed were not widely understood. Once farmers realised processes were slow, painful and poorly communicated, willingness to participate became damaged.
Good communications	The response adopted a command-and-control approach during the initial phases and was slow to create space for others to participate in or share decision-making. Critical impediments to collaboration were: **a)** insufficient appreciation of the importance of maintaining the confidence of stakeholders or assessing the impact of how the Programme interacted with participants; **b)** inability to listen and respect the input of others trying to provide useful information that would help the Programme; **c)** privacy issues, or the conservative application of privacy principles, which created a climate of secrecy and fear and led to active social networks sharing information; **d)** long delays, while issues worked up the channel and back down to the local level, led to frustration; **e)** insufficient training, guidance or support for local Programme staff led to highly variable and uncontrolled communication experiences for farmers and stakeholders; **f)** following the reset, well intentioned but ad hoc attempts being made by senior leadership to cut through communication bottlenecks, which created de facto back channels to relitigate Programme staff's decisions; **g)** insufficient attention being paid by the Programme to non-traditional communication channels.
Sound relationships	It was clear MPI did not have deep relationships with farmers or the pastoral community at a local level. Relationships at the national level were relatively untested to manage an animal health response. The shock of what the Programme meant, early poor interactions as the response learnt how to operate, and slow information sharing and decision-making created problems for farmers that were never satisfactorily resolved. Mistakes made due to poor data or insufficient training were widely shared through social networks and created uncertainty and distrust for farmers. Consistency of treatment became an issue, particularly if staff changed and a different approach was taken with the same farmer. Staff who felt that their decisions or attempts to resolve issues locally were being second-guessed, or challenged higher up in management, became reluctant to respond pro-actively.

Operational effect on farmers

As part of the review, the Panel considered a survey, commissioned by the *M. bovis* science programme and conducted by the Litmus social research firm[54], to gather farmers' observations of and feedback on the Programme activities.

Litmus farmer experience study

The issues relevant to assessing engagement included:

- multiple rounds of testing contributed to cumulative stress
- experience of testing was highly farm specific
- farmers' expectations of professionalism on-farm were often not met, particularly in the Programme's earlier years
- many farmers lacked an understanding of the operation behind the testing, contributing to a lack of confidence in the results
- farmers had mixed experiences of Incident Control Point managers
- the compensation settlement process was complex and bureaucratic; the longer the claim took, the more significant the impact on farmers

The lack of co-ordination between regional and national offices and the fact that regional centres were not empowered to make decisions, so decision-making was slow, created frustration for both farmers and Programme staff in the regions. Issues of information provision and how the Programme operationalised Privacy Act considerations created significant issues for affected farmers, their neighbours and the community.

The Panel heard that many farmers were frustrated by poor implementation of the eradication processes. Farmers thought the Programme was not prepared or allowed to respond to their particular needs and circumstances. Additionally, they felt their ideas on how to best achieve an outcome were not valued.

What they saw was that many parts of the early Programme response were inefficient and wasteful.

Farms placed under Notice of Direction

The Panel found that farms placed under an NOD were viewed by neighbours with suspicion and families felt they were being isolated from their communities. Privacy issues made this more challenging when the Programme was not able to disclose any personal information, but rumours could be rife within the district. Farmers felt fearful of losing relationships with neighbours and the farming community due to the stigma of being connected with *M. bovis*. Farmers reported their children were bullied at school following the community becoming aware that their farms were under surveillance or movement controls.

Farms placed under Active Surveillance

The Panel found that farms placed under Active Surveillance also had unique challenges.

These farms are required to undergo testing to determine their disease status as a precautionary measure. The testing is done because their farm may have sent cattle to a farm that later became infected, they were neighbours of an infected farm, or may have received cattle from an infected farm before the Programme believed that farm to be infected.

Few farms placed under Active Surveillance were ever found to be infected. Because the risk was judged to be low, these farms were not placed under movement restrictions. The affected properties were, however, still perceived as a risk by the local community. Farmers under Active Surveillance found it difficult to sell their animals through normal contractual arrangements and no provisions were made for compensation for reduced prices or slow sales.

Operational effect on Programme staff

Working in a response of any type is a demanding environment. The impact on affected farmers is often easier to quantify through the value of destroyed stock, other financial losses and the loss of personal control.

54 Litmus (2021) *Understanding farmers' stressors during their time in the M. bovis Programme.* Research report. Ministry for Primary Industries: Wellington. Biosecurity New Zealand Technical paper No: 2021/16. Biosecurity New Zealand Technical paper No: 2021/16

For those conducting the Programme, prolonged time spent working in a highly pressured, stressful and arduous environment is extremely challenging, even for well-trained and prepared people.

The Panel considered that, early in the Programme, insufficient attention was paid to the wellbeing and support of staff, and even less support was available to staff who were contracted to work for the Programme. The result was a lack of trust and confidence in the Programme management and its likely outcomes. This matter has received significant attention since the end of 2018. The Programme has subsequently developed a sound approach to staff wellbeing with a focus on building staff trust and confidence through stronger engagement and communication.

Effect on wider stakeholders

The operation of the Programme affected all parties, industry partners, service providers and the wider farming community. This created an environment for declining trust and confidence in the Programme and its goals with similar experiences for farmers and Programme staff, though not so directly.

The Panel has determined that an engagement strategy is needed, developed in peacetime, to build trust and confidence in New Zealand's livestock biosecurity system and its leaders.

2017–2018

Summary

In July, a South Canterbury veterinarian identified a herd with severe mastitis and other unusual clinical signs. The vet submitted samples to MPI's Animal Health Laboratory, where it was confirmed as New Zealand's first case of *Mycoplasma bovis*.

MPI initiated a standard incursion response in conjunction with contractor AsureQuality. The farm was placed under movement controls, and testing began on related properties. This was managed from MPI's Diagnostic & Surveillance Services Directorate, with a field headquarters in Oamaru. Other South Canterbury farms linked by animal movements were also found to be infected.

Governance

23 July
Industry organisations briefed.

3 August
M. bovis response builds on its Surveillance Programme, tracing cattle movements and testing for the disease. Wider stakeholder engagement begins.

9 August
Support requested from epidemiologists and laboratory staff from Australia under the International Animal Health Emergency Reserve Agreement.

26 September
Consideration to commercial testing of service bulls was first raised, as a means to mitigating their risk of spreading the disease.

5 October
M. bovis Response Intelligence Report released by MPI.

October
PGG Wrightson agrees to carry out valuations needed for compensation of depopulated cattle.

October
M. bovis Eradication Options Governance Paper released.

12 October
Governance Group decides to depopulate 5,500 cattle from confirmed properties at an estimated cost of $16.5 million.

31 October
MPI suspends the live animal Import Health Standard (IHS) for cattle, but not for bovine semen IHS. No live cattle imports since 2013.

November
Localised Elimination, Analysis of Pathways and NZIER Economic Impacts papers released.

December
Technical Advisory Group (TAG) made up of local and international experts meet to provide advice.

07 January 2018
Southland Control Centre established in Invercargill.

09 February
The TAG, which met in December 2017, assesses the eradication of *M. bovis* as technically feasible.

March
The NZ Government and industry partners announce $85 million in extra funding to aid the response.

23 April
M. bovis staff levels increase.

May
Cost of phased eradication estimated at $870 million over 10 years. Government allocates $444 million for the next two financial years and a further $28 million for the 17/18 financial year.

16 May
Teleconference with TAG group which is divided on whether eradication of *M. bovis* still feasible. Questions raised on the economic feasibility of eradication.

28 May
Cabinet and industry decide phased eradication is the best way forward. DairyNZ and Beef + Lamb NZ to contribute 32% of the eradication cost. An 8–10 year plan decided on.

Operations

July
Samples collected and processed by MPI Animal Health Laboratory (AHL).

July
All 16 Van Leeuwen Dairy Group (VLDG) farms immediately placed under movement controls.

27 July
Field HQ in Oamaru established.

28 July
Disease controls being investigated. All restricted properties installed with clothes washers and dryers.

1 August
Permitting and movement process developed to enable movement of animals from Restricted Properties (RP) to slaughter as part of farm BAU.

11 August
The need for testing reagents in NZ creates a worldwide shortage of *M. bovis* testing kits.

December
Public debate and media interest in Inter-island control on movements. Absence of testing in North Island led to false assumptions that disease not present.

31 January
National surveillance work begins. Intention to test bulk milk and discard milk collection and testing from around 11,000 herds.

March
MPI launches Operation Cook Strait to monitor NAIT compliance. MPI staff check stock departing Picton.

23 April
New cleaning and disinfection (C&D) procedure developed, allows C&D to occur during 60-day stand-down period. Farmers can get back to BAU sooner.

Compensation/ Farmer Support

17 July
Exotic Pest and Disease Hotline notified about suspected cases of *M. bovis*.

21 July
M. bovis confirmed on a farm belonging to VLDG.

31 July
A second VLDG farm is confirmed infected with *M. bovis*.

29 August
Three additional properties have been designated as infected. All in the South Canterbury region.

December
The first Southland Infected Property (IP) was detected revealing the presence of spread outside the immediate South Canterbury area. First North Island IP found in the Hawkes Bay.

29 January
20 Confirmed Infected Properties
35 properties under Restricted Property (RP) Notice
262 properties to be cased
76,971 samples received by AHL
66,217 completed tests

08 February
23 Confirmed Infected Properties
28 properties under RP Notice
305 properties to be cased
84,886 samples received by AHL
79,769 completed tests

March
Of the $85 million in extra funding from the NZ Government and industry partners $50 million is for compensation.

March
Acute Recovery Team established.

14 March
27 Confirmed Infected Properties
47 properties under RP Notice
106,418 samples received by AHL
102,831 completed tests

May
Government allocates $444 million for the next two financial years and a further $28 million for the 17/18 financial year. Of this, $20 million is for compensation.

13 April
30 Confirmed Infected Properties
50 properties under RP Notice
120,664 samples received by AHL
119,123 completed tests

4 May
Compensation team consists of 26 claims assessors, recruiting begins for additional staff.

3 May
M. bovis is detected at a beef farm in Pahiatua, the second infected farm in the North Island.

13 May
35 Confirmed Infected Properties
53 properties under RP Notice
135,326 samples received by AHL
128,960 completed tests

Disease Status

Farming Calendar

Dates in this timeline are indicative only and may vary from region to region.

Beef Cattle

Winter | Spring | Summer | Autumn

Dry period: Bull sales
Calving: Early calving starts; Conduct bull tests (BVD, IBR); Calf purchases throughout spring; Spring yearling sales; Calving cows continues
Calf marking: Calf marking, vaccinations and tagging; Pre-mating vaccinations; Cull cows
Mating: Calf vaccinations; Rotate bulls; Early heifer pregnancy testing; Remove bulls
Weaning: Calf sales; Cattle pregnancy testing
Dry period: Cull cows; Body condition scoring (BCS) cattle; Fertility testing & bull soundness prior to sales

This is based on a spring calving dairy farm.

Dairy Cattle

Dry period: Moving day (1 June)
Calving: Plan spring rotation; Drafting of calving mobs; Plan and plant summer crops; Calf disbudding
Heifer and stock movement during winter
Management of metabolic issues through calving period
Calf sales throughout spring
Artificial breeding: Bulls arrive on farm
Natural mating: Perform early scans/repro review
Pregnancy scanning: Feed summer crops
Late lactation: BCS of cows; Dry cow and animal health planning; Drench and weigh young stock; BCS of cows; Draft winter mobs
Dry period: Administer dry cow treatment

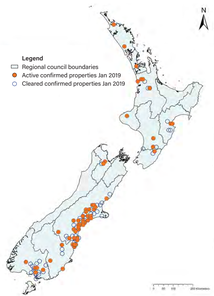
June 2017 | July 2017 | August 2017 | September 2017 | October 2017 | November 2017 | December 2017 | January 2018 | February 2018 | March 2018 | April 2018 | May 2018

2018–2019

Summary

By January 2018, a new cluster of infected farms had been identified in Southland, and infected animals were traced to Canterbury and the North Island. MPI and AsureQuality ramped up the scale of the response. Further field headquarters were established in Invercargill, Ashburton and Hamilton.

A key decision was needed on whether to attempt eradication of *M. bovis*. In May, Cabinet decided to attempt eradication in partnership with Beef + Lamb New Zealand and DairyNZ. The programme was expected to take up to 10 years and cost $886 million.



Governance

2018/2019
Costs budgeted to be $170 million (including a further $37 million for compensation) and access to a further $88 million sitting in a joint Ministers contingency fund.

June
Cabinet advised that a number of items were not included in initial costings and could be included as part of the $88 million contingency.

30 June
$42.9 million of operational budget spent.

26 November
Second TAG meeting takes place in Wellington including scientists from Australia, Canada and the US.

18 December
Strategic Science Advisory Group (SSAG) creates science plan to guide future research to support and accelerate eradication of *M. bovis*.

1 February
The second TAG report is finalised.

March
New National Plan is rolled out, setting out the three high-level goals and objectives.

April
$10 million draw-down from the Joint Ministers Contingency requested ($88 million available) and made available.

5 April
Terminology change, previously used terms Restricted Places and Infected Places replaced by Confirmed Properties, Restricted Places and Cleared Properties.

10 May
As result of the increase in farms to be investigated, three reviews were commissioned. These are carried out by the TAG, MPI's Chief Departmental Science Adviser (Dr John Roche), and Roger Paskin, a senior Australian veterinarian.

17 May
M. bovis Advisory Group established in Ashburton including representatives from *M. bovis* Programme, DairyNZ, Beef+Lamb NZ, Federated Farmers, the Rural Support Trust, and Mayoral office members. Ashburton Mayor Donna Favel is the Chairperson.

Operations

July
National Bulk Tank Milk (BTM) surveillance programme begins using both PCR and ELISA testing.

July
Discussions with the four largest processing plants in the South Island regarding costing schedule and extra charges for processing *M. bovis* animals.

July
It is now mandatory that neighbours of confirmed properties are informed, either by the affected farmer or *M. bovis* staff.

09 November
Commercial calf rearing surveillance begins, targeting those who source dairy calves from five or more properties to be reared on beef farms to analyse the infection risk of this pathway.

15 February
Nelson fires break out affecting several farms under restrictions in the region. No immediate impacts on properties in the Programme.

April
After Spring Surveillance Programme ends, ongoing bulk tank milk screening begins. ELISA chosen as primary screening tool. Six infected dairies identified via Autumn 2019 BTM Surveillance.

1 April
Current number of staff at 423
- National Control Centre – 110
- Regional HQs – 50
- Compensation – 40
- Animal Health Laboratory – 40
- DBCAT – 23
- AsureQuality – 160

17 April
The Programme sees a substantial increase in cases to be investigated. Additional staff employed to address this.

6 May
An additional 36 people were employed to work on the casing surge. In May, 1,100 farms were ceased.

27 May
To date 100,000 cattle have been culled.

17 August
All four processing plants met with in July have agreed to substantially reduce charges for processing *M. bovis* animals.

31 August
Letter from Head of Biosecurity to 40,000 rural addresses providing links to the *M. bovis* website. Messaging from MPI around NAIT changes communicated.

21 September
Second in-house workshop with affected farmers is held.

26 September
Additional Rural Support Trusts contracted. Acute Recovery Team to work with farmers. Increased case manager support to farmers undergoing testing.

28 September
DairyNZ and Beef + Lamb Compensation Assistant Team (DBCAT) established, to provide support to farmers with compensation claims.

January 2019
Recovery package agreed by Governance group.

Compensation/ Farmer Support

15 June
Further resourcing to the Response Welfare Team managing *M. bovis* Welfare co-ordination within the National Adverse Event Committee.

30 June
$69.9 million of compensation budget spent.

July
Additional Rural Support Trusts were mobilised and additional funding made available.

10 July
The first in-house workshop with affected farmers is held with the aim of ensuring lessons from legacy cases were applied and improvements made to the response.

Disease Status

01 June
36 Confirmed Infected Properties
72 properties under RP Notice
149,574 samples received by AHL
138,951 completed tests

July
First infected dairy in Northland identified via the BTM Spring Surveillance Programme ELISA screening.

July
41 Confirmed Infected Properties
69 properties under RP Notice
185,310 samples received by AHL
155,739 completed tests
3,854 properties traced

03 August
41 Confirmed Infected Properties
67 properties under RP Notice
186,030 samples received by AHL
172,603 completed tests
4,820 properties traced

24 August
Five Star Beef Feedlot near Ashburton is confirmed infected with *M. bovis*.

14 September
37 Confirmed Infected Properties
57 properties under RP Notice
192 properties under Notice of Direction (NOD)
24 properties with IP controls lifted

12 October
38 Confirmed Infected Properties
59 properties under RP Notice
220 properties under NOD
36 properties with IP controls lifted

09 November
34 Confirmed Infected Properties
58 properties under RP Notice
246 properties under NOD
42 Properties with IP controls lifted

21 December
36 Confirmed Infected Properties
61 properties under RP Notice
188 properties under NoD
51 properties with IP controls lifted

April
First West Coast infected property found via BTM.

Farming Calendar

Dates in this timeline are indicative only and may vary from region to region.

This is based on a spring calving dairy farm.

Beef Cattle

- **Winter**
  - **Dry period**: Bull sales
- **Spring**
  - **Calving**: Early calving starts; Conduct bull tests (BVD, IBR); Spring yearling sales; Calving cows continues
  - Calf purchases throughout spring
- **Summer**
  - **Calf marking**: Calf marking, vaccinations and tagging; Pre-mating vaccinations; Cull cows
  - **Mating**: Calf vaccinations; Rotate bulls; Early heifer pregnancy testing; Remove bulls
- **Autumn**
  - **Weaning**: Calf sales; Cattle pregnancy testing
  - **Dry period**: Cull cows; Body Condition Scoring (BCS) cattle; Fertility testing & bull soundness prior to sales

Dairy Cattle

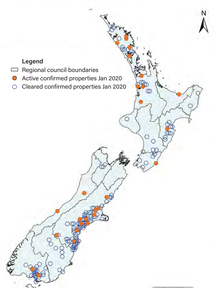
- **Winter**
  - **Dry period**: Moving day (1 June)
- **Spring**
  - **Calving**: Plan spring rotation; Drafting of calving mobs; Plan and plant summer crops; Calf disbudding
  - Heifer and stock movement during winter
  - Management of metabolic issues through calving period
  - Calf sales throughout spring
- **Summer**
  - **Artificial breeding**: Bulls arrive on farm
  - **Natural mating**: Perform early scans/Repro review
- **Autumn**
  - **Pregnancy scanning**: Feed summer crops
  - **Late lactation**: BCS of cows; Dry cow and animal health planning; Drench and weigh young stock; BCS of cows; Draft winter mobs
  - **Dry period**: Administer dry cow treatment

2019–2020

Summary

The Programme had expanded rapidly and was struggling to manage the scale of operations. Technical expertise in disease management was stretched and the volume of compensation claims overwhelmed MPI's processing capacity, leading to long delays. In April, a backlog of farms needing follow-up action was identified, highlighting the limits of the existing management system. A Programme 'reset' was undertaken, with a strengthened governance group, and an internal reorganisation including strengthened technical capability.

Regular background surveillance of all commercial dairy herds by bulk milk testing had been trialled in 2018 and was formalised in 2019.



Governance

30 June — $133.6 million in operational budget spent.

July — $68.5 million budget for operational costs set.

05 August — Tiaki Part 1 data management system is launched. An off-the-shelf Customer Relationship Management database has been modified to incorporate a Human Workflow Tool to assist in *M. bovis* management.

09 August — The Programme makes significant changes to on-farm sampling.

06 September — The Milk Solids Levy came into effect. DairyNZ collects the levy via dairy companies. Max rate is 3.9 cents per kilogram of milk solids.

October/November — Programme restructure following Paskin and Roache reviews in July 2019.

November — $58.2 million shortfall to run the Programme for the 2019 2020 financial year was identified.

22 November — Tiaki Part 1 has significantly increased the efficiency of the Programme. Governance Group considers options for delivery of Tiaki Part 2.

December — Approval granted to begin Tiaki Part 2 work. Scheduled completion date set at December 2020.

21 January — Northland Regional Office opened in Whangarei by the Minister in response to increasing numbers of infected properties in the region. Secondees are appointed to roles under a dedicated local manager.

February — Update to Cabinet to support the Budget bid submitted in November 2019. Asked for two years funding worth $336.2 million. Received one year funding at $195.50 million, this includes $53.2 million in compensation.

March — Contingency fund has been fully utilised.

March — COVID-19 is identified in NZ, the country moves to Alert Level 4. The Programme is deemed an essential service and operations continue.

1 March — Beef+Lamb NZ levy on commercially processed carcasses comes into effect to fund the Beef+Lamb NZ contribution to the Programme. Dairy cull animals are excluded.

April — Stuart Anderson replaces Geoff Gwyn as Programme Director.

Operations

10 June — Project looking at all imported animal records dating back to 2000 is initiated. Genomic evidence continues to suggest the infection is more recent and most likely occurred around 2015.

July — MilkTestNZ is chosen as the supplier for the ongoing BTM screening. Each supplier will be screened with an ELISA test each month.

04 July — Dr John Roche and Roger Paskin release reports on the "casing surge." Both reports recommend improvements to the programme, but find the "casing surge" has little impact on feasibility of eradication.

September — Background surveillance of the beef population begins with the blood testing of selected cattle entering the Five Star Beef Feedlot.

October — First agricultural training programme for office staff rolled out, including farm visits and education about the NZ farming sector and impacts of the Programme on day-to-day operations.

October — Procure to Pay (P2P) accounts payable system rolled out to improve payment processes. Highly successful and adopted by wider MPI in June 2021.

January 2020 — *M. bovis* sampling of animals killed at a commercial processing plant begins at Silver Fern Farms, Hawera. Other plants due to follow.

March — Beef sampling at meat processing plants expands to three more North Island plants.

March — Moving day early notification and prioritisation tool has been developed to limit the impact of the Programme on stock moving between dairy farms.

March — COVID-19 restrictions cease sampling in all beef surveillance streams, including Five Star Beef Feedlot intake and processing plants.

12 March — Large-scale drought declared affecting both the North Island and South Island. Increased strain on feed demand and space at the meat works.

April 2020 — Beef sampling resumes at a limited scale at some beef processing plants and during stock entry to Five Star Beef Feedlot.

May — Beef sampling resumes at a limited scale at some beef processing plants and during stock entry to Five Star Beef Feedlot.

Compensation/ Farmer Support

30 June — $77.9 million of compensation budget spent.

19 July — Second local advisory group has been formed in Waimate and Waitaki. The group is organically developed into a farmer centric advisory group.

25 October — 1,542 claims received
1,211 claims complete/ part payments
$114.1 million claims assessed
$102.1 million claims paid
23 days to complete claim (4 month rolling average)

29 November — 1,647 claims received
1,342 claims complete/part payments
$123.2 million claims assessed
$113 million claims paid
23 days to complete claim (4 month rolling average)

December — 1,667 compensation claims received, $124 million paid out to date.

20 December — 1,412 claims paid and completed
146 claims being processed
$118.7 million claims paid
23 days to complete claim (4 month rolling average)

31 January — 1,547 claims paid and completed
115 claims being processed
$126.6 million claims paid
22 days to complete claim (4 month rolling average)

February — Update to Cabinet to support the Budget bid submitted in November 2019. Asked for two years funding worth $336.2 million. Received one year funding at $195.50 million, this includes $53.2 million in compensation.

March — The remaining $19.8 million from the contingency fund was drawn down to add to the compensation budget.

27 March — 1,712 claims paid and completed
134 claims being processed
$138.6 million claims paid
20 days to complete claim (4 month rolling average)

24 April — 1,785 claims paid and completed
152 claims being processed
$145.3 million claims paid
20 days to complete claim (4 month rolling average)

29 May — 1,875 claims paid and completed
158 claims being processed
$155 million claims paid

Disease Status

25 October — To date 201 Confirmed Properties
297 properties under Notice of Direction
337 properties under Active Surveillance
118,480 animals culled
1,006,888 tests completed

29 November 2019 — To date 211 Confirmed Properties
260 properties under Notice of Direction
359 properties under Active Surveillance
124,050 animals culled
1,074,160 tests completed

06 December — 21 Active Confirmed Properties, 15 in the South Island, 6 in the North Island. To date, 124,000 cattle have been culled.

20 December — To date 214 Confirmed Properties
232 properties under Notice of Direction
264 properties under Active Surveillance
130,773 animals culled
1,133,492 tests completed

31 January — To date 229 Confirmed Properties
198 properties under Notice of Direction
247 properties under Active Surveillance
136,338 animals culled
1,187,876 tests completed

28 February — To date 238 Confirmed Properties
187 properties under Notice of Direction
283 properties under Active Surveillance
141,667 animals culled
1,248,965 tests completed

27 March — To date – 244 Confirmed Properties
170 properties under Notice of Direction
279 properties under Active Surveillance
150,204 animals culled
1,300,588 tests completed

24 April — To date – 247 Confirmed Properties
114 properties under Notice of Direction
273 properties under Active Surveillance
153,029 animals culled
1,374,697 tests completed

29 May — To date – 249 Confirmed Properties
121 properties under Notice of Direction
196 properties under Active Surveillance
156,125 animals culled
1,443,228 tests completed

Farming Calendar

Dates in this timeline are indicative only and may vary from region to region.

This is based on a spring calving dairy farm.

Winter

Spring

Summer

Autumn

Beef Cattle

- Dry period
- Bull sales
- Calving
- Early calving starts
- Conduct bull tests (BVD, IBR)
- Spring yearling sales
- Calving cows continues
- Calf purchases throughout spring
- Calf marking
- Calf marking, vaccinations and tagging
- Pre-mating vaccinations
- Cull cows
- Mating
- Calf vaccinations
- Rotate bulls
- Early heifer pregnancy testing
- Remove bulls
- Weaning
- Calf sales
- Cattle pregnancy testing
- Dry period
- Cull cows
- Body Condition Scoring (BCS) cattle
- Fertility testing & bull soundness prior to sales

Dairy Cattle

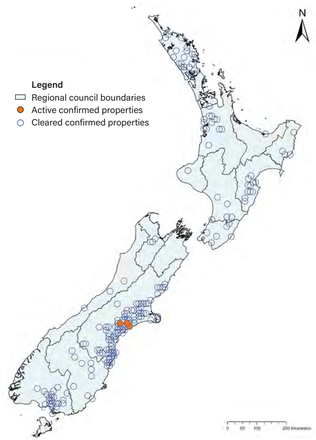
- Dry period
- Moving day (1 June)
- Calving
- Plan spring rotation
- Heifer and stock movement during winter
- Drafting of calving mobs
- Management of metabolic issues through calving period
- Plan and plant summer crops
- Calf disbudding
- Calf sales throughout spring
- Artificial breeding
- Bulls arrive on farm
- Natural mating
- Perform early scans/repro review
- Pregnancy scanning
- Feed summer crops
- Late lactation
- BCS of cows
- Dry cow and animal health planning
- Drench and weigh young stock
- BCS of cows
- Draft winter mobs
- Dry period
- Administer dry cow treatment

2020–2021

Summary

A national beef surveillance programme began to cover the dry stock sector. Numbers of affected farms declined, and dairy and beef surveillance provided increasing confidence that there were not large numbers of undetected cases. The backlog of compensation claims was cleared and processing times reduced.

In winter 2020, the number of known infected farms dropped to a single feedlot property in Canterbury. Once bulk tank milk testing resumed in spring, around 10 further infected farms were detected in mid-Canterbury. The Programme has begun considering the transition to long-term proof-of-freedom surveillance.



Governance

June
$138.7 million of operational costs incurred.

July
Beef surveillance sampling increases the number of processing plants to seven.
On-farm *M. bovis* sampling during tuberculosis (TB) testing resumes.

August
Coverage of the meat processing plants extended to include the West Coast.

September
PCR testing of mastitic milk discontinued. PCR testing is deemed to not be sensitive enough to use for background surveillance.

November
Week-long TAG meeting held to provide external feedback on a range of technical issues that included modelling, surveillance and prep to move to a "proof of absence" phase.

November
Request for Proposals for the supply of testing and sampling services for the Beef Surveillance Programme is released.

January
M. bovis Governance Group commissions independent review to identify lessons learnt from the programme.

26 February
Tiaki Part 2 goes live, bringing increased functionality. There was a delay from the expected December 2020 date due to a change of vendor.

March
Reports from November TAG meeting finalised. Report recognises progress made and makes a number of recommendations.

Operations

June

26 June
1,934 claims paid and completed
173 claims being processed
$159.2 million claims paid

31 July
2,060 claims paid and completed
113 claims being processed
$168 million claims paid

26 August
2,113 claims paid and completed
143 claims being processed
$170.7 million claims paid

25 September
2,171 claims paid and completed
130 claims being processed
$175.9 million claims paid

30 October
2,278 claims paid and completed
97 claims being processed
$184.5 million claims paid

November
Sampling at meat processors expands to include dairy cattle in some regions. More than 100,000 animals have been sampled under the Beef Surveillance Programme.

November
Programme restructured, reducing staff numbers, reorganising functions and bringing some frontline services in house from AsureQuality.

27 November
2,312 claims paid and completed
97 claims being processed
$185.1 million claims paid

30 November
The Programme attends meeting of the Ashburton Advisory Group. High level of interest in testing and tracing of the Canterbury cluster farms.

December
Additional processing plants carrying out beef surveillance are added on both islands, bringing the total involved with the Programme to 16.

18 December
2,358 claims paid and completed
92 claims being processed
$187.5 million claims paid

January
2,413 claims paid and completed
75 claims being processed
$190.7 million claims paid

26 February
2,467 claims paid and completed
58 claims being processed
$193.4 million claims paid

26 March
2,500 claims paid and completed
57 claims being processed
$194.6 million claims paid

Compensation/ Farmer Support

June
$53.8 million of compensation spent.

26 June
To date 249 Confirmed Properties
94 properties under Notice of Direction
194 properties under Active Surveillance
157,492 animals culled
1,487,194 tests completed

31 July
To date 250 Confirmed Properties
28 properties under Notice of Direction
172 properties under Active Surveillance
157,869 animals culled
1,533,932 tests completed

August
BTM screening identifies three infected dairies, all in Canterbury.

26 August
To date 250 Confirmed Properties
62 properties under Notice of Direction
167 properties under Active Surveillance
158,024 animals culled
1,553,826 tests completed

25 September
To date 252 Confirmed Properties
36 properties under Notice of Direction
170 properties under Active Surveillance
158,180 animals culled
1,591,440 tests completed

30 October
To date 255 Confirmed Properties
75 properties under Notice of Direction
146 properties under Active Surveillance
158,400 animals culled
1,632,821 tests completed

27 November
To date 259 Confirmed Properties
89 properties under Notice of Direction
137 properties under Active Surveillance
158,808 animals culled
1,685,089 tests completed

December
Two Lincoln University dairy farms confirmed as infected. One detected in September as a result of BTM surveillance, the other exchanged a large number of animals with that farm. No links to Canterbury cluster are known.

18 December
To date 260 Confirmed Properties
87 properties under Notice of Direction
103 properties under Active Surveillance
163,685 animals culled
1,738,951 tests completed

January
To date 260 Confirmed Properties
47 properties under Notice of Direction
101 properties under Active Surveillance
165,025 animals culled
1,830,443 tests completed

26 February
To date 261 Confirmed Properties
35 properties under Notice of Direction
115 properties under Active Surveillance
167,983 animals culled
1,910,633 tests completed

26 March
To date 262 Confirmed Properties
47 properties under Notice of Direction
149 properties under Active Surveillance
169,925 animals culled
2,002,036 tests completed

Disease Status

Farming Calendar

Dates in this timeline are indicative only and may vary from region to region.

Winter | **Spring** | **Summer** | **Autumn**

Beef Cattle

- **Dry period**: Bull sales
- **Calving**: Early calving starts; Conduct bull tests (BVD, IBR)
- Calf purchases throughout spring
- **Calf marking**: Calf marking, vaccinations and tagging; Pre-mating vaccinations; Cull cows
- **Mating**: Calf vaccinations
- **Weaning**: Rotate bulls; Early heifer pregnancy testing; Remove bulls; Calf sales
- Spring yearling sales
- Calving cows continues

This is based on a spring calving dairy farm.

Dairy Cattle

- **Dry period**: Moving day (1 June)
- **Calving**: Plan spring rotation
- Heifer and stock movement during winter: Drafting of calving mobs
- Management of metabolic issues through calving period: Plan and plant summer crops; Calf disbudding
- Calf sales throughout spring
- **Artificial breeding**: Bulls arrive on farm
- **Natural mating**: Perform early scans/repro review
- **Pregnancy scanning**: Feed summer crops
- **Late lactation**: BCS of cows; Dry cow and animal health planning; Drench and weigh young stock

June 2020 | July 2020 | August 2020 | September 2020 | October 2020 | November 2020 | December 2020 | January 2021 | February 2021 | March 2021

Glossary

Active Confirmed Property	A farm with *M. bovis* that has a Restricted Place Notice and requires depopulation of the infected cattle.
Active Surveillance	A farm is under Active Surveillance when the cattle are deemed to have a low risk of having *M. bovis*. The farm has been identified as low risk, and because a neighbour is a Confirmed Property or has cattle tracing back to a Confirmed Property. The cattle undergo one to two rounds of testing to ensure no infection is present. Farms under Active Surveillance are not under any movement restrictions and can operate as usual, while testing is carried out. All farms under Active Surveillance have access to a dedicated liaison team in the Programme's national office. If a farm tests positive for *M. bovis*, it is issued a Notice of Direction or may go straight to being a Confirmed Property.
AsureQuality (AQ)	AsureQuality is a state-owned enterprise that provides services to MPI and industry, including meat inspection, surveillance, export certification, verification of industry risk management programmes, sampling services for residue programmes and provision of laboratory services. www.asurequality.com
Beef + Lamb New Zealand	Beef + Lamb New Zealand is the farmer-owned, industry organisation representing New Zealand's sheep and beef farmers. They invest farmer levies in programmes that grow the sheep and beef industry and provide sustainable returns now and for future generations. Beef + Lamb New Zealand is part of the *M. bovis* Governance Group and the Government Industry Agreement. https://beeflambnz.com/
Biosecurity Act 1993	The Act provides the legal framework for MPI and others to help keep harmful organisms out of New Zealand, as well as how we respond and manage them if any do make it into the country. It covers pre-border risk management and standard setting, border management, readiness and response, and long-term pest management. The Minister for Biosecurity announced an overhaul of the Act in July 2019 to ensure it remains fit for purpose in the future. https://www.legislation.govt.nz/act/public/1993/0095/latest/whole.html
Biosecurity New Zealand	A business unit of MPI charged with maintaining New Zealand's biosecurity. The branch has a critical role in preventing harmful organisms crossing New Zealand's borders. It manages border and compliance activities as well as preparing for, and responding to, any biosecurity incursions that may occur. The branch also manages MPI's centralised intelligence, planning and co-ordination group which was established to manage food, biosecurity and animal welfare responses consistently and effectively. https://www.mpi.govt.nz/biosecurity/
Biosecurity system	The biosecurity system prevents or manages risks from harmful organisms, like pests and diseases. It helps protect New Zealand's economy, environment, human health, and various social and cultural values. MPI is the lead agency for biosecurity. See Appendix 7A for further information.
Coordinated Incident Management System (CIMS)	The New Zealand Government's framework for giving structure in a response to any incident at any scale. It was designed and introduced to provide effective management of a variety of incidents spanning storm events, tsunamis, earthquakes, terrorism, pandemics, volcanic activity, infrastructure failure, major transport incidents, biosecurity incursion, fire events, maritime incidents (and others). A workforce of emergency managers and staff exists across government agencies, organisations and private entities to respond using CIMS. https://www.civildefence.govt.nz/resources/coordinated-incident-management-system-cims-third-edition/
DairyNZ	DairyNZ is the industry organisation that represents all New Zealand dairy farmers. It supports farmers through investing in research, resource development, extension and advocacy to ensure they lead the world in sustainable dairy farming. DairyNZ is part of the *M. bovis* Governance Group and the Government Industry Agreement. https://www.dairynz.co.nz/
Farmer Experience Survey	A research report commissioned by the M. bovis Governance Group, managed by MPI's Strategic Science Advisory Group and conducted by the research company Litmus. The report presents qualitative research findings with farmers on 50 dairy, beef and mixed farms who exited the *M. bovis* eradication Programme between 2018 and 2020.
Food and Agriculture Organization of the United Nations (FAO)	The FAO is a specialised agency of the United Nations that leads international efforts to defeat hunger. http://www.fao.org/home/en/
Foot and mouth disease (FMD)	FMD is a highly contagious viral disease that only infects cloven-hooved animals. In New Zealand, it would affect most production animals including cattle, sheep, pigs, deer, goat, alpaca and llama. FMD is an animal health disease that has no significant impact on humans. https://www.mpi.govt.nz/biosecurity/plans-for-responding-to-serious-disease-outbreaks/foot-and-mouth-disease/about-foot-and-mouth-disease/

Foot and Mouth Disease Preparedness Programme	The 2013/14 FMD Preparedness Programme was started in October 2013 and sets out to develop a comprehensive response capability, covering response structure and disease management. The aim is to minimise the impacts of an FMD incursion on the economy, people and communities of New Zealand. Primary sector industry partners have been actively involved in both the creation and implementation of the programme. https://www.mpi.govt.nz/dmsdocument/5179/direct
Good Emergency Management Practice (GEMP) guide	Developed by the Food and Agriculture Organization of the United Nations as a guide to planning for animal health emergencies with a focus on preparedness. http://www.fao.org/documents/card/en/c/cb3833en/
Governance	The system by which an organisation or project is directed and controlled. It means thinking about strategic issues, rather than the operational day-to-day running of an organisation.
Government Industry Agreement (GIA)	GIA operates as a partnership between primary industry and government to manage pests and diseases that could badly damage New Zealand's primary industries, economy and environment. Under a GIA, signatories share the decision-making, responsibilities and costs of preparing for – and responding to – biosecurity incursions. By working in partnership, industry and government can achieve better biosecurity outcomes. https://www.gia.org.nz/
Incident control point (ICP) manager (Called farm systems manager since Nov 2020.)	The *M. bovis* Programme and response staff member who directly liaised with farmers. A defined role in the CIMS structure.
Institute of Directors	A professional body for directors and the heart of New Zealand's governance community. It supports and enables directors to add value to their organisations and wider communities and prepares them to positively transform the future. https://www.iod.org.nz/#
Laboratory Information Management System	Software that allows the effective management of samples and associated data. By using this, a laboratory can automate workflows, integrate instruments, and manage samples and associated information.
Litmus	The Wellington-owned social research, evaluation and design firm who conducted the Farmer Experience Survey on behalf of MPI. https://litmus.co.nz/about/
MINDA	A herd management system created by the Livestock Improvement Corporation to help farmers in making better and faster decisions about their animals and farming operations. https://www.lic.co.nz/products-and-services/minda/
Ministry for Primary Industries (MPI)	The Ministry for Primary Industries helps to seize export opportunities for New Zealand's primary industries, improve sector productivity, ensure the food produced in New Zealand is safe, increase sustainable resource use, and protect the country from biological risk. https://www.mpi.govt.nz/
Ministry of Agriculture and Forestry	The state sector organisation that dealt with matters relating to agriculture, forestry and biosecurity before merging with the Ministry of Fisheries in 2011 and then the New Zealand Food Safety Authority in 2012 to form the Ministry for Primary Industries.
Mycoplasma bovis (M. bovis)	*Mycoplasma bovis* is a bacterium that can cause a range of serious conditions in cattle, including mastitis that does not respond to treatment, pneumonia, arthritis and later-term abortions. The bacteria is an Unwanted Organism under the Biosecurity Act 1993. See Appendix 5 for further information. https://www.mpi.govt.nz/biosecurity/mycoplasma-bovis/
Mycoplasma bovis Governance Group	Led by an independent chair, the M. bovis Governance Group is made up of the chief executives of MPI, DairyNZ and Beef + Lamb New Zealand. It is this group that has commissioned the independent review of the *M. bovis* Programme and this report.
National Animal Identification and Tracing (NAIT)	NAIT is the mandatory system used to identify and trace livestock in New Zealand. The scheme requires all cattle and deer to be identified with an approved permanent NAIT device within 180 days of their birth or before they are moved between properties, whichever occurs first. https://www.ospri.co.nz/assets/Documents/NAIT-Standard-Animal-Identification-Devices.pdf
New Zealand Veterinary Association	The New Zealand Veterinary Association is a membership organisation for New Zealand's veterinary profession. www.nzva.org.nz

Notice of Direction (NOD)	Farms are placed under a Notice of Direction when their cattle are considered at greater risk of having *M. bovis*. The farm has been identified as higher risk through bulk tank milk testing using the ELISA test, positive testing results, or when cattle have been traced from a Confirmed Property or other related properties. Under a Notice of Direction, the farm is issued a legal notice placing movement restrictions on cattle and other high-risk items (for example, milk and equipment). Cattle and high-risk movements are stopped while testing is done to determine if any cattle are infected. If the farm has trace animals, the animals are sent to slaughter and tested. During this phase, farms are also assigned a case manager (the Authorised Person under the Biosecurity Act 1993) who oversees all activities relating to the legal notices placed on the farm).
Office of the Auditor-General (OAG)	The OAG carries out the work of the Controller and Auditor-General, along with Audit New Zealand and private sector auditing firms. This work includes strategic audit planning, setting policy and standards, appointing auditors and overseeing their performance, carrying out performance audits, providing reporting and advice to Parliament and carrying out inquiries and other special studies. The work of the OAG gives Parliament, public entities and the public independent assurance that public entities are operating, and accounting for their performance, in keeping with Parliament's intentions. **https://oag.parliament.nz/**
OSPRI	OSPRI is a not-for-profit limited company made up of a group of companies including TBfree NZ Ltd and NAIT Ltd. It is a partnership between primary industries and the Government. **https://www.ospri.co.nz/about-us/**
Restricted Place Notice	The Restricted Place Notice is the highest level of legal control on movements of at-risk cattle and items. Controls during this stage mean all cattle within the Restricted Place Area will be culled and cannot be moved in and out of the Restricted Place Area.
Rural Support Trusts (RSTs)	Connect farmers with those who can provide support, including farming or business advice, financial information, health, mental health and counselling services. **https://www.rural-support.org.nz/**
Rural Women NZ	Rural Women NZ seeks to empower rural women and girls by nurturing their talents and encouraging members to develop their skills through leadership roles within branches and provincials. **https://ruralwomennz.nz/**
Technical Advisory Group (TAG)	A group of external experts examining and advising on technical aspects of the Programme.
Tiaki	A response information management system that provides decision-makers with a real-time view of data and access to a "single source of the truth" for reporting. It gives field staff the ability to collect data on site and up-to-date response information for partners and stakeholders. It is based on the off-the-shelf Salesforce Customer Relationship Management platform.
World Organisation for Animal Health (OIE)	An intergovernmental organisation focused on improving animal health worldwide of which New Zealand is a long-standing member. **https://www.oie.int/en/home/**

Abbreviations

AHL	Animal Health Laboratory
AQ	AsureQuality
ARDB	Animal Response Database
BAU	Business as usual
BCS	Body condition scoring
BRKB	Biosecurity Response Knowledge Base
BSI	British Standards Institute
BTM	Bulk Tank Milk
CIMS	Co-ordinated Incident Management System
CVO	Chief veterinary officer
DBCAT	DairyNZ and Beef + Lamb New Zealand Compensation Assistance Team
DDG	Deputy director-general
DG	Director-general
FAO	Food and Agriculture Organization
FMD	Foot and mouth disease
GEMP	Good Emergency Management Practice
GIA	Government Industry Agreement (for Biosecurity Readiness and Response)
ICP	Incident Control Point
ISO	International Standards Organisation
M. bovis	Mycoplasma bovis
MPI	Ministry for Primary Industries
NAIT	National Animal Identification and Tracing
NBCN	National Biosecurity Capability Network
NOD	Notice of Direction
OA	Operational agreement
OAG	Office of the Auditor-General
OIE	World Organisation for Animal Health
PCR	Polymerase chain reaction
RP	Restricted Place
RSTs	Rural Support Trusts
SSAG	Strategic Science Advisory Group
TAG	Technical advisory group

Appendices

Appendix 1 – Independent Review Terms of Reference

Terms of Reference

Capturing and applying the Lessons Learnt from the *Mycoplasma bovis* response – an independent and forward-looking assessment

Constitution

The Minister for Biosecurity and industry partners have agreed to a constructive, forward-looking review to capture lessons learnt from the *Mycoplasma bovis* response.

While it is likely that the review will elicit some criticism about operational aspects of the programme from some quarters, the focus will be on identifying and applying the benefits of the experience of the overall response, including those gained from an operational level.

Independence

The review will be independent. Independence offers the opportunity for free and frank discussion, brings an outside, objective view to the proceedings and lends credibility to any findings and recommendations. The review team will not include staff of the Ministry for Primary Industries, DairyNZ or Beef + Lamb New Zealand. The secretariat to the review team may include personnel from the partner agencies.

Owned by the Governance Group

The review will be owned by the Governance Group and through it; the Minister for Biosecurity, the boards of Dairy NZ and Beef + Lamb New Zealand and the MPI Senior Leadership Team.

Purpose of the review

The 2019 National Plan for *Mycoplasma bovis* sets out three clear goals: to eradicate *M. bovis* from New Zealand; to reduce the impact of the disease and the eradication programme for everyone affected; and to leave New Zealand's biosecurity system stronger.

The review team will conduct a forward-looking review that will inform our biosecurity readiness and response to future animal disease incursions. The review will determine the partners' ability to learn the lessons from a disease that affects animal health and productivity and translate those lessons into the necessary steps to reduce more serious risks to trade, food and economic security from livestock diseases.

Objectives

The review has three objectives:

1. To identify and retain critical knowledge and capabilities developed during the response.
2. To consider lessons learnt from the *M. bovis* Programme that will help strengthen our readiness and response to future animal disease and pest incursions, now and in the future.
3. Support Governance Group strategic planning and support efforts to strengthen the Biosecurity system (Goal 3 of the National Plan).

What's in scope

The scope of this review is:

- New Zealand's collective capacity and capability to deal with *M. bovis* and the parallels relating to our ability to mount a future foot and mouth (FMD) response
- the sector's ability to learn lessons from *M. bovis* (a disease that affects animal health and productivity) and translate these lessons into the steps necessary to reduce more serious risks to trade, food and economic security

- what significant changes were made over the life of the Programme that made the response run better
- what limiting factors contributed to system drag within disease control
- the capabilities that have been developed over the life of the Programme and how they could be managed in the future
- the Operational Agreement implementation
- relationship components
- communications
- the partnership arrangement for the eradication programme
- the management and governance frameworks in the context of a biosecurity response to ensure that it is fit for purpose for the next phase of the Programme – and services the Government-Industry Agreement (GIA) Partnership
- decisions made by governance and programme leadership level
- Programme/system capabilities such as:
    - Epidemiology
    - Tracing
    - Response.

What's out of scope

The review won't:

- examine the source of the disease
- consider the biological and technical feasibility of eradication
- examine the decision to eradicate
- review the GIA framework
- appraise the Operational Agreement set-up – e.g. changes to the current programmes, funding profile or operational agreement settings
- consider the level of compensation.

Accountability

The review team will report to an independent subcommittee of the Governance Group that, in turn, will report to the whole Governance Group.

The leader of the review will have direct access to the Independent Chair of the *M. bovis* Programme, Governance Group members, the Programme Director and the Deputy Director General of Biosecurity New Zealand.

Responsibilities

The responsibilities of the review team are as follows:

1. Contemplate New Zealand's collective capacity and capability to deal with *M. bovis* and the parallels relating to our ability to mount a future FMD response and strengthen the biosecurity system.

2. Provide insights and recommendations based on the following strategic themes
    - Governance, decision making and cost sharing under a partnership model
    - Relationships and engagement (including communications and stakeholder engagement)
    - Capability (including veterinary services, epidemiology, laboratory, tracing, response, compensation, human welfare, recovery, compensation)
    - Operational and logistics functions, including the application of regulatory powers
    - Information systems for tracking and tracing, including functionality, data integrity, accuracy and completeness, and interoperability with dependant systems

- Human welfare and social impacts at key points in the response timeline (incursion start, decision to respond, etc)
- Recovery
- Relationship management
- Finance and procurement processes including use of contractors
- Health, safety and wellbeing
- OA implementation
- Mechanisms to facilitate enduring change.

3. Maintain direct communication with the independent Chair of the Governance Group or Executive Director of the review.

4. Ensure there are no surprises for the Governance Group by elevating matters to the oversight committee as the review team thinks necessary.

Oversight

The Governance Group has appointed a subcommittee of the Governance Group to oversee the conduct of the review. It will be made up of the independent Chair (Kelvan Smith) and independent members versed in review governance.

Review and Reports

The key deliverable will be a report, together with an agreed set of recommendations for the *M. bovis* Governance Group on how a partnership model of readiness and response could be strengthened.

The final report will be supported by reports at formal review points, a draft report, oral updates and advice as and when necessary to ensure that there are no surprises.

Reasonable notice of meetings and consultation forums shall be given to all invited participants.

Minutes of all meetings and the objectives, agendas and outputs will be kept.

Assumptions and dependencies

The following has been assumed:

- The review will be conducted from February 2021 to a date to be determined by the oversight committee.
- The review will, if timing permits, consider the findings of other relevant reviews currently in flight such as the GIA deed review, the Biosecurity Act Review and any GIA operational reviews.
- The cost of the review will be borne by the *M. bovis* Programme.

Points of contact

Kelvan Smith, Independent Chair of the *M. bovis* Governance Group.
John Martin, Executive Director of the Review.

Appendix 2

Independent Review Survey Results and Analysis

Survey Results

Purpose

The purpose of this appendix is to provide an overview of the analysis of data derived from two surveys, commissioned by the Review panel, to establish an understanding of the key issues faced by both farmers and staff who participated in the *Mycoplasma bovis* (*M. bovis*) Eradication Programme.

Approach

The Review team designed and conducted two online surveys using Survey Monkey, one for staff involved in the Programme and another for affected farmers.

The design of the surveys was conducted with the assistance of the Research and Evaluation Team in MPI, and the surveys were approved by the New Zealand Ethics Committee.

The surveys included lines of enquiry based on the semi-structured interview guides, to ensure survey participants had a similar scope for input as participants involved in face-to-face interviews.

The surveys included answering both questions on a Likert scale and open-ended questions with free text answers.

Selection of the Survey Group

The *M. bovis* Programme circulated the online farmer survey link via its weekly email newsletters to stakeholders, which includes many farmers who entered the Programme since 2019.

Beef + Lamb New Zealand, DairyNZ and Federated Farmers included the online survey link in weekly stakeholder update emails and followed up with reminders prior to the survey ending.

Rural Support Trust and Rural Women NZ were also provided the online survey link with a request that they circulate it via their own networks and communication channels.

Constraints

Targeted circulation of the farmer survey was constrained by the Review Team's inability to access MPI's database of *M. bovis* affected farmers for privacy reasons. Therefore, the survey was circulated by other means, other than direct email from the Review Team itself, as described above.

Discussion

These results include information from answers to survey questions on a Likert scale and not open-ended questions with free text answers. Answers to the open-ended questions were qualitatively analysed, treated the same as key points extracted from face-to-face interviews and used to inform the recommendations and body of the report.

Answers from the Likert scale questions echo what the Review Team heard through interviewing staff involved in the Programme and across affiliate organisations, interviewing farmers and at farmer focus groups, and analysing the text answers of the open-ended survey questions.

Overall, it is impossible to come to any detailed conclusions about the Programme from the quantitative data. The value in the quantitative data is in its use to corroborate observations gleaned in interviews. However, where the surveys have value is in the qualitative data. The Panel used the findings from the survey to inform its reflections.

Farmer Survey

It is impossible to establish a response rate to the farmer surveys given the method of dispatching the surveys (via links in emails). The Panel has been advised that the number of farmer responses received is not untypical of other surveys conducted by industry groups.

The low number of responses to the farmer survey meant that statistical significance between different groups could not be estimated, and so only the overall answers are displayed.

● Table A. Number of responses based on which phase farmers exited the programme.

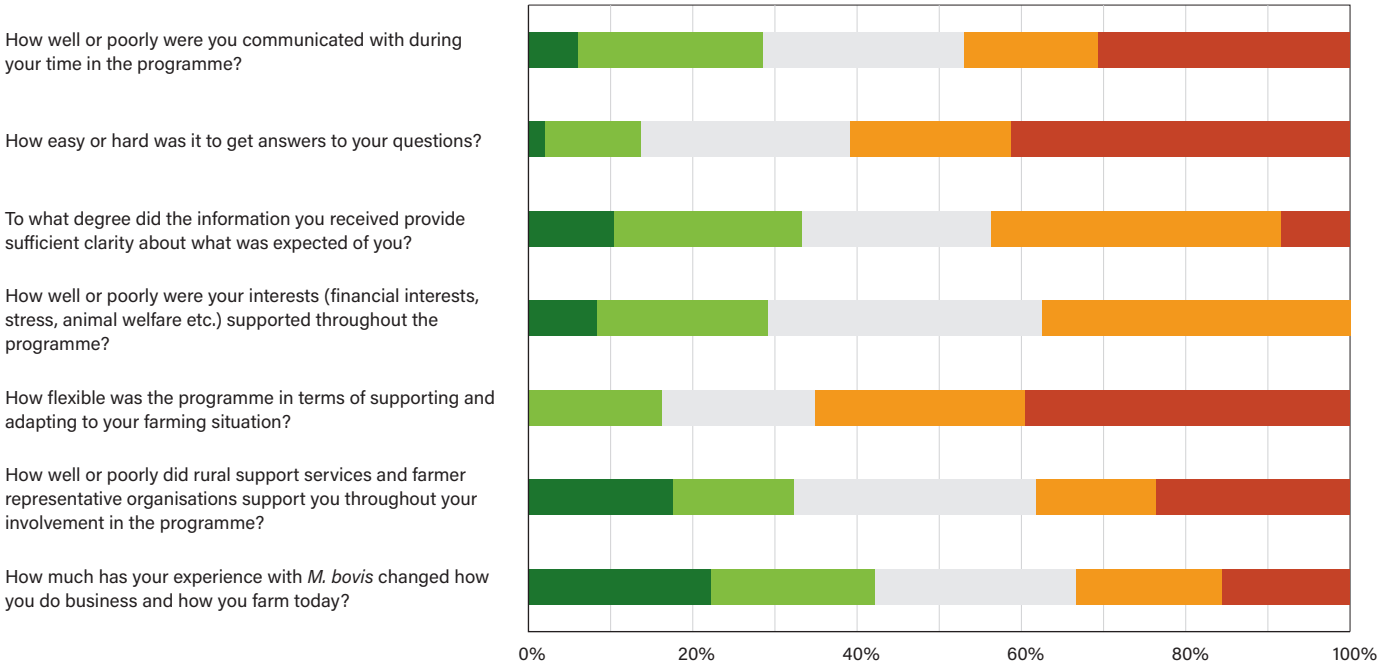
Phase exited from programme	Number of responses
Surveillance	12
Notice of Direction	22
Restricted Property	20
Other	6

● Table B. Number of responses based on region.

Region	Number of responses
Canterbury	20
Waikato	12
Northland	7
Taranaki	4
Southland	3
Bay of Plenty	3
Hawke's Bay	1
Otago	1
Nelson and Marlborough	1
Wellington	1
West Coast	1

● Table C. Number of responses based on farm type.

By farm type	Number of responses
Dairy	32
Beef Finishing	14
Cattle Trading	6
Grazing Others' Stock	6
Beef Breeding	5
Commercial Calf Rearing	2
Other	2



● Figure A. Farmer survey results. The red and orange colours are the very negative and negative answers to a particular question, grey is neutral, and green and dark green are the positive and very positive.

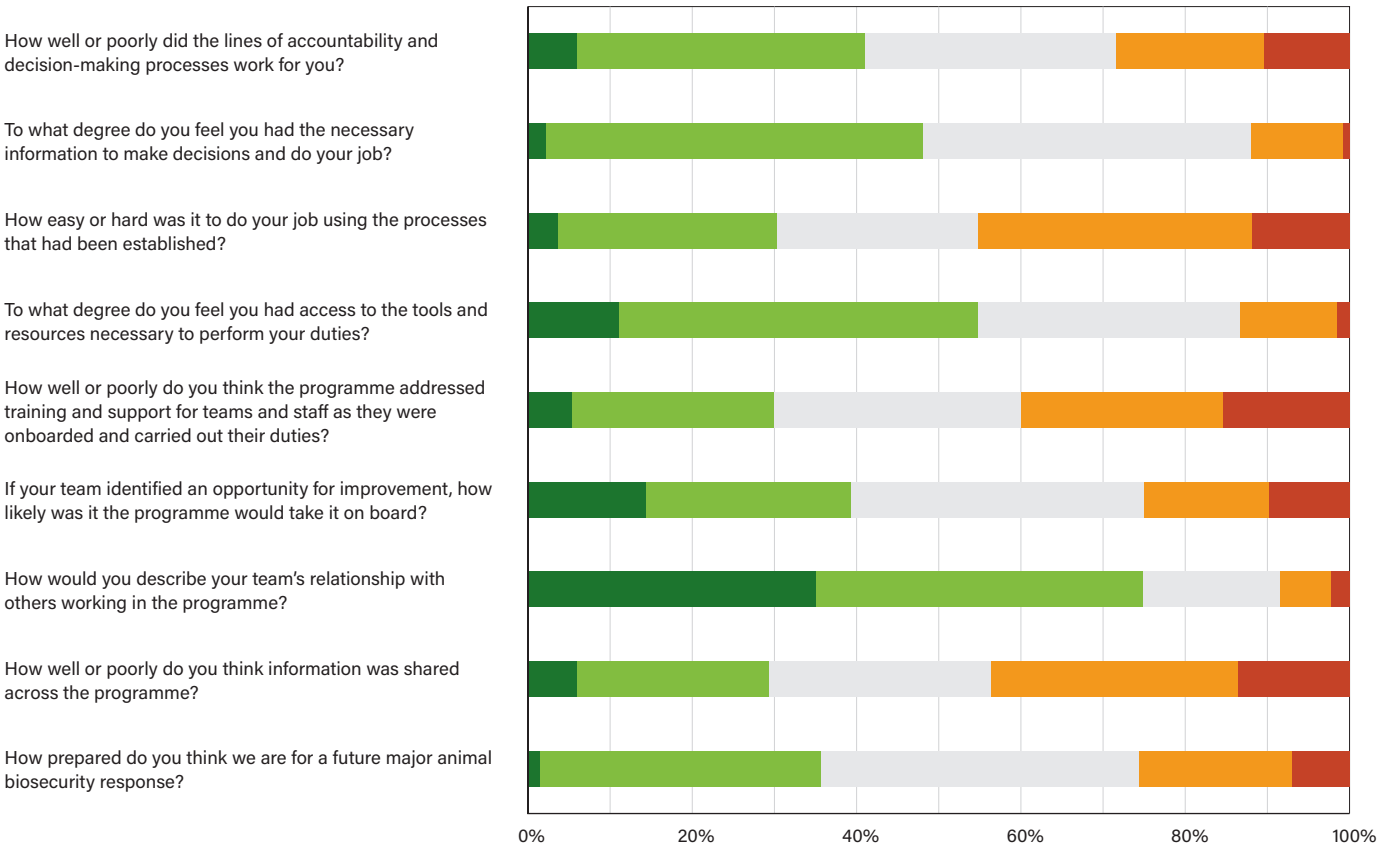
It can be seen in Figure A that the most negative responses related to programme flexibility and adaptability to the participants' farming situation, and it being challenging to get answers to their questions. This aligns with what the Panel heard through farmer interviews and the farmer focus groups.

Staff Survey

In the case of the response rate to the staff survey, given the diverse nature of the work force (MPI employees, contractors, subcontractors and employees of supporting companies) there is no precise record of the total number of employees engaged throughout the life of the Programme. Some of the staff who had worked in the Programme in its formative years were able to be contacted but many were not. Additionally, there was no compulsion for current employees to complete the survey.

● Table D. Staff survey participant breakdown by organisation.

Organisation	Number of respondents
Ministry for Primary Industries	116
AsureQuality	33
Beef + Lamb NZ	5
Dairy NZ	5
Ospri	3
DairyNZ and Beef + Lamb New Zealand Compensation Assistance Team	3
Rurual Support Trusts	1
Total	**166**



● Figure B. Staff survey results showing the answers to questions across all participants. The red and orange colours are the very negative and negative answers to a particular question, grey is neutral, and green and dark green are the positive and very positive.

Statistical significance analysis, using the Mann-Whitney U test with a significance level of .05, was carried out to compare responses from MPI and AsureQuality staff and to compare responses from participants involved in the beginning and later stages of the Programme.[1] Comparisons with other organisations could not be undertaken due to the small size of other data sets.

'January – June 2018' and 'January 2021 – now' answers were compared to test for statistical significance to see if the Programme changed over time.

Tables E and F shows where there are statistical significances, and the statistically significant results are subsequently displayed in Figures C to I.

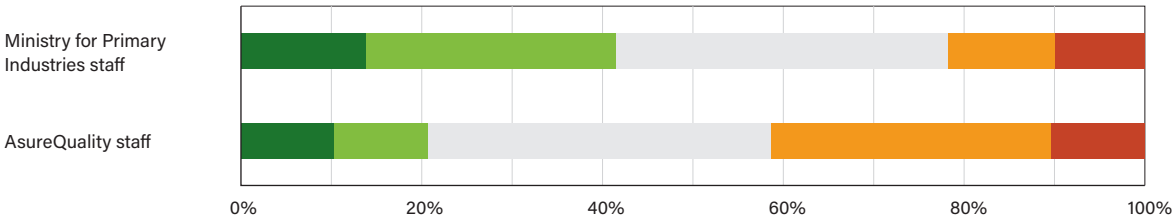
● Table E. Where statistically different answers exist between Ministry for Primary Industries and AsureQuality staff.

Survey Question	Statistical significances between MPI and AQ staff
How well or poorly did the lines of accountability and decision-making processes work for you?	–
To what degree do you feel you had the necessary information to make decisions and do your job?	–
How easy or hard was it to do your job using the processes that had been established?	–
To what degree do you feel you had access to the tools and resources necessary to perform your duties?	–
How well or poorly do you think the Programme addressed training and support for teams and staff as they were onboarded and carried out their duties?	–
If your team identified an opportunity for improvement, how likely was it the Programme would take it on board?	The difference is significant
How would you describe your team's relationship with others working in the Programme?	–
How well or poorly do you think information was shared across the Programme?	–
How prepared do you think we are for a future major animal biosecurity response?	The difference is significant

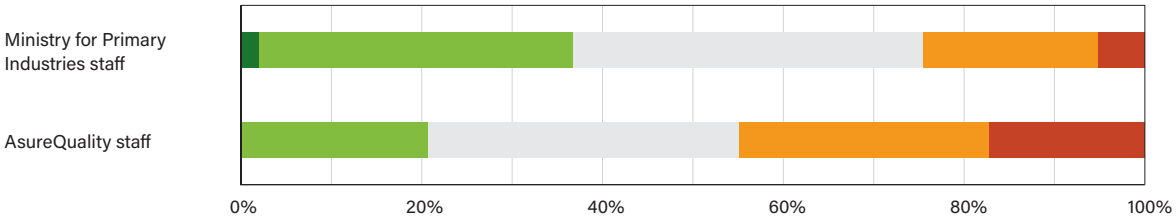
● Table F. Where statistically different answers exist between staff involved at the start (January–June 2018) and later stage (January 2021 – now) of the Programme.

Survey Question	Statistical significances between January – June 2018 and January 2021 – now
How well or poorly did the lines of accountability and decision-making processes work for you?	The difference is significant
To what degree do you feel you had the necessary information to make decisions and do your job?	The difference is significant
How easy or hard was it to do your job using the processes that had been established?	–
To what degree do you feel you had access to the tools and resources necessary to perform your duties?	The difference is significant
How well or poorly do you think the Programme addressed training and support for teams and staff as they were onboarded and carried out their duties?	The difference is significant
If your team identified an opportunity for improvement, how likely was it the Programme would take it on board?	–
How would you describe your team's relationship with others working in the Programme?	–
How well or poorly do you think information was shared across the Programme?	–
How prepared do you think we are for a future major animal biosecurity response?	The difference is significant

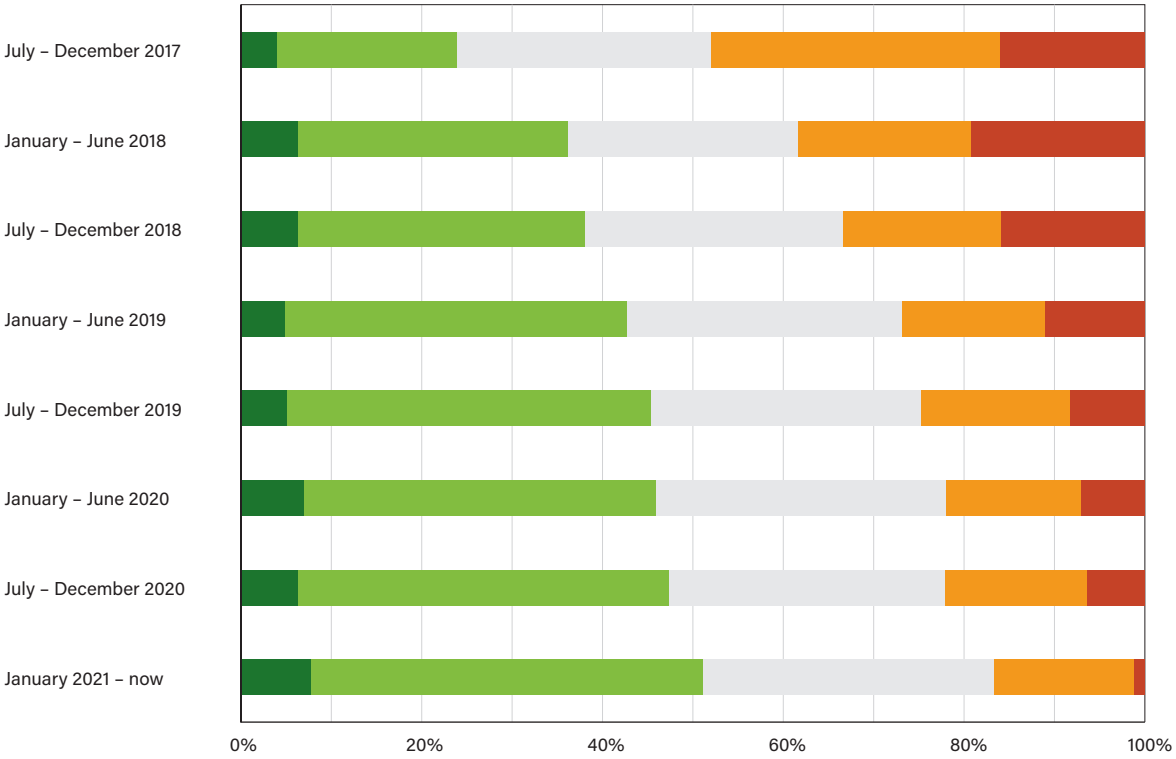
1 AsureQuality (AQ) is a state-owned enterprise contracted by MPI to deliver biosecurity response services. AQ staff made up a large proportion of front-line staff during the response to *M. bovis*.



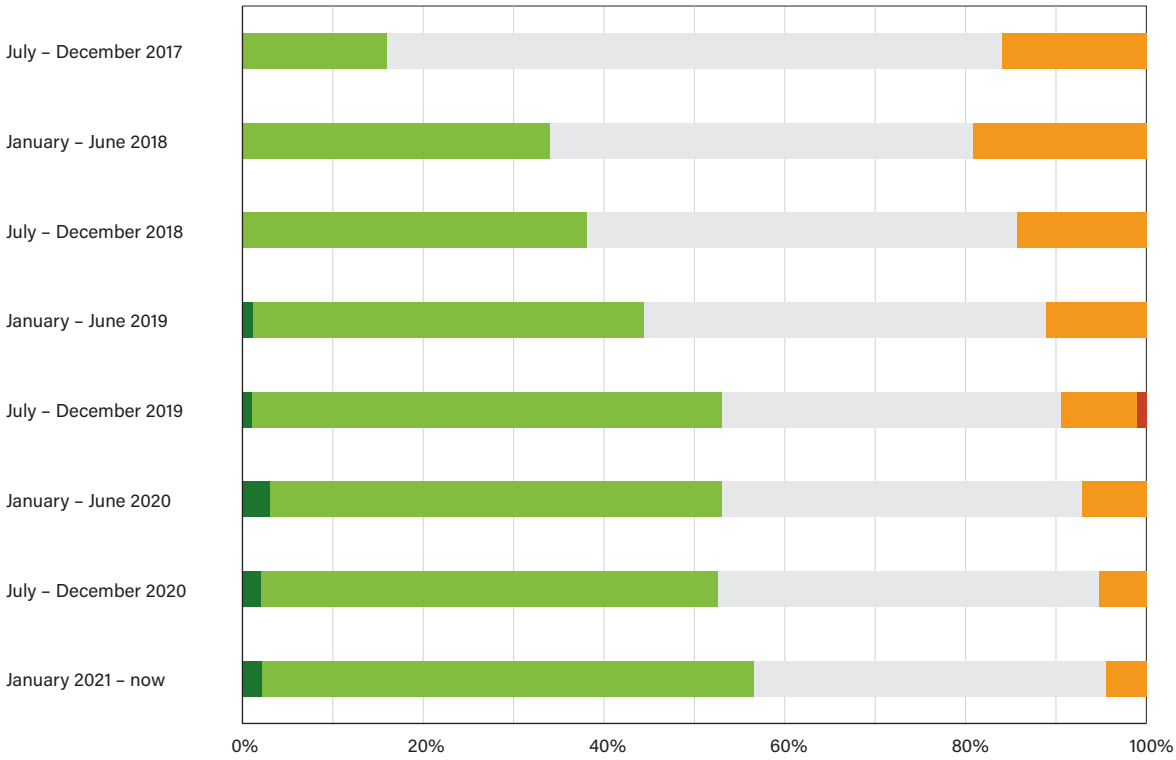
- Figure C. Comparative answers of MPI and AQ staff to the question "If your team identified an opportunity for improvement, how likely was it the Programme would take it on board?".



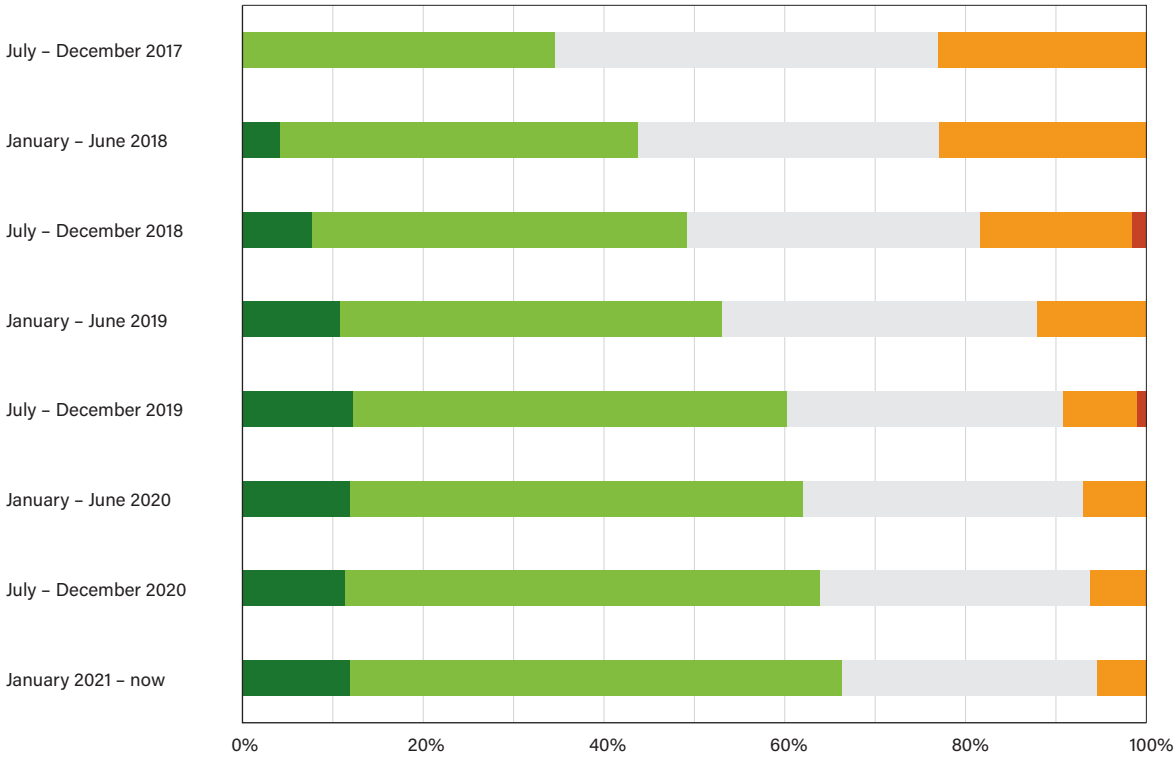
- Figure D. Comparative answers of MPI and AQ staff to the question "How prepared do you think we are for a future major animal biosecurity response?".



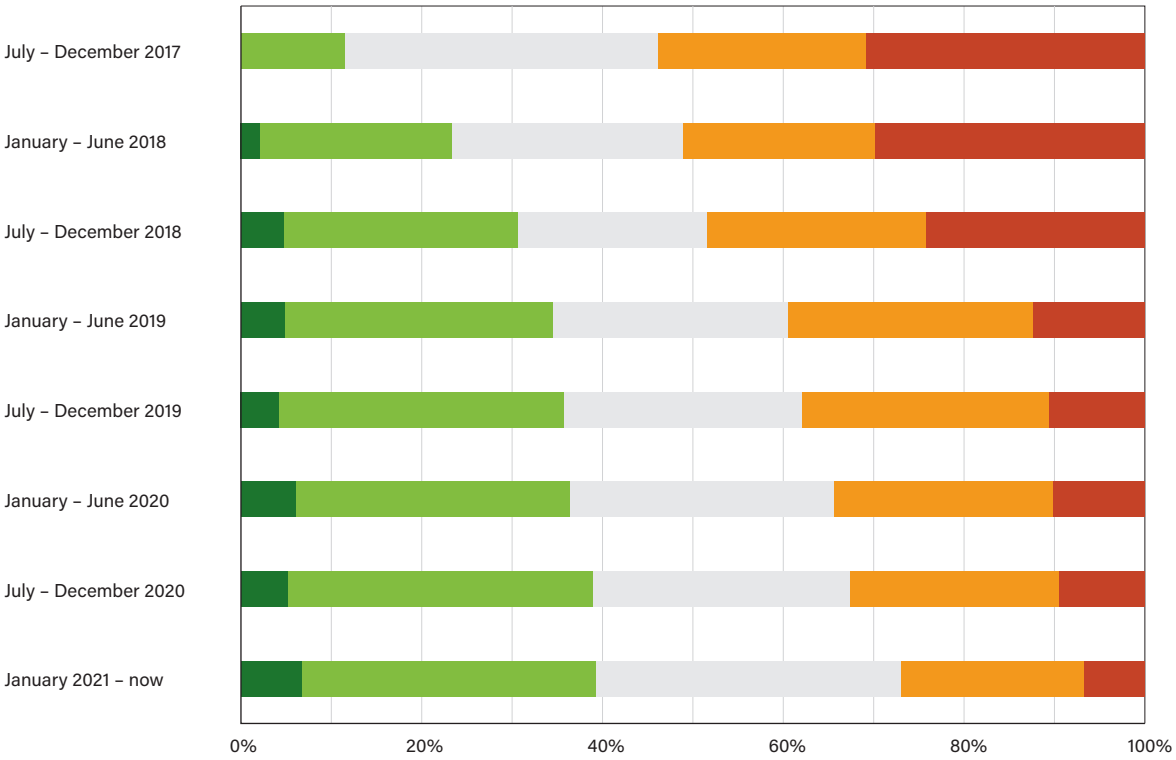
- Figure E. Comparative answers of staff over time to the question "How well or poorly did the lines of accountability and decision-making processes work for you?".



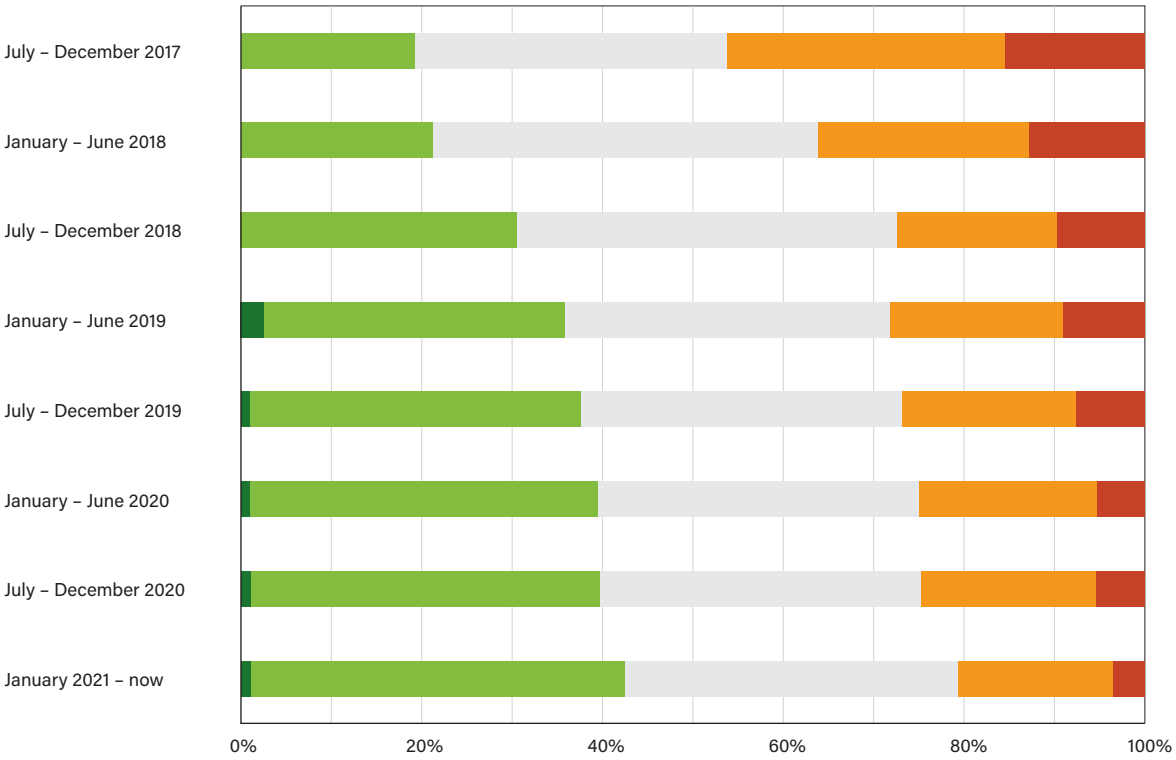
● Figure F. Comparative answers of staff over time to the question "To what degree do you feel you had the necessary information to make decisions and do your job?".



● Figure G. Comparative answers of staff over time to the question "To what degree do you feel you had access to the tools and resources necessary to perform your duties?".



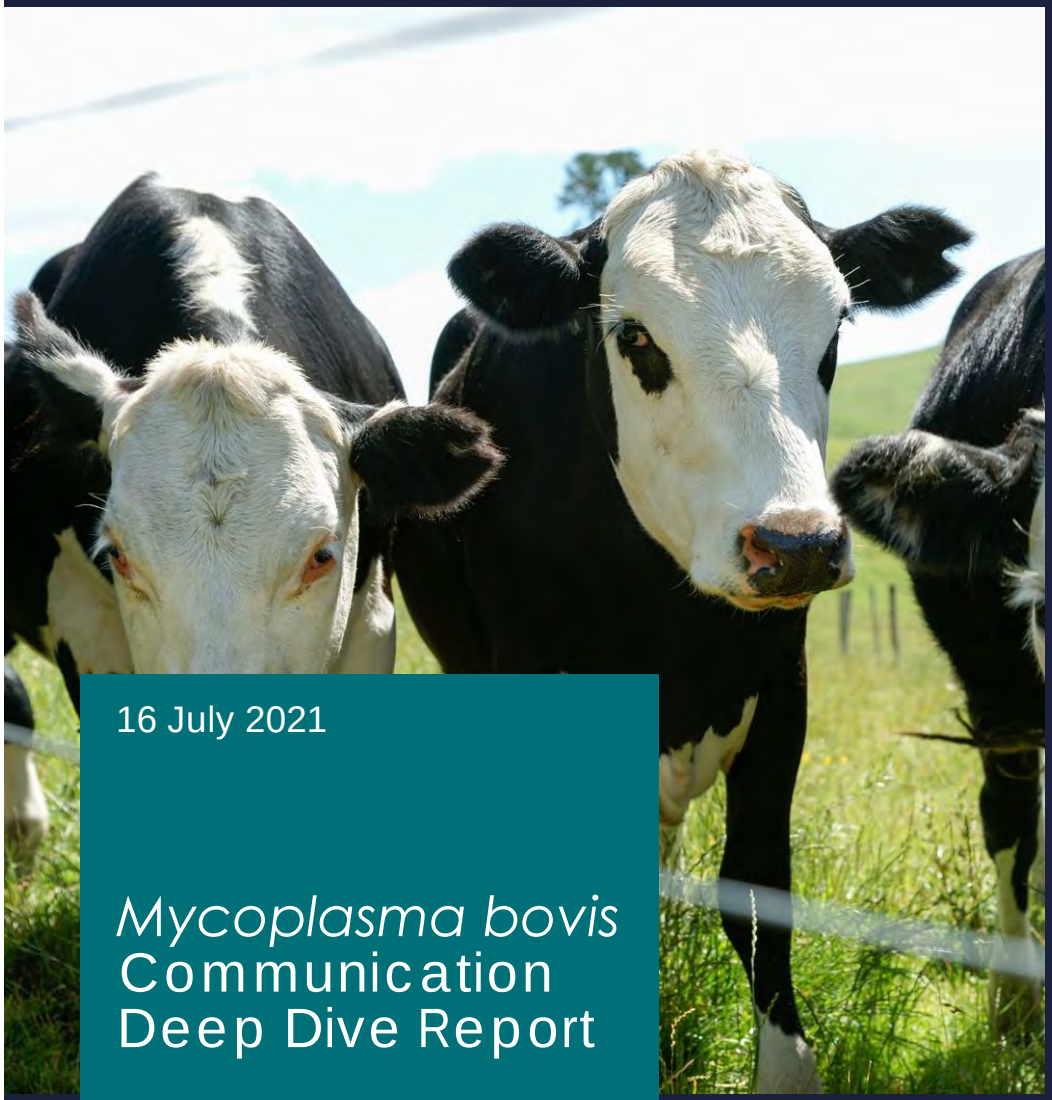
● Figure H. Comparative answers of staff over time to the question "How well or poorly do you think the Programme addressed training and support for teams and staff as they were onboarded and carried out their duties?".



● Figure I. Comparative answers of staff over time to the question "How prepared do you think we are for a future major animal biosecurity response?".

Appendix 3 – Communications Deep Dive Report

senateshj grounded in smart thinking



16 July 2021

Mycoplasma bovis Communication Deep Dive Report

Prepared for:
The Office of the Independent Review

senateshj.co.nz

Contents

Introduction

This report reviews the communication response to Mycoplasma bovis (*M. bovis*) from July 2017 to June 2020.

It is part of a wider review being carried out to identify lessons that can be learned from New Zealand's largest biosecurity response.

The purpose of this Communication Deep Dive review is to formally assess the communication response, identify what worked well and what needs to be done better, and to provide recommendations on how MPI can prepare itself and the primary sector for future biosecurity threats / risks.

While the review is informed by past activity, it is intended to be forward-looking and provide recommendations for how communication in biosecurity responses can be improved in future.

This report comes at a unique time, where it is also possible to reflect on the experiences of COVID-19 in terms of how New Zealand considers and prepares for future risk.

If the experience of COVID-19 has taught us anything, it is that New Zealand must take a more proactive, strategic and disciplined approach to predicting potential future crises, anticipating their impact and considering in advance how the Government, its agencies and the public would respond.

A devastating biosecurity event in New Zealand would have disastrous consequences for our economy and our credentials on the international stage as a source of safe, high quality food.

In our view, as the threats of climate change and destruction of ecosystems start to impact the planet, and New Zealand's environment, the need to improve capability in planning for, and responding to, biosecurity threats is growing even more urgent.

Methodology

This report has been informed by:

- Qualitative interviews with past and present members of the response communication team
- Qualitative interviews with stakeholders from rural industry groups
- Qualitative interviews with impacted farmers
- Reviewing interview notes from Governance team members
- Reviewing the Litmus report into farmers' experience of the *M. bovis* eradication programme
- Reviewing available documents, including communication strategies and plans developed during the response
- Review responses to an online survey of farmers
- Research into best practice and international standards for crisis responses.

Twenty-one interviews were completed for this report.

All interviews were conducted on the basis of confidentiality and, on that basis, no individuals or groups have been identified. It is important to acknowledge and thank interview participants for the honest and clear feedback they provided.

Where this report refers to views of "stakeholders", it means the external (non-MPI) stakeholders that were interviewed.

Communication team structure

The communication response to *M. bovis* involved two workstreams:

- Communication – responsible for developing and delivering content and collateral through key channels such as the media, emails, advertising, mail-outs and website; and supporting Ministerial communication
- Liaison – responsible for the face-to-face engagement with affected farmers.

These two workstreams were structured together under the same manager, but operated in separate physical locations.

This report is primarily concerned with the Communication workstream.

However, it is important to note that for many stakeholders, their interpretation of "communication" from MPI was the personal interactions they had with members of the liaison team, or others involved in the response.

During the interviews, it became clear very early in the process that the poor quality of some of the personal interactions stakeholders had with the liaison team had shaped perceptions about communication as a whole.

Therefore, we have reflected learnings from this feedback in the report where relevant, as the effectiveness of wider systems and processes has a direct impact on the perceived success and effectiveness of communication.

Overall assessment

The effectiveness of communication during the *M. bovis* response was hampered by:

1. Ineffective governance of the communication workstream, that either contributed to, or failed to mitigate, inadequate communication strategy and planning.

2. Communication plans were not developed early enough and do not align to international standards, or broader crisis management frameworks. The objectives were too broad, the plans were not implemented in full and the plans and activities were not measured for effectiveness.

3. Sector partners were not been engaged effectively in the critical early months and ongoing years of the response.

4. Resource constraints were not well managed, creating additional pressures on planning and implementation delivery.

Governance is the most significant issue that needs to be addressed to support improved biosecurity response communication in future. It is likely that the other findings in this report would naturally be addressed with a stronger governance approach.

The detailed findings that follow in this report provide a deeper analysis on the four key factors outlined above, as well as related factors that will support a stronger communication approach in future.

Positive aspects to maintain

The interviews identified that communication in the *M. bovis* response did improve over time, although there were still many areas it could have improved further. Positive feedback was provided on the following specific communication themes, and the good work in these areas should be maintained:

- The development of regionally-led engagement approaches in the later stages of the response
- The quality of organisation-to-organisation updates from MPI to other entities
- The ability of MPI to handle a large volume of media queries
- The use of partner channels to disseminate information to farmers
- The use of public meetings and other forms of face-to-face engagement where farmers could hear from and speak directly to biosecurity and science experts
- A well-planned website that hosted useful information
- High quality printed collateral that explained the response in detail.

Opportunities for improvement: detailed findings

The findings in this section are listed in order of importance (most important factors first) according to their likely impact on improving future responses.

1. Governance

Many of the wider issues identified in this report relate back to a core issue of poor governance of the communication workstream.

No-one on the governance team had specific responsibility for communication. While there is evidence of communication plans being shared with the governance group, several interviewees at an operational level in the programme spoke of a dynamic where communication matters were raised for consideration but not taken further at a governance level, leaving the operational team to keep pushing on without clear strategic guidance or direction.

While all interviews at the governance and senior leadership level indicate awareness of some of the gaps in the communication response, only one interviewee clearly articulated the need for better strategic communication in future. That interviewee also identifies that the governance team may not have been receiving adequate information, and/or had a lack of visibility on key strategic risks, which in turn impacted on the ability to make decisions about strategic communication.

These information flows need to be addressed for future responses, as the transparent and accurate sharing of information and facts up to the governance level is crucial to an effective crisis response.

That said, a strong governance structure with robust crisis management frameworks around it should be able to proactively identify where information gaps may exist and seek to close them.

Likewise, many of the wider findings in this report, including the lack of clear communication strategy, inadequate resourcing, lack of measurement and gaps in capability are issues that a strong governance team should have found and addressed during the response.

The overarching sense from the governance level interviews is that there is an awareness of the need to improve communication in future, but little concrete thinking is in place as to how that should be achieved.

In a strong crisis response, the Governors need to approve a communications strategy. This needs to be implemented by an experienced senior leader at the response leadership level who can manage the overall strategic communication decisions, enabling the operational team members to focus on their tasks.

A separate role to review the communications leadership (acting as a 'sounding board') should also be established.

This must be addressed in future response plans. It also needs to be tested during scenario training.

2. Improving the approach to communication strategy development

The key to successful communication in a crisis is proactive, strategic and disciplined forward planning.

In the case of *M. bovis*, no formal, documented communication plan existed until July 2018, when the decision to eradicate had already been made and a response was well underway. A further communication plan was drafted in May 2020 and updated in 2021.

The two plans followed different formats and lacked consistency between them. While they contained some strong tactical components, they were not grounded in key crisis management principles, or aligned to any obvious wider crisis or issues management framework or guidelines.

In reviewing the timeline of the *M. bovis* response, there were clear opportunities to develop communication plans much earlier in the journey. This would have:

- Identified issues regarding capability, resourcing and channel gaps
- Corrected issues relating to the tone of communications
- Created the forward-looking issues assessment processes that are vital in effective crisis management.

Ideally, a high-level response communication plan should have existed before the first case even emerged, given *M. bovis* was identified the 1960s and is widespread in other OECD nations, particularly in the US and Europe. It should have also been tested and this testing should have involved key sector organisations and stakeholders.

It also seems logical that a formal communication plan should have been prepared in advance for the possibility of eradication as soon as that was identified as an option, to allow time to prepare the necessary materials, engage and align with stakeholders, and to ensure communications were on the front foot.

The interviews clearly identified the communication team was under resourced from July 2017 to July 2018, which is likely to have compounded their ability to plan ahead.

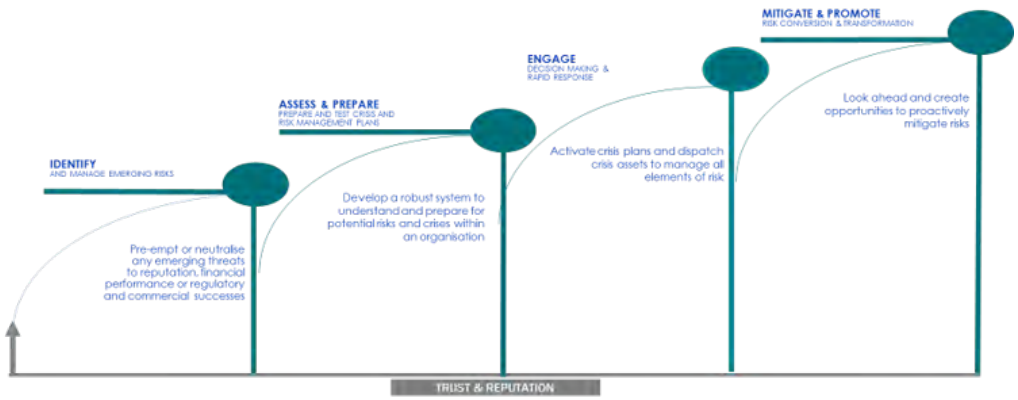
The communication team delivered a huge volume of work, in difficult circumstances, however, interview feedback demonstrates that it was always delivered on the back foot, waiting for the next issue to emerge, rather than proactively getting ahead of things.

Nevertheless, the need for stronger communication should have been on the governance team's radar, and there should have been stronger support at that level to enable the critical planning work to be delivered.

There is an opportunity to act now for future responses, to prepare in advance a clear communication strategy that sits within and supports a stronger overarching Crisis Management Plan for known and unknown biosecurity risks. The plan and core communication response team should also be tested regularly to ensure strong capability should such a crisis incident occur again.

Typically, a Crisis Management Plan acts as the communications and decision-making component of an overall Business Continuity Plan. It is part of a system-wide plan that connects policy, infrastructure, information (including scientific), key stakeholders, and is based on insights (including cultural).

It should be grounded in a wider system approach to reputation risk management, such as:



Source: SenateSHJ 2021

A comprehensive crisis management plan enables rapid and effective communication to ensure overall safety to both internal and external stakeholders. This is essential in an environment where digital channels create instant perceptions (whether they are true or false), and the demand for information, locally and internationally, can be insatiable. In instances regarding health-related issues, this is even more critical.

A crisis communication plan details the processes and roles an organisation needs to have to monitor issues and ensure effective decision-making and communications in a crisis. It is designed to allow effective decision-making to happen under intense public scrutiny, and in situations where the organisation will have little, or no, notice and initially, very little factual information. It ensures timely communication to stakeholders (internal and external) and ensures ethical, legal, reputational and financial issues are planned for and managed.

This requires known and possible significant issues to be identified and planned for, draft communications to be developed in advance and senior crisis team members to know what their roles and those of others in the team are. It also depends on these executives, and those in key stakeholder organisations, having the relevant support and practice to assess reputational risks quickly and to be able to respond to them confidently and competently.

The best crisis communication plan is concise, easy to follow, has clear roles and responsibilities, and is updated and tested regularly. It is also supported by pre-agreed training for key people and pre-approved content (written and audio-visual). All of this enables quick response times – crucial in a biosecurity response.

3. Need for a more single-minded approach

The communication plans reviewed for this report had mixed, multiple objectives.

The first plan, developed in 2018, had four different objectives. The second, developed in 2020, had nine objectives.

Given the programme had such a clear goal – to eradicate *M. bovis* – the communication objectives needed to be much more focused on supporting this overall objective.

They also need to be able to be measured and evaluated during, and after, the *M. bovis* programme.

By being more focused and singular in its intent, the communication workstream would be able to better focus on activity that supports the programme objective and rule out activity that does not make a direct contribution to eradicating the disease.

4. Proactively planning for scenarios

It is widely acknowledged that one of the keys to successful crisis communication is proactively anticipating scenarios, rehearsing those scenarios, and using feedback from rehearsals to improve the planning and response systems, processes and tools.

A lot of focus in the wider review process has been on "how would we handle foot and mouth disease?" This is an important question to ask, given that it would be a worst-case scenario. It is pleasing to note that a communication plan for foot and mouth disease exists, and is being actively reviewed.

Outside of known diseases such as foot and mouth, it is also crucial to consider proactively planning for the unknowns as well.

If the focus remains only on known diseases, there is a risk of losing momentum on improving crisis response capability overall if it feels like the boxes are ticked on them.

There is common acceptance that foot and mouth would be a significant issue for New Zealand farmers and New Zealand, but the disease is understood, as is what would need to happen to respond to a potential outbreak.

What would be infinitely worse for New Zealand is not responding well to a known risk, or needing to deal with a fast-moving infectious disease that is not understood and planned for.

Therefore, our key recommendations are:

- Ensure the response plan (including communications) for all known risks are well prepared for and tested
- Ensure MPI is considering and planning for the unknowns.

In practical terms, this means proactively developing crisis response frameworks and supporting communication plans that consider broad scenarios such as:

- Infectious / non-infectious disease (known and unknown)
- Fast moving infectious disease (known and unknown)
- Slow moving infectious disease (known and unknown)
- Newly discovered zoonotic diseases.

By lifting the focus to these broader scenarios MPI will build greater ability to:

- Feel confident that no matter what the scientific subject matter involves, it can stand up an effective response quickly
- Know that response systems, tools and processes can handle extreme scenarios
- Build capability to lead and implement the communications
- Adopt a principles-based approach to communication planning, which would support the ability to be agile on the implementation details in a real-life scenario.

In our experience, the more often an organisation tests its crisis plan, the better placed it is to respond well when a crisis occurs. How an organisation / sector responds to a crisis incident is just as important as what it says in communication channels. This is vital for New Zealand given its dependence on international market trust and confidence in its products and services, and its farming systems.

Failing to prepare properly greatly enhances reputational risk – for the organisation and individuals. It means organisations won't be able to respond fast enough, resulting in others setting the agenda. In this instance, that could create international consumers and buyers

having a long-lasting negative perception of New Zealand food products and farming practices.

5. Improving face-to-face communication[1]

As outlined in the introduction sections, although the primary focus of this review is the Communication workstream, rather than the Liaison workstream, it must be acknowledged that poor face-to-face communication with affected farmers has created significantly negative perceptions of communication overall.

Face-to-face communication has been identified in the online survey of farmers as the most preferred method of communication.

If farmers don't have faith in the personal interactions, they won't trust the communications. This will lower their acceptance of recommended actions and their willingness to actively participate in playing a positive role.

Interviews highlighted specific areas for improvement in future:

- Empowering liaison team members to share data, be upfront about what they do not know, and be realistic about timeframes. Farmers especially indicated they would prefer an 'under promise and over deliver' approach in these situations.
- Being clear and empathetic to the personal impact on farmers
- Having stronger database systems (improvement is already underway with Tiaki now in place)
- Training for all liaison team members on how to handle delivering and discussing difficult information
- Training or support material to educate non-rural liaison team members about farming
- Engaging other stakeholders such as veterinarians to share the communication load.

6. Team size and composition

Several interviewees highlighted the need to increase the size of the communication team and ensure the right skillsets are in place for future responses.

From July 2017 to the first quarter of calendar year 2018, the Communication team was very small, starting with just two team members in 2017 and building up to five team members in July 2018.

These two team members were highly experienced individuals, however, they had to handle a significant volume of activity in the early stages of the response, dealing with a disease that was unknown, under intense political scrutiny, and with drawn-out decision making on the eradication decision. Their resilience in this challenging situation should be acknowledged.

The communication team was significantly scaled up in approximately April 2019, around the time of the surge. This required finding and upskilling new team members quickly during another very busy period of activity.

In a future response, the communication team size should be increased at the start of the response, ensuring that every role also has a back-up available to cover breaks for the core team members. A formal review process should be part of the decision-making agenda cycle,

[1] Feedback in this section reflects the views of farmers interviewed to date. It does not yet reflect the online farmer survey feedback.

ensuring adequate resourcing at all times of the crisis cycle. The team can then be scaled back as the response comes under control, using the same formal review process.

Interviews with communication team members also highlighted gaps in specialist capability, which, although less visible to external stakeholders, needs to be addressed in future. Specific feedback was given about the need for:

- Communication team members with farming or rural experience
- Proactive media relations capability
- Social media and digital capability
- Stakeholder engagement capability.

These roles would be considered standard roles in a crisis incident communication team and the absence of them (or knowledge of them) needs to be rectified quickly.

Specific roles should be mapped in advance with detailed responsibilities outlined against each position, for every scenario-related crisis communication plan. Scenario testing should emphasise the importance of each role "staying in its lane" and focusing solely on the delivery of its specific responsibilities.

7. Involvement and engagement with stakeholders

Throughout its life cycle, the response relied on partner channels for communication (such as the communication channels managed by Dairy NZ and Beef & Lamb New Zealand), but there was no meaningful stakeholder engagement strategy in place to truly empower these partners. Other potential partners, such as the veterinary network, were not engaged at all.

DairyNZ and Beef + Lamb New Zealand both seconded team members to the communication response, however, it took some time for the working arrangements to settle into a relationship of trust and genuine partnership.

Both external stakeholders themselves and members of the communication team felt that more could have been achieved with closer stakeholder alignment and involvement, but at the same time some communication team members described a sense of facing roadblocks from industry organisations where *M. bovis* was seen as just one thing amongst many that their farmers needed to deal with.

The absence of a clear stakeholder engagement strategy meant that other potential networks of influence that could have delivered key messages to farmers were missing from the response. This included veterinarians, rural GPs, farm consultants, banks and accountants.

Future communication plans need to build in clear guidelines for how to activate and use these networks to get information to farmers. Veterinarians can play a particular role in breaking down scientific information for farmers and it is important they are factored into future plans.

The lack of scenario planning and testing that involved key stakeholder groups added to the lack of cohesion.

8. Channels fit for purpose

The interviews highlighted the critical importance of face-to-face communication for farmers, but they also acknowledged there is no one-size-fits-all approach and multiple channels are needed to ensure information is seen and absorbed.

These findings were reinforced by the farmer survey which showed a preference for face-to-face and written communication, but also appetite for a wide range of other communication channels as well, including conducting independent research and peer-to-peer learning.

Several interviewees reported issues with communication channels, including over-reliance on a weekly email update as the core communication channel, the length of time it took to get a website up, and lack of social media presence throughout the response. Paid advertising was intermittent and the media environment was reported as being hostile and negative.

A range of farmer-led Facebook groups have emerged through the response but there is no balance or input on the discussions from MPI itself.

None of the communication channels used in the response were measured for effectiveness or impact.

Digital channels and sophisticated users mean crisis situations can be communicated quickly, widely and with significant impact. Online content is now the central basis of coverage or commentary of an incident. A person's smartphone coverage, combined with their perception of what is happening will shape the initial perception and sentiment, of an incident.

In today's media landscape there are no deadlines for "bulletins" and media outlets are under intense pressure to deliver real-time content via their digital platforms. When combined with the impact of social media posts, the initial coverage of a crisis now happens, domestically and across borders, with a speed and level of intensity that takes many by surprise.

Digital communication channels are no longer an optional part of an organisation's crisis response; they are the primary tools in the toolbox and organisations need to know how they will use digital channels to manage a crisis situation.

Communities, activists, media and stakeholders expect digital communications. They not only use them to access information but also expect organisations to respond to them there as the channels they choose and prefer.

There are significant opportunities to expand and improve the use of different communication channels in future, and communication plans should note the benefits / purpose of different channels in different contexts. For example, paid advertisements are a strong way to convey the "why" behind a response, social media can be useful for busting myths and misinformation, face to face communication is best for individual farm action planning.

In long-term programmes such as *M. bovis* measurement of channels is also important as it would enable better informed decisions about what channels to support over time.

9. Alignment to international best practice

None of the communication planning material reviewed as part of the preparation of this report aligns to, or acknowledges, recognised international best practice standards for crisis communication.

Both the International Standards Organisation (ISO) and the British Standards Institute (BSI) have standards related to crisis management.

We recommend reviewing and monitoring New Zealand's biosecurity crisis response plans against these standards to ensure they meet these global benchmarks.

Of note, ISO is developing ISO 22361 which will provide guidelines for developing a strategic capability for crisis management:

> *"This project will result in an International Standard that provides guidelines on good practice for crisis management to help the strategic decision makers of an organization to plan, implement, establish, operate, monitor, review, maintain and continually improve a crisis management capability. It is intended for any organization regardless of location, size, type, industry, structure, or sector.*

This document will provide guidance for:

- *understanding the context and challenges of crisis management;*
- *developing an organisation's crisis management capability through preparedness;*
- *recognizing the complexities facing a crisis team in action;*
- *communicating successfully during a crisis; and*
- *reviewing and learning.*

It is intended for management with strategic responsibilities for the delivery of a crisis management capability. It is for those who operate under the direction and within policy of top management in:

- *implementing the crisis plans and structures; and*
- *maintaining and assuring the procedures associated with the capability."* [2]

The British Standards Institute offers PD CEN/TS 17091 "Crisis Management – Building a Strategic Capability" which provides specific guidelines for communication management in a crisis response that future biosecurity responses would benefit from:

"Previous Standards provided a limited view on crisis communication, primarily focusing on media management. The media is just one of many stakeholders a crisis communication strategy needs to address. The new Standard better recognises this and will help people, especially those not in communications roles, to understand the reach and impact of the communication strategy to the response.

The Standard also provides more detailed guidance for managing and using social media. It outlines key considerations for planning and suggests that building an effective social media capability in 'peacetime' can help a company be more proactive when a crisis hits. This will help organisations that treat social media as a new and emerging 'nice to have' to view it as a critical pillar of crisis communication." [3]

10. Being farmer-centric, not animal-centric

In a biosecurity crisis, while the subject matter of communication involves animals, the action or ask is on people.

One of the key opportunities for improvement in future responses is ensuring crisis communication plans are grounded in key principles that support positive human behaviour change.

These could include, but are not limited to:

- Demonstrating empathy – farms are livelihoods and communications need to be cognisant of this
- Using peer-to-peer content to shape behaviour – consider using case studies and more creative tools such as video to put the farmer at the centre of communication
- Using plain, simple language free of corporate jargon
- Mapping influential or respected farmers on a regional basis and ensuring they are equipped to reinforce key messages and communicate to their peers effectively.

[2] https://www.isotc292online.org/projects/iso-22361/

[3] https://blogs.deloitte.co.uk/crisisandresilience/2018/12/building-a-strategic-capability-in-crisis-management.html

Communication in a farming context needs to be mindful that many farm businesses are family operations. Therefore, channels and messaging that resonates with both older and younger audiences, and across genders, is important to ensure reach.

The tone and style of communication is also an important consideration to ensure it conveys empathy, speaks to human beings, and retains accuracy of technical and/or scientific information.

The Litmus report identifies the importance of farmer-centric communication as well, given the overwhelming nature of the issues they were dealing with and the sense of fearfulness and isolation that many farmers felt.

Examples of this would be in the key messages for the communication strategy:

Current key message	Farmer-centric message
The *M. bovis* Programme's goal is to eradicate *M. bovis* from our national herd while reducing the impacts of the disease and eradication on people and communities affected by the Programme and to leave New Zealand's biosecurity system stronger.	Our goal is to support New Zealand farmers to eradicate *M. bovis*. By working together with farmers and rural communities, we can reduce the impact of the disease and build a stronger biosecurity system for the future.
The Programme is continually listening to farmers, independent experts and stakeholders, and taking feedback on board, improving processes to mitigate on-farm disruptions.	We know that it is extremely challenging for farmers who have *M. bovis* on their properties and we are always working to improve our support processes.

11. Regional capability

In some scenarios, there may be opportunity to implement more of a "hub and spoke" model, where core planning, messages and content are developed centrally, but regional teams are deployed to manage local stakeholder and media engagement.

Such a model would require strong governance and reporting systems, but would have the advantage of maximising deeper understanding of local networks and nuances. It would also draw on trusted and respected regional / local spokespeople, who have strong personal networks.

This model would suit slower-moving, regional outbreaks of disease rather than fast moving situations.

12. Faster information flow

Nearly all interviewees highlighted frustrations caused by the slow pace of information flowing out of the response.

This was particularly noticeable in the April 2019 surge, where slow information flow to the liaison team severely hampered the ability to provide adequate, accurate information to farmers.

Compensation was another significant communication challenge. While it was not the communication team's challenge to solve, they ended up carrying the problem of the slow decision making happening elsewhere.

We note though, compensation should have been identified, along with a range of other possible issues, as part of an ongoing issues management / crisis mapping processes.

The communication and liaison teams were also physically separated in the response building. Several interviews suggested that these teams should be co-located in future, with a well-established crisis room set-up, to ensure faster and more comprehensive two-way feedback between the teams.

Risk communication: creating future buy-in

In addition to the opportunities outlined above for improving crisis response systems, there is also a significant opportunity to increase the trust and buy-in for future responses by delivering an effective biosecurity risk communication strategy in "peace time".

In the case of New Zealand's biosecurity system, this is important for rebuilding some of the trust and belief that has eroded due to the significant social impacts of *M. bovis* cited by some farmers in the interviews for this report.

The level of trust between farmers and the biosecurity response system needs to be measured and addressed, because even the very best crisis management systems risk failing if they are launched into a wider context of mistrust and low buy-in.

It is recommended that MPI consider developing a broader, "peace time"-oriented communication and engagement strategy that focuses on building trust in the system to support future responses.

What we have seen from the experience of responding to COVID-19 is that clear and consistent communications, linked to required behaviours with regular reporting, make a big difference to belief in a public response effort. It is difficult to sustain, particularly when active groups with opposing or cynical views are involved.

There are a wide range of international reference resources available that provide guidance on best practice risk communication.

The World Health Organisation's *Guide to Communicating Risk in Public Health Emergencies* provides useful guidelines from health responses that could be applied to a biosecurity setting. These guidelines note:

> *"… effective risk communication allows people at risk to understand and adopt protective behaviours. It allows authorities and experts to listen to and address people's concerns and needs so that the advice they provide is relevant, trusted and acceptable."*

Australia's Department of Agriculture also developed a national biosecurity communication and engagement strategy in 2020 that provides a useful template for this type of approach.

Conclusion

New Zealand took a bold step in its decision to eradicate *M. bovis* from the national herd.

At the four-year point of what it is expected to be a 10-year programme, there are significant things to learn from to improve future responses.

The four most significant opportunities for improvement are listed below. Of these, governance is the most significant single opportunity, and it also impacts on the other three areas.

1. Ineffective governance of the communication workstream, that either contributed to, or failed to mitigate, inadequate communication strategy and planning.
2. Communication plans were not developed early enough and do not align to international standards, or broader crisis management frameworks. The objectives were too broad, the plans were not implemented in full and the plans and activities were not measured for effectiveness.
3. Sector partners were not been engaged effectively in the critical early months and ongoing years of the response.
4. Resource constraints were not well managed, creating additional pressures on planning and implementation delivery

While interviewees believed the communication programme is improving over time, a stronger governance process, and an improved overall framework for crisis planning and scenario-testing, would mean New Zealand would be much better placed from the outset for its next major biosecurity event.

Impact of improvement opportunities

In addition to the key themes outlined above, the interview process showcased a range of other opportunities for improving crisis communications in a biosecurity response.

The table below captures all the key themes raised in the interviews, and groups them according to likely level of impact on the success of a future response.

High impact	• Dedicated, communication-focused governance role • Scenario-led communication plans prepared in advance that are principles-based and have clearer articulations of the roles and responsibilities required to deliver an effective response • Team resourcing and capability • Pressure testing communication plans in realistic rehearsals • Aligning communication plans to international standards (ISO or BSI) • Engaging earlier and more effectively with rural stakeholders • Significantly increasing communication team size in the early stages of a response • Better alignment of communication with the overall response approach i.e. communication plans aligned to response milestones
Medium impact	• Adopting social and digital communication tools • Greater range of communication channels deployed • Peer-to-peer content e.g. case studies, videos of farmers talking to farmers • Stakeholder registers to map influential / respected local stakeholders on a regional basis • Deeper understanding of farming and the farm calendar within the response communication team • Improved feedback and inter-team communication to ensure stronger alignment and understanding across aspects of the response • Strengthening media relationships to deepen understanding of biosecurity issues in advance of a crisis.
Low impact	• Availability of more senior spokespeople (DDG or DG level) • Reduced layers of sign-off on key documents – streamlined process with autonomy for sign off clearly designated to the response team • Using “peace time” to reinforce messaging on best practice behaviours required of farmers e.g. use of NAIT • Identifying additional social media capability that could be stood up quickly during a response e.g. via an external provider.

Appendix 1: 11 core components of a crisis management plan

Crisis management plans need to be concise and portable if they are to be effective and user-friendly. A strong crisis management plan should include:

1. An outline of the purpose, principles, scope and goals of the plan, including how different types of issues are classified and responded to
2. Clear details of how it relates to, and connects with, other emergency plans (e.g. premise / location evacuation plans, etc)
3. Who are the designated Crisis Management Team (CMT) members, and their specific roles. It should also clarify who are their deputies in the event they are unavailable.
4. Role descriptions and key responsibility checklists
5. The agreed escalations, decision-making processes and sign-off procedures (especially for all legal and listed company requirements)
6. A crisis response strategy that develops a framework to manage the crisis, including crisis procedures that define specific responses to a variety of high-risk incidents
7. Contact information, including lists of staff, stakeholders and relevant regulatory agencies (in all locations)
8. Clear instructions for the establishment and operation of the Crisis Centre, and the back-up facilities should the primary location be unable to be used
9. Media and social media management policies and procedures
10. Draft templates of communications (for the priority risks)
11. Proven monitoring and reporting processes

The crisis management plan should also describe the organisation's risk monitoring systems and reporting processes, and have agreed processes for testing the effectiveness of the crisis management plan and updating it on a regular basis.

The detailed version of the appended checklist would assist in bringing all the key information inputs together, and then keeping them current.

Appendix 2: 10 steps to developing a crisis management plan

The key steps involved in developing a crisis management plan are:

12. Review performance objectives for the programme.
13. Review risk / threats identified during the risk assessment.
14. Assess the availability and capabilities of resources -- including people and equipment -- for incident stabilisation.
15. Review BCP and assess emergency service response protocols to determine their response time, knowledge of the organisation's facility and its hazards, and capabilities to stabilise an emergency.
16. Determine if there are any emergency planning regulations and address them.
17. Develop protective actions for life safety, such as evacuation, shelter, shelter in place and lockdown.
18. Create hazard- and threat-specific emergency procedures.
19. Coordinate emergency planning with public safety services.
20. Train personnel.
21. Test the plan.

Once the emergency response is over, the organisation moves onto disaster recovery to restore operations as comprehensively as possible.

The crisis management plan should be designed as a digital document, with clear and easy links to all components. This will be essential for regular updates, and for any and all required translations to be easily managed.

The digital document should have links to all related BCP and emergency plans, as well as all planning and communication templates, databases and draft content (visual and audio-visual).

Paper based copies should be held in every key location, and be updated at least every six months.

Full versions of the digital and paper-based plans and draft communications should also be saved off-site in the event of any critical failures of electronic systems.

Recommendations for improving *Mycoplasma bovis* (*M.bovis*) eradication programme information exchange and data management systems

Authors:

J Krause (GCDS – Stats NZ)

K Sweeney (GCDS – Stats NZ)

L MacKay (GCDS – Stats NZ)

D Kwon (GCDS – Stats NZ)

Reviewers:

M.bovis Independent Review Panel (N Shadbolt, R Paskin, C Saunders, T Cleland) [27-May-2021; version 0.8]

C Jones (GCDS – Stats NZ) [20 May 2021; version 0.6]

H Hutchins-Pond (GCDS – Stats NZ) [20 May 2021; version 0.6]

E Hawkins (GCDS – Stats NZ) [19 May 2021; version 0.5]

R McGrath (GCDS – Stats NZ) [19 May 2021; version 0.5]

Major SL Bassett (NZDF) [13 May 2021; version 0.3]

Date: June 2021

Version: Final 1.0

Contents

Abstract

The recent *Mycoplasma bovis* (*M.bovis*) outbreak response in New Zealand has provided insights and lessons that can enhance our preparations for future biosecurity incursions with the potential to significantly impact New Zealanders' economic and social wellbeing.

Effective management of data and information, along with proper leveraging of expertise, supports the formation of a common operating picture with which to make appropriate and timely response decisions. Some baseline data takes time to acquire and maintain, but represent critical assets ahead of an incursion response. Other data are incursion-specific and therefore must be acquired ad-hoc from day zero of an incursion event. All data and information and the systems that facilitate access to them need to be interoperable and consistently applied, thereby supporting a common, trusted view of biosecurity status.

Systems and processes within the scope of this review cater to the requirements of both current and past New Zealand biosecurity scenarios. However, many of them are unlikely to adapt to the data and information needs of a future biosecurity threat, especially one that may be more complex and spread more rapidly than any experienced previously. A biosecurity data strategy and effective governance processes are required to inform trade-offs (costs versus risks) associated with proactive (collecting data ahead) versus reactive (collecting data just in time) investment.

Expertise within the biosecurity data lifecycle could be better leveraged to stress-test preparations for new incursions and define baseline versus ad-hoc data needs for an effective response. Preparation needs to include the identification of common patterns of critical path data flow requirements across scenarios.

Inclusive, ongoing co-design with data suppliers and users will help with management of constraints and provide opportunities to improve the data lifecycle and support resilient biosecurity outcomes. An inclusive approach would reflect MPI, industry, laboratory, farming practice, and iwi and Māori perspectives.

Executive summary

Background

In March 2021, the office of the Government Chief Data Steward (GCDS) at Stats NZ was asked to assist the independent review panel established to assess the Ministry for Primary Industry's *Mycoplasma bovis* (*M.bovis*) eradication programme. Based on its data system leadership role and subject matter expertise, the GCDS was commissioned with reviewing the *M.bovis* programme information exchange and data management systems, ascertaining whether current systems were fit for purpose, and providing a set of recommendations for improvement.

Employing a series of "deep-dive" workshops with *M.bovis* programme staff and stakeholders, the GCDS identified a set of insights based on the experiences of the workshop participants. These insights were synthesised into a set of six recommendations. This process ensured that the advice offered by the GCDS was based on real-world lessons learnt.

The recommendations have been organised within five broad data themes, drawn from a refreshed *New Zealand Data Strategy and Roadmap*. These themes cover the key areas of data, infrastructure, leadership, people capability, and Te Tiriti o Waitangi partnership:

1. The right data
2. Enabling infrastructure
3. Collective leadership and settings
4. Data capability and skills
5. Collaboration with industry, agency, and iwi and Māori partners

The application of these themes provided a useful means of organising the recommendations, but also helped align the *M.bovis* eradication programme to the strategy established for the New Zealand government data system, within which the biosecurity system operates. When cast in the context of national biosecurity, these data themes promote an inclusive and integrated approach to data, which helps foster the trust of New Zealanders in their government.

Final recommendations

The right data

Making sure data is findable and easily accessible, providing the right data at the right time, and ensuring that the data provided is fit for its intended purpose. This includes the identification and mitigation of data adequacy gaps, and the incorporation of appropriate levels of data quality.

> **Recommendation: Identify and mitigate gaps in baseline data required for resilient biosecurity**
>
> Leverage a biosecurity data strategy that provides direction on the value of developing data assets during peacetime versus collecting data ad-hoc during an incursion event, to inform investments in baseline data.

> **Recommendation: Develop the utility of data to contribute to a common operating picture for end users**
>
> Develop and review critical path data model requirements at the variable level, to maximise downstream data utility and interoperability for improved incursion response and informed decision-making.

Enabling infrastructure

Ensuring the mechanisms and consistent architecture are in place for data to operate in the most effective and efficient way possible, and therefore able to deliver value. Infrastructure supports access to data and its descriptive information, the safe sharing of data, and the ability to easily integrate data.

> **Recommendation: Test the strategic readiness of data by staging regular, expert-led, preparedness scenarios**
>
> Stage table-top response scenarios (ie, war games) with suitable experts and supported by NZDF, highlighting the data and information needed to meet a minimum risk tolerance for strategic preparedness, while validating standard operating procedures (SOP).

Collective leadership and settings

The leadership, governance, legislation, and sharing agreements that together contribute to the realisation of a coherent data system. Established and enacted collectively, these settings can serve as effective levers, facilitating important outcomes like a common understanding of data norms, and agreement on the strategic direction that data is meant to support. By providing clarity about rules, regulations and associated compliance expectations, they can also foster increased levels of assurance and trust in data.

> **Recommendation: Implement a data strategy that establishes critical data and information flow requirements for both proactive and reactive biosecurity processes**
>
> Engage with biosecurity stakeholders, led by MPI, to design a strategic approach to data and information that emphasises and supports explicit governance and decision-making, data process and resource interoperability, operational agility and scalability, and fit for purpose data quality.

Data capability and skills

The development and maintenance of the skills of people who work with data, incorporating coordination, and contributing to the optimal use of data assets. Data capabilities ensure that the needs associated with the use of data are effectively met and that any new needs that arise are likewise managed. As data provides new opportunities generally, it likewise provides new growth opportunities for those who work with it.

> **Recommendation: Leverage the expertise from a core, cross-functional data and analytics working group to support good data practice**
>
> Leverage expertise to establish a working group to maintain critical path information flows, focussing on the data and information management capabilities required across various biosecurity use cases, and necessary to sustain sufficient response resilience.

Collaboration with industry, agency, and iwi and Māori partners

A collaborative data environment is developed with partners so that data is inclusive, delivers to the needs of all involved, and contributes to a collective knowledge. Data principles, design, rules, and processes involving Māori data align with the principles of Te Tiriti o Waitangi, and are co-designed with iwi and Māori. Use of Māori data is further managed in a way that supports Māori data governance and acknowledges Māori data sovereignty.

> **Recommendation: Co-design data sourcing improvements with industry, agency, and iwi and Māori partners**
>
> Co-design a biosecurity data sourcing approach that:
>
> - deepens the collective understanding of the connections, interdependencies, and intergenerational perspectives associated with biosecurity-related data and information;
> - acknowledges the various intersecting and disease-specific business requirements that reflect a mix of stakeholders from the public sector, industry, and public-private partnerships;
> - helps facilitate bi-directional value exchange with providers;
> - incorporates data and information needs specific to iwi and Māori, including those that contribute to mātauranga Māori (Māori knowledge), support Māori data sovereignty, and meet Te Tiriti o Waitangi obligations.

Proposed sequencing

While the recommendations all offer value, the sequence with which they are implemented will influence their impacts on the biosecurity data system. It also affects the extent to which the recommendations enhance each other, and the level of positive influence they collectively provide.

The following table offers a view of how the recommendations could be enacted to deliver "quick win" value to national biosecurity, while also building a foundation of good data practice that supports long-term readiness and resilience.

Recommendation	Sequencing
Leverage the expertise from a core, cross-functional data and analytics working group to support good data practice	Establish early and use the joined-up capability to support the formation of a data strategy, strengthen relationships, and provide the leadership to guide required change.

Recommendation	Sequencing
Co-design data sourcing improvements with industry, agency, and iwi and Māori partners	Successful outcomes will require an investment of time to properly develop partner relationships and agree a collaborative approach. The relationship management that is required can leverage the working group governance and support the formation of the data strategy.
Implement a data strategy that establishes critical data and information flow requirements for both proactive and reactive biosecurity processes	Initiate early to allow for the time required to socialise, agree, and implement a strategy, and to realise the outcomes needed to influence and guide the biosecurity data system.
Identify and mitigate gaps in baseline data required for resilient biosecurity	Early wins can be delivered for familiar data gaps. Once in place, the data strategy and working group will provide a perspective and mechanism with which to identify and address data gaps for ongoing readiness.
Test the strategic readiness of data by staging regular, expert-led, preparedness scenarios	Successfully running scenarios and realising benefits from the results will require an operating environment characterised by strong partner relationships and an agreed strategic perspective provided by previous recommendations.
Develop the utility of data to contribute to a common operating picture for end users	While there are gains to be realised from addressing familiar data gaps, this recommendation is associated primarily with an ongoing environment of readiness. Benefits therefore will continue to be realised over time.

Table 1. Proposed sequencing of recommendations

Next steps: leveraging the recommendations and improved resilience

The recommendations provided by the GCDS are applicable to biosecurity information exchange and data management systems, which themselves represent one element of the wider set of recommendations that will comprise the independent review. The final set of independent review recommendations therefore may include all, some, or potentially none of the information and data system recommendations offered in this paper.

Regardless of the extent to which the GCDS advice is incorporated into the final independent review, it can nonetheless provide a useful starting point and offer a path forward for the sector, led by MPI, to improve the resilience and effectiveness of the biosecurity data system.

Data and information are critical components of the programme, and the proper management of those assets will be paramount to the ongoing success of the nation's biosecurity. The increased resilience resulting from the implementation of these recommendations means that the country will be able to adapt to changing conditions, effectively plan for future incursions, and better manage unanticipated disruptions that do occur.

Background and context

In May 2018, New Zealand's Cabinet, following consultation with industry, committed to completely eradicating *Mycoplasma bovis* (*M.bovis*) throughout the country. The disease eradication, a world-first, was conservatively costed at $870M, and was expected to take 10 years to achieve.

Cabinet's decision resulted in a phased plan, to be delivered through a programme of tracing, testing, culling, and continued surveillance. The Ministry for Primary Industries (MPI) was given responsibility within government for implementing the eradication and surveillance programme, working with industry partners DairyNZ and Beef + Lamb New Zealand.

The 2019 *Mycoplasma bovis* National Plan established three goals:

1) eradicate *M.bovis* from New Zealand
2) reduce the impact of the eradication programme for those affected, and
3) apply lessons learnt to strengthen the national biosecurity system.

In February 2021, an independent governance group consisting of MPI, DairyNZ and Beef+Lamb commissioned an independent review to assess the eradication programme progress and make any necessary recommendations for improvement. A key outcome of the review is a strengthened national biosecurity system, able to deal more effectively with future incursions.

One component of the review involved gaining an understanding of the performance of the *M.bovis* programme information exchange and data management systems and based on that, recommend improvements. This required subject matter expertise that reflected a high level of independence and that also exceeded the existing competencies of the review panel.

As a result, the Government Chief Data Steward (GCDS) at Stats NZ was approached to assist with this part of the independent review. Based on its role and experience as the functional lead for government data, the GCDS would assess the performance of the *M.bovis* programme information exchange and data management function, help ascertain whether information systems have been fit for purpose and based on that, provide any suggestions for improvements and future-proofing.

With limited time available, the GCDS was not able to conduct a detailed analysis. Rather, the approach focussed on capturing the experiences and perspectives of *M.bovis* programme operational staff and stakeholders, with the goal of developing a set of insights on both the current and aspirational state of the eradication programme information environment. Those insights could then support recommendations which reflected real-world conditions.

During April and May 2021, following a review of relevant documentation provided by the independent review team, the GCDS facilitated a series of six workshops with *M.bovis* programme staff from MPI and from partner stakeholder organisations. These sessions were designed to build a view of the data and information systems supporting current operation of the eradication programme, and capture lessons learnt associated with those systems, the results of which would help shape the development of relevant recommendations.

The resulting recommendations provided by the GCDS reflect good data practice, in keeping with its remit to lift data capability across the New Zealand government data system. They have been structured around core elements of the *New Zealand Data Strategy and Roadmap*. Because the *M.bovis* programme is administered by a Crown agency, the recommendations have also taken into account MPI's data-related obligations as a Te Tiriti o Waitangi partner.

Objectives for GCDS review of *M.bovis* information systems

The independent review panel provided the GCDS with ten objectives to consider when reviewing the *M.bovis* information exchange and data management systems. The GCDS employed those objectives to shape the "deep-dive" staff and stakeholder workshops and direct the discussions that arose within those sessions.

Independent Review objectives

1. *Identify the information systems used in the response and their main purposes.*
2. *Are these systems useful and fit for purpose, and what changes are required to provide better systems to manage biosecurity responses?*
3. *Does the available information exchange between these systems work in a manner that allows the M.bovis response to function effectively?*
4. *Do the agencies that need the information have access to it within the timeframes required of a biosecurity response?*
5. *Does the system have sufficient resources (human, technical and financial)?*
6. *What is the level of interoperability within the system?*
7. *What improvements have been made to the system over the period of the response?*
8. *How could the information sharing and management system between the M.bovis response and critical stakeholders, including the partners, be made more effective?*
9. *What changes are required to provide a fit-for-purpose information management system for emergency pest/disease responses?*
10. *How effective is the information sharing and management system between the M.bovis response, laboratories, farm registration databases and critical stakeholders, including the partners, during the initiation, response, and programme stages?*

Additional direction was provided by the independent review Executive Director at the kickoff of the first workshop. Participants were advised to take the opportunity to capture their learnings and insights, with a goal of not only using them to improve the *M.bovis* eradication programme, but also inform the country's readiness for future biosecurity incursions generally.

The Director stressed the important role of properly administered data and information sharing and management systems, as an effective means of mitigating potentially significant negative impacts of disease incursions on the New Zealand economy.

Guiding framework: New Zealand's Data Strategy and Roadmap

To help align its findings regarding the *M.bovis* programme information and data systems with accepted good data practice, the GCDS employed the *New Zealand Data Strategy and Roadmap*, first published in 2018 and currently undergoing a refresh. The core elements of that Strategy were used to organise and shape the recommendations.

A stated goal of the Data Strategy and Roadmap is delivery of an inclusive and integrated data system for New Zealand. As such, it is designed to communicate a cohesive view of data practice for the New Zealand government data system, while it serves as a guiding document for government agencies developing their own data agendas.

The Strategy identifies five primary mechanisms for delivering to this goal, which when enacted properly, also foster the trust of New Zealanders:

1. Providing the **right data** at the right time
   Ensuring New Zealanders have the data needed to improve their well-being and inform their participation in society.

2. Building **infrastructure** that enables effective data management and re-use
   Ensuring data is created, collected, and managed in the most effective and efficient way across the data system.

3. Making sure **leadership**, clear rules and **system settings** are in place and understood
   Ensuring the leadership, governance, agreements, and rules are in place to effectively manage and improve the data system.

4. Developing **capability** and **skills** within our people to collect, manage and use data
   Ensuring government has the capability and skills to make optimal use of data.

5. **Collaborating** with **iwi and Māori** partners
   Ensuring government data principles, rules and design are aligned with the principles of Te Tiriti o Waitangi, co-design processes with iwi and Māori are in use, and data system and Māori data governance are aligned.

These means of realising strategy goals for the New Zealand government data system are also applicable as guidelines for considering the information and data system performance of the *M.bovis* eradication programme administered by industry and by MPI, as a government agency operating within that data system.

They can be used to highlight the ways current data practice associated with the eradication programme does or does not align with guidance that is designed for the wider data system.

The GCDS therefore has employed these five elements as the framework for organising and presenting its review recommendations for the *M.bovis* programme information and exchange and data management systems.

Methodology

Over the course of six workshops with *M.bovis* eradication programme staff and stakeholders, the GCDS employed a suite of methods with which to capture the experience, perspectives, and suggestions of those in attendance.

The workshop approach was used to facilitate a deep dive, within the relatively limited time available, to uncover the perspectives of those involved in *M.bovis* eradication. Moreover, it represented an opportunity for stakeholders otherwise influenced by varying agendas to sit together in one room, focussed on a common topic. This group of *M.bovis* stakeholders had not previously taken the time to participate in this level of collaborative reflection, and that aspect alone proved particularly beneficial.

The outcomes of the workshops, encapsulating direct experience in relevant information and data systems, informed the development of GCDS insights. To avoid conclusions that might reflect anomalous or otherwise low significance conditions, the GCDS prioritised workshop inputs that were corroborated by multiple sources, and ideally represented different perspectives or contexts within the *M.bovis* programme.

The first three workshops were delivered as discovery sessions, to give the attendees a chance to communicate their ideas as well as convey any lessons learnt. In workshops four and five, the GCDS highlighted some of the conceptual frameworks it would be using to organise its insights and recommendations. The final workshop provided an opportunity for the GCDS to present insights collected from the previous workshops, and test those with the attendees.

The following organisations were represented at the workshops:

- Ministry for Primary Industries
- OSPRI
- Assure Quality
- Beef + Lamb New Zealand
- DairyNZ
- New Zealand Defence Force

The participant roles and objectives associated with each workshop are detailed in *Table 2*.

Workshop	Participant roles	Objectives
Workshop One. Data Value Chain Part One: Mapping the Data Flows	Data brokers and relationship managers, reaction/tracking operations, IT support for data (ingestion, storage, access)	• Understand the nature of *M.bovis* information and data • Understand constraints associated with supply agreements • Understand timelines of data collected, stored and used along the value chain

Workshop	Participant roles	Objectives
Workshop Two. Data Value Chain Part Two: Capturing Context Within the Value Chain	Data brokers and relationship managers, environment scan analytics/intelligence reporting, IT support for data (ingestion, storage, access), analytics execution	• Understand the nature of intelligence analytics • Understand the non-functional requirements (eg, time from detection to triggering the react and track process)
Workshop Three. Joining up, Reflecting, and Measuring	Subset from first two workshops including technical data management roles, business accountability for outcomes	• Reflect on and join up the end to end value chain (and address gaps) • Understand key measures along the value chain • Work through key data management principles supporting the measures • Understand any constraints both environmental and capability-related
Workshop Four. What "Good" Looks Like, and Next Steps to Get There	Subset from first two workshops including technical data management roles, business accountability for outcomes	• Describe a good target state based on requirements and measures • Identify achievable next steps towards the target state
Workshop Five. Recommendations Review and Discussion	Subset from first two workshops including technical data management roles, business accountability for outcomes	• Review summarised workshop outcomes with participants • Test proposed framing of recommendations with the group • Understand short, medium, and long-term requirements for success
Workshop Six. Presenting Insights Gained to Workshop Participants	Subset from first two workshops including technical data management roles, business accountability for outcomes	• Present insights collected from the previous workshops and solicit feedback from participants

Table 2. Workshops run with M.bovis and biosecurity subject matter experts

Numerous methods were employed in the workshops to collect information from those attending. Illustrations of these methods in use during the workshops are included in *Appendix 1*.

Critical information path mapping

At Workshop One, the workshop participants were split into two groups, representing *M.bovis* data sourcing and *M.bovis* data use. This designation was designed to capture distinct perspectives and

insights on information and data at either end of an incursion response programme. Participants were encouraged to join the group that best aligned with their work, and each group then developed an information flow map. Taken together they would help present a comprehensive view of information flows associated with the *M.bovis* programme.

At Workshop Two, the participants together mapped out one critical path for information exchange within the *M.bovis* incursion response programme. The critical path chosen for this exercise was deliberately chosen to represent only one portion of the overall *M.bovis* critical path, so that participants could uncover detailed context in the time allowed. The path mapped was called "find to contain," as it represented that portion of the *M.bovis* critical path from identification of a diseased animal to the point at which the host farm was cleared as free from disease.

Stakeholder mapping

At Workshop Three, participants collectively mapped all known stakeholders that contributed to the complete critical path of an *M.bovis* incursion event. Using a map of the incursion response process supplied by MPI, a whiteboard was divided into the major steps comprising that process (tracing, casing, de-population, legal notice, etc) and participants added stakeholders into each section based on their knowledge. The whiteboard map was recorded and later developed into a digital map, including colour-coding of stakeholders to highlight patterns.

SWOT analysis

At Workshop Four, participants were given the chance to identify strengths, weaknesses, opportunities and threats associated with information exchange and data management throughout the *M.bovis* programme. Following the posting of these suggestions, members of the group had the opportunity to present more detail and context about their contributions and to offer feedback on the contribution of others. This process resulted in a SWOT analysis, and development of a more comprehensive view of the *M.bovis* programme.

Other methods: Contribution boards for pain points, rules, short-medium-long term

At Workshop Three, participants contributed suggestions to a "Pain Points" board. No additional guidance was offered, to allow participants the leeway to offer any thoughts on challenges associated with any *M.bovis* information exchange and data management component. Once a sufficient number of contributions were added to the board, they were organised into common themes. A guided discussion followed, giving participants the opportunity to elaborate on their ideas about programme pain points.

Also at Workshop Three, participants were given the opportunity to contribute to a "Rules" board. This board was designed to uncover ideas and issues associated with various rule types (eg, legislation, informal agreement, memorandum of understanding) relevant to the *M.bovis* programme, and highlight any impacts each rule type might exert on information exchange and data management. The board was organised under three headings: Data, Type (of rule), and Impact. Participants were asked to first list data relevant to their needs, then the rules they believed influenced the access or sharing of that data, and finally any impacts they believed the application of those rules had on the ability to use the listed data.

At Workshop Five, participants were invited to record what they believed to be requirements for *M.bovis* programme success, which was defined as the eradication of the disease. The board used to

capture this input was divided into three timeframes, short-term, medium-term, and long-term, defined as follows:

- short: up to six months from present,
- medium: between six months and two years, and
- long: beyond 2 years.

At the final Workshop Six, participants were provided with a document that listed all of the insights the workshop facilitators had captured during the previous workshops. This list was used to guide subsequent discussion meant to test with participants the selection of insights that would be used to develop a set of recommendations for the *M.bovis* programme independent review.

Insights gained

The following section presents insights gained by the GCDS, based on discussion and feedback from the subject matter experts involved in information exchange and data management within the *M.bovis* eradication programme.

The insights have been organised under two perspectives, one provided by the independent review panel, and one from material used by the GCDS in its data system leadership role:

1. Objectives for the GCDS review
2. Data Stewardship Framework best practice.

Taken together, these two perspectives represent a means of comprehensively organising *M.bovis* programme insights, positioning them to facilitate development of a set of information and data best practice recommendations.

Objectives for the GCDS review

The GCDS was able to gather the following insights, aligned to each of the ten review project objectives.

Objective 1: Identify the information systems used in the M.bovis response and their main purposes.

a. Systems are specific to discrete processes and in some cases, specific disease. We did not hear much about data capture required for known diseases that New Zealand has not yet experienced. This indicates the current strategy of data management is predominately about response only and trying to react as fast as possible, not about investing in pre-emptive data capture for new scenarios.

b. A table listing *M.bovis* programme systems is included in *Appendix 2*.

Objective 2: Are these systems useful and fit for purpose and what changes are required to provide better systems to manage biosecurity responses?

a. Manual exchange of data in many critical paths of data flows will limit getting the right data to the right people at the right time.

b. Attribute data captured at source does not always meet the need of downstream usage. There are gaps and data are not always interoperable between systems and channels.

c. Experience suggests standing up suitable data management systems, processes, and trained people "just in time" will not meet the response requirements of significant, volatile, faster moving incursions.

d. Data accuracy is often reduced as industry activity increases. For example, on moving day animal tracking data lags behind scan data until discrepancies can be picked up and Persons in Charge of Animals/farmers (PICA) chased to update the data in NAIT.

e. The scalability, resilience, and capacity of some data management processes (and supporting systems) as currently designed will not meet response requirements of significant, volatile, fast moving incursions.

f. Baseline data coverage needs to be expanded over and above that delivered in *M.bovis*, to build an accurate common operating picture applicable to more significant use cases.

g. Industry processes can't always access data at the point needed without affecting operations. Timeliness and accuracy of data will be impacted especially for intensive, high speed industry processes such as meat processing lines and large volume initial animal registration (eg, 2-year olds).

Objective 3: Does the available information exchange between these systems work in a manner that allows the M.bovis response to function effectively?

a. Much of the feedback received suggested that information exchange has been enhanced, contributing to improved *M.bovis* response effectiveness.

b. But indications are also that the exchange of information between stakeholders could be improved, particularly in regards to interoperability. For example, there are still instances of manual data entry (see *Appendix 2* for sample instances in the Tiaki architecture), different templates in use, data formatting differences, lack of clarity around optional versus mandatory data capture, and challenges for effective on-farm supply of data.

c. Additionally, the lack of a trusted, single source of truth means that the derivation of insights from data currently requires data users to reconcile the differences that arise from employing data from disparate sources – something that is not always possible.

Objective 4: Do the agencies that need the information have access to it within the timeframes required of a biosecurity response?

a. This depends on disease spread speed, time of year (ie, moving day) and vectors. There are data gaps associated with other species (eg, sheep, pigs, horses). There are data gaps and delays during high-activity periods. Most impact was felt downstream when those using data for reporting tried to reconcile data from different capture processes (eg, movement in NAIT versus field observation scan data).

b. There also appears to be a likely risk when faced with the need to scale up data access. This involves appropriate system connectivity, and having sufficient people with appropriate skills to extract and provide data when required.

c. There appears to be limitations and risks associated with an iterative and timely cycle of data request, usage, and refinement, to get insights to inform a common operating picture. There

appeared to be manual steps in this process that limited scalability and capability (distinct from any issues with gaps and inconsistencies in the data itself).

d. Providing and accepting data and information to/from multiple data suppliers and users is limited and it would be challenging to build an accurate, timely picture to drive effective response actions. Notably, this risk would increase greatly as the speed and complexity of the incursion(s) increased.

Objective 5: Does the system have sufficient resources (human, technical and financial)?

a. If the context is *M.bovis* and the characteristics of the incursion don't change, then feedback suggests current data management systems and processes are just sufficient. However, indications are also that if a faster moving incursion were to occur, then the current weaknesses and threats noted above would negatively impact response effectiveness.

Objective 6: What is the level of interoperability within the system?

a. Current interoperability is limited due to systems and capability being more aligned to disease-specific data capture requirements and the needs of associated processes. There also appears to be issues when the data needs to be used for insight generating processes. There seems limited focus currently on defining and improving the flow of data from all suppliers so that data consumers have the right data, at the right time, and to the right level of quality.

b. Representing the lead central government agency within the biosecurity system, MPI is positioned to offer leadership to help address issues like data interoperability. The GCDS could provide support for MPI in this regard, recognising it as the biosecurity domain data steward, promoting and facilitating use of industry data standards for instance, amongst government agencies and industry partners operating in that domain.

Objective 7: What improvements have been made to the system over the period of the response?

a. NAIT Act and collection processes to improve movement data compliance.

b. Tiaki case management (currently specific to *M.bovis*). It is unclear if there are limitations in extending Tiaki for other use cases, as part of Tiaki Futures.

c. Better management of data channels and requests processes by the MPI Intelligence and Planning team.

d. While still a work in progress, templates used to collect the results of livestock scanning have been improved to facilitate the capture of both mandatory and optional data requirements of those subsequently using that data.

e. Most improvements mentioned revolved around data sourcing and were specific (and possibly bespoke to) *M.bovis*. There seemed to be little improvement in data and information management from a user perspective.

Objective 8: How could the information sharing and management system between the M.bovis response and critical stakeholders, including the partners, be made more effective?

a. There was agreement amongst subject matter experts involved in the response that there were some valuable lessons and insight gained in *M.bovis* that could be leveraged to

improve biosecurity resilience and readiness generally. Examples of opportunities for improvement include:

- Defining the critical path of data flow down to the variable level, to ensure end to end consistency of data.
- Co-designing and coordinating with industry, farmers, and MPI, the different processes for moving day versus non-intensive days, and on farm data capture, slaughter data capture and sampling, transport sector animal movement data capture, movement rules radius, farm definition and correlation with movement.
- Providing value back to farmers in the form of insights from data they provide. For instance, lab results that help them to understand the health of their farms.
- Capturing other practice data from farmers to support more broadly applicable insights, rather than having to discover and react during an incursion event. This would include gathering hard to collect data in peacetime when there is more time.
- Reviewing opportunities and incentives to connect to existing on and off farm data capture processes (used by vets, councils, and transporters) that are not currently feeding into the biosecurity data lifecycles, thereby reducing farmer burden.

Objective 9: What changes are required to provide a fit-for-purpose information management system for emergency pest/disease responses?

a. A toolkit of resources is being developed as a component of the *Data Stewardship Framework* published by the GCDS. This can be used by both government and industry to target areas for improvement in support of information and data outcomes like fit for purpose information management systems. The elements of that toolkit have been used to organise the subsequent section and highlight additional insights relevant to fit-for-purpose response information management systems.

Objective 10: How effective is the information sharing and management system between the M.bovis response, laboratories, farm registration data bases and critical stakeholders, including the partners, during the initiation, response and programme stages?

a. There appears to have been significant positive improvements mentioned by the subject matter experts familiar with the *M.bovis* response. However, most felt that there was still significant work to be done to move beyond a bespoke response to *M.bovis* and translate it into improved overall biosecurity readiness and resilience. This is especially important if enabling an effective response to future incursions that will have a significant impact on New Zealand's economic and social well-being.

b. The Data Stewardship Framework section below includes additional insights noting the potential for improving the effectiveness of data and information flows. For example, reviewing risk and exposure to single points of failure in critical path information flows involving people, systems, and technical channels (including manual data exchange).

Data Stewardship Framework

The recommendations provided by the GCDS are intended to reflect good data practice, in keeping with its system leadership role to lift data capability across the government data system. Core to this responsibility is the promotion of data stewardship as an overall approach, providing clarity and consistency with which government organisations can design and develop their data strategies.

Accordingly, the GCDS has published a Data Stewardship Framework and related toolkit, to enable government to maintain a sustainable data system. It provides a structure and common language for organising and describing the different elements that constitute effective data stewardship.

The Framework also offers direction on how stewardship can operate at different scales – from the individual, to the organisation, to the wider data system – which is relevant for applying a stewardship lens across data use within the various contexts of the *M.bovis* eradication programme.

The Data Stewardship Framework includes seven key elements for effective data stewardship, and these have been used as a guide for capturing and organising additional insights:

1. Strategy and culture
2. Rules and settings
3. Roles, responsibilities, and accountabilities
4. Data capability and quality
5. People capability and literacy
6. Influence and advocacy
7. Monitoring and assurance.

In addition, during the workshops, participants were asked to contribute what they considered worthwhile short-term, medium-term, and long-term outcomes for the *M.bovis* programme. These results have been noted, where appropriate, under the seven Framework elements.

Strategy and culture

A strategy that provides a shared vision and clear direction, and a data culture that enables strategy implementation and sustains good data stewardship practice.

Relevant insights:

- Opportunity to implement investment planning to strengthen resilience and ensure data value is genuinely scalable, including in the response to significant, volatile, and fast-moving incursions
- Opportunity to develop and implement a consistent data strategy and mechanism for oversight of data management across a range of biosecurity use cases
- Should develop a shared understanding at a strategic and decision-making (investment) level of data, information, and insights in relation to core data requirements and highlight any resultant gaps
- Could define the agenda and improve understanding of the drivers for change that would influence the use of data and information, including the identification of strategic sponsors (eg, trade, economy, disease, welfare)
- Should incorporate preparedness measurement into strategic planning to inform data sourcing and system interoperability investment, and contribute to a common operating picture (COP)

Rules and settings

Legislation, policies, principles, and sanctions providing boundaries and guiding how the data system should operate.

Relevant insights:

- Opportunity to evaluate and develop a familiarity with relevant legislation, informing its use as a lever to develop a more robust data environment, including identifying any misalignment with operational contexts and necessary updates
- Could review requirements for end-to-end data classification and protection mechanisms, including storage and protection of personally identifiable data, and the implications on usage of this data within a biosecurity response context
- Opportunity to proactively address potential data privacy concerns and thereby reduce barriers to data interoperability and data sharing, while also supporting improved participation by farmers, industry partners, iwi and Māori, and government agencies.
- Should employ the Privacy Act 2020 information privacy principles and codes of practice to ensure personal information collected as part of a response, including *M.bovis* eradication, is properly managed throughout the biosecurity data and information lifecycle
- Could investigate how frontline *M.bovis* data capture systems (NAIT, Agribase) may contribute to the development of baseline data applicable to a wider range of applications, eg, other livestock tracking, or different species tracking requirements (flock, herd, animal)
- Should clarify and codify information sharing settings with industry partners to reflect an overall cohesive response setting [*Medium-term*]
- Could design a data collection strategy supporting collect once, use multiple times [*Long-term*]
- Could incentivise the transport industry to support NAIT on a commercial or subsidised basis [*Long-term*]

Roles, responsibilities, and accountabilities

Governance structures, role definitions and expectations, and leadership.

Relevant insights:

- Opportunity for MPI to assume a biosecurity domain data steward role, drawing on support from the GCDS and promoting good data practice amongst other government and industry organisations operating in that domain
- Should improve baseline data capture and access, including instituting formal supply and use agreements, in support of a complete reference dataset that meets significant, volatile, fast-moving incursion requirements
- Should review critical path data model capture requirements at the variable level, to support interoperability and maximise downstream utility
- Could establish additional data sources, modelled for interoperability with baseline data, to support needs associated with different incursion characteristics
- Should ensure customer relationship management system (SIMS and Tiaki) data capture is interoperable with baseline reference data and critical path data flows
- Should ensure the consistency of data capture sequencing end to end
- Should identify data duplication within end to end data lifecycle processes, for individual (or across multiple) critical path data flows
- Opportunity to provide value-added data back to suppliers as feedback loops, to support their investment and improve data quality

- Could regularly audit the data store and access, to maintain an accurate view of data supply
- Should conduct a baseline data assessment of existing systems [*Short-term*]
- Should agree requirements for critical biosecurity data across stakeholders: MPI, industry, livestock sector, livestock biosecurity council (LBC) [*Short-term*]
- Should develop and maintain a database necessary for animal and disease management [*Short-term*]
- Could identify investment needs for outdated key systems and platforms [*Short-term*]
- Should identify areas amenable to data automation [*Short-term*]
- Should further develop data analytics capability [*Short-term*]
- Could develop a shared public data catalogue for OSPRI data
- Opportunity to establish a mandated livestock farm register to support timely and accurate capture of livestock data [*Medium-term*]
- Could develop an electronic version of ASD (eASD) to provide ready access to data on livestock movements [*Medium-term*]
- Can provide data analytics and interoperability as a service alongside raw data (for NAIT dataset) [*Medium-term*]
- Could improve the farm database to hold information for multiple government and industry purposes and reduce the need for farmers to supply the same information to many points in government [*Long-term*]
- Should include collection of data for other livestock (sheep, horses, poultry, pigs) to become part of NAIT or other readily accessible system [*Long-term*]
- Opportunity to publish agreed data standards and provide training for use of the standards, to facilitate consistent collection and interoperable data [*Long-term*]
- Could develop a response system reflecting data collected from diverse sources that can be queried by source on an incident basis [*Long-term*]
- Could implement real-time tracking of animal movement (at the transport level) [*Long-term*]

People capability and literacy

Skills, knowledge, and services for accessing, managing, analysing, and communicating data and insights.

Relevant insights:

- Could perform a capability assessment to facilitate adequate capability development for operational, tactical, and strategic contexts [*Short-term*]
- Should establish capability benchmarking [*Short-term*]
- Should create a capability development pathway for subject matter experts [*Short-term*]
- Could publish an MPI and government programme data capability register [*Long-term*]

Influence and advocacy

Effective relationships and networks to endorse, promote, and support good data practice.

Relevant insights:

- Opportunity to investigate the co-design of a data supply with industry to improve data capture with minimal impacts and in consideration of actual current practice
- Should establish a data requirements working group for oversight of practice and as a source of advice [*Short-term*]
- Could survey organisational capability and levels of interest [*Short-term*]

- Opportunity to leverage industry and MPI knowledge, information, and functions across strategic, tactical, and operational levels to guide system improvements [*Medium-term]*
- Could implement an expertise pipeline [*Medium-term*]
- Could establish relationship managers at the enterprise (key account) level [*Medium-term*]

Monitoring and assurance

Assessing environmental trends and developments, measuring stewardship performance, and responding to changing circumstances or new information.

Relevant insights:

- Opportunity to conduct regular war game incursion scenarios to understand core data requirements, ensure critical path flows of data are in place and scalable [*Short-term*]
- Should establish a regime of preparation to help understand system and data needs for more complex and faster-spreading incursions [*Short-term*]
- Should develop standard operating procedures (SOP) for the most likely and most dangerous incursion scenarios [*Medium-term*]
- Could schedule regular reviews of established SOP and risk profiles [*Medium-term*]
- Could conduct an annual MPI-sponsored, cross-sector training exercise at the operational level [*Medium-term*]
- Could establish a readiness and response intelligence capability that is forward-focused (risk-based) [*Long-term*]
- Could investigate regional government enforcement of environment requirements as a mechanism to validate and drive compliance with farm and stock registration requirements [*Long-term*]
- Opportunity to develop standardised and fit for purpose reporting suites [*Long-term*]
- Opportunity to support a more robust system of compliance and enforcement [*Long-term*]

Final Recommendations

The insights gathered though an *M.bovis* eradication programme literature review and over the course of the MPI staff and industry stakeholder workshops were used to generate a list of recommendations for the independent review. These recommendations also leverage the experience and perspective of the GCDS as functional lead for government data, to reflect good data practice that can help make the information and data systems used in biosecurity more resilient.

The right data

Making sure data is findable and easily accessed, providing the right data at the right time, and ensuring the data that is provided is fit for its intended purpose. This includes the identification and mitigation of data adequacy gaps, and the incorporation of appropriate levels of data quality.

> **Recommendation: Identify and mitigate gaps in baseline data required for resilient biosecurity**
>
> Leverage a biosecurity data strategy that provides direction on the value of developing data assets during peacetime versus collecting data ad-hoc during an incursion event, to inform investments in baseline data.

> **Recommendation: Develop the utility of data to contribute to a common operating picture for end users**
>
> Develop and review critical path data model requirements at the variable level, to maximise downstream data utility and interoperability for improved incursion response and informed decision-making.

Enabling infrastructure

Ensuring the mechanisms and consistent architecture are in place for data to operate in the most effective and efficient way possible, and therefore able to deliver value. Infrastructure supports access to data and its descriptive information, the safe sharing of data, and the ability to easily integrate data.

> **Recommendation: Test the strategic readiness of data by staging regular, expert-led, preparedness scenarios**
>
> Stage table-top response scenarios (ie, war games) with suitable experts and supported by NZDF, highlighting the data and information needed to meet a minimum risk tolerance for strategic preparedness, while validating standard operating procedures (SOP).

Collective leadership and settings

The leadership, governance, legislation, and sharing agreements that together contribute to the realisation of a coherent data system. Established and enacted collectively, these settings can serve as effective levers, facilitating important outcomes like a common understanding of data norms, and agreement on the strategic direction that data is meant to support. By providing clarity about rules, regulations and associated compliance expectations, they can also foster increased levels of assurance and trust in data.

> **Recommendation: Implement a data strategy that establishes critical data and information flow requirements for both proactive and reactive biosecurity processes**
>
> Engage with biosecurity stakeholders, led by MPI, to co-design a strategic approach to data and information that emphasises and supports explicit governance and decision-making, data process and resource interoperability, operational agility and scalability, and fit for purpose data quality.

Data capability and skills

The development and maintenance of the skills of people who work with data, incorporating coordination, and contributing to the optimal use of data assets. Data capabilities ensure that the needs associated with the use of data are effectively met and that any new needs that arise are likewise managed. As data provides new opportunities generally, it likewise provides new growth opportunities for those who work with it.

Recommendation: Leverage the expertise from a core, cross-functional data and analytics working group to support good data practice

Leverage expertise to establish a working group to maintain critical path information flows, focussing on the data and information management capabilities required across various biosecurity use cases to sustain a sufficient level of response resilience.

Collaboration with industry, agency, and iwi and Māori partners

A collaborative data environment is developed with partners so that data is inclusive, delivers to the needs of all involved, and contributes to a collective knowledge. Data principles, design, rules, and processes involving Māori data align with the principles of Te Tiriti o Waitangi, and are co-designed with iwi and Māori. Use of Māori data is further managed in a way that supports Māori data governance and acknowledges Māori data sovereignty.

Recommendation: Co-design data sourcing improvements with industry, agency, and iwi and Māori partners

Co-design a biosecurity data sourcing approach that:

- deepens the collective understanding of the connections, interdependencies, and intergenerational perspectives associated with biosecurity-related data and information;
- acknowledges the various intersecting and disease-specific business requirements that reflect a mix of stakeholders from the public sector, industry, and public-private partnerships;
- helps facilitate bi-directional value exchange with providers;
- incorporates data and information needs specific to iwi and Māori, including those that contribute to mātauranga Māori (Māori knowledge), support Māori data sovereignty, and meet Te Tiriti o Waitangi obligations.

Reflections

The GCDS review of the information exchange and data management systems associated with the *M.bovis* eradication programme has been designed to contribute to improved resilience for the nation's biosecurity, while also delivering to its own goals of lifting data capability and enabling good data practice across the government data system. The offer to contribute advice to the independent review of *M.bovis* therefore offered a unique opportunity to demonstrate the inherent value of data and information to the security and wellbeing of New Zealanders.

The recommendations presented in this paper, developed from engagement with *M.bovis* subject matter experts through a series of workshops, reflect real-world conditions associated with MPI and industry's incursion management responsibilities. They are built upon insights that align closely with and draw directly from the realities that characterise biosecurity as it exists in New Zealand today. As such they are positioned to deliver advice to the independent review panel that can result in meaningful, positive change.

Inherent in the recommendations is the recognition that information and data assets represent a critical national asset that is particularly valuable, as the COVID-19 pandemic has demonstrated, in the face of significant disruptive events. But that value is only accessible to the extent that those assets are managed properly, in keeping with accepted good practice, and with a clear goal in mind.

A coherent biosecurity data strategy

A refrain that appeared to run through or underpin nearly all of the topics of discussions during the workshops was the importance of a cohesive, unified strategic approach to the way information and data are collected, managed and used in a biosecurity context.

This was significant in two ways. Firstly, because as an idea it aligns closely with advice from the GCDS, which posits a clear and agreed data strategy as a foundation for all data practice, particularly in those situations that play out at a national level and where so much is at stake. Secondly, because it suggests a path forward, including specific actions that can be taken by MPI, its industry stakeholders, and its partners, to improve the resilience of the biosecurity data system.

It was also noted in the workshops that, while it represented a valuable use case with which to explore information exchange and data issues, *M.bovis* has been a relatively containable incursion. It was seen therefore as less valuable as an instrument with which to plan improvements for much larger, and faster-spreading events. However, by situating its planning within a cohesive information and data strategy, MPI and industry partners can not only leverage *M.bovis* lessons learnt, but also direct its efforts in a way that contribute to improved biosecurity generally.

A list of possible actions suggested by the GCDS are implied in the six recommendations presented in this paper, as well as in the more detailed *Insights gained* section. A few persistent themes emerge from that list and a couple are worth noting, since they can form the basis of any information and data related recommendations or other outputs that the independent review panel may deliver.

The value of a collaborative approach

To develop a meaningful and agreed information and data strategy, and advance the roadmap actions that come from that strategy, there needs to be a collaborative approach established more generally. A biosecurity incursion involves a host of stakeholders and actors, including central government, private industry, public-private partnership organisations, research labs, and of course farmers themselves, each with their own agendas and interests. A collaborative approach, realised through mechanisms like governance, can help focus those variable interests on a common goal.

Data represent one such common element. While the modelling of data assets and the design of systems to leverage them can highlight different needs, they are more likely to serve as a point in common, bringing stakeholders together around a shared topic that offers mutual benefit.

A collaborative approach to data will contribute to a collective understanding of important aspects like interdependencies and intergenerational perspectives, while the increased diversity of thought that results also brings with it the possibility of innovation. Incorporating the views of iwi and Māori farmers in this case, beyond delivering to the Te Tiriti o Waitangi partnership, represents one such opportunity with the potential to surface new approaches to biosecurity.

A collaborative approach will further lead to increased interoperability of data and information, and by extension, to that of the processes operating across an incursion event that use data and information. The inclusivity will foster a closer alignment of stakeholders, particularly at those internal boundaries where data and information are exchanged from one stakeholder or one

environment to another. This in turn contributes to increased trust amongst internal stakeholders as well as the public, in the data that is developed, and the ways that derived information is used.

The resultant interoperability and stakeholder coordination can then be leveraged to help develop a common operating picture and standard operating procedures, which contribute certainty and clarity for decision-making and the rapid response required during disruptive biosecurity events.

Investment for resilience

An agreed information and data strategy will also prove valuable for a particularly challenging aspect of improving national biosecurity resilience, that of investment. It is no easy task to determine the investment approach that generates the best return, when considering the development and maintenance of data available as a resource during "peacetime" and an incursion response, versus data best developed during a specific incursion event. Investing in the wrong data can mean money wasted, while missing data investment opportunities can mean shortages of critical data when it is urgently needed.

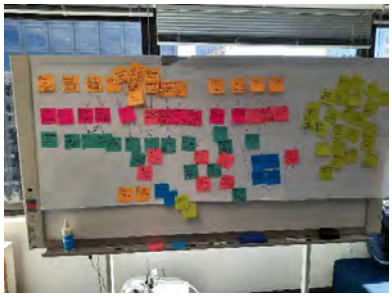
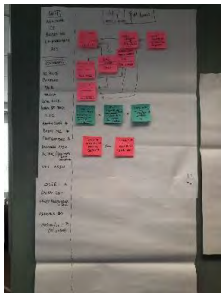
While there is no way to determine all of the critical data assets relevant for possible future incursion scenarios, a cohesive biosecurity data strategy will offer a view of the data required to meet national biosecurity goals. Those requirements represent an effective means with which to direct data investments, including identifying what data can serve as a common baseline for biosecurity generally. An agreed strategy will also help with the determination of the critical information and data flows for an incursion response, itself a source of insight on data requirements.

The recommendations provided by the GCDS are applicable to just one element of the set of recommendations that will comprise the independent review. But regardless of the extent to which the GCDS advice is made visible in the final review, it can nonetheless provide useful guidance and offer a path forward for the sector, led by MPI, to improve the resilience and effectiveness of the biosecurity data system.

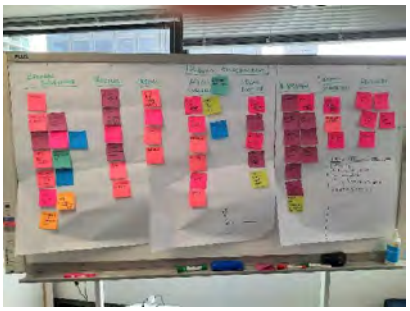
Data and information are critical components of that programme, and the proper management of those assets will be paramount to the ongoing success of the nation's biosecurity. The increased resilience resulting from the implementation of these recommendations means that the country will be able to adapt to changing conditions, effectively plan for future incursions, and better manage unanticipated disruptions that do occur.

Appendix 1: Illustrations of methodologies used in the workshops

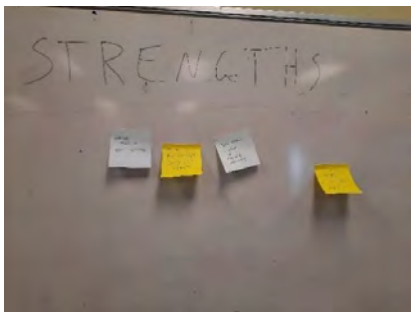
Critical information path maps

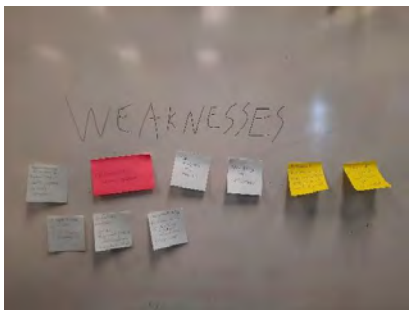



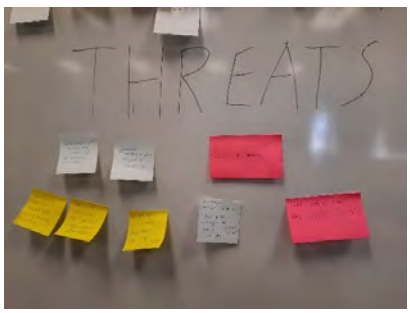

Stakeholder map



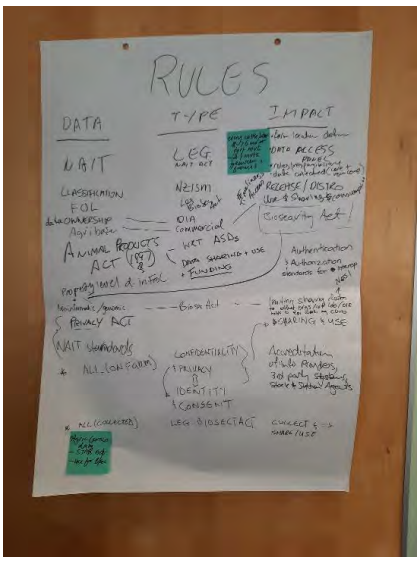

SWOT Analysis

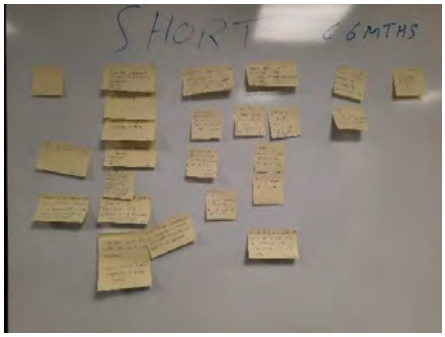


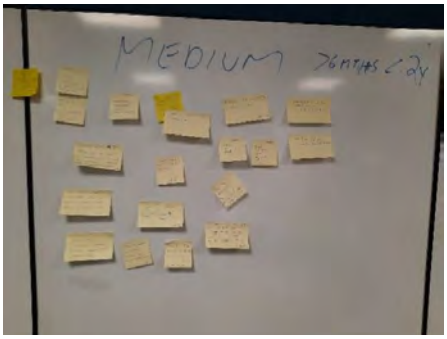


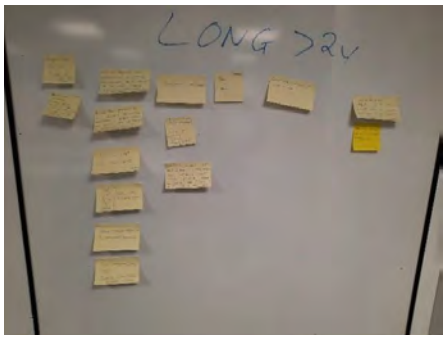


Other workshop methods







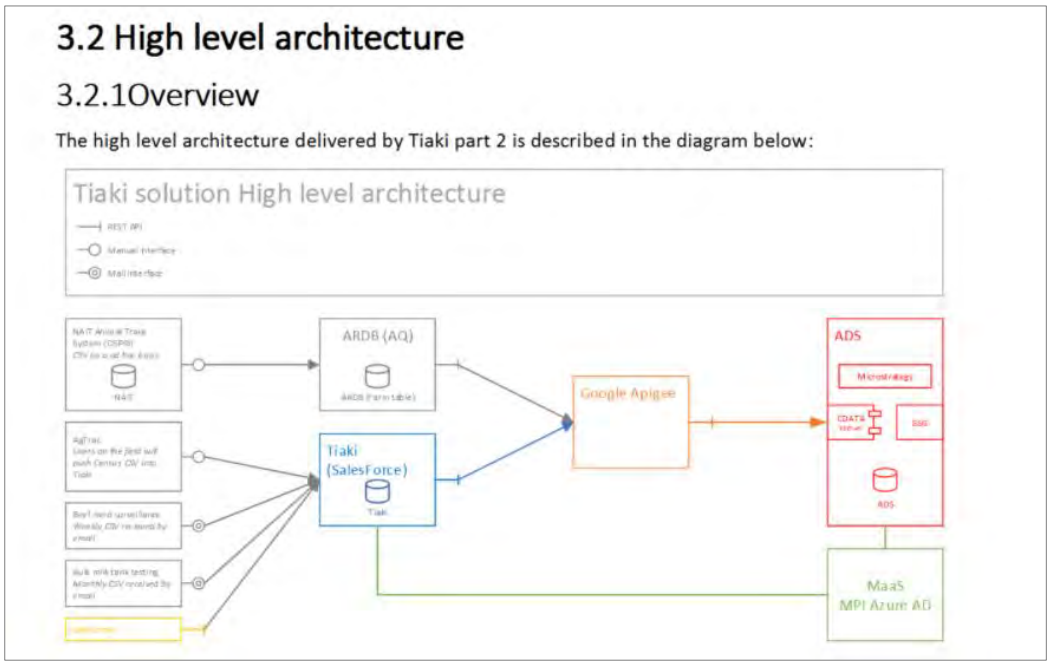


Appendix 2: List of *M.bovis* programme systems

The following table includes a list of *M.bovis* programme systems and the organisation(s) responsible for each, as noted by participants during the staff and stakeholder workshops. A view of the high-level architecture associated with one of the systems, Tiaki, is also included.

System	Summary	Organisation
Agribase	Maps, assigns traceable ID and holds information on approximately 144,500 live (current) New Zealand rural properties, including those involved in livestock farming, arable cropping, horticulture, viticulture, or forestry. Lifestyle blocks and conservation estate are also included.	Owned by Assure Quality (private)
ARDB (Animal Response Database)	A web-based geospatial database that records tracing, casing, and disease management information, including laboratory summaries.	Owned by Assure Quality (private)
ASD (Animal Status Declaration)	Used to transfer key information about an animal, or group of animals, to the next person in charge of the animals, and ultimately to the processor. Paper-based, with an electronic version recently made available.	Farmers, meatworks, food industry, MPI, OSPRI, used by anyone who needs information about stock movement.
CIMS (Co-ordinated Incident Management System)	New Zealand's official framework to achieve effective co-ordinated incident management across responding agencies.	Multiple government agencies including MPI
EDIR (Exotic Disease Investigative Report)	Form filled out by a veterinarian when a property has a confirmed positive case of an exotic disease. A paper form that is usually scanned and sent electronically to MPI.	Veterinarians fill out on farm and then supply to MPI
FarmsOnLine	A comprehensive database of rural properties, with approximately 98% coverage. Captures farm location, ownership and land use.	MPI, Biosecurity

LIMS (Laboratory Information Management System)	A type of software designed to improve lab productivity and efficiency, by keeping track of data associated with samples, experiments, laboratory workflows, and instruments.	Laboratories
NAIT	An online tool used to provide fast and accurate tracing of NAIT animals (deer and cattle only) to support disease management in New Zealand.	OSPRI
Piritahi	Cloud-based Cohesion enterprise content management (ECM) service.	MPI
SIMS (Surveillance Information Management System)	MPI's Surveillance Information Management System.	MPI
Tiaki	Information system developed for *M.bovis* response (currently *M.bovis* specific). Contains information relating to animal movement, culling, intent to slaughter, sampling, on-farm audits, actions (and their outcomes), case management.	MPI



Tiaki system data flow integration (from background documentation supplied to the GCDS)

Appendix 5

Science of *Mycoplasma bovis*

Purpose

The purpose of this appendix is to provide sufficient background information to understand the science of *Mycoplasma bovis* (*M. bovis*) and use this information as context for the eradication programme. It should be noted that this information reflects the knowledge and experience that has been gleaned over 4 years of scientific study, assessment and eradication. For much of the early stages of the Programme, information regarding the disease was incomplete.

Summary

Mycoplasma bovis (*M. bovis*) is a bacterium that can cause a range of serious signs of disease in cattle, including mastitis that does not respond to treatment, pneumonia, arthritis, and late-term abortions. However, the infection may also lie dormant in an animal and cause no clinical signs at all.

In times of stress (for example, calving, drying-off, poor nutrition or high stock density, transporting, or being exposed to extreme weather), the animal may shed bacteria in milk and nasal secretions. As a result, other animals may be infected and subsequently become diseased.

International experience suggests outbreaks of *M. bovis* clinical disease are more common in large herds and herds housed indoors, but can occur in herds of any size or location where the bacterium is present, and animals become stressed.

The disease was identified in New Zealand in 2017. The bacterium is an Unwanted Organism under the Biosecurity Act 1993.

M. bovis is not listed as a notifiable organism with the OIE[1] (the World Organisation for Animal Health) and doesn't present a trade or human health risk for New Zealand's animal products. Internationally, the disease is managed by farmers through:

- good on-farm biosecurity practices
- careful selection of replacement stock and breeding bulls
- keeping herds in a good state of health
- prompt culling of animals displaying signs of disease.

What are Mycoplasmas?

Mycoplasmas are a genus of bacteria that have unusual characteristics, making them different from most bacterial genera. Over 125 mycoplasma species in animals are known; in general, each species infects only one type of animal. For example, those that occur in cattle are rarely found in other animals. More than 12 different mycoplasmas and related species occur in cattle, but few result in disease – the species *M. bovis* is typical of the genus.

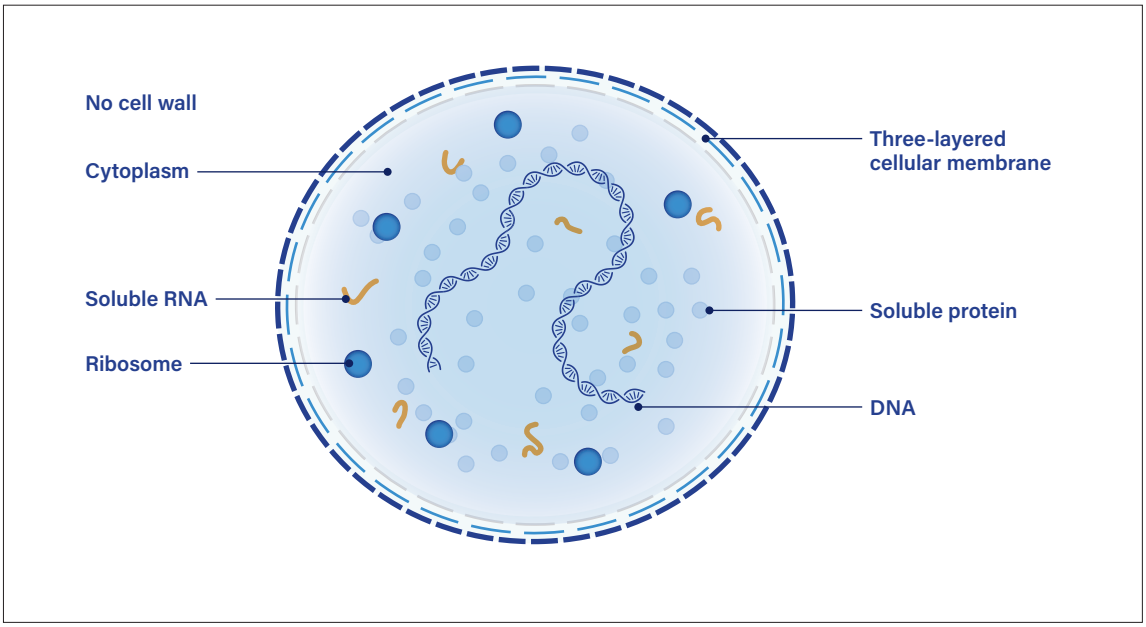
1 Office International des Epizooties.

Special characteristics of mycoplasmas (including *M. bovis*) include:

- the lack of a typical cell wall so that certain widely used antibiotics are not effective
- an ability to evade the immune system so that infections are difficult for cows to fight
- the ability to create conditions that allow evasion from antibiotic treatment (for example, within large abscesses).

These defences make the development of effective vaccines and detection of infection and treatment of clinical disease relatively difficult.

Characteristics of a *Mycoplasma bovis* bacterium



- Figure A.5.1: Characteristics of a *Mycoplasma bovis* bacterium

What is *Mycoplasma bovis*?

M. bovis is capable of infecting cattle and is found in most countries with a cattle population. In Europe and the Americas, only Norway has not recorded the presence of *M. bovis*. The organism has been previously isolated from other animal species, but only bovines (buffalo, bison, cattle and so on) are considered epidemiologically relevant.

The bacterium is listed as an Unwanted Organism under the Biosecurity Act 1993 and is notifiable under the Biosecurity (Notifiable Organisms) Order 2016. *M. bovis* is not listed by the OIE and poses no risk to human health (either by exposure to infected cattle or consumption of livestock products). Due to the fact *M. bovis* poses no food safety or biosecurity risks from the trade in meat or milk products, New Zealand has faced no barriers to trade associated with the detection of *M. bovis*.

Disease caused by *M. bovis*

When infection with *M. bovis* leads to clinical disease, some or all of the following signs can be evident in cattle:

- atypical mastitis in cows (both dry and in milk) that is unresponsive to antimicrobial therapy
- arthritis in cows and calves
- atypical, difficult-to-treat pneumonia in calves
- middle ear infection (otitis media) in calves
- respiratory disease including severe pneumonia of adult cows (usually rare in outdoor farming systems).
- abortion.

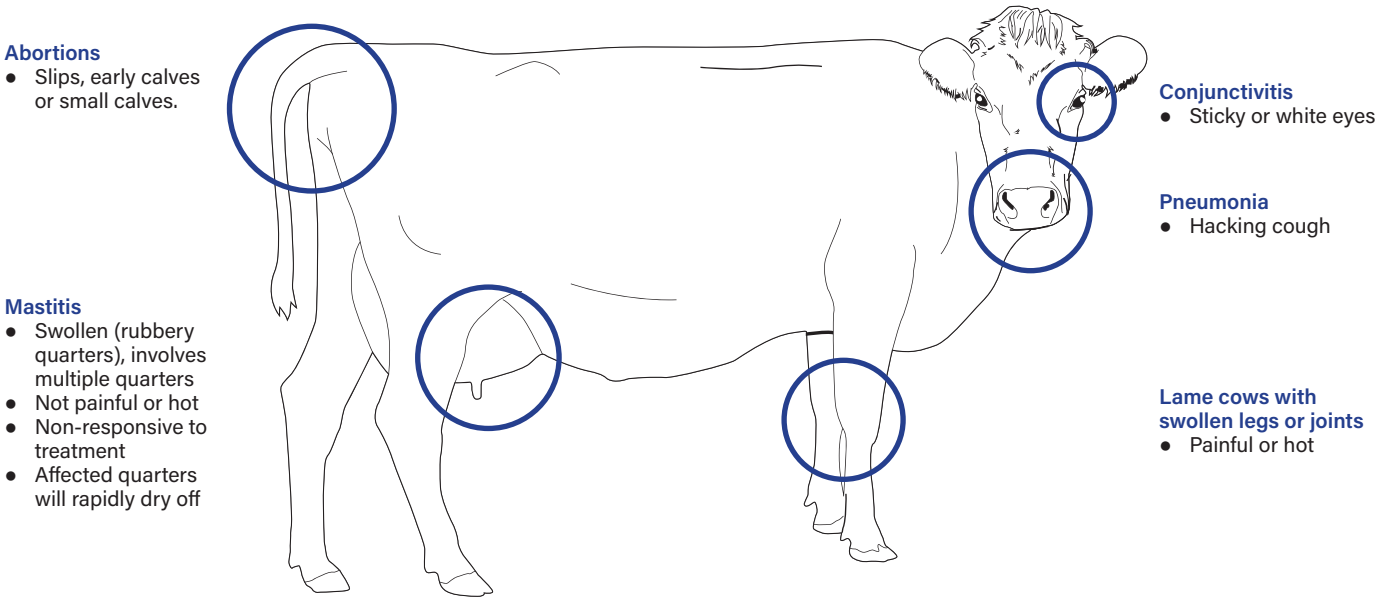


Figure A.5.2: Schematic representation of clinical signs of disease that can be caused in cattle by *M. bovis*

All conditions are difficult to treat following the onset of clinical signs. Symptoms are more commonly seen in large herds, due to the greater opportunity for animal-to-animal transmission and the stress that cattle can experience owing to social dominance hierarchies, which can increase with herd size.

Stock can be infected for long periods, often indefinitely, without clinical signs of disease developing. Emergence of clinical signs can be triggered by stressors or co-infection with other diseases. Management practices that combine stressors with environmental factors such as frequent or confined animal-to-animal contact are important determinants in the presentation of disease. For example, the stress of calving followed by close contact with other animals during milking can trigger shedding of bacteria and onset of clinical signs of disease. Overseas, where beef animals are finished in high intensity feedlots (or indoors), *M. bovis* plays an important role in respiratory disease.

The treatment of clinical disease caused by *M. bovis* has a poor chance of success, and those animals that recover often continue to shed bacteria, so should be treated as persistently infected. In countries overseas, early diagnosis and culling of animals with clinical signs of disease is implemented to prevent serious outbreaks of otherwise largely untreatable disease.

To date, limited clinical disease has been observed in infected dairy animals in New Zealand, except for the index case (detected in an atypical dairy farming operation) where very severe mastitis and lameness were observed in a large number of animals. The property also experienced high calf mortality. Some signs have also been reported on a small number of other infected dairy farms and properties receiving calves from infected farms, but confirmation as to whether the cause was *M. bovis* or another pathogen, is generally lacking.

In 2017, a predictive assessment of the impact of *M. bovis* on New Zealand beef farms suggested clinical signs of disease would be seldom, if ever, seen on extensive beef farms. To date, no evidence has been seen that contradicts this prediction.

The decision to eradicate *M. bovis* was taken largely to prevent predicted impacts on dairy production, forecasted to be in excess of $1 billion over 10 years without intervention, including risks to calves and lactating stock (including risks to animal welfare).

Transmission of infection

Shedding of bacteria from infected animals occurs mainly from the eyes, nose and vagina, and in semen and milk and can occur in the absence of clinical signs of disease. The agent enters the animal's body by ingestion or inhalation, becomes widely distributed (bacteraemia) and establishes a localised infection. In cases of mastitis, the agent may directly invade via the teat canal, an important consideration as it can be spread by milking equipment.

M. bovis typically spreads between cattle when they are in close contact for a prolonged period (that is, when they are together in a paddock, pen or milking shed). Infection by nose-to-nose contact across fence lines is possible but uncommon. Usually, infection spreads between farms when infected cattle are brought into a previously uninfected herd or where stock have strayed on to other properties.

M. bovis can also be spread to calves that are fed untreated milk from infected cows. Equipment used as part of the milking process has also been linked to the spread of infection between cattle on individual farms.

The bacteria may be spread via genetic material containing the bacteria such as semen, but this means of spread is extremely rare compared with spread via the movement of live cattle and milk.

M. bovis is unlikely to persist on pasture as it is relatively fragile in the environment. The silage-making process (ensiling) creates an acidic environment (approx. pH 4.5) where *M. bovis* bacteria are unlikely to survive. Therefore, silage and baleage are believed to pose an extremely low risk of spreading *M. bovis*.

Transient exposure to trucks and yarding equipment that have housed infected cattle has not been shown to have led to transmission of *M. bovis*. The risk of *M. bovis* spreading via organic material such as soil, effluent or feed types other than milk is extremely low. The fact *M. bovis* is widespread in the rest of the world has presented challenges to the eradication programme in New Zealand. Unlike for many other infectious diseases, there has been little investment worldwide in research into the eradication of *M. bovis*. This has made determinations about risk associated with different environmental exposures challenging, with attending difficulties in being fully confident about the effectiveness and proportionality of measures implemented to manage these risks. For example, there was little knowledge about cleaning and disinfecting equipment and environments that have housed infected stock, as these are not significant transmission pathways in a country where *M. bovis* is endemic, but are crucial to an eradication programme.

Testing for *M. bovis*

M. bovis is difficult to diagnose in an individual animal, as clinical signs are not seen in all infected animals and collecting of samples for diagnostic testing is necessary to identify infected animals and groups of animals.

To ensure the testing is accurate, many animals are tested multiple times (see below). The number and groups of cattle that samples are taken from varies depending on several factors such as the:

- number of cattle on a farm
- way in which cattle are organised into groups
- way the property was identified as being at risk of *M. bovis* infection.

Two types of test are used to detect *M. bovis*: the ELISA test and the PCR test.

Enzyme Linked Immunosorbent Assay

The Enzyme Linked Immunosorbent Assay (ELISA test) works by detecting antibodies to *M. bovis* bacteria in blood or milk. It looks for the immune response to the bacteria, rather than the bacteria itself. An individual animal that returns a positive ELISA test result is referred to as a 'reactor'. The immune response to *M. bovis* does not involve a strong antibody response, meaning that a negative antibody test does not necessarily indicate an absence of infection. ELISA test results are interpreted across the group of cattle tested, often referred to as herd-level interpretation. If

more than a certain percentage of the cattle tested in a group are 'reactors', the herd-level result is deemed to be positive. The percentage of reactors needed for a herd to be considered positive (that is, infected) varies depending on the circumstances of the individual farm. To be considered a Confirmed Property, two or more positive herd-level ELISA results are required.

Polymerase Chain Reaction

The Polymerase Chain Reaction (PCR) test detects *M. bovis* DNA in a sample taken from the animal (for example, tissue, milk or swabs from tonsils).

A positive PCR test is conclusive evidence that the animal is infected, because DNA of the bacteria has been found. However, a negative result is less reliable, because the PCR test relies on the bacteria being captured on the swab and, even in an infected animal, bacteria may not always be present at the location that the swab was taken from. For example, a nasal swab may find bacteria while a tonsillar swab does not, or vice versa. This means a significant proportion of infected animals will test negative in a PCR test (false negatives). This is a further diagnostic uncertainty.

If any sample from a group of cattle returns a positive PCR result, then that is a conclusive determination that the infection is present in that group.

Applying the tests to find farms with stock exposed to *M. bovis*

Field intelligence and tracing activities provide information about farms that may have, or have had, animals infected with *M. bovis*. These farms are followed up, and stock is placed under surveillance to determine their exposure status – this is referred to as network-associated surveillance.[2] This includes those farms that have had infected stock move through them, farms that sent stock to an infected property where the source of infection has not been established, and farms belonging to the same owner as an infected farm.

In addition, active and background surveillance is undertaken by ELISA testing of bulk milk samples from all commercial dairy farms and by blood testing (serum ELISA) beef animals at meat processors and on farms. Background surveillance looks for infection where it is not believed to be present, to catch any sources of infection that have otherwise gone undetected via the tracing and active surveillance processes.

Confirmation of *M. bovis* at the group level frequently requires multiple rounds of testing

Adequate confidence in the status of herds can frequently be obtained only through multiple rounds of on-farm blood testing.

Animals that will require more than one round of testing include those where:

- the ELISA test detects *M. bovis* antibodies in round 1 (a positive result)
- trace animals were present in the group
- the group was fewer than 40 animals (and round 1 was negative).

All trace animals are sent for slaughter sampling after this round of testing. At slaughter (which also serves to remove these heightened risk animals from the population) trace animals are post-mortem tested using the ELISA and PCR tests.

To meet the case definition of a Confirmed Property, a farm must have two rounds of positive ELISA results or a PCR positive result.

Using biosecurity tools to minimise risk

Controls on the movement of cattle and risk goods (milk and some types of equipment) are required to prevent infection spreading from infected farms to others.

Advice about prevention of infection centres on maintaining good basic biosecurity on farms, including:

- minimising sources where stock is purchased from
- preventing or reducing the numbers of new animals introduced onto farm
- maintaining secure boundaries
- minimising mixing of different mobs of cattle on farm

2 Depending on the level of risk, the associated farms may simultaneously be placed under movement restrictions until their status is determined.

- controlling milk sources carefully for young calves, including avoiding using waste milk or colostrum from other farms
- avoiding sharing milking equipment
- keeping good records in the National Animal Identification and Tracing system of movements of cattle.

Once infection is detected on a farm, all in-contact cattle must be assumed to be infected as tests applied at the individual animal level are insufficiently sensitive and specific to determine which ones are infected, or free from infection. For this reason, eradication of *M. bovis* typically requires culling entire mobs or herds that have been shown to be infected or strongly suspected of being in contact with infected animals. Culled animals, unless showing significant signs of clinical disease, are safe for human consumption and are disposed of via normal meat processing channels.

References

1) MPI (2017) Two-page summary of *Mycoplasma bovis*, the diseases it causes, and its surveillance, diagnosis and control, 19067-mycoplasma-bovis-fact-sheet (mpi.govt.nz).
2) Biosecurity (Notifiable Organisms) Order 2016. 6403-Biosecurity-Notifiable-Organisms-Order-2016 (mpi.govt.nz).
3) H Pfützner and K Sachse (1996). *Mycoplasma bovis* as an agent of mastitis, pneumonia, arthritis and genital disorders *Revue Scientifique et Technique (International Office of Epizootics)* 15(4): 1477–1494. D9106.PDF (oie.int).
4) MPI (2019) Clinical signs of *M. bovis.* Mycoplasma-Bovis-What-to-look-out-for-A3-poster-updated-2019.pdf (mbovis.govt.nz).
5) *M. bovis* Response Industry and MPI Technical Working Group (2017) *Predictive assessment of the potential impact of* Mycoplasma bovis *on the New Zealand beef sector* (mbovis.govt.nz).
6) Office of the Minister for Biosecurity (2018) Sub 18-0049. Mycoplasma bovis *response options* (Cabinet Paper 2018, May 28).
7) MPI (2019) What's *M. bovis*? Knowledge hub for affected farmers about *Mycoplasma bovis* | *Mycoplasma bovis.* (mbovis.govt.nz).
8) MPI (2019) What's involved with testing? What's involved with testing? | *Mycoplasma bovis.* (mbovis.govt.nz)
9) DairyNZ (2018) Biosecurity WOF. biosecurity-wof-a4-brochure.pdf (dairynz.co.nz).
10) Beef + Lamb New Zealand (2018). *Mycoplasma bovis*: Guidance for beef cattle farmers. BLNZ_Mbovis_Guidance.pdf (beeflambnz.com).

Appendix 6

Background on the New Zealand Dairy and Beef Farming Sectors

Purpose

This appendix is intended to give context to how cattle farming systems operate. Data and dates given are approximate and will vary between and within regions. A glossary of key terms can be found at the end of this appendix.

Summary

Agriculture is New Zealand's largest industry, with red meat and dairying exporting $9.2 billion and $19.7 billion, respectively, worth of products during 2020. New Zealand is the world's eighth largest milk producer and the largest exporter, supplying about 30% of internationally traded dairy products.

Major biosecurity incursions, depending on the livestock disease, can lead to immediate and protracted suspension of access to overseas markets. The economic consequences of this for the industries and the New Zealand economy are dire, and the flow-on consequences for human and animal welfare are also potentially extremely serious.

Overview statistics

In 2017, there were approximately 52,000 farm holdings in New Zealand, irrespective of size or location, with an average area of 270 hectares.

Farms by farm type, 2017

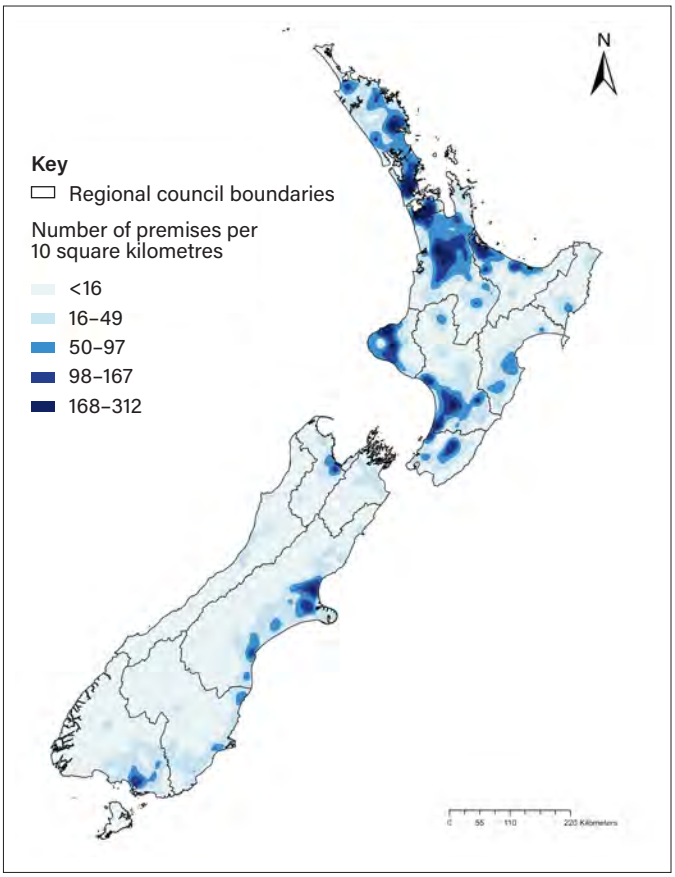
	Farms[1] No.	%	Agricultural area ha(000)	%
Sheep and feef farming	23,403	45%	8,765	63%
Dairying	11,100	21%	2,442	18%
Cropping	2,991	6%	365	3%
Deer farming	783	1%	261	2%
Pig farming	150	0%	8	0%
Poultry	162	0%	4	0%
Forestry	4,194	8%	1,784	13%
Other	9,510	18%	271	2%
Total all farm types	**52,293**	**100%**	**13,900**	**100%**

1 Includes non-commercial smallholding farms.
● Source: Statistics NZ, Agricultural Production Census, 2017.

Livestock numbers, 2017 to June 2020

	2017	2018	2019	2021[1]
Dairy Cattle[2]	6,529,811	6,385,541	6,260,895	6,112,100[P]
Beef Cattle	3,616,091	3,721,262	3,889,996	3,950,500[P]
Sheep	27,526,537	27,295,749	26,821,846	26,161,900[P]
Deer	836,337	851,424	810,443	829,400[P]
Pigs	273,860	287,051	255,934	233,700[P]
Goats	98,812	..	93,606	..
Llamas & Alpacas	9,649	8,619	10,185	..

1 Rounded to the nearest 100.
2 Includes dairy Bulls.
P Provisional.
.. Figure not available.
● Source: Statistics NZ (Agricultural Production Statistics June 2020).



● Figure 1. Density map of cattle farms (all production purposes) in New Zealand at 2020.

Livestock numbers by region to June 2019[1]

	Dairy Cattle[2] (000)	Beef Cattle (000)
Northland	335	382
Auckland	124	118
Waikato	1,823	547
Bay of Plenty	318	107
Gisborne	S	254
Hawke's Bay	78	449
Taranaki	587	125
Manawatū –Whanganui	468	575
Wellington	83	150
Total North Island	3,822	2,707
Tasman	65	37
Nelson	S	2
Marlborough	18	64
West Coast	153	31
Canterbury	1,213	525
Otago	353	325
Southland	636	192
Total South Island	2,439	1,183
Total New Zealand	6,261	3,890

1 2019 was an agricultural production survey year.
2 Includes dairy bulls.
S Suppressed – No data available.

● Source: Statistics NZ, Agricultural Production Statistics, June 2019.
Note: Figures may not add to the totals due to rounding.

Dairy production overview

HERDS AND COWS

Total number of herds	11,179
Average herd size	440
Number of cows (milking)	4.92 million

FARMERS AND DAIRY LAND

Number of farm owner/operators (including herds with contract milkers)	7,865
Number of sharemilkers	3,227
Average farm size	155
Average cows per ha	2.84

Total effective hectares of dairy land in New Zealand

1,730,374 million hectares

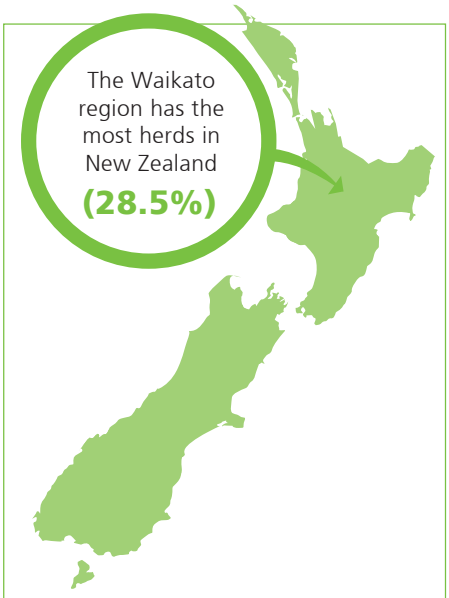
Milk processed by dairy companies (2019-20)

21.1 billion litres

containing 1.90 billion kilograms of milksolids

3.68
MILLION COWS HERD TESTED

3.46
MILLION COWS MATED TO AB



THE NORTH ISLAND HAS 71.4%
of New Zealand's dairy herds,
58% of dairy cows and produces
54% of New Zealand's milksolids.

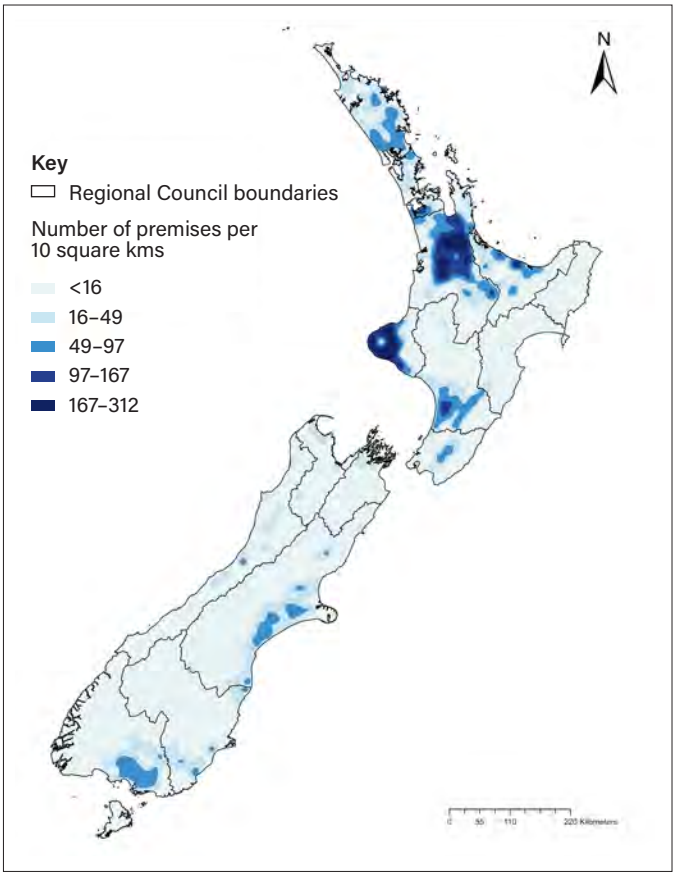
THE SOUTH ISLAND HAS 28.6%
of New Zealand's dairy herds,
42% of dairy cows and produces
45% of New Zealand's milksolids.

● Source: DairyNZ https://www.dairynznewslink.co.nz/business/dairy-sector-quickstats

Dairy production

Most New Zealand's dairy farms are based on a pastoral free-range system. This involves running a spring-calving herd whose demand for feed matches the 'spring flush' of rapidly growing fresh grass. This results in milk production following the grass growth curve, peaking in the spring and tapering off from there. In the spring, surplus grass is made into silage and forage crops are sown to provide feed for the cows later in the season when grass growth is less in order to extend lactation. Other supplements include maize silage and palm kernel extract. Internationally, most dairy production systems are based on housed animals milked all year round on stored feed that is transported to the milking herd, with minimal direct grazing of pasture.

The New Zealand dairy farming season runs from 1 June to 31 May. Calves are generally born from late June to September, with some regional variation. Calves are bucket reared, initially on early-lactation milk containing colostrum, and then on milk and concentrate until they are weaned. Male and non-replacement female calves are generally sold for finishing or directly to slaughter as bobby calves at 4 to 10 days of age, while female calves (heifers) are reared and kept as replacements. These heifers will be mated at around 15 months of age, usually to a low birth-weight bull (for example, a Jersey) and will enter the milking herd at two years.



● Figure 2. Density map of dairy cattle farms in New Zealand.

Herds begin being mated around October. This is usually by Artificial Insemination (AI) for approximately 5–6 weeks, and then bulls are run with the herd for approximately 4–6 weeks (total mating period 10–12 weeks).

Around mid to late May (depending on the season) cows confirmed as pregnant will be "dried off" (approximately 8 weeks prior to calving), whilst poor-performers, old, or non-pregnant ("empty") cows will be culled. The methods of drying off consist of either simply not milking the cows, or gradually tapering off milk harvesting for a week or two before stopping. At the last milking, farmers often administer an intramammary Dry Cow Therapy (DCT), an antibiotic treatment, to cows with a high somatic cell count. They might also have administered a teat seal product to low cell count cows and in calf heifers. These treatments help to repair and protect the udders and minimise the impact of mastitis during the dry period and early lactation.

A variation on the common theme of calving is autumn-calving herds, that is, calves being born from March to May. This was traditionally practised by 'town supply' herds closer to towns and cities to ensure fresh milk was available for the local population year-round. It is also practised now for export products requiring continuous supply of milk and is more common in the North Island, where there is greater pasture growth over winter. Most herds do both spring and autumn calving, and these are called split-calving herds.

Sharemilking is an arrangement whereby the income and costs of running a farm are divided between the owner of the farm and a 'sharemilker' responsible for providing labour and often other inputs. A herd-owning sharemilker, also called a 50:50 sharemilker, owns a herd of dairy cows and runs them on a farm that is owned by somebody else, with income shared between the two parties. These sharemilking contracts, which often run for two to three years, tend to be renewed on 1 June every year, giving rise to 'moving day', when sharemilkers and their herds move to new farms. Note that there is not a single moving day – it is spread out over several weeks.

Variable order sharemilkers (VOSM) and contract milkers do not own the herd and generally supply labour and sometimes other inputs. The difference between a VOSM and a contract milker is that the VOSM receives a share of the revenue while the contract milker receives a price per kilogramme of milk, so does not carry any of the milk price risk. In comparison, a farm manager receives a salary irrespective of any variation in milk yield or price.

DairyNZ Ltd is the industry good organisation representing commercial dairy farmers. DairyNZ was established under the Commodity Levies (Milksolids) Order 2020 and, as a signatory to the Government Industry Agreements (GIA) Deed[1], is the recognised representative of dairy farmers on biosecurity issues.

1 The GIA is the framework in place under the Biosecurity Act 1993 to give effect to cost and decision sharing between primary industries and Ministry for Primary Industries on biosecurity readiness and responses. This is described in more detail in the Biosecurity in New Zealand paper prepared by the Secretariat for the Review Panel.

Milk collection and processing

Once calving begins, milk collection from the farm commences. The milk is chilled and stored briefly on the farm, before being picked up by milk tankers and taken to a milk processor that the farmer has a supply agreement with. The farmers are paid an amount each month based on the quantity of milksolids (kgMS) they supply. Depending on the processor, what they are paid is usually an advance payment, with final payments made at year end. Financial penalties may be imposed by the milk processor for failing to meet milk quality standards. These are generally for having high somatic counts, high water content, traces of faeces (coliforms), tainting of the flavour or smell (as a result of the animals' diet), poor cooling temperature control and, most seriously, the detection of inappropriate levels of veterinary medicines (for example, antibiotics). Some processors also pay a bonus for milk quality and proven on-farm best practices.

Levies are also deducted before the farmer is paid. These levies contribute to biosecurity responses and are established under the Biosecurity (Response – Milksolids) Levy, which is in place is help fund biosecurity responses like the *Mycoplasma bovis* Eradication Programme. The DairyNZ milksolids commodity levy invests in areas of farm systems and resilience, research and development, farmer training and education, biosecurity, and protecting the environment, as well as creating tools and information for good practice farming.

Once milk has left the dairy farm it goes to a milk processor for processing into a wide range of products. Dairy processors may be corporate (for example, Synlait, Open Country Dairy) or farmer-owned cooperatives (for example, Fonterra and Tatua) There is a large export market of New Zealand's dairy products, which include whole and skim milk powders, butter, ghee, anhydrous milk fat (AMF), cheese, casein and infant formula. Only around 5% of total dairy production is consumed in New Zealand, so the industry is highly export-focused.

New Zealand's milk processors are represented by the Dairy Companies Association of New Zealand (DCANZ), a voluntary trade association, which is a signatory to the GIA Deed that represents dairy processors.[2]

Beef production

Commercial beef cattle farms broadly fit into two categories: breeding farms and finishing farms. Many New Zealand beef farms are a combination of the two, with a breeding herd along with additional bought-in young stock for fattening (finishing). Some farmers prefer to simply buy young stock and finish them at a target live weight, rather than deal with the management challenges presented by breeding animals.

Finishing farms can be highly intensive operations on good-quality land, with stock densities more commonly associated with dairy farms. In particular, bull calves (which have higher growth rates than other calves) can be reared intensively in 'bull beef' systems, which have an objective of producing slaughter-sized animals in under two years.

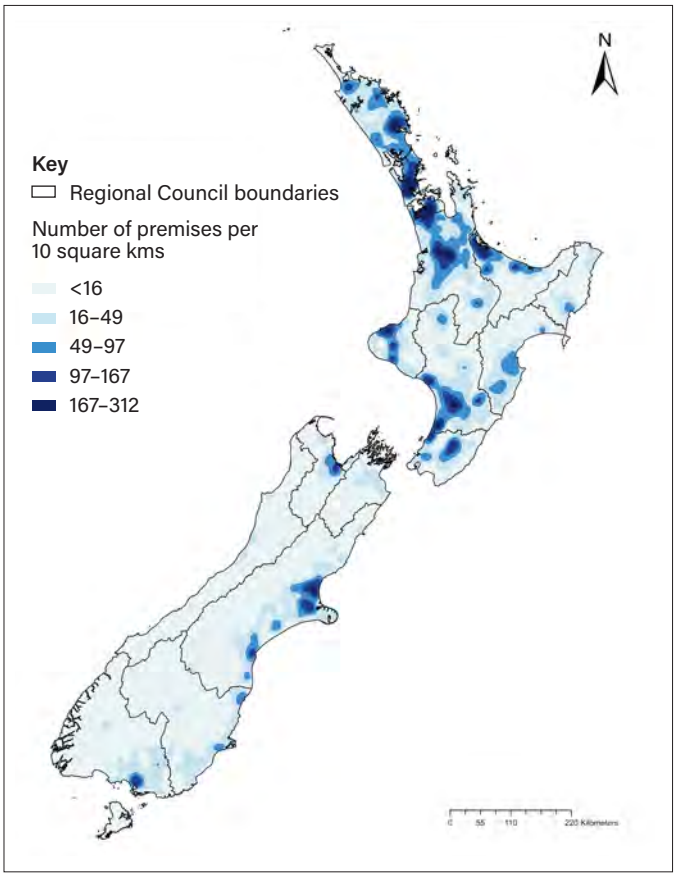


Figure 3. Density Map of beef cattle farms in New Zealand.

2 For more information, see the DCANZ website https://www.dcanz.com.

Beef cows often calve later than dairy cows, and the calves are left with their mothers until weaning (usually around March or April), generally at a target weight of around 200kg. The cow herd is joined with one or more bulls in early summer (November or December), ideally for two to three cycles (six to nine weeks). About eight weeks after bull removal, the herd will be pregnancy tested and 'empty' (that is, non-pregnant) cows will be culled.

Weaned calves will be sold to finishing farms (often termed 'stored' or 'sold store'), finished on the same farm, or kept as replacement cows if heifers. In contrast to dairy farmers, not all beef breeders calve their heifers at two years of age, preferring to add another year of growth before breeding.

Some beef finishing farmers will supply animals to meat companies 'on contract', where an agreement is signed early in the season to provide a certain number of animals at a certain target liveweight by a certain date.

Extensive beef farms are not ideally suited to supplemental feeding of livestock, but some more intensive farms will provide hay, silage or forage crops to their cattle during winter.

Beef + Lamb New Zealand Ltd (B+LNZ) is the industry good organisation representing commercial sheepmeat and beef producers,[3] established under the Commodity Levies (Meat) Order (2015). B+LNZ also represents sheepmeat and beef producers on biosecurity issues as a signatory to the GIA Deed.

Calf rearers or traders

A calf-rearing venture can be done contractually, whereby the rearer agrees to rear 4–10-day old calves to weaning for a third party, or by purchasing the animals and having control over the future of the animal after weaning for trading or finishing.

Calves are collected by the rearer or delivered to the rearing property from multiple different farms and fed milk (using milk powder or having a supply of fresh milk (generally waste milk[4])) transported to the rearing block from another property or factory. Over the course of approximately 10–12 weeks, the calves are reared and weaned onto solid feed concentrate once they meet generally accepted industry weight targets (dependent on breed). Once they have reached their target, they are finished by being grazed on pasture by the calf-rearer, sold on for finishing elsewhere, or sent to their predetermined destination if being reared on contract.

If they do not take animals through to slaughter, calf rearers and traders do not contribute levies to the industry body B+L NZ and have no specific representation in the biosecurity system.

Stud farms

A stud farm is a farm that primarily breeds animals for their genetics, while also producing meat or milk. This is where the best genetics of bulls and rams are born and selected for sale to commercial farmers. Stud bulls and rams are very valuable animals, both in dollar terms and in the genetic worth that has been built up over many years. In the dairy industry, the cows in herds from which stud bulls are selected are also very high value, as they have high proven genetic worth.

A single stud bull can sell for over $100,000 at auction, but most tend to sit in the $5000 to $10,000 range. Beef stud auctions usually take place in June, on the farm or at a saleyard.

Another product of a breeding enterprise is the direct sale of genetic material in the form of semen and embryos for insemination or transplantation.

Lifestyle blocks

There is no formal definition of a lifestyle block but, generally speaking, a lifestyle block is a small farm (less than 10ha for example) whose owners have

3 This includes dairy farmers in their capacity as beef producers where cull cows are processed.
4 Most often milk that is otherwise unsuitable for commercial collection. If untreated, this milk can act as an efficient pathway for the transmission of infectious diseases.

other income or employment and are not financially dependent on their farm income. Often these blocks will have multiple species and, occasionally, uncommonly found species and breeds. A large array of animals can be encountered on lifestyle blocks, including sheep, cattle, goats, pigs, chickens, ducks, turkeys, geese, guinea fowl, ponies, horses, donkeys, mules, alpacas, llamas, ostriches and emus.

A large number of lifestyle block owners are not from a rural background and may have limited knowledge of animal husbandry procedures and of their responsibilities under relevant animal welfare, animal products, and biosecurity legislation.

The Livestock-selling process

Most farmers buy and sell stock with the assistance of a stock agent or meat company. The agent liaises with the meat company before animals are sent to slaughter. Once animals are selected, the agent will organise transport to the slaughter plant, sometimes at the farmer's expense. Farmers are then paid by the meat company based on the weight of each carcase.

Farm-to-farm trading of livestock can happen through a saleyard, a stock agent or privately between farmers. At a saleyard, pens of animals are auctioned by a livestock agent and sold to the highest bidder. This can include 'store' stock, immature and mature breeding stock, cull stock and stud stock. Meat companies also purchase animals from saleyards that are sent directly to slaughter.

Online trading of livestock is becoming increasingly common in New Zealand.

Figure 4. Cattle movements recorded by NAIT.
Source: Data supplied by OSPRI.

Figure 4. shows the number and location of National Animal Identification and Tracing system (NAIT)-recorded movements over one typical week in August 2020. Note that the number of movements exceeds the number of animals as some animals are moved twice in this period, for example, initially to sale yards and then to the purchasing farm or processing plant.

Meat processing

For the year ending December 2020, the meat industry earned export revenue of $9.2 billion. An incorporated society, the Meat Industry Association, represents sheep and beef processors and exporters that operate more than 60 processing plants throughout the country, employing over 25,000 people. These plants are shown on the following map. The plants process approximately 23 million sheep and 4 million cattle each year. The industry typically operates on low profit margins so relies on high turnover. It is characterised by intense competition between meat companies to purchase high-quality stock for processing. This dynamic can make cooperation within the meat industry challenging, as industry participants are used to treating each other as rivals.

More than 1 million tonnes (or 85% of production) is exported to 120 overseas destinations.

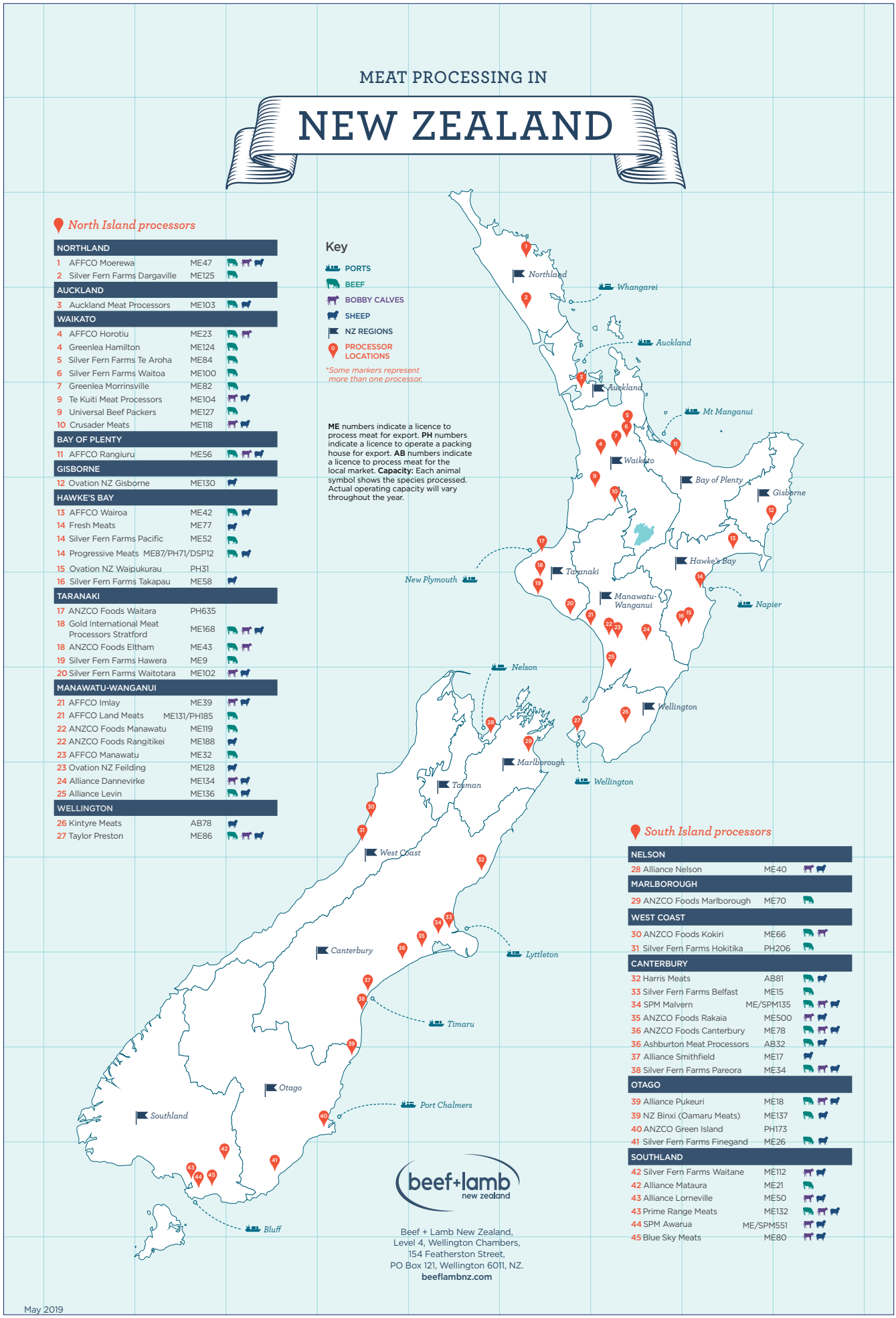


Figure 5. New Zealand Meat Processing.
Source: The Industry | New Zealand Meat Board (nzmeatboard.org).

Rural vets

The Veterinary Council of New Zealand is responsible for ensuring vets are competent to practice under the Veterinarians Act 2005. This means they register and issue practising certificates to qualified veterinarians, set the standards for veterinary performance, and monitor and discipline if required.

The New Zealand Veterinary Association is a voluntary membership-based organisation offering support for members wellbeing, as well as seeking to provide leadership and direction for the profession, and advocacy on matters of importance to the profession.

Rural veterinarians are a significant part of any farming enterprise regardless of type, size or location. They perform many services on-farm and are often a trusted source of advice to farmers.

Vets are relied on to be informative about on-farm operations and how different diseases, ailments and injury will impact on the farming business. Exotic disease emergencies can require the involvement of large numbers of qualified vets. As a result, the participation of this sector in such events has the potential to be a key determinant of success or failure.

		No. of practices that provide services for:			
Region	Total No. of Practices	Companion Animals	Large Animals	Equine	Wildlife
NORTH ISLAND					
Northland	22	22	19	11	0
Auckland	81	77	14	10	1
Waikato	60	51	42	17	0
Bay of Plenty	30	26	14	8	1
Gisborne	5	4	3	4	0
Taranaki	15	13	12	3	0
Manawatū–Whanganui	24	18	12	10	1
Hawke's Bay	9	9	7	5	0
Wellington	27	27	9	6	1
Total North Island	**273**	**247**	**132**	**74**	**4**
SOUTH ISLAND					
Tasman–Nelson	9	9	5	1	0
Marlborough	3	3	2	2	0
West Coast	5	4	5	3	0
Canterbury	63	53	37	14	1
Otago	22	19	15	10	0
Southland	11	11	10	6	0
Total South Island	**113**	**99**	**74**	**36**	**1**
Total	**386**	**346**	**206**	**110**	**5**
%		**89.6%**	**53.4%**	**28.5%**	**1.3%**

● Figure 6. The number of Vet practices by region/ animal type that are members of New Zealand Veterinary Association.
* Not included due to unknown detail – 10 practices
Source: New Zealand Veterinary Association, Find a vet (webpage), (www.nzva.org.nz).

Livestock transport industry

In New Zealand, farm animals frequently have multiple moves between different properties during their lifetime. The number of moves varies significantly by species and production purpose. Transport of livestock is mainly by road freight, and this is regulated to meet health and safety, environmental (effluent disposal), traceability, and animal health and welfare needs.

When livestock are purchased or moved to another property (for example, for grazing) the farmer or the livestock agent, generally on behalf of the stock purchaser, will contact a livestock transport company to arrange the logistics. If stock are going to a meat processing plant, the livestock agent (or farmer) will contact a representative of the farmer's preferred meat plant company to arrange the logistics – that is, booking both the kill space and the transport company to pick up the animals).

The New Zealand Livestock Transport Assurance Programme is a programme for transporters of livestock to ensure they are meeting their obligations under the Transport within New Zealand Code of Welfare, and any other animal welfare regulatory requirements. It covers cattle, sheep, lambs, goats and calves.

For stock to be transported, cattle and deer need to have an NAIT ear tag, accompanied by an animal status declaration form that declares the tuperc status of the animals, and whether any have received hormonal growth promotants. There are financial penalties in the form of infringement notices and additional processing costs for non-compliance.

Glossary

The following words and terms are mentioned in this appendix or are common farming terms that may be encountered when talking to farmers.

Term	Definition
AI/AB	artificial insemination/artificial breeding – insemination with fresh or frozen semen using special equipment
Autumn-calving	Calving dairy cows in autumn instead of spring
Bobby calf	A calf, usually male, that is sent for slaughter at 4–10 days of age
Bull	A non-castrated male cattle beast
Colostrum	the nutrient-rich milk produced by a newly calved cow or lambed ewe
Contract supply	Contract whereby an agreed number of animals at a target liveweight are provided by a certain date to the meat company
Cow	Female cattle beast
Dam	Mother – a term often used by breeders to identify lineage. Can also mean a pond used as a source of drinking water for livestock.
Dry	Not being milked
Drying off	Ending lactation for the season
Empty	Not pregnant (sometimes abbreviated as MT)
Farm gate sales	Generally, calves sold by the farmer direct to a purchaser without the use of a stock agent or sale yards
Grazier	A farmer who grazes someone else's livestock for payment
Heifer	A young cow. On dairy farms these will typically calve at age two, whereas on beef farms they may not calve until age three. Some heifers are raised for beef only, instead of breeding.
Herd	A group of cattle that generally kept together, may refer to all the cattle kept on a particular farm
Mastitis	A disease of the udder in milk-producing animals, characterised by painful swelling and clotted or bloody discharge
Milking platform	The area of the farm where the milking cows are grazed and milked
Mixed-age	Adult ewes or cows
Mob	A group of animals of a single species
Moving day	A period around 1 June where sharemilkers move their herds, families, equipment and so on. to new properties to take up new contracts. There is no single moving day. The moving period can last for several weeks and herds often move in stages (for example, heifers followed by cows).
Mustering	Rounding up animals in a paddock
Runoff	A property where dry dairy cows and replacements are kept between milking seasons
Sharemilking	An arrangement where the livestock and the farm are owned by different people, and farm income is shared
Slip	Abortion (miscarriage)
Split calving	A herd that has cows calving in both spring and autumn
Steer	A castrated male cattle beast
Stock agent	A rural professional who brokers sales of livestock between farmers or to meat companies
Store/sell store	Selling non-breeding animals to another farmer to finish or fatten
Stud farm	A farm that specialises in selling genetically superior breeding animals and or semen and embryos
Weaner	Usually applies to a calf on a beef breeding farm that has been weaned from its mother

Appendix 7A

New Zealand's Biosecurity System

Introduction

This appendix introduces key biosecurity concepts and outlines New Zealand's biosecurity system. It has a strong focus on post-border activities, as these are most relevant to the response to the *Mycoplasma bovis* (*M.bovis*) incursion.

Biosecurity is defined as systems and processes for excluding unwanted pest and disease organisms from a country, region or location.

As an island country, New Zealand enjoys the benefits of natural quarantine barriers. New Zealand is also a trading country that imports a wide range of plant and animal products from all parts of the world, which poses a continual threat to its animal and plant health status.

New Zealand's economy relies on the export of agriculture, horticulture and forestry plant products. The absence of many of the serious pests and diseases and an integrated biosecurity system to provide assurances to trade partners provide a competitive advantage for market access.

The biosecurity system in New Zealand is made up of many groups and organisations, including importers, industry organisations, regional councils, Crown Research Institutes, and the public, all of whom play a part in the system.

Leadership of the biosecurity system rests with the Ministry for Primary Industries (MPI), reporting to the Minister for Biosecurity. MPI is responsible for regulatory oversight of the system, policy development, international agreements relating to biosecurity and maintenance of the effectiveness of the biosecurity system.

The primary legal basis for the biosecurity system is the Biosecurity Act 1993. This Act is broad in scope and drafted as an enabling Act providing a wide range of powers, rather than specifying outcomes or solutions. Other legislation impacts on the biosecurity system, but the Biosecurity Act is the primary source of legal authority.

While there is a temptation to view biosecurity as an activity that happens 'at the border,' there is a multi-layered system with pre-border (that is, overseas), border and post-border components. This is illustrated in the following table.

● New Zealand's biosecurity system

	Layer of the system	Outcomes
Pre-border	**International Plant and Animal Health Standards** Developing international standards and rules under the World Trade Organization Sanitary and Phytosanitary Agreements.	Science and risk-based standards lead to an easier environment to trade in while protecting our biosecurity.
	Trade Agreements and Bilateral Arrangements Negotiation, agreements and processes for future biosecurity cooperation and trade.	Biosecurity requirements for New Zealand businesses are reasonable and create commercial certainty when trading overseas.
	Risk Assessment and Import Health Standards Identification of risk and specification of requirements for people and goods coming into the country, including assessment of applications to import organisms new to New Zealand.	The majority of biosecurity risks are managed offshore so that compliant passengers and cargo arrive at our border. Biosecurity risks which arrive onshore are managed effectively.
Border	**Border Intervention** Educating and auditing to encourage compliance. Inspecting to verify compliance and taking action to manage non-compliance.	Trade and travel are facilitated for people and goods complying with New Zealand regulation. The accidental or illegal import of pests is prevented from creating biosecurity risk.
Post-border	**Surveillance** General and targeted programmes to detect harmful pests and diseases.	Harmful pests and diseases are detected promptly. New Zealand's pest freedom status is known. The spread of established pests into new areas, or changes in a pest's risk profile, are detected promptly.
	Readiness and Response Regular testing of the biosecurity system's capability to respond. Responding to detected harmful pests and diseases.	The biosecurity system is ready to respond to new organism incursions. Harm from detected new pests and diseases is minimised.
	Long-term Pest and Disease Management **National scale management** – eradication, containment or management of a pest across New Zealand. **Regional management** – primarily led by regional councils through regional pest management plans and pathway plans. **Local scale management** – to protect values in places. Pests within a site are managed to the extent necessary to protect the place's values.	Harm caused by established pests and diseases is reduced or contained, through exclusion, eradication, progressive containment, or sustained control at the most appropriate scale (national, regional or local).

New Zealand's biosecurity legislation – Biosecurity Act 1993

The biosecurity system is primarily regulated through the Biosecurity Act 1993, administered by the Ministry for Primary Industries. The Biosecurity Act provides the legal framework for biosecurity activities in New Zealand. It covers:

- pre-border risk management and standard setting
- border management
- surveillance
- readiness and response
- long-term pest management.

Pre-border risk management

MPI works to keep risks offshore before they get to New Zealand by imposing standards for countries wishing to export to New Zealand. It is important these standards are evidence-based and consistent with New Zealand's obligations to trading partners under the Sanitary and Phytosanitary Agreement of the World Trade Organization.

Border management

The Act provides powers for MPI to effectively manage the risks that come with:

- importing goods, including personal effects from passengers, which may have harmful organisms in or on them
- any vessels (such as planes or ships) landing in New Zealand.

It does this by requiring that all goods entering New Zealand get biosecurity clearance before being allowed unrestricted access to the country – using a range of powers and duties to manage any risks from incoming vessels, people, and goods.

Readiness and response

The Act gives agencies, including MPI, a wide range of powers to deal with harmful organisms that have entered New Zealand. During readiness and response activities, those powers may be used to:

- enter property
- impose movement controls
- destroy contaminated property or infected animals
- give directions (for example, to test at-risk animals).

The Act places restrictions on the spread of harmful organisms and imposes reporting obligations for specified harmful organisms.

The Act is also designed to help government and industry work together to make decisions about preparing for harmful organisms and any necessary responses – as well as setting out how these activities should be paid for. These aims are formalised in the Government Industry Agreement for biosecurity readiness and response (GIA).

Long-term pest management

If a harmful organism establishes in New Zealand, the Act allows for national and regional pest and pathway management plans. Industry organisations have used national pest management plans to manage organisms that damage their sectors, while regional councils use regional pest management plans to do their biosecurity work.

The Act also provides for pathway management plans, which can be used to control the many ways pests or diseases may move around New Zealand.

Compensation

The Act also provides (section 162A) for the payment of compensation where powers under the Act are exercised and a verifiable loss has resulted; for example, if:

- property has been damaged or destroyed
- restrictions have been imposed on the movement or disposal of goods, which have caused a loss

The restrictions might be through a Restricted Place Notice, Notice of Direction or Controlled Area Notice.

The objective of paying compensation is to incentivise the reporting of the presence of suspected unwanted organisms, and to encourage compliance with biosecurity control measures when an incursion response is under way.

Before the discovery of *M. bovis* in mid-2017, MPI set up a dedicated compensation team to deal with the claims resulting from responses such as to myrtle rust, fruit fly and *Bonamia ostreae*. Before July 2017, MPI had received around 50 compensation claims from a variety of responses.

Ex gratia payments

Where a loss is incurred but falls outside of what can be compensated under section 162A of the Act, the Crown may consider providing an ex gratia payment. These are decided on a case-by-case basis.

Biosecurity Act 1993 review

The Act is being reviewed to ensure it remains effective and up to date in light of increasing pressures the biosecurity system is facing. These pressures include:

- growth and diversity in trade and tourism
- increases in the number of packages arriving in New Zealand through online purchasing
- climate change
- pressure from established pests.

Other legislation and assurances

MPI also administers other laws. The one most relevant to *M. bovis* is the National Animal Identification and Tracing (NAIT) Act 2012.

National Animal Identification and Tracing Act 2012 (NAIT)

The NAIT system is a statutory animal identification and tracing system for cattle and deer. The NAIT system provides for individual bovine traceability based on property identification. The system uses ear-tag animal identification linked to movement reporting from registered properties. New Zealand does not have an individual animal identification system for sheep, goats, camelids or pigs, but the Animal Status Declaration (ASD) as described below provides for mob-level traceability.

Animal Products Act 1999

Under the Animal Products Act 1999, ASDs form a vital component of the market eligibility and food safety system that underpins the Government's ability to sign export certificates. It applies to cattle, deer, sheep, lambs, goats, ostriches, emus, horses, alpacas and llamas. A separate ASD is required for pigs.

When one or more of these animals changes ownership, the sending farmer must complete, and provide to the new person in charge, an ASD attesting to key attributes of the previous management and provenance of the stock.

Post-border biosecurity

Surveillance and incursion investigation

Surveillance involves looking for unwanted exotic pests and diseases for early detection of new incursions, looking for established pests and diseases to determine distribution and population density to support pest management actions, and determining the presence or absence of pest or disease to provide trading partners with assurances about New Zealand's disease status.

Surveillance may be considered the 'backstop' for New Zealand's border inspection. It is recognised that not all pest and disease pathways can be totally controlled. Should a pest or disease of major concern enter New Zealand, it is important that it be detected before it becomes widely established. This allows consideration of the widest possible range of management options, including eradication.

Active surveillance programmes with annual sampling of at-risk populations are carried out for a small number of pests and diseases, including arboviruses, scrapie, Bovine Spongiform Encephalopathy (BSE), and various fruit fly and mosquito species.

MPI also operates pathway and passive surveillance programmes. Pathway surveillance programmes target high-risk sites to look for pests, diseases and risk organisms. Sites are visited at a specified frequency, and surveillance is conducted for any new pests, diseases or risk organisms present at that site. Results are maintained in the national animal disease surveillance database with annual reporting publicly and to the World Organisation for Animal Health (OIE).[1]

Passive surveillance means people, including the public, keeping watch for and reporting unwanted pests and diseases.

1 Office International des Epizooties.

Passive surveillance includes:

- an exotic pest and disease hotline – 0800 80 99 66
- publishing lists of notifiable pests, diseases and unwanted organisms
- monitoring of animal disease data and syndromes submitted to private veterinary laboratories
- incursion investigators, who investigate reports to the pest and diseases hotline
- maintaining public awareness of new pests and diseases and how to report them.

A further role of MPI is to demonstrate freedom from specified pests and diseases. This is the country's part of the assurance provided for produce exported from New Zealand and justifies the imposition of border measures intended to prevent entry and establishment of such pests and diseases.

Emerging risks – identification and response

MPI in conjunction with industry and research agencies scan for risks from emerging pest and diseases that may impact on New Zealand's biosecurity. The key sources of information include:

- alerts from national plant protection organisations
- science and research publications
- industry publications and sources in overseas countries
- intelligence from industry, Crown Research Institutes and MPI personnel following overseas visits.

Readiness and response

'Readiness and response' refers to New Zealand's ability to effectively respond to any incursions, which includes MPI working in partnership with industries to better plan and prepare for responses under the GIA. Response plans have been prepared for major threats such as foot and mouth disease and fruit fly, and generic programmes are designed to cover other scenarios. These plans are routinely updated. It is expected that in the event of a high-impact incursion there would be sufficient access to expertise and operational capacity to respond immediately.

MPI maintains a network of trained vets around the country to investigate reports of suspected exotic diseases. These initial investigating vets are often local vets that have received special training in exotic disease recognition. They are on standby 24 hours a day, 7 days a week.

GIAs are a formal agreement about biosecurity readiness and responses. They operate as a framework of partnerships between primary industry groups and MPI to manage pests and diseases that could damage New Zealand's primary industries.

A Signatories to a GIA share the decision-making, responsibilities and costs of preparing for – and responding to – biosecurity incursions. By working in partnership, industry and government can achieve better biosecurity outcomes.

Pest management

The Biosecurity Act provides for a system of pest management plans to contain or reduce the impact of established pests and diseases. Pest management plans are in place for a small number of pests and diseases, including bovine tuberculosis. Managing established pest organisms is a major expense to industries, regional councils, among others, that represents over half of New Zealand's total biosecurity expenditure.

Readiness, response and capability

Coordinated Incident Management System

Biosecurity responses are led by Biosecurity New Zealand, a business unit within MPI. These responses are framed and operated using the Coordinated Incident Management System (CIMS). CIMS has been adopted as New Zealand's official framework to achieve effective co-ordinated incident management across responding agencies (for example, MPI, New Zealand Police, civil defence).

National Biosecurity Capability Network

The National Biosecurity Capability Network (NBCN) was a vehicle designed for delivering response capability. MPI contracted AsureQuality to facilitate access to capability where organisations were willing and able to commit resources in the event of a response. Agreements were signed with several organisations around training and provision of personnel in a response. The NBCN does not appear to have been utilised in the *M. bovis* response, possibly as it had not yet developed to the point where it was fully operational. The NBCN appears to have been superseded in July 2020 by the 'panel of providers' approach outlined below.

Response service providers

At the time of the *M. bovis* outbreak, the state-owned enterprise AsureQuality was the primary provider of response services to MPI. AsureQuality was contracted by MPI to provide much of the on-the-ground operational capability necessary to achieve the objectives of a particular response, including providing frontline, public-facing staff as required. It was the responsibility of MPI to oversee AsureQuality's delivery of response operational service.

In July 2020, Biosecurity New Zealand moved away from such direct reliance on its response contract with AsureQuality and established a panel of providers to deliver response activities. This panel gives access to specialists with diverse skills and knowledge and introduces an increased element of competition to the supply of services. The panel of providers includes AsureQuality, Cawthron Institute, New Zealand Biosecurity Services, National Institute of Water & Atmospheric Research Limited (NIWA) and SPS Biosecurity. It appears that each service provider will develop its own network of additional capability, superseding the NBCN model outlined above.

Biosecurity Response Group

Within MPI, Biosecurity New Zealand maintains a permanent standing team of response staff whose job it is to manage and lead responses to biosecurity incursions as and when they are required. In the event of relatively large, long running, complex or simultaneous responses occurring, staff from across MPI, and potentially from other supporting organisations, such as GIA partners or local councils, are drawn in to support this standing team, operating within a dedicated CIMS structure for each response.

Diagnostic and Surveillance Services

The Diagnostic and Surveillance Services directorate of MPI is responsible for delivering the core functions of diagnostics, surveillance and incursion investigations.

DSS is accountable for managing surveillance for and investigation of notifications of suspected exotic pests and diseases that may affect New Zealand's primary industries or aquatic and terrestrial environments. DSS informs the Biosecurity Response Group about any potential biosecurity risks to enable effective deployment of robust leadership to any such response event.

DSS provides specialist diagnostic services to response operations, and incursion investigators frequently serve in response roles requiring a high level of technical expertise and experience.

DSS laboratories also provide testing services to meet regulatory requirements for imported and exported animals and plants (and derived products) and for private organisations seeking specialist services.

Readiness

Readiness is preparedness to manage responses to threats posed by adverse events and biosecurity incursions. The Biosecurity New Zealand Readiness team's role is to facilitate, coordinate and support the collective improvement of response readiness across all of MPI. This dedicated team within Biosecurity New Zealand focuses on improving overall readiness to respond effectively, including running exercises, providing training and developing plans and resources.

The Readiness team develops and manages pest- or disease-specific biosecurity response plans, welfare plans and guidance, and plans for recovery and transitioning out of responses.

Appendix 7B

Biosecurity System International Standards and Guidelines

Introduction

While this review is focused on how New Zealand's livestock disease response system responded to the *Mycoplasma bovis* outbreak and how lessons from this can be used to inform future preparedness, New Zealand's livestock biosecurity response system operates within a broader global framework of operating standards, guidelines and models designed to inform and shape how nations manage their responsibilities. This appendix outlines the applicable pertinent livestock biosecurity readiness and response standards. They act as a framing device for the other content and topics discussed throughout this document.

Several key international organisations are tasked with setting the standards for livestock biosecurity both at national and international levels. Among these organisations, the most significant are the:

- Organisation International des Epizooties/World Organisation for Animal Health (OIE), which is the standard-setting body for animals and animal health
- World Trade Organization (WTO), which sets the standard for international trade
- Codex Alimentarius Commission, which sets standards for food safety
- Food and Agricultural Organization of the UN (FAO), which is a development organisation that does not set standards, but develops guidelines related to animal health and biosecurity.

Of these organisations, the most significant (in terms of animal health) is the OIE. OIE standards are used by WTO in deciding trade-related biosecurity issues. The OIE and FAO also collaborate on many animal health matters.

New Zealand is a respected OIE member and plays a role in developing OIE standards. As a fact of its membership, New Zealand is also bound to uphold these standards, appreciating the inherent variances between farming systems around the world.

As stated by the New Zealand Strategic Objectives for the OIE 2019–2023:

"The international trade in animals and animal products is conducted in accordance with international rules and guidelines. The World Trade Organization's… Agreement on the Application of Sanitary and Phytosanitary Measures… requires that any sanitary and phytosanitary measures that are applied to animals or animal products in relation to international trade are based on international standards, science and risk assessment. The intent behind these standards is that safe international trade is facilitated, while still allowing importing countries to apply appropriate measures to the extent necessary to protect human, animal, or plant life or health."

The OIE is recognised by the WTO as the standard setting body for the international trade in animals and animal products. It also has a key role in developing

the capacity of veterinary services of its members, as well as to assist in the international control of animal diseases. The OIE's broad objectives include:

- ensuring transparency in the global animal disease situation
- encouraging international solidarity in the control of animal diseases
- safeguarding trade by publishing health standards for international trade in animals and animal products
- improving the legal framework and resources of national veterinary services
- providing a better guarantee of food of animal origin and to promote animal welfare through a science-based approach.[1]

MPI (as the lead agency for biosecurity in New Zealand) plays a very active role in OIE affairs, contributing to various working groups and having had staff occupy senior roles in OIE headquarters. However, MPI's engagement in the OIE is weighted towards trade issues, with a particular emphasis on developing and updating health standards for international trade in animals and animal products. New Zealand had a high reputation internationally for its expertise in this specialist field.

Within the OIE, there is an institutional expectation that standards for surveillance, traceability, emergency management and national veterinary structures are developed for the promotion of a level playing field for trade and biosecurity. All members are expected to meet the same standards; assistance is often provided to those who struggle to meet these standards. 'Developed' countries like New Zealand with sophisticated agricultural industries are generally assumed to be capable of managing their own biosecurity systems to internationally accepted standards and as a signatory to the WTO Sanitary and Phytosanitary Measures principles, these will be taken into account in developing New Zealand's biosecurity system.

OIE standards

The key areas of relevance outlined in the OIE's standards (primarily the OIE Terrestrial Animal Code) are:

- surveillance
- certification
- traceability
- diagnostics
- emergency management
- veterinary structures
- legislation.

The full OIE statement on the coverage of national veterinary services is contained in Rem Article 3.2.3 of the OIE Terrestrial Code:

"Organisational components of Veterinary Services which have responsibility for key functional capabilities should be identified. These capabilities include epidemiological surveillance, disease control, import controls, animal disease reporting systems, animal identification systems, traceability systems, animal movement control systems, communication of epidemiological information, training, inspection and certification. Laboratory and field systems and their organisational relationships should be described."

This section outlines these key areas of relevance in turn, referencing in the heading (as well as throughout the text) the various resources in which these standards are contained and how they can be applied in practice.

Animal health surveillance – OIE Code Chapter 1.4

The OIE sets standards for surveillance systems, their implementation, data management and data use. It is expected that there will be a system of regular disease data gathering from animal populations as well as, where necessary, specific disease surveys. There must also be system for data storage (raw data) that is closely managed, and the entire system must be properly supervised and quality controlled.

OIE standards describe surveillance as a mechanism needed for early warning, proof of disease freedom

1 Ministry for Primary Industries (2019), New Zealand's Strategic Objectives for the World Organisation for Animal Health (OIE) 2019-2023, MPI, Wellington. www.mpi.govt.nz/dmsdocument/43258-New-Zealands-Strategic-Objectives-for-OIE-2019-2023

(ongoing proof of freedom needed for trade), and for monitoring disease control programmes. There is a clear expectation that data will be actively analysed and used as a basis for decision-making.

The desired OIE standard is described as:

"The Veterinary Services have comprehensive passive surveillance nationwide providing high confidence in the notifiable disease status in real time. The Veterinary Services routinely report surveillance information to producers, industry and other stakeholders. Full epidemiological disease investigations are undertaken in all relevant cases with tracing and active follow up of at-risk establishments."[2]

Certification – OIE Code Chapters 5.1 and 5.2

Trading nations set their own import health requirements for animals and products. Most base their requirements on OIE standards. However, almost all of these are customised for individual countries. When certifying products or animals for export to other countries, New Zealand uses certificates generated by the importing countries and is acting on behalf of these countries' veterinary services. Certification is, therefore, a very serious and complex issue that must be carried out diligently.

OIE requirements on certification include:

- due authorisation of certifying veterinarians
- accurate completion of certificates
- the need to base certification on real data on the animal health situation
- the obligation to provide trading partners regular information on the country's animal health status
- the supply of accurate information on diagnostic tests in use that support certification.

Traceability – OIE Code Chapters 4.2 and 4.3 and the OIE Performance of Veterinary Services Pathway

Effective traceability relies on accurate animal identification and movement tracing. The OIE defines 'identification' as:

"the combination of the identification and registration of an animal individually, with a unique Identifier, or collectively by its epidemiological unit or group, with a unique group identifier."[3]

Furthermore, the OIE defines 'traceability' as:

"the ability to follow an animal or group of animals during all stages of its life."

The OIE notes that:

"Animal identification and animal traceability are tools for addressing animal health (including zoonoses) and food safety issues. These tools may significantly improve the effectiveness of activities such as: the management of disease outbreaks and food safety incidents, vaccination programmes, herd or flock husbandry, zoning or compartmentalisation, surveillance, early response and notification systems, animal movement controls, inspection, certification, fair practices in trade and the utilisation of veterinary drugs, feed and pesticides at farm level."[4]

"There is a strong relationship between animal identification and the traceability of animals and products of animal origin."

"Animal traceability and traceability of products of animal origin should have the capability to be linked to achieve traceability throughout the animal production and food chain taking into account relevant OIE and Codex Alimentarius standards."

Traceability is the key to success in disease control and eradication. As the COVID-19 pandemic has clearly demonstrated, rapid tracking and isolating of all people who have had contact with a diseased person is central to success. Some animal diseases bring a further degree of complexity to this, as they are not only transmitted by contact between animals, but also by vehicles, clothing and equipment.

While the OIE's desired position is that traceability should be under the sole control of the national

2 p22, OIE Tool for the Evaluation of Performance of Veterinary Services (Version 7, 2019), World Organization for Animal Health, Paris.
3 Glossary, Terrestrial Animal Health Code (2021), World Organization for Animal Health, Paris.
4 Article 4.2.1. OIE Terrestrial Animal Health Code (2021), World Organization for Animal Health, Paris.

veterinary authority, it is recognised that a system will encompass numerous actors, from farmers to agents and saleyards to abattoirs as well as the government. In recognising this reality, the OIE states in its Performance of Veterinary Services (PVS) that:

"The authority and capability of the Veterinary Services, in coordination with producers and other stakeholders, to regulate the identification of animals, to trace their history and location(s), and to control domestic movements for the purpose of animal disease control, food safety, trade or other legal requirements under the Veterinary Services mandate."

While the veterinary services may, therefore, not run the traceability system directly, it must be able to demonstrate that it has control over the system.

Successful traceability

The two major descriptors of a successful traceability system (according to the PVS tool) are:

"The Veterinary Services implement appropriate and effective animal identification, traceability and movement control procedures for some animal species at national level, in accordance with international standards. The Veterinary Services carry out periodic audits of the effectiveness of their identification, traceability and movement control systems. They have been demonstrated as effective in dealing with a problem (e.g. tracing a disease outbreak, residue or other food safety incident)."

OIE traceability standards make provision for a register of establishments (farms, saleyards and so on) where animals may be present; an appropriate means of individual or group identification; and recording of movements between these establishments, using animal identification.

The OIE standards make these points:

"An information system should be designed in accordance with the scope, performance criteria and desired outcomes. This may be paper based or electronic. The system should provide for the collection, compilation, storage and retrieval of information on matters relevant to registration. The following considerations are important:

- *have the potential for linkage to traceability in the other parts of the food chain;*
- *minimise duplication;*
- *relevant components, including databases, should be compatible;*
- *confidentiality of data;*
- *appropriate safeguards to prevent the loss of data, including a system for backing up the data.*
- *The Veterinary Authority should have access to this information system as appropriate to meet the scope, performance criteria and desired outcomes."*

Global traceability examples

Many countries involved in the export of livestock products have created various traceability mechanisms for their livestock sectors. Most have implemented individual identification (often using ear tags equipped with radio frequency identification (RFID) for cattle and group identification (usually via visual tags) for sheep and goats. Systems for pigs are variable, some use tags and others tattoos or brands.

Many areas of the world have particularly high requirements regarding traceability. For example, the European Union demands that 97% or more of animals must be identified and traceable. Australia has also implemented clear performance standards covering the timeframes within which animals must be traced with accuracy. With respect to a possible outbreak of foot and mouth disease outbreak, the Australian expectation is that within 24 hours of the relevant Chief Veterinary Officer (CVO) being notified, it must be possible to determine:

- the location(s) where a specified animal was resident during the previous 30 days
- the location(s) where all susceptible animals that resided concurrently and/or subsequently on any of the properties on which a specified animal has resided in the past 30 days.

Other examples of global identification schemes are as follows:

- Brazil has an individual animal identification scheme for exports to the European Union (EU).

- Canada implemented mandatory individual identification and adopted permanent RFID tags from 1 January 2005.
- The EU has used an individual animal RFID and passport system since 2000.
- Japan has implemented individual identification through the supply chain.
- Uruguay commenced an individual traceability system for exports to the EU in 2001. It is trialling an 'improved' system that involves double tagging cattle (visual and electronic tags) and recording movements on a central database.

Laboratory diagnostics – OIE Code Chapter 3 (evaluation of veterinary services) and the PVS

Reliable laboratory diagnosis is a critical competency for veterinary services. The standard within the PVS states:

"The authority and capability of the Veterinary Services to access laboratory diagnosis in order to identify and report pathogenic and other hazardous agents that can adversely affect animals and animal products, including those relevant to public health."

It is, thus, not necessary for the veterinary services to 'own' a complete laboratory, but it does need to have ready access to relevant diagnostic services. Ideally, according to the PVS, the veterinary services will "have access to and use a network of national or international reference laboratories (e.g. an OIE or FAO Reference Laboratory) to obtain a correct diagnosis."

Critical to a laboratory is rapid 'turnaround', in other words, the ability to rapidly process samples and have results available (within hours is desirable) in order to facilitate rapid field responses.

Emergency management – OIE Code Chapter 3 and FAO guidelines

Being able to respond effectively to emergency animal diseases is a keyveterinary services function, and is part of animal health control. Chapter 3 of the Code states:

"Details should include enabling legislation, programme plans for epidemiological surveillance and animal disease emergency responses, quarantine arrangements for infected and exposed animals, herds or flocks, compensation provisions for animal owners affected by disease control measures, training programmes, physical and other barriers between the free country or zone and those infected, incidence and prevalence data, resource commitments, interim results and programme review reports."

The desirable level of preparedness is described in the PVS as:

"The Veterinary Services have national emergency management plans for all diseases of concern (and possible emerging infectious diseases), incorporating coordination with national disaster agencies, relevant Competent Authorities, producers and other non-government stakeholders. Emergency management planning and response capacity is regularly tested, audited and updated, such as through simulation exercises that test response at all levels. Following emergency events, the Veterinary Services have a formal 'After Action Review' process as part of continuous improvement."

International best practice in terms of planning is illustrated by countries such as Australia, the US and UK, which have comprehensive response plans (in consolidated book form) for most major epidemic diseases freely available on their government websites. These plans have been drafted in conjunction with their livestock industries. In addition, Australia also has comprehensive plans for emergency control centres (including detailed job descriptions for all personnel working within or from these control centres) and plans for animal destruction, disposal and decontamination and plans for enterprises such as abattoirs, saleyards, feedlots.

Regular and effective training and simulation exercises are essential to both provide real-life experience to responders, as well to test response plans and systems. For example, most Australian jurisdictions run small simulations in-house around once per year

and large national exercises (usually full functional exercises) are held every 2–3 years. Available and trained emergency responders (across government departments) are recorded in registers held by the jurisdictional veterinary services in order to ensure that emergency responses can be initiated without delay when needed. These registers are updated regularly.

FAO guidelines

The FAO has also issued guidelines for emergency preparedness. An FAO checklist regarding this covers:

- legal powers of the veterinary services to institute responses
- adequate financial provision made for emergencies
- chain of command (from CVO to incident commanders to field workers)
- presence of a properly equipped national animal disease control centre
- availability of sufficient competent personnel to handle an emergency
- holding of training sessions and simulations
- adequate emergency equipment stores
- detailed emergency manuals.

The FAO Good Emergency Management Practices manual contains detailed guidelines for drawing up emergency plans, risk analysis, disease prevention and other important topics. The GEMP guidelines describe a tiered emergency management structure akin to that described in CIMS and Australasian Inter-Service Incident Management System (Australia).

Veterinary structures – OIE Code Chapter 3, and the PVS

The OIE sees properly structured, well-managed and legally empowered veterinary services as central to national animal health management. This includes a strong chain of command and the availability of appropriate expertise within the veterinary services.

The OIE standard (article 3.2.3) states:

"A key element in the evaluation is the study of the organisation and structure of the official Veterinary Services. The Veterinary Services should define and set out their policy, objectives and commitment to quality systems and standards. These organisational and policy statements should be described in detail. Organisational charts and details of functional responsibilities of staff should be available for evaluation. The role and responsibility of the Chief Veterinary Officer/Veterinary Director should be clearly defined. Lines of command should also be described."

Office of the Chief Veterinary Officer

The CVO is described in OIE standards as the head of the national veterinary services. Article 3.2.3 states:

"The role and responsibility of the Chief Veterinary Officer/Veterinary Director should be clearly defined. Lines of command should also be described. The organisational structure should also clearly set out the interface relationships of government Ministers and departmental Authorities with the Chief Veterinary Officer/Veterinary Director and the Veterinary Services."

Veterinary services

There are a number of qualities which the OIE describes as essential to national veterinary services. Professional judgement (having the right expertise, qualifications and experience throughout the organisation), independence (immunity from political/outside interference), impartiality, integrity, objectivity, supportive/enabling legislation, effective general organisation (able to demonstrate control over the national animal health situation), adequate quality control, properly documented procedures and standards, an information/requests/appeals mechanism to deal with clients at home and abroad, an effective document management system, a culture of regular self-evaluation, effective external communications, and adequate human and financial resources.

Structure of veterinary services

The ideal veterinary services structure (according to the PVS) has authority emanating from the CVO to field activities and contracted services. The veterinary authority chain of command/ internal co-ordination mechanism is given as:

"The capability of the Veterinary Authority to coordinate their mandated activities with a clear chain of command, from the central level (the Chief Veterinary Officer or equivalent), to the field level of the Veterinary Services, as relevant to the OIE Codes (e.g. surveillance, disease control, food safety, emergency preparedness and response)."

The ideal structure will have:

"formal and fully documented internal coordination mechanisms and a clear and effective chain of command for all activities, and these are periodically reviewed/audited and updated to re-define roles and optimise efficiency as necessary."

Technical independence of veterinary services is important in the international context and is defined by OIE as:

"The capability of the Veterinary Services to carry out their duties with autonomy and without undue commercial, financial, hierarchical and political influences that may affect technical decisions in a manner contrary to the provisions of the OIE (and of the WTO SPS Agreement where applicable)."

Preserving technical independence is important in gaining and maintaining credibility and preserving market access. Maintaining this independence can be a difficult issue. In South Australia, as an example, this is addressed by:

- separate (non-delegated) legal powers for the CVO
- the CVO controlling the budget for veterinary services
- regular external audits by accredited OIE-trained auditors.

Veterinary legislation – OIE Code Chapter 3

The national veterinary services is essentially a regulatory/certification body that requires empowering legislation in order to function. The OIE frames this issue as:

"Veterinary legislation is prerequisite to support good governance and provide the legal framework for all key activities of the Veterinary Services. Legislation should be suitably flexible to allow for judgements of equivalence and efficient responses to changing situations. In particular, it should define and document the responsibilities and structure of the organisations in charge of the animal identification system, control of animal movements, animal disease control and reporting systems, epidemiological surveillance and communication of epidemiological information. A similar demonstration should be made by Veterinary Services when they are in charge of veterinary public health activities."

Not only does the OIE consider enabling legislation to be essential, but it also places value on regulation of the veterinary profession and regulation of veterinary medicines.

Appendix 8

Review Methodology

Purpose

The purpose of this appendix is to set out the process and methodology followed in conducting the review and give the reader confidence that the review has been conducted in a manner commensurate with contemporary practice.

Summary

In January 2021, the *Mycoplasma bovis* (*M. bovis*) Governance Group commissioned a constructive, forward-looking review to capture lessons learnt from the *M. bovis* Eradication Programme. The review was to look at the experiences from *M. bovis* and recommend how these lessons could be used to strengthen the biosecurity system for New Zealand.

Independence

The Governance Group required the review to be independent. The principle of independence offered the opportunity for free and frank discussion and collection of information in order to form an objective assessment of the programme. The aim was to provide credible and practical reflections and recommendations.

Independent oversight of the review was developed outside the Governance Group structure to ensure ongoing independence and maintain the credibility of the review findings. Consequently, the review was undertaken at arm's length from the interests of governance partners and other stakeholders.

For a review that looks at the result of a private-public partnership (the response operated under the Government Industry Agreement (GIA) framework), the Governance Group appointed a panel of highly regarded reviewers supported by relevant experts and an experienced Secretariat. The competencies of the panel included:

- an understanding of contemporary cattle farming methods
- wider biosecurity system knowledge with experience in public administration and disease management
- an international perspective
- a macro system focus.

The Review Panel was supported by a Secretariat comprised an independent director, consultants, and seconded staff from DairyNZ, Beef + Lamb New Zealand and the Ministry for Primary Industries (MPI). In two cases, specialist communications and information management services were commissioned to augment the competencies of the Panel. In both cases the work was provided solely for and directly to the Panel.

Right focus

Care has been taken to ensure the review has been conducted in accordance with its Terms of Reference. Through a series of contextual briefings, the Review team gained an early appreciation of the significant issues that allowed it to focus its data gathering and analysis. During research and distillation of the information received, issues surfaced and reflections

were developed. These have been tested against the Terms of Reference to ensure their inclusion in the report is appropriate. Consequently, the Panel is confident that issues result in reflections that support recommendations in how livestock biosecurity preparedness and responses can be strengthened.

Ensuring balance

The Review Panel was conscious of the various biases that might influence the conduct of the review and development of the report. While these biases could not be avoided, they were managed. The following procedures were put in place to ensure a fair and balanced view was taken and recommendations were even-handed:

- The Chair of the Review Panel led the review report process, mindful of where bias could play out and ensured that this was managed.
- Review Panel deliberations, observations and considerations were developed by blending the unique perspectives that each member provided.
- Processes and procedures to conduct the review were benchmarked against good practice.
- The New Zealand Ethics Committee was engaged to ensure lines of inquiry within surveys and structured interviews were without bias.
- All interviews were conducted with at least two members of the Review team present.
- Interviewees edited their own transcripts or records of conversation to ensure their points had been faithfully recorded.
- The development of reflections and recommendations was conducted with the complete Review Panel present.
- The Secretariat was led by an independent director, external from the participating parties.
- A team charter was developed that focused on the need to be fair and balanced.
- A team culture was developed that allowed all to have input and call out infractions against the team charter.
- Key stakeholders were briefed on the preliminary report to elicit comment regarding fact, error, omission and bias and where necessary these comments were used to amend the report.

Process management

To develop a report that would be recognised as a credible assessment on the Programme, the Review team established a comprehensive approach to collecting information and data and undertaking analysis. The Review team created a standard for its analysis and reporting and commissioned outside expertise to satisfy itself that this process was followed.

The review followed the process outlined next.

Initiation

Documentation and background information and briefings were requested from governance partners. Lists of affected parties, stakeholders, staff from the Programme and subject-matter experts to be interviewed were assembled. International experience and background on the New Zealand biosecurity system and on the science of *M. bovis* were also reviewed.

From this, the Review Panel formed an initial view of the review process, and which areas it wished to investigate further.

Information gathering

The Review team data and information to support its analysis from:

- briefings from key Programme participants
- other reviews conducted by the Programme, in particular the:
  - Technical Advisory Group Reports 1-4
  - Roche and Paskin Reports into Programme processes in 2019
  - The Farmer Experience Survey Report
- semi structured interviews led by Review Panel members
- semi-structured interviews led by Secretariat members
- three group interviews of farmers in affected regions
- two targeted surveys, one of current and past programme staff, one of farmers
- two deep dive specialist reviews: one on communications, one on information exchange and data management systems.

Document search

The Review Panel commissioned a document search across partner agencies to ensure it had access to those documents on which key decisions were made. Those agencies provided reasonable assurance that information dealing with the Programme would be provided where it existed.

Specific information requests were initiated to assist the Review team to fill in gaps in knowledge. Where information has not been supplied, it has been assumed that it does not exist and this is reflected in the results.

Directed work

The Review Panel commissioned work to consider areas of interest. These included:

- an information systems deep dive (see Appendix 4)
- a communications deep dive (see Appendix 3).

The Review Panel also commissioned background reference documents on:

- what is New Zealand's biosecurity system (see Appendix 7A)
- science of *M. bovis* (see Appendix 5)
- background on the New Zealand dairy and beef farming sectors (see Appendix 6)
- analysis of survey data (see Appendix 2).

These documents are attached to the Report as appendices.

The Review team considered other reports including:

- Technical Advisory Group reports 1–4;
- Office of the Auditor General Reports 2001, 2013, 2015
- the Roche and Paskin reports into programme processes in 2019;
- the 2013 Performance Improvement Framework review of MPI – 2013
- the Farmer Experience Survey report by LITMUS.

Maintaining process integrity

The Review Panel was concerned to ensure that best practice review protocols were in place and followed during the review. Processes were developed that ensured the principle of independence was maintained. These included:

- creation of an audit trail from information request to the receipt of formal advice from agencies that the information supplied was correct and official
- establishment of a stakeholder identification process was established
- appropriate prioritisation of people, groups and identities to be interviewed
- interview procedures that complied with contemporary standards for research
- surveys and semi-structured interviews that complied with New Zealand Ethics Committee standards
- data analysis and storage that complied with contemporary government standards
- non-partner members of the Secretariat being present for all high priority interviews
- separating information analysis from the development of observations and recommendations
- interview notes were confirmed with interviewees, key themes identified and observations anonymised.

Process assurance

An independent assurance process has been conducted. The assurance report commissioned by the Governance Group overseeing the Independent Review into the eradication of *M. bovis* has been received by the Oversight Committee. The report concluded that the review fully complies with the methodology and processes set by the Review Panel. This provides confidence that the review has been conducted using methods that meet best practice and there are clear links between the information gathered and the subsequent analysis and distillation into observations from which the Review Panel developed their recommendations.

Interviewing and surveying

In total, 94 farmers, 146 staff and 89 other stakeholders from industry or the wider agricultural sector were engaged through face-to-face interviews and surveys or via written communication.

Two groups are central to the conduct of the review: farmers who were affected by the eradication process and the staff who had to conduct the eradication process. Significant effort was made in engaging these groups. Additionally, a large group of interested parties and stakeholders who had either direct or indirect involvement in the eradication effort. Each offered a valuable and unique point of view. Engagement with these groups was carefully calibrated to ensure a wide range of views and experiences could be considered without the voices of any one group drowning out those of another.

Face-to-face interviews were conducted.

Firstly, interviews with those who were directly involved in the Programme, farmers and programme staff. Their views are critically important to the Panel forming a complete picture of events, themes and issues.

Secondly, interviews with those affected by the Programme. The views of this group were considered important. The individual concerned, while an important stakeholder, may not have been the person directly involved in the Programme response (for example while their company was involved), a staff member or manager was the person dealing with Programme or response staff.

Finally, interviews with those who were involved in the Programme, but who may not have been the person directly engaged with (such as the chief executive or director of a company). Their views are important and needed to be heard.

The capacity of the Review Panel to receive information from these groups was constrained by time, so other reports that could contribute to the development of a complete picture were identified. A key input into the review was the report *Understanding farmers' stressors during their time in the* M. bovis *programme* conducted by Litmus Research by the Governance Group. Very early on in the review, the survey was identified as a key source of information. In addition to allowing the views of some 50 farmers to be incorporated into the review, the Farmer Experience Survey brought the attendant benefits that a large number of farmers would be spared the need to be interviewed by the Review Panel and the Panel could more efficiently focus on other areas.

Methods used to conduct face-to-face interviews

One key method of obtaining information was through face-to-face interviews. The following approach was taken to conduct this activity.

Selection of sample to interview

The Secretariat developed a list of key stakeholders to be interviewed based on experience working across the Programme. Those listed were organised by their respective roles and responsibilities, to ensure widespread knowledge and experience was captured in the face-to-face interviews. This list was distributed to the Review Panel and, where necessary, additional interviewees were added.

The Programme database randomly generated a list of affected farmers who had no ongoing welfare or legal matters, to ask if they would agree to be interviewed as part of the review. The details of those who agreed were subsequently passed onto the Review team to schedule an interview time. Other farmers contacted the Review team independently and requested to be interviewed.

Development of a consistent approach

- Two semi-structured interview guides were developed; one for staff working in the Programme or affiliate organisations and another for farmers. These guides ensured standard questions, ranging across a number of relevant focus areas, were put to each participant. This allowed the interviewee to delve into their particular response experience to draw out observations and lessons learned.
- The interview approach was reviewed and approved by the New Zealand Ethics Committee. The interviews included checking in with participants to make sure they were comfortable with the approach and how their information would be used to inform the Review and advising then that they could decline to answer any questions with no reasons given could end the interview at any time.

- The interviews were generally conducted by video call, with two members of the Review Panel leading the interview. Given resource and coordination constraints, interviews were also conducted by the Secretariat to maximise source input into development of the recommendations. The Secretariat took notes of key points of the interviews and recorded these interviews so a transcript could be provided.
- Following the interviews, either a summarised question and answer transcript or key bullet points were sent to the participant, who was offered an opportunity to review them and add further points if they wished.
- Key points were then drawn from the transcripts and collated under key headings to be used in the analysis phase.

Methods used in the conduct of surveys

The Review team designed and conducted two online surveys using Survey Monkey, one for staff involved in the Programme and another for affected farmers.

Principle of design

- The design of the surveys was conducted with the assistance of the Research and Evaluation Team in MPI, and the surveys were approved by the New Zealand Ethics Committee.
- The surveys included lines of enquiry based on the semi-structured interview guides, to ensure survey participants had a similar scope for input as participants involved in face-to-face interviews. The surveys included answering both questions on a Likert scale and open-ended questions with free text answers.

Selection of survey group

- The *bovis* Programme circulated the online farmer survey link via its weekly email newsletters to stakeholders. The email list includes many farmers who entered the programme after 2019.
- Beef + Lamb New Zealand, DairyNZ and Federated Farmers included the online survey link in weekly stakeholder update emails and followed up with reminders prior to the survey ending.
- Rural Support Trust and Rural Women NZ were also provided the online survey link with a request that they circulate it via their own networks and communication channels.

Methods used in meeting with farmer groups

Three focus groups were held with farmers in areas that had been most affected by *M. bovis* – in: Ashburton, Southland and Northland. These groups allowed the Review team to understand the individual and regional experiences of farmers first-hand. Federated Farmers issued the invitations, and numbers were purposefully capped to a focus group size, so all participants had an opportunity to tell their story.

The focus groups were attended by affected farmers, Federated Farmers' representatives, two Review Panel members and two Secretariat members. Following the meetings, summary notes were circulated to the focus group participants to allow an opportunity for review and to add anything that may have been missed. Key points were drawn from these notes to use in the analysis phase.

Processing the information

Analysis and theming

Interview notes, farmer focus group notes and survey data were examined and key points extracted. These were themed into focus areas with similar observations and experiences, enabling the Review team to look across information from all sources and make sense of it all.

Drafting the report

Once survey data and the results of interviews and face-to-face meetings were to hand, the Panel selected the thematic approach and commenced drafting its initial report based on this framework. Information gained was developed into themes, which are addressed within the body of this report. An overarching preparedness lens was chosen to be reflected through all report chapters to ensure observations and recommendations encompassed a forward-looking approach.

Each draft chapter was overseen by a Review Panel member, who acted as a chapter coach, providing regular feedback and guidance. Following the initial draft and approval from the chapter coach, each chapter was subsequently reviewed by a different Review Panel member who took on a chapter editor role, to provide further suggestion and guidance on the direction of the initial drafts.

Then the Review team held focused workshop sessions for each report chapter to further shape initial draft material. This ensured key reflections, developed through information analysis and theming, were accurately communicated in each chapter. In addition, it provided Review Panel members who were neither the chapter coach nor editor the opportunity to provide feedback and refine other chapters.

Thereafter, the Review Panel commissioned drafting of the recommendations. A focused workshop was held to integrate the views of Review Panel members in the development of the recommendations outlined in this report.

Considering and confirming reflections

The Review Panel regularly came together to discuss reflections and to direct lines of inquiry. Assumptions were tested to ensure that reflections were well supported by data and evidence. Because the Programme evolved, and because many of the events were painful for participants at the time, the Review Panel was careful to ensure its reflections:

- were fair and represented a wide perspective of the events of the response Programme
- reflected the stage of the Programme that was assessed.

The review process is illustrated in the accompanying diagram.

Developing a biosecurity preparedness reference point

The Review Panel developed a view of what preparedness should look like by referencingthe World Organisation for Animal Health (OIE), the

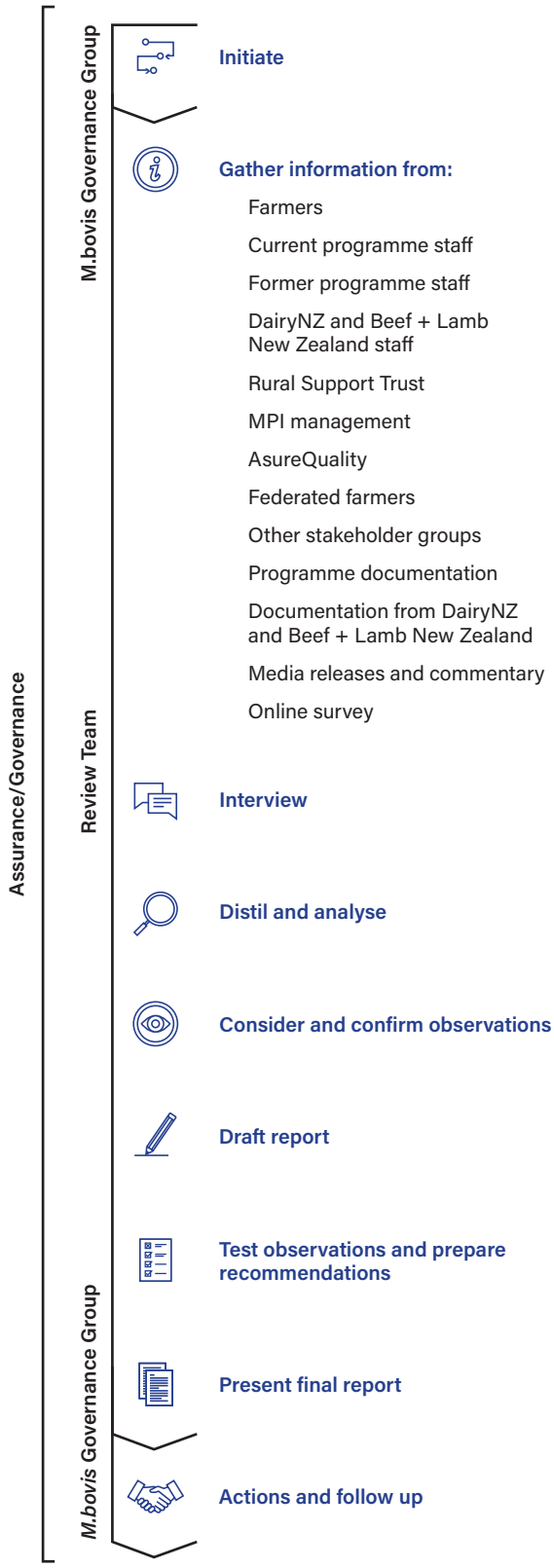


Figure 1. Independent Review methodolody.

intergovernmental organisation focused on improving animal health worldwide and to which New Zealand is a long-standing member. The OIE publishes standards for preparedness that are considered the minimum standards for good practice. A useful resource is the *Good Emergency Management Practice Guide*, developed by the Food and Agriculture Organization of the United Nations. Additionally, other areas of best practice have been considered in order to provide a useful reference point by which to compare the *M. bovis* experience and develop a view about preparedness.

Testing observations and preparing recommendations

The draft report was tested with key stakeholders including the Boards of DairyNZ and Beef + Lamb New Zealand and the MPI Senior Leadership Team. The report was briefed to the leadership teams of the *M. bovis* Eradication Programme and Biosecurity New Zealand. Where comments were received, these were considered and, where appropriate, included in the report. On completion, a briefing on the preliminary report was provided to the Minister of Biosecurity.

Presenting the final report

The Panel is confident that the review has been conducted in a transparent manner. The resulting report has been developed through a thorough process.

With the review activity complete and stakeholder comment on the preliminary report considered, the Independent Review report was finalised and presented to the Governance Group for its acceptance.

MorrisonLow

Assurance Report Commissioned by the Governance Group overseeing the Independent Review into the eradication of *Mycoplasma bovis*

July 2021

Document status

Ref	Approving Director	Date
259501	Dan Bonifant	28 July 2021

Contents

Our Brief

Morrison Low were commissioned to undertake a brief assurance review of the processes undertaken by the Review Panel, and to form an assessment of the quality of the process.

> *The Oversight Committee has determined that the process that the review has used to collect, distil and develop results and recommendations be put through an assurance process to test its analysis and processes against a best-practice framework. In this way, Governance will be assured that the information considered by the Review Team [Panel] maps against the review results and recommendations.*
> 'Governance Paper' Governance meeting June 2021

Our Methodology

We have reviewed the documentation collected by the Review Panel (the Panel), we have reviewed the records of interviews, and we have sampled information to test that the information presented in the draft preliminary report can be mapped back to data, evidence and testimony.

Our purpose was to provide an assessment of the extent to which Governance can have confidence in the integrity of review processes, and that observations and recommendations are grounded in evidence and testimony.

Our best practice framework is as follows, did the Panel:

- Set out its methodology and evidence standards clearly and transparently at the outset?
- Follow those processes?
- Seek a sufficiently broad range of views to ensure balanced assessment?
- Follow its own guidance for the handling of interviews and testimony?
- Seek appropriate expert advice, and did it follow an appropriate selection process?
- Actively address bias in its analysis and the formulation of conclusions and recommendations?
- Review its analysis and ensure that it was confident it had ensured that its conclusions, findings and recommendations were based in evidence and weighted fairly?
- Directly address the terms of reference for the review, and where it varied from the scope was this clearly identified?

Documents reviewed

We reviewed the following documents:

- Document, *Team Charter*, 4 February 2021.
- Document, *Some key review principles to guide our analytical processes*, 11 February 2021.
- Records of interviews conducted, and summary document of how key interview themes were processed for each review chapter.
- Survey data commissioned by the Panel.

- Advice from MPI legal and the NZ Ethics Committee regarding protocols and practice for the conducting of interviews and of survey questions.
- Appendix on Review Methodology in the *Draft Report of the Independent Review.*

We also reviewed advice commissioned from third parties. In particular, the two deep dive reports:

- Senate SHJ, *Mycoplasma bovis Communication Deep Dive Report*, 16 July 2021.
- Office of the Chief Data Steward, Stats NZ, *Recommendations for improving Mycoplasma bovis (M. bovis) eradication programme information exchange and data management systems*, June 2021.

Process testing

We reviewed data and documentation. We looked at a sample of interviews to check that interview protocols had been followed, that transcripts had been confirmed with interviewees, and that key themes from interviews had been documented and were used in the creation of analysis and ultimately report chapters.

We reviewed two report chapters to back-check that key findings or reflections were grounded in evidence.

We also looked at the recommendations from the two deep dive reports to see how these were reflected in the draft report.

Our Findings

Compliance assessment

Factor	Assessment
Did the Panel set out its methodology and its evidence standards clearly and transparently at the outset?	**Fully compliant.** The review prepared an ex-ante methodology to guide best practice in undertaking the review (attached). The review also prepared an appendix to the draft report setting out the methodology followed. Evidence standards were guided by the professional experience of Panel members, supported by expert advice from the NZ Ethics Committee and MPI evaluation staff.
Did the Panel follow those processes?	**Fully compliant.**
Did the Panel seek a sufficiently broad range of views to ensure balanced assessment?	**Fully compliant.** The review developed an extensive interview list, commissioned survey data, reviewed other survey information commissioned by the programme, and conducted two farmer workshops.

Factor	Assessment
	Farmer interviews were selected by a randomised process through M. bovis programme staff, farmer workshops were coordinated by Federated Farmers who invited participants. We were advised that the brief from the Panel was to ensure adequate coverage of views, and this was achieved to the Panel's satisfaction. 55 people were directly interviewed. Interviewees were chosen because of the roles and functions they had played during the course of the programme, or the roles they held in partner organisations, or contractors to the programme. The Panel also commissioned surveys of staff, contractors to the programme and affected farmers. These surveys were adequately publicised, and respondents self-selected to participate.
Where the Panel sought testimony or interviews, did it make clear how information would be managed?	**Fully Compliant.** Clear information protocols were established and shared in writing with interview subjects.
Did the Panel follow its own guidance for the handling of interviews and testimony?	**Mostly Compliant.** ***Interview process:*** **Fully Compliant**. Two Panel members interviewed each respondent in Tier 1 (38 interviews) and Secretariat members interviewed a further 17 respondents (testimony was recorded, transcripts were confirmed with interviewees, key issues were collated and attributed to stages of the programme). All chapters of the draft report have been informed by interview testimony. Interviewees were selected by role and function, with an emphasis on ensuring complete coverage. 12 further farmer interviews were selected by a randomised process and provided by the *M. bovis* Programme. There were three group meetings, held in Whangarei, Ashburton and Invercargill, attendees at those group meetings were selected by Federated Farmers, who facilitated the meetings. ***Processing interview transcripts:*** **Mostly compliant.** We were shown evidence that key issues from interviews were actively shared with chapter authors.

Factor	Assessment
	However, not all interview transcripts were put through secondary processing where key themes were summarised by chapter. We were advised that this was due to time pressure and will be finalised prior to the final report being completed.
Use of expert technical advice?	**Fully Compliant.** Two deep dive reports were commissioned into information management and sharing, and communications. Both were let within the delegation of the Director supporting the review. The information review was commissioned from the NZ Chief Data Steward at Stats NZ, and the communications review was commissioned from Senate SHJ, an experienced strategic communications consultancy. Both organisations have recognised competency in the area of investigation. The Panel also received expert advice from the Governance Group Secretariat on how governance processes evolved, and from the Strategic Science Advisory Programme on how science data was used to support decision making. Advice was also sought from the NZ Ethics Committee, and MPI evaluation staff on survey design, conduct and information handling procedures.
Did the Panel actively address bias in its analysis and the formulation of conclusions and recommendations?	**Fully Compliant**. We were advised that the Panel regularly reflected at Panel meetings on the importance of understanding bias and maintaining a balanced approach.
Did processes exist to enable the Panel to ensure that it was confident it had ensured that its conclusions, findings and recommendations were based in evidence and weighted fairly?	**Fully Compliant.** The Panel explicitly addressed independence and balance and evidence as part of its risk management framework. It reviewed its risk register at each meeting. Panellists allocated each other chapters to work on, with a colleague providing editorial support and quality assurance. This meant that every chapter was closely reviewed by Panel members, and the whole was reviewed regularly by the Panel together.

Conclusion

Our assurance process has explored the quality of data, the use of evidence, and the processes that the Panel adopted to discharge its Terms of Reference.

We recommend that the Governance Group Review Panel:

Note that the Independent Review into the *Mycoplasma bovis* eradication programme has **fully complied** with the methodology and processes it set itself in preparing its report.

Note that reflections and findings in the draft report, when sampled were able to be traced back to interview testimony, data or expert advice.

Dan Bonifant
Managing Director
Morrison Low

Appendix A: Independent Review approach to analysis

11 February 2021

Some key review principles to guide our analytical processes

Independence

The Review Report is an authoritative, fair and dispassionate assessment of the Programme.

The Review Team can state with confidence that the Review task was undertaken and completed independently of, and at arm's length from, the interests of Governance partners to the M.bovis response, or of other stakeholders.

Professional services (e.g., specialist "deep dives", legal and Communications) for the Review were commissioned and managed independently of governance partner organisations. Where services were sought or provided directly by governance partner organisations, they were provided through a relationship where accountability to, and the independence of, the Review Team was actively preserved.

Right focus

The scope of the report is appropriate and addresses the ToR.

The approach taken was sensible and effective.

The review identified the most significant issues early and in sufficient time to focus its thinking and analysis.

The Review Team is confident that all significant issues have been surfaced and addressed.

Assessments, findings and recommendations address significant themes and issues directly.

Prioritisation decisions are clearly documented.

The Review Team is confident that recommendations reflect the importance of issues and provide a sensible basis to confirm where things went well, and to recommend improvements.

The Review Team confirms that it stayed within scope and the report meets the objectives sought for the review.

Good process management

When we refined the analysis down to the critical aspects we wished to prioritise, the judgement process followed are documented, criteria and principles used are clear.

Where critical decisions around priorities or the weight to attach to information were made, they were made transparently either directly by, or confirmed by, the Review Team.

Documentation is robust, and we have created an audit trail that can be easily followed.

We created a set of interview protocols and followed them.

We developed a comprehensive stakeholder process and talked widely and appropriately with stakeholders.

A wide range of evidence and information is analysed and interpreted in a balanced and credible way.

Our processes demonstrate that we ensured our thinking was both tested and well informed.

Our process was transparent, we delivered on our commitments, and we have recorded how we reached indicative findings.

Where outside work is commissioned, good procurement processes were followed.

High quality work

Evidence and information was assessed in balanced and considered ways with conclusions and recommendations flowing logically from the analysis.

Data and information is presented clearly and with attribution

Ideas and key messages are presented in plain and clear language, there is good use of tables, charts and graphics to communicate facts and ideas.

Where conclusions are reached, the basis for the conclusion is made clear.

Analysis and findings are evidence-based, credible, robust and persuasive.

The methodology followed is clearly articulated, and followed

Conclusions, recommendations and suggestions for system improvement are practical and workable

Effective engagement

We demonstrated that we engaged with interested parties and stakeholders.

We are confident that we have reflected the information received through engagement and that our conclusions, findings, observations and recommendations are balanced in terms of the judgements made and the breadth of views.

We are confident that our analysis was not unduly swayed by the interests or concerns of individuals or affected parties but represents and balanced and fair assessment of the facts and evidence.

Clear delivery of message

The report is well written and accessible to a wide range of readers.

We have used tables, charts and graphics appropriately to guide understanding and to present information in a compelling manner

The report structure is sensible, and well organised, chapters and sub-headings lead the reader through the analysis and advice

Pull quotes to illustrate points made by stakeholders are used appropriately.

The recommendations are clearly practical and forward looking, as requested in the Terms of Reference.

Overall performance

We expect that the full report will be recognised as a credible assessment of the M. bovis programme.

Our recommendations will clearly flow from the evidence and analysis, and they will set out practical findings, reveal issues and lessons learned, and will suggest ways in which New Zealand's pest and disease response systems can be strengthened and maintained.

Our report must be able to stand alone as a useful reference for M.bovis partners, and the leaders of future development of disease and pest response programmes in New Zealand in our trading partners.

Our Review Team will regard this as an exercise that they have been proud to be part of.

Report of the Independent Review into the *Mycoplamsa bovis* Programme