Bovine Tb Strategy

Review of Costs

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Glossary

AHB	Animal Health Board
Anergic	Animals which have Tb and may be infectious to other animals, but do not form antibodies, and hence do not test +ve for the disease using conventional tests.
Breakdown	Tb detected in a farmed herd.
bTb	Bovine Tuberculosis (see Tb)
Chew Track Cards:	Card with a lure (peanut butter) that records animal bites and can be used to detect possums and other pests at low densities (RTC < 2%).
CRA	Community Relations Advisor.
DDCM	District Disease Control Manager
FarmsOnLine	Record of bio-security data related to a property
Ha	Hectare, where one hectare = 10,000 m2
MCA	Movement Control Area which is usually set in response to the high risk of Tb, usually from wildlife
NAIT	National Animal Identification and Tracing. See www.nait.org.nz
NPMS	National Pest Management Strategy which defines the rules and objectives for AHB's Tb control activities.
OIE	World Organisation for Animal Health.
Reactor	Animal which reacts to Tb antigen either via an injection or via a blood test. In New Zealand a Reactor confirmed via blood test is usually slaughtered.
Recrudescence	A resurgence of Tb related to anergic animals.
RTC or RTCI:	Residual Trap Catch Index: protocol typically used to measure the density of possums using leg-hold traps (approximately 100 traps monitored for three nights for every 500 ha). It is suitable for densities above 2% RTC. 1 possum per ha is nominally equivalent to 5%-10% RTC (Morgan et al 2006).
STA	Special Test Area
Tb	Tuberculosis which is a wasting disease in humans. It is loosely used to refer to Bovine Tuberculosis which is a similar wasting disease in cattle and deer.
Vector	Animal that carries disease, most commonly the possum.
VFA	Vector Free Area which designates a region free of Tb in wildlife
VRA	Vector Risk Area which designates a region where wildlife carry Bovine Tb

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Executive summary

Background

The Animal Health Board (AHB) spends $80m per annum controlling Bovine Tb by operating 'test and slaughter' and movement control programmes in farmed cattle and deer, and a vector control programme to control Tb in wildlife, mainly possums. The approach is delivering ahead of expectations, and the AHB has proposed a 'proof of concept' strategy to eradicate Tb from wildlife from selected areas in addition to the current control programme.

Cabinet has requested MAF Biosecurity New Zealand to assess whether the proposed wildlife eradication strategy can be carried out for a lower cost and has requested a review of AHB's 'efficiency and effectiveness', to address the following issues:

- *the cost effectiveness of delivery,*
- *appropriateness of the business model,*
- *any significant opportunities to drive efficiency and effectiveness within the programme and*
- *the extent to which management systems can provide confidence that the activities of the AHB will continue to be delivered in a cost effective way.*

In addition we considered concerns expressed by the Tb community at the growth of the AHB, and possible implications for efficiency and stakeholder relationships.

Why?

Bovine Tb is an ancient disease that used to be endemic in cattle and dairy herds. It causes a wasting condition which results in a 5% production loss and it is infectious, with approximately one affected animal infecting five others over a year, in a typical dairy herd. The disease is controlled by slaughtering suspect animals and quarantining the herd, and can be devastating for an individual farmer, especially if a herd is used for breeding.

Pasteurisation and meat inspection results in minimal risk to consumers from Bovine Tb, but the growing concern with food safety introduces risks of consumer boycott and non-tariff barriers to trade, if Tb is not controlled.

Control

Most developed countries have operated 'test and slaughter' programmes since the 1930s which has virtually eradicated the disease in most jurisdictions. However in NZ, UK and Ireland, wildlife acts as a reservoir of Tb, and the failure to control Tb in the possum in New Zealand and the badger in the UK, has led to resurgence. As a result, Tb is almost at epidemic levels in parts of UK and Ireland, with 50,000+ suspect animals slaughtered per annum, and little expectation of an improvement. By comparison Tb is under control in New Zealand.

Findings

The current Tb strategy has delivered beyond what many observers thought possible, especially compared with the Tb situation in the UK and Ireland. To achieve this the

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AHB has developed a professional and output focused organisation, and efficient contracting relationships with a range of highly skilled contractors.

In the years since its formal inception in 1998 the AHB has grown from small beginnings where most work was contracted out, to become a organisation of 90+ people split between Wellington and regional offices, where the vector control and disease testing services are contracted out, but most other services are provided in-house. In our opinion this growth in staff numbers reflects a culture of efficiency and a desire to deliver services at the least cost, in a sustainable manner. It also reflects the changing times where public risks must be managed more intensely, and information systems are needed to achieve operational and investment efficiency.

In our opinion, the AHB operates in an efficient and effective manner, with a mix of internal and external services appropriate to the AHB's objectives, and it has a sound process to review and adjust those settings. The board and management team are in touch with what is happening, are focused on achieving results, and have good processes for hearing dissenting voices. The results of the Tbfree programme speak for themselves. Over the years the organisation has responded to significant technical, contractual and funding challenges, and there is a strong expectation that it has the governance and management expertise to respond to future challenges, and deliver a sustainable programme.

AHB contracts for approximately $60m of services compared with $20m of internal spend, and we observe that any inefficiency in the management of the contracted spend has the potential for a multiplicative effect if managers are not focused on an efficient outcome. Hence the AHB has adopted a very professional and in some areas a sophisticated approach to managing its business, and the management structure and cost elements reflect that, including ongoing consideration of methods of operation and efficiency of expenditure. We have considered whether the degree of sophistication used is warranted and whether some cost elements can be reduced, but we note:

- a comment from one stakeholder; *you can never be too good*,
- that the cost elements that might be reduced are relatively minor and
- that any dent in the overall culture of professionalism can have a multiplicative effect on outcomes when the ratio of internal to contracted costs (1:3) is considered.

We summarise below areas where we believe there are opportunities for AHB to improve operational performance:

1. Funding instability
   Funding instability is the greatest challenge to the efficiency of AHB operations, due to its impact on contractor work flow. The AHB uses a range of levying agencies to collect funding for vector control, including external industry sector organisations and Regional Councils, who often choose to assert governance control on these funds. Many argue that this is not efficient and may not reflect farmer views on the Tb programme. For instance the AHB has to continually negotiate with most of the Regional Councils for regional funding, based on their annual budgeting and three yearly planning and elective cycles, which are subject to the multitude of regional issues that get raised in this process. More

importantly, the funding arrangement with Central Government and the farming sectors requires their funding to be supported by Regional Council contributions. As a result, although regional funding decisions nominally represent only 10% of total vector control funding, they can have large consequences, and have resulted in vector control contracts being terminated when regional funding is not secured.

The volatility introduced by levying organisations conducting separate reviews of the Tb strategy is inefficient. It costs time for management and governance, which is arguably better spent on operational issues, and the volatility of operational activity is potentially inflationary and ineffective at eradicating Tb in wildlife. It has been suggested that a more efficient approach for the AHB to raise regional finding is to levy land occupiers directly as is currently the case for raising the Otago regional funding share, and a similar argument applies to sector funding. This will incur additional cost for consultation and collection. Based on local body experience the collection of the levy could add cost of 2% - 4% of the income collected, as opposed to the 10% the AHB estimates it costs to negotiate Regional Council funding, and the 15% required to collect the Otago regional funding share.

2. On farm Testing
   We observe that on farm livestock Tb testing may not be aligned to Tb risk as well as it could be, and suggest the AHB should review the disease surveillance and control rules in the light of the changing epidemiology and the economics of disease control. We acknowledge that testing appears to be a well accepted practice by farmers and that any change requires careful consideration and communication.

Other issues

Stakeholders have requested that we comment on the following issues that impact scheme efficiency.

1. Stakeholder management
   Some stakeholders have commented that the AHB's focus on output and efficiency has come at the expense of the soft skills needed to bring stakeholders onboard with the inevitable changes affecting the sector. As a result, in some regions there is less commitment to the cause than could have been, and this is likely to be a more important issue as farmer apathy grows with the decline of Tb but the need for funding continues. The AHB is both aware of this issue and in the process of restructuring responsibilities to address it.

2. Capacity management
   AHB needs a skilled, efficient and sustainable contractor base to deliver the wildlife Tb eradication strategy, and has a capacity management plan in place to provide continuity of work where possible and encourage good people to enter the industry. Consultation with contractors indicates a desire by senior contractors to participate more in this process, and we have noted some minor issues that could be improved.

Conclusion

In conclusion it is our opinion that the AHB's governance and management focus is well placed to deliver the wildlife Tb eradication strategy in a cost effective way.

However current funding arrangements are not efficient, nor is the AHB well structured to manage the negotiations and stakeholder relationships required by those arrangements. Hence, it would be more efficient for the AHB's funding arrangements to match the 5 yearly cycle used to review the Tb strategy, and it may be most appropriate for the AHB to have a direct levy collecting relationship with its farmer stakeholders, rather than to use third party levying agencies who introduce another governance layer into the arrangement. The objective should be to promote funding arrangements that match the term of the strategy, so that Tb control operations proceed in a planned and optimal fashion, which minimises cost over the lifetime of the strategy.

1 Introduction

1.1 Purpose of the report

The Animal Health Board is responsible for delivering the strategy to achieve Tb Free status for New Zealand by 2013. That strategy is currently under review as required by the Biosecurity Act 1993. AHB have submitted an amended strategy following consultation with stakeholders to extend the current strategy to 2025 to enable the concept of eradication of TB from wildlife to be fully tested.

In August 2009 Cabinet agreed in principle to maintain Crown funding for the strategy at the current level. It was also agreed that this will be contingent on demonstrating that the spending of the funds is cost effective and that measures are in place to ensure Ministers have confidence of ongoing cost-effectiveness and value for money.

As such, Cabinet has directed MAF Biosecurity New Zealand to carry out a further assessment of whether the proposed strategy can be carried out for a lower cost in accordance with terms of reference approved by the Minister of Finance and Minister of Agriculture.

1.2 Terms of reference

MAF Biosecurity has contracted Outcome Management Services[1] to evaluate the costs of delivering the current Tb control strategy with the following terms of reference:

Issues Referred to the Reviewer

1. *The task for the reviewer is to assess and provide recommendations and assurances with respect to;*
   - *the cost effectiveness of delivery,*
   - *appropriateness of the business model,*
   - *any significant opportunities to drive efficiency and effectiveness within the programme and*
   - *the extent to which management systems can provide confidence that the activities of the AHB will continue to be delivered in a cost effective way.*
2. *For the purposes of this review, cost-effectiveness is defined as "the relationship between the levels of resources used (costs) and progress towards the strategy outcome (effectiveness)".*
3. *The review will examine costs and processes for vector control operations, disease control operations, governance, administration and management of the strategy. Issues to be investigated as part of the assessment include;*

Are the preferred option costs appropriate*?*

a. *Are governance, administration and management costs appropriate given the purpose of the organisation and the scope and size of its operations?*
b. *Do the vector control and disease control programmes demonstrate consistent costs nationally or are there major unexplained variances across regions?*
c. *Is the AHB taking reasonable steps to promote contestability within the market for provision of vector control and disease management services?*
d. *Has the AHB derived the expected outcomes from bringing the vector operations management in-house?*
e. *Are there in-house operations that should be outsourced or any currently outsourced operations that should be brought in-house?*

Is the strategy delivering a quality programme?

[1] Outcome Management Services provide cost/benefit and public policy analysis.

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f. *Are the vector control and disease control programmes clearly specified, applied consistently, with optimum efficiency and effectiveness, and demonstrating cost reductions over time.*
g. *Is the AHB tender process applied consistently and robustly?*
h. *Is there anything in the funding mechanisms and processes that is adding costs or causing difficulties?*
i. *Is the AHB utilising research to derive value and business improvements so as to increase the efficiency and effectiveness of strategy implementation?*

Does the AHB maintain, and deliver to, established standards?

j. *Is bench marking applied to help determine the reasonableness of costs across regions and between suppliers?*
k. *Are the AHB's communications and engagement processes sufficient to give assurance to stakeholders and funding partner that funds are being spent appropriately?*
l. *Are there systems for controlling costs and reviewing expenditure and are these effective?*

Out of Scope

m. *Whether the preferred option is the optimum strategy; this has been assessed through the strategy review process.*
n. *High level technical design (e.g. specifications for the buffer zone or how to establish proof of eradication). This is being addressed through a governance review and through the performance measurement process.*
o. *Distribution of costs between parties to the strategy, as this is addressed through AHB engagement with funding parties.*

1.3 Scope of work

The evaluation considered the following:

1. Policy papers
   Policy papers submitted to the board and stakeholders were used to evaluate AHB's decision making around investment options and issues management.

2. Financials
   Costs for the last 11 years were evaluated at individual account level, including allocation models used to allocate cost across services.

3. Stakeholder consultation
   Stakeholders within and outside the AHB were interviewed to gain a balanced perspective on issues impacting efficiency and unit cost. This included members of the senior management team, members of the Board, selected chairs of the regional Tbfree committees, selected contractors and the Representatives Committee which represents the owners of the AHB.

4. Contentious issues
   A range of contentious issues were raised with the Chief Executive, the Representatives Committee and the Board Audit Committee, as part of the report development process. This included concerns expressed to us from the Tb community at the growth of the AHB, and possible implications for efficiency and stakeholder relationships.

1.4 Overview of the report

Topics covered by the chapters in this report are:

1. Background to Bovine Tb

Outlines the epidemiology of the disease and the reasons why the Tb strategy is in place.

2. Vector control
   Reports the efficiency of the contracting methods used by the vector control programme to control vectors at low density so that Tb dies out.

3. Disease control
   Reports the efficiency of the contracting methods used to fund the Tb surveillance and quarantine programmes, and also comments on the management of Tb risk.

4. Governance and administration
   Reports on the efficiency of governance and administration and selected internal functions used to support AHB operations such as IT.

5. Research
   Reports on the efficiency of the process for using research to improve the efficiency and effectiveness of operational activity.

6. Governance and administration
   Reports on processes and costs of governance, management and administration.

7. Other issues
   Reports on issues that are not directly specified in the terms of reference but nevertheless have a significant impact on the efficiency of the Tb strategy.

8. Findings
   This section lists the questions in the terms of reference and provides a brief answer to each one.

1.5 Limitations

The evaluation was targeted at issues of cost efficiency and involved interviews with stakeholders such as the management team and chairs of Tb free committees. It includes an analysis of standard operating procedures, and an analysis of financial information provided by the AHB. No attempt was made to audit the data or to sample contracts to verify precise levels of compliance with operating procedures. Findings have been reviewed with the affected parties.

This report does not consider the economic basis underpinning the current or proposed Tb strategy, nor the rules around Tb testing of livestock.

2 Background to Bovine Tb

2.1 Introduction

This chapter briefly outlines what Bovine Tb means to farmers in New Zealand and the logistics around its control. Detailed information can be found in Attachment Four.

2.2 Threat from disease

Bovine Tb is a wasting disease that causes loss of production with local experience suggesting an average 5% loss of production[2]. In addition, Bovine Tb is highly infectious, and an infectious animal is likely to infect 5 others per annum in an average sized New Zealand dairy herd[2]. Increasing consumer concern with food safety introduces the risk of consumer boycott which provides an additional reason to eradicate the disease. The inability to effectively treat animals, the infectious nature of the disease and associated livestock production losses mean that the control action of choice is to slaughter infected animals.

In the early 1900s Bovine Tb was endemic in herds in Europe and the US. Policy makers were concerned for the economics of farming and for the impact on human health, and adopted 'test and slaughter' policies in the US in the 1930s, which Europe followed up with in the 1950s. Surveillance and quarantine were used to control herd breakdowns and manage the infectious risk within herds. This involved a programme of 'test and slaughter' to identify and slaughter Reactor animals and then control movements of the herd to reduce subsequent risk. By the 1980s most of the developed world had been declared Tb Free.

However while the disease has been largely cleared from farmed animals, in recent times some jurisdictions have seen a resurgence of the disease as Tb has spread through wildlife, which has brought the disease back into farmed animals.

2.3 Tb in New Zealand

In New Zealand possums are the main wildlife 'vector' or carrier due to their propensity for 'high density' living and inherent biological susceptibility to the disease. Control operations are targeted at reducing possum densities down to levels which cause the disease to die out of the possum population, and prevents transmission of disease back to livestock.

Figure 2.1 illustrates how the relaxation of control operations during the 1980s led to resurgence in the disease which started to abate when controls were reinstated over the 1990s. The target of Tb Free status by 2013 appears to be well within grasp and the AHB is now looking to eradicate Tb from wildlife. 'Tb Free' is an internationally defined status whereby the incidence of breakdowns among herds is below 0.2% – it does not reflect complete eradication of the disease from either animals or wildlife.

[2] AHB pers. comm.

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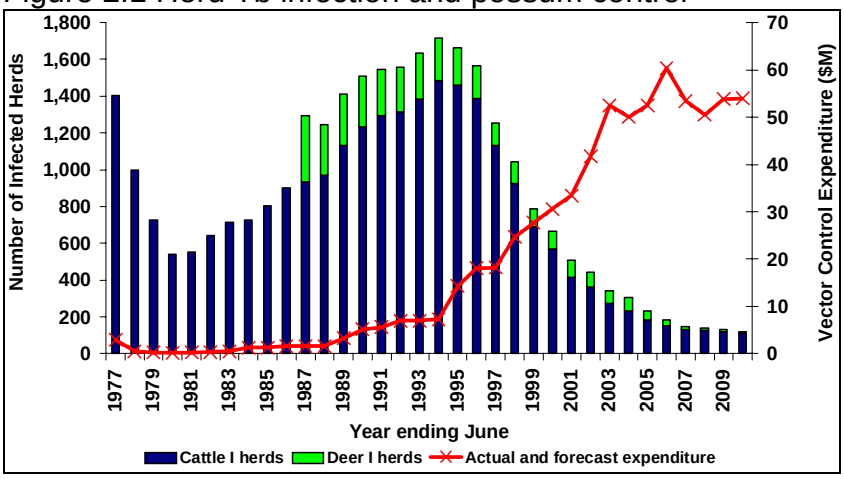
Figure 2.1 Herd Tb infection and possum control

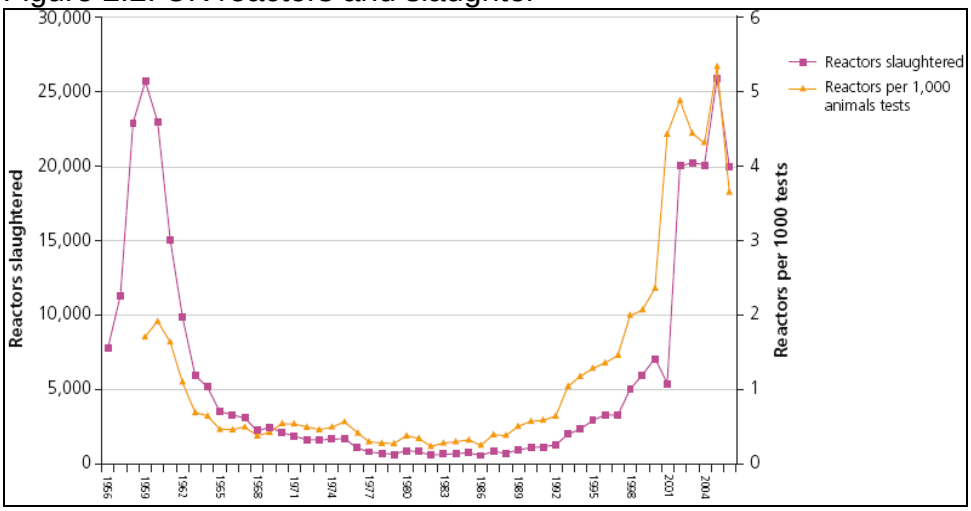


Source: AHB

2.4 Tb in the UK

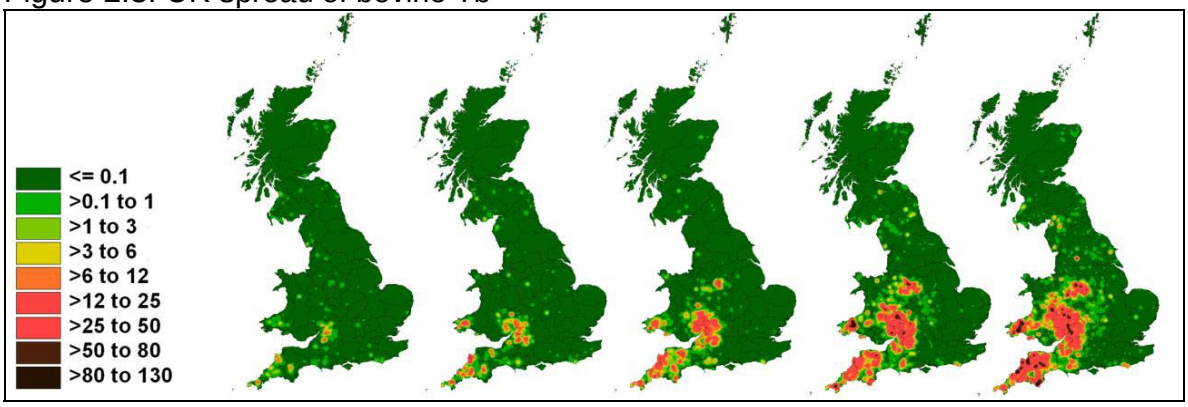
Figure 2.2 reports the incidence of Bovine Tb in the UK, which was under control by the 1980s. However the disease spread to badgers, and by 2005 Bovine Tb in cattle has almost reached epidemic proportions, due to the growth in the badger population, made worse by diversion of resources to management of BSE and foot and mouth outbreaks in 2001. Figure 2.3 maps the progress of Bovine Tb from the South and South-West into wider parts of England and Wales, as wildlife vectors have spread augmented by cattle movements. Unfortunately the badger is a protected and much loved animal in the UK, and an outright culling policy is not considered feasible. Hence the likelihood of the problem persisting.

Figure 2.2: UK reactors and slaughter



Source: ISG 2007

Figure 2.3: UK spread of bovine Tb



Source: DEFRA 2009

Both the UK and Ireland have similar problems with badgers and as a result approximately 50,000+ cattle per annum are being slaughtered in the UK and Ireland to control Bovine Tb.

2.5 Controlling wildlife vectors in New Zealand

Bovine Tb has been observed to spread by 3km/annum through uncontrolled possum populations in deep bush, across mountains and over significant watersheds (pers. comm. AHB). Hence operations need to plan for the control of vectors and associated predators/scavengers, so that this potential for disease to spread into new habitats and into farmed animals is controlled.

2.6 Summary

Bovine Tb is a highly infectious disease which causes a wasting condition mainly caused by contact between cattle, deer and possums (known as Tb vectors). In addition to the loss of production, high levels of disease could present a risk to trade in meat and dairy products, especially into high value overseas markets where consumers increasingly demand high standards of food safety.

Local and international experience suggests that any relaxation of eradication controls can have serious downstream implications, especially if wildlife vectors are not controlled.

In 1998 the Animal Health Board (AHB) was appointed under the National Pest Management Strategy to achieve the international standard for Tb freedom, nominally to reduce herd incidence beneath 0.2%. The AHB has recently proposed new Tb strategy objectives which are aimed towards eradicating Bovine Tb in wildlife, so that the threat to farmed animals is completely removed.

3 Vector control

3.1 Introduction

Vector control is arguably AHB's most significant activity consuming approximately 65% of total AHB resources to control Tb in wildlife vectors.

This chapter reviews the efficiency of AHB's vector control work. It overviews the mix of work performed, how it is organised and delivered, and compares cost structures to other contracting industries and jurisdictions.

3.2 Background

3.2.1 Institutional arrangements

The following chronology indicates major milestones in the institutional arrangements to control Tb vectors in New Zealand:

1. Regional Councils
   From 1989 the responsibilities of the old Pest Destruction Boards were largely assumed by Regional Councils. Many of them established operational units to control rabbits and possums among other pests.

2. Animal Health Board (AHB)
   In 1992 the AHB was established to provide a national structure to Tb surveillance and co-ordinate vector control activity among the 13 Regional Councils. In 1998 the AHB (Inc) was made formally responsible for the National Pest Management Strategy for Bovine Tuberculosis via an Order-in Council under the Biosecurity Act 1993, with funding from farmers, Regional Councils and the Government. In 2001 AHB was tasked with achieving Tb Free status for New Zealand by 2013 which requires herd incidence to stay beneath 0.2% for a minimum of three years.

3. Managing the market
   In the early 2000s the AHB moved to initiate a contestable market for vector control services to improve efficiency. This change was partly prompted by a Cabinet condition for future Crown funding which reflected public sector thinking at the time, where Regional Councils were required to separate out their contracting divisions so that they would compete on a level playing field.

   One example was Target Pest, set up by Canterbury Regional Council. Around 2003 Target Pest starting competing aggressively for work throughout New Zealand using predatory pricing and in some cases, unskilled labour to win work. However Target Pest grew too large too quickly and poor performance led to its failure, but not before it significantly de-stabilised the market for both contractors and the AHB. That experience continues to over-hang how the AHB manages the markets it works in.

4. Re-regulation of 1080
   1080 is a broad spectrum poison which is considered to be critical to pursuing an eradication strategy in an economic manner, but also controversial due to its

toxicity on dogs and deer, among other issues. In 2007 the Environmental Risk Management Authority approved 1080's ongoing use subject to additional controls as appropriate to the aerial release of a toxic pharmaceutical.

5. Regional vector management
   The AHB inherited an arrangement where it funded the Regional Councils to manage vector control operations on its behalf. However this arrangement was complicated by 'private' arrangements that Regional Councils had with related party contracting units and conflicting vector control priorities. These conflicts together with the difficulty of co-ordinating 11 different methods of operation resulted in the AHB deciding in 2007 to initiate a transition to bring vector management services in-house. In 2010 most regional vector management is provided by AHB employed staff, together with some seconded regional staff, and one contract with a Regional Council (Hawkes Bay). As a result approximately 24 additional people moved into the AHB by 2010, or 25% of headcount.

3.2.2 Cost structure

Table 3.1 reports the cost components used for vector control.

Table 3.1: Vector control activity

Activity	Cost ($m) 2010 forecast
Vector control contracting	$46.0
Regional management	$4.6
VectorNet system	$1.9
National office support for vector control	$0.8
TOTAL	$53.3

The efficiency of the individual components are considered below.

3.3 Vector control contracting

3.3.1 Mix of control activity

Table 3.2 reports the mix of vector control work performed in 09/10 up to June 2010.

Table 3.2: vector control contracted work

Activity	Percentage of Control Cost	Cost	Habitat ha	Cost per ha	Projects	Avg project cost
Ground output	46%	$19,012,834	777,191	$24.5	434	$43,808
Aerial	15%	$6,093,610	351,267	NA[3]	43	$141,712
Ground input	14%	$5,897,519	227,192	$26.0	140	$42,125
Survey	13%	$5,481,860	345,465	$15.9	727	$7,540
Monitor	12%	$4,755,603	1,222,240	$3.9	618	$7,695

We note the following:

[3] Aerial control often spans years and hence cost does not necessarily relate to the area under control

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1. Ground control
   Ground control is the dominant activity with 60% of control cost directed at ground crews laying traps and toxins such as encapsulated cyanide, 1080 etc. The contracts use mainly 'output' based performance measures, where the control operation is followed by a monitoring programme to verify contracted vector densities have been achieved. However in approximately 23% of ground control activity, the additional cost of monitoring (approximately 16% of the control cost) is dispensed with and 'input' contracting is used, where the contractor is paid when specified activities have been performed, rather than on achieving post-control vector density.

2. Survey
   Wildlife Tb survey is an additional ground control activity where 13% of control cost is directed at gathering information on where Tb and the vectors are. This is becoming a more important part of the strategy as vector densities have been driven down and effort needs to be targeted at residual wildlife Tb. Surveys mostly target ferrets and feral pigs since they are likely to contract Tb from possum carcases. In other areas the survey work must target possums directly or other animals.

3. Aerial control
   Aerial application of 1080 bait was more commonly used but increasing compliance costs and public concern are impacting on the extent of its use in some areas. 15% of total control cost is directed at aerial control activity where virtually all work is contracted on an 'input' basis where a post-operational monitor of possum density is not usually performed (because experience indicates the reliability of results). Aerial control is a small but critical component of the control strategy and is used where ground control is impractical or very costly, such as in steep and dense forest. However it is controversial and consumes resource for stakeholder consultation, regulatory requirements and research into alternatives.

3.3.2 Contracting methods

The AHB has a long and extensive history of negotiating an efficient basis for contracting, in a market subject to significant constraints such as:

1. Market dominance
   In-house or related contractor arrangements were a feature of some past arrangements with Regional Councils who acted as vector control managers. As a result monopolies were created which did not always serve AHB's interest well.

2. Market failure
   An example of a contractor that grew too big, too quickly, is to be found in Target Pest. They were an organisation who were owned by a Regional Council that went into bankruptcy, but not before creating significant distortions to price and capacity and destabilising the market due to their predatory pricing, and subsequent poor performance.

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3. Capacity
   The AHB dominates the vector control market, there are barriers to entry and capacity needs continually shift as priorities changes. Hence the AHB needs to manage this market to ensure there is sufficient capacity relative to demand, and the providers have confidence the market is 'fair', so they actively compete for work. This requires market management as well as operating a procurement process that gives confidence of a fair outcome.

   The lack of a pool of personnel who can respond to need is a constraint on AHB operations whenever there are large changes in workload such as on the West Coast around 2006 when funding was shifted from the North to South Island. As a result the need to both operate a contestable market and to manage contractor capacity has been a frequent theme in management process and audit reports.

a. Barriers to entry
   Few contractors enter this market despite efforts to encourage entry, and hence AHB must develop the contractors it has, if it is to maintain a competitive market.

b. Regional supply/demand miss-matches
   Most contractors prefer to stay within their home patch (especially ground control operators) due to the cost and problems with staff if they are away from home for any length of time. As a result the number of contractors competing for a specific block of land can be eroded by local supply/demand issues.

In response the AHB responded with a range of contract and market arrangements to achieve an efficient outcome. Some of these are discussed following:

1. Contestable contracting
2. Managing contractor capacity

3.3.2.1 Contestable contracting

Pre 2000 the Pest Destruction Boards and later Regional Councils largely used 'input' based contracting system by directly employing staff to conduct pest control activity. In the early 2000s in an effort to improve performance the AHB introduced an 'output' based contracting system within a contestable contracting process. The impact on sector performance as noted by one observer was:

> *Over the last 5-10 years a 'watershed' has occurred in the trade used to control possums. The industry has moved from an 'input' driven approach heavily influenced by 'folk-lore' to one which is driven by objective results tied directly to reducing possum densities, and the associated benefits to Tb eradication. As a result a $1 spent on possum control in 1990 is almost worth $2 now in terms of the work it achieves.*
> *Source: Rosevear 2003*

Today the 'output' contracting arrangements have produced an outcome focused sector which reliably control pests at low unit costs. However 'output' based contracting incurs an additional 15% monitoring cost which can be avoided if the 'recipe' for success can be specified and compliance easily measured. Hence 'input' based contracting is now being used in 99% of aerial and 25% of ground work, where

it is possible to explicitly define activity, and the link between activity and outcomes is well known and can be readily audited.

Over time, market distortions from monopoly arrangements have been removed. However providers have also exited the market, and there is now insufficient capacity in some regions which is causing rising prices and dominant behaviour.

Contractors tend to stick to their patch and are reluctant to travel far from home base due to difficulties with employees when away from home for long periods. In addition home patch advantage gives the local provider an advantage with issues such as weather uncertainty and landholder liaison, which can make working on someone else's patch uneconomic. Hence this can lead to lack of competition in some regions and the risk of dominant behaviour which needs to be managed.

3.3.2.2 Managing contractor capacity

The AHB is managing a market which is not quite mature and is still influenced by the deregulation of the contracting arms of the regional councils. These entities provide scale and management expertise in a market which may otherwise be largely fragmented.

To achieve sustainability and efficiency, this market is managed by discouraging both predatory pricing and provider dominance, and capacity shifts between contractors are managed so that no one contractor grows too fast. However there are examples where these actions have not been successful, especially in the aerial market where there are barriers to entry due to the skill required, the fiscal risks and compliance requirements. As a result in some regions prices are thought to be too high, by approximately 20%.

In response AHB is working on:

1. Mentoring
   Small operators who have proven themselves on easy blocks are encouraged to grow and tackle more difficult projects. However this takes time, given the fiscal risk for the operator and a public relations risk for the AHB.

2. Training
   Qualifications have been introduced to train contractor staff in basic pest control requirements, and training for more experienced workers who have the capability to be leaders in the industry is being considered.

3. Better specifications
   AHB now seeks to understand cost drivers with a view to finding more efficient methods of delivering services such as consenting, rather than making this a contractor's responsibility. Better ways of better managing risk (such as the weather) are being considered, and a common public liability insurance scheme has recently been launched so that the AHB and its contractors can be insured under the same arrangement.

4. Alternative arrangements
   If a contestable market is not achievable, delivering a service using in-house resource may be an option. For instance DoC maintains their own ground crews to support aerial operations.

5. New entrants
   AHB routinely seeks new entrants although this is hampered by the generally low numbers and in many cases the failure of aspiring contractors to provide adequate assurances of their ability to operate safely and effectively.

3.3.3 Managing cost drivers

Understanding the drivers of cost is necessary to for efficient delivery by managing clarity of specification and splitting the work appropriately between contractors. We present an analysis of how these issues are managed under the following headings:

1. Specification
2. Consultation
3. Risk

Details are presented below.

3.3.3.1 Specification

Contract specification drives cost and examples are presented below of the issues which generally impact a contractor's cost.

1. Ground control
   Ground operation costs are driven by the ease of access to set traps and bait stations, and table 3.3 defines the type of habitat which typically drives cost.

   Table 3.3: Ground Control Costs

Habitat	Cost
Open grass/tussock land	$4/ha
Mixed farm/bush	$13/ha
Bush pasture margin	$40/ha
Deep forest	$80/ha+

   We note that recent experience at Kumara in the West Coast indicates that ground operations in deep forest cost approximately 3.5 times more than aerial, assuming the block is accessible via ground, (see Attachment Three). This typically requires the building of infrastructure such as tracks and bridges to crisscross the block to ensure the traps and toxins mimic the pest control that an aerial operation would provide. This facilitates the subsequent annual maintenance controls to ensure densities are controlled at the target level. In blocks where access is difficult or dangerous, aerial control is the only option.

   To reduce ground control costs the AHB is developing the Chew Track Card system, (see Attachment Three), to achieve efficient control at low densities in blocks accessible by foot, by targeting effort to where the possums are living. The system is under trial in the Hawkes Bay and expected to reduce ground control costs by 30%, from an average of $15/ha, to $8/ha - $12/ha.

Ground control work used to be mostly performed using output based contracts where payment was conditional on reducing possum density beneath a pre-defined target (typically 1% - 3% RTC). This developed a contestable market in ground control operations, created some risk for the contractor and guaranteed an outcome based performance for the AHB, albeit at the additional cost of monitoring post-operation possum density. The advent of GPS technology to locate trap and bait stations has allowed the AHB to audit contractor performance and introduce input based contracting for ground control. As a result input based contracting has been developed which removes the monitoring cost (typically 16% of contract cost) and minimises the contractor's risk premium which can be of the order of 15%, and is driven by the following factors:

a. Skill base of the team performing the work
b. Quality of previous control work and the patchiness of the block
c. Target density. Achieving ultra-low density (such as 1% RTC or less) is especially risky and subject to random foci of surviving possums being caught by the monitor.

2. Aerial control

Aerial operations are largely cost-insensitive to the type of land being flown and the recipe for success is now well known as people understand better the dynamics of bait aversion, and how to bring possums down from the canopy to forage for baits on the forest floor.

However there are market factors and operational risks which drive additional cost, such as public concern, weather and the risks of by-kill. Until recently the AHB has had little need to understand the breakdown of these costs since the market has delivered efficient results. However the location and volume of aerial operations have changed and the market has become less competitive. On the West Coast the sensitivity of landholders to outsiders and the weather uncertainty has given a decided 'home patch' advantage. Hence the AHB now has a need to understand the true drivers of cost in order to better manage contract specification and the market. Table 3.4 provides estimates of some of these costs.

Table 3.4: Aerial Control Costs

Activity	Cost estimate	Basis of estimate
Control (2kg/ha pre-feed + 2kg/ha toxin) 12gm cereal	$20/ha	Rosevear 2003
Landholder liaison	$3/ha	Rosevear 2003
Consents	$2/ha	Rosevear 2003
Sensitive stakeholder management	$5/ha	est. based on West Coast tenders
Home patch disadvantage	$0 - $7/ha	est. based on West Coast tenders
By-kill: deer repellent	$7/ha - $12/ha	AHB
By-kill: complex perimeter control	$3/ha	est. based on AHB obs.
Security	$4/ha	AHB
Weather risk premium (dry versus wet climate)	$5/ha	est. based on West Coast tenders
Price premium due to market dominance	$0 - $5/ha	est. based on West Coast tenders
Post operational monitor	$5/ha	AHB

As noted, many of these issues are not currently known, but are likely to be quantified once the current contracting round is complete.

In response to rising costs, AHB have moved away from traditional outcome based contracts which required a post-operation survey, and instead uses input based contracts where the record of lines flown from the GPS system is used as proof of compliance. This saves approximately 15% of project cost, at little loss of reliability, since experience indicates that aerial contractors have perfected the recipe for a reliable control operation. AHB is also investing in research on further reductions in bait application rates which may lead to further cost reductions in aerial control operations.

In summary, in 2003 aerial costs were typically $30/ha (control + survey), but have increased to $35/ha+ in 2010. Over that time issues driving cost have been more demanding specifications, less competition in the market and general cost increases e.g. fuel. The more demanding specifications require contractors to consult more widely, adjust their flight paths to avoid sensitive areas such as waterways and boundaries to minimise by-kill and pollution, and ensure all landholders are fully aware of the operation.

3.3.3.2 Consultation

ERMA's review of 1080 has increased the compliance workload and in addition growing public awareness and concern with the use of toxins is growing the need for specialist public communications work. In response AHB has established a new role at regional level to deliver communications, manage the consenting process with councils and to build relationships with Iwi and other landholders to minimise issues with provider capture.

3.3.3.3 Risk factors

Failure of an operation to reduce pests beneath target density can result in additional cost to re-work the block and to pay for re-survey. Even for skilled and professional contractors there are risks to be managed:

1. Stakeholders
   Public opposition to aerial operations is a significant risk factor, especially in the West Coast where the majority of control work is by air, and in some cases security is needed to protect staff and equipment.

   AHB employs communication professionals to help manage this task.

2. Weather
   Improvements in forecasting have reduced weather risk. However the risk of persistent bad weather for an outside contractor working in an isolated area is a significant economic barrier, and there are examples of contractors who have refused to return to a region for those reasons.

   AHB currently requires the contractor to take on this risk and they essentially self-insure for this risk. The option of weather insurance may be one approach to reduce this risk and make some regions more attractive for contractors.

3. Home patch advantage
   An operator with local knowledge and local connections can obtain a significant 'home patch' advantage especially if they are closely linked to landholders or they are used to working under difficult conditions. To offset this the AHB is now contracting with a mix of 'home' and 'away' blocks in a single contract to try to modify the 'home' advantage and grow the range where contractors are able to work.

4. Ground
   When access has to be by foot in difficult country it can be expensive and logistically difficult to fully cover the ground. Hence ground control can miss 'hot-spots', and some blocks are renowned for being 'risky' and difficult to control (see Mouseback block in Attachment Three), especially when densities are low. However the use of GPS locators makes it easier for ground crews to work to a consistent pattern and to set and return to traps.

   AHB is managing this risk by developing the Chew Track Cards which offers a 30% reduction in cost and helps crews target residual pockets and eradication when possums are at ultra-low densities.

5. Interworking with other agencies
   The move to in-house regional vector management avoids the conflict with Regional Council control operations to meet biodiversity objectives, but it also may lose the efficiencies of inter-working on those projects. We understand the AHB is currently working on the possible efficiencies of integrated planning with biodiversity projects run by other agencies such as Regional Councils, DoC and other landholders.

3.3.4 Capacity management

The AHB manages capacity among its contractors with a view to providing continuity of work and retaining the good operators. However in any contractor/contracting relationship, there is room for improvement and consultation with contractors has raised the following issues:

1. Continuity
   The success of the wildlife Tb eradication strategy will rely on a skilled contractor base which can tolerate the contractor's life of uncertainty, or as one contractor put it:

   Continuity of work keeps us going, but fear keeps us motivated

2. Safety
   The safety record among contractors is poor, relating to the difficult terrain and uncontrolled work environment that work is conducted in, and possibly to the entry level skills of staff that are typically paid less than forestry workers. However since assuming direct management of the vector control programme, AHB has instituted national requirements for health and safety systems, improved accident reporting systems and is now monitoring accidents to enable better hazard identification and safety management by contractors.

The AHB have commented that drug and alcohol testing in the forestry sector has become mandatory in order to reduce accidents, and AHB is considering the same in order to improve safety and operational standards. This is considered useful but unlikely to make a significant difference.

3. Training
   AHB has introduced minimum training requirements for the sector and has developed an AHB Pest Control qualification in conjunction with the Agriculture ITO. However this could be improved and made more relevant by recognising experience, setting levels of attainment possibly related to the type of work which can be undertaken, and formally involving contractors in the governance over curriculum and levels of certification, so that training meets the business needs of the AHB, other agencies, contractors and regulators. We understand that the AHB is working on this.

4. Ground contracts in deep forest
   Concern with aerial operations is requiring blocks previously controlled aerially to be controlled to ultra low densities using ground methods. To do this work effectively requires an initial 'fixed' investment in an infrastructure of tracks, bridges, lines etc to facilitate access, which usually incurs cost in excess of $80/ha, in addition to the subsequent repeating control costs to mop up residual possum foci. To some extent, the quality and efficiency of subsequent control work is dependent on the quality of that infrastructure. Currently we understand these contracts are let on short-term basis which does not necessarily encourage optimal resource use over the term of a wildlife eradication strategy. To encourage optimal investment AHB may consider two options:

   a. Long-term contracting
      Letting contracts on a long-term basis encourages contractors to invest in infrastructure and subsequent control that stands the test of time and provides continuity of work. However it also encourages dominance which could be controlled by pre-qualification and suitable reviews.

   b. Infrastructure only contracts
      Letting separate contracts for the access infrastructure, versus the pest control work, may be one method of getting efficiency by encouraging specialist 'access' contractors for difficult blocks. This allows the block to be competitively tendered but is dependent on the infrastructure specification and whether it is over or under engineered. We understand that the AHB is trialling investment in ground control infrastructure.

5. Packaging of work
   Most tendering for ground control work is performed on an annual block by block basis. To give better continuity of work and to improve the ability of contractors to keep good staff, the AHB could consider grouping blocks into packages which give continuity and allow contractors to move staff around blocks to meet constraints such as game hunting seasons, lambing, and seasonal possum control efficacy factors dependant on habitat type. In addition contractors tell us that they lose their best staff if work is not 'family friendly', and hence a reasonable percentage of 'near home' work is required. We understand the AHB is however concerned about contractors dominating their

'home patch' and have additional reasons for creating packages of blocks that include a group of 'home' and 'away' blocks. It may be useful for the AHB to seek contractor input into this 'packaging' process so that operational efficiency is maintained and sector capacity is enhanced. We understand the AHB is trialling the use of 2-3 year packages of both ground and aerial control contracts in Wellington and West Coast regions.

6. Information
   Currently during a tender round, a lot of information related to the difficulty of controlling a block is captured by contractors talking among themselves. This is ad-hoc and potentially inefficient since the AHB should have this information to help set priorities for TB control and eradication. It has been suggested that AHB should gather this information and include it in tender packs, especially the control history of a block and instances of control failure. This will increase AHB's cost in the short term, but should decrease its long-term cost as the instability caused by re-work declines, contractor's risk premium falls, and information on control outcomes is better captured.

3.3.5 Conclusion

AHB has a strong culture of seeking efficiency by lowering unit cost and by targeting effort where it is best rewarded. In addition, it is experienced at managing its market, via contestable tendering and application of research to control activity.

Unit costs for vector control are increasing due to the changing dynamics of competition in the market and increased compliance requirements. In response the AHB is managing cost by adjusting specifications and encouraging the uptake of new practice arising from research.

One suggested issue for improvement is to be more explicit about information provision that impacts the economics of vector control, by both contracting parties. The AHB could document the control history and issues with a block, especially where there have been failures. This is likely to increase costs for difficult blocks in the short term, but in the long-term it will reduce cost by identifying the risks and the best method of managing them. In addition it would also be useful for the AHB to understand in more detail the reasons why cost varies across blocks, since it may highlight more efficient methods of allocating work among contractors and between the AHB and its contractors.

New methods of managing contractor capacity are being considered that encourage good people to enter and stay in the industry. This will require managing contractor desire for continuity and a good mix of 'home' and 'away' work, that also meets the AHB's needs for sustainable and efficient pest control outcomes.

3.4 Efficiency of vector control management costs

3.4.1 Cost components

We have chosen to group non vector control costs together since they represent all the management costs necessary to deliver the contracted services. Table 3.5 reports the cost components used to manage vector control.

Table 3.5: Vector control management cost

Activity	Cost ($m) 2010
Regional management	$4.6
VectorNet system	$1.9
National office support	$0.8

The services provided are:

1. Regional management
   Staff located in regional offices who provide programme management, vector planning, field supervision and contractor liaison services.

2. VectorNet system
   VectorNet is a contract management system that also holds information on vector densities. It is used by regional and national contract staff and by vector planners to facilitate contract planning decisions.

3. National office support
   This represents finance, procurement and management support needed to govern and administer the contracting service.

3.4.2 Comparison to other contracting sectors

AHB's management of vector control contractors is a relatively unique service, and hence it is not possible to directly compare the efficiency of regional management with other providers on a 'like with like' basis. However some comparisons are possible with other contracting industries, and Table 3.6 records the comparison of management services across contracting sectors.

Table 3.6: Cost to manage contractors by sector

Management (design, supervise, consent, and approve)	% of contracted cost	Source
AHB vector control management cost	16%	AHB
Rural bridge design with average supervision[4]	10%	IPENZ 2004
Small building construction	10%-14%	Rawlinsons pers. comm.
Large building ($50m)	16%	OCTA project manager pers. comm.
Medium commercial building ($1m)	20%	BRANZ pers. comm.

These sectors all employ tertiary trained and experienced project managers to contract with trade and labour only contractors. However the management cost will vary depending on project needs, driven by complexity, size and specialisation required. Within AHB's vector control activity management input varies between operations,

[4] Supervision appropriate for medium sized projects of a routine nature being undertaken by an experienced contractor when the risk of non compliance is acceptable.

ranging from surveys which have modest needs, to aerial operations in sensitive areas such as the West Coast, where management input is high.

One of the major drivers of AHB's regional management cost is VectorNet which was a bespoke software development needed due to the specialist nature of AHB's work, which represents approximately 30% of AHB vector control management cost. By comparison, other industries would use commercially available systems to design and manage work, where systems cost would be expected to be 5% - 10% of total cost.

In conclusion, AHB's vector control management cost is approximately the same as other comparable sectors, and may even be on the low side, when the costs imposed by the specialised nature of AHB's operations are considered.

3.4.3 VectorNet

VectorNet[5] was commissioned in 2007 to deliver accountability, visibility and improved efficiencies for vector control contracting and planning (see ACIL 2009). The system replaced the 11 different systems used by the regional vector management staff, some of which were paper based systems. Table 3.7 reports the major costs.

Table 3.7: VectorNet costs

Cost item	Cost ($m) 2010
VectorNet depreciation	$1.0
Staff to support and enhance	$0.5
Ancillary costs (network, licences etc)	$0.4
TOTAL	$1.9

From a forward looking perspective the major discretionary component of this cost is the $0.5m of staff time which is used for support and enhancements. Offsetting this cost are the benefits:

1. Investor trust
   Audit functions and sound financial reporting do not of themselves deliver value. However they do provide trust to external investors that money is being well managed and in the case of public agencies that the public interest is also being protected. VectorNet provides visibility of contracting operations, and enables effective budgeting of resource.

2. Effective use of vector control resource
   VectorNet provides a repository of information to 'optimally' inform vector planning. AHB is currently developing a modelling capability via its research fund which will use VectorNet as its information hub to 'optimise' the use of vector control resources to meet the goal of eradicating Tb in wildlife. Hence VectorNet is likely to be further enhanced to ensure it has the capability to deliver the role of information hub to make effective us of the vector control resources.

[5] VectorNet captures the key creative themes of the system, as explained by the brand development group involved in developing the system out of the more prosaic sounding Vector Management Information System (VMIS), which pre-dated it;
http://www.mpwr.biz/index.cfm?layout=communicationsClientApps

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In conclusion, AHB argues that VectorNet is a cost that the business has to incur to effectively manage the $46m of vector control resources and to perform its fiduciary duty. The specialist nature of its contracting has required it to develop a bespoke system which needs ongoing enhancements for the system to optimise the wildlife eradication strategy.

3.4.4 Regional management moved in-house

Historically vector control was largely managed by the Regional Councils which tended to focus on regional pest management and local contractor needs, which sometimes conflicted with the AHB's priorities and gave poor information. The approach was fragmented and expensive in many cases[6]. By late 2007 it was decided to bring the regional management function in-house to reduce cost, and target a more efficient outcome by improving the link between funding, doing and managing.

When the AHB moved most of regional vector management activity in-house, it made savings in its regional costs but incurred additional costs to support those in-house staff. Table 3.8 reports the results of these changes.

Table 3.8: Costs and savings incurred in changes to regional vector management

Cost item	Cost change ($m)
Savings in regional vector management cost	-$1.8
Additional staff for GIS, H&S, invoicing and HR support	$0.4
TOTAL savings	$1.4

The direct savings achieved will provide a vector management capability that is focused on AHB's national Tb control strategy. However there are indirect costs that have been incurred that are not able to be directly measured. Some of these are:

1. Regional funding at risk
   At the time of writing all regions have agreed to future regional funding levels and it appears this identified risk has not eventuated for the forecast period.

2. Stakeholder relationships
   Councils have relationships with local stakeholders and landholders which may have helped with access and consenting in the past. Whereas the AHB will have to develop its own relationships now, although this could also be an advantage since it is likely to reduce the dependence on past contractors and allow greater freedom to manage operational parameters, such as use of deer repellent.

In conclusion, a substantial direct cost saving has occurred which has not been offset by any significant indirect costs to date.

[6] In one region approximately 2% of contracted cost was incurred which was eventually repaid as being outside the scope of the contract, and there was anecdotal evidence from another region of a similar issue.

3.5 Summary

AHB has consistently pursued a policy of efficiency in controlling Tb vectors. This has included significant changes to sector contracting arrangements via outcomes based contracting, and development of a contestable market. Latterly we see the use of 'input' based contracting for aerial operations, the use of Chew Track Cards to improve operational efficiency for ground operations and the move to in-house provision of regional vector management.

Offsetting these gains are cost increases caused by supply/demand changes in the contracting industry as the sector evolves from a regulated market to become more mature. As a result, the unit cost of aerial operations is rising, from an average of $30/ha (aerial +survey) in 2003, to $35/ha (input based contract) in 2010. In addition compliance and stakeholder concerns are driving up cost and some blocks which were previously controlled aerially now have to be performed using ground techniques which can increase unit cost by around 300%.

AHB has been forthright in pursuing opportunities for improving vector control efficiency and in controlling costs, by the development of VectorNet, the transfer of vector management operations in-house, and actively pursuing more efficient contracting methods.

In conclusion, it is our opinion that the AHB has strong processes staffed by experienced managers who have a strong focus on reducing unit costs, to control these cost pressures.

4 Disease control

4.1 Introduction

This chapter examines the background, funding and efficiency of disease control service used to detect disease via surveillance, to manage outbreaks via quarantine using herd management and movement control, and to administer the service with a contact centre, lab testing, procurement services, compliance activities etc.

These activities are funded entirely by the beef, dairy and deer farming sectors and attract no Crown or Regional Council funding.

4.2 Background

4.2.1 Institutional arrangements

AHB operates a robust process to manage a contestable and sustainable market for Tb testing. It has experience of managing this market successfully in the face of a range of shocks, which in the recent past have been:

1. Monopoly provider
   The original contract inherited by AHB involved an incumbent supplier for the Tb surveillance and quarantine services. In an effort to achieve greater transparency and efficiency, AHB sought to separate out the services provided and put them out to tender. However the AHB found it had to first establish an in-house Disease Management Information System (DMIS) and bring contact centre in-house around 2005, to achieve full contestability and unfettered access to information.

   It is instructive to note that New Zealand practice for Tb testing is to use lay personnel to reduce cost without any significant loss of accuracy, as opposed to international practice, which generally uses vets to conduct these tests.

2. Competitors merge
   The AHB established a contestable market for Tb testing around two strong performers; Asure NZ and AgriQuality. However the contestability of this market was threatened when those two entities merged in 2007 to become AsureQuality.

3. Current market
   In the 2009 tender round the AHB worked to encourage a tender round with quality providers who could also put pressure on pricing. As a result supply agreements for Tb testing were agreed with both the incumbent AsureQuality, and with a consortium of veterinary practices.

The AHB is also affected by wider developments in the agricultural sector to increase the capability to respond to a major outbreak such as foot and mouth. Hence the AHB will need to adjust its systems and processes for disease control to interface to the National Animal Identification and Traceability (NAIT) and FarmsOnLine projects.

4.2.2 Disease control activity

Table 4.1 reports the major activities for disease control.

Table 4.1: Disease control services

Service	Cost ($m) 2010 forecast	Status
Tb testing	$10.9	Contracted
Management and IT	$2.4	In-house
Lab services	$2.0	Contracted
Sale-yard monitoring	$1.0	Contracted
Contact centre, casing of farms to identify herds, etc	$0.8	In-house
Other	$1.5	In-house
TOTAL	$18.6	

Source: AHB

The individual activities are discussed separately below.

4.3 Tb testing

4.3.1 Tb testing background

All cattle and deer in New Zealand are subject to Tb testing with costs met nominally on a 'user pays' basis by levy funding in the cattle and dairy sectors, and predominantly by direct payment of testing cost by individual farmers in the deer sector. The rules for testing are defined in AHB's National Operational Plan which is nominally based on the World Organisation for Animal Health (OIE) protocols, adapted to New Zealand conditions, especially considering the role of wildlife vectors and the use of movement controls appropriate to risk. The intent of these rules is to implement a practical and economic approach to Bovine Tb to prevent the loss of production and risk to market access.

4.3.2 Efficiency of Tb testing

An efficient testing regime needs to detect the problem at minimal cost and relative to the risks that the disease imposes. We have broken up our analysis into the following components:

1. Unit cost
   The unit cost should be competitive relative to the market.

2. Quality
   The testing should be targeted at the risk.

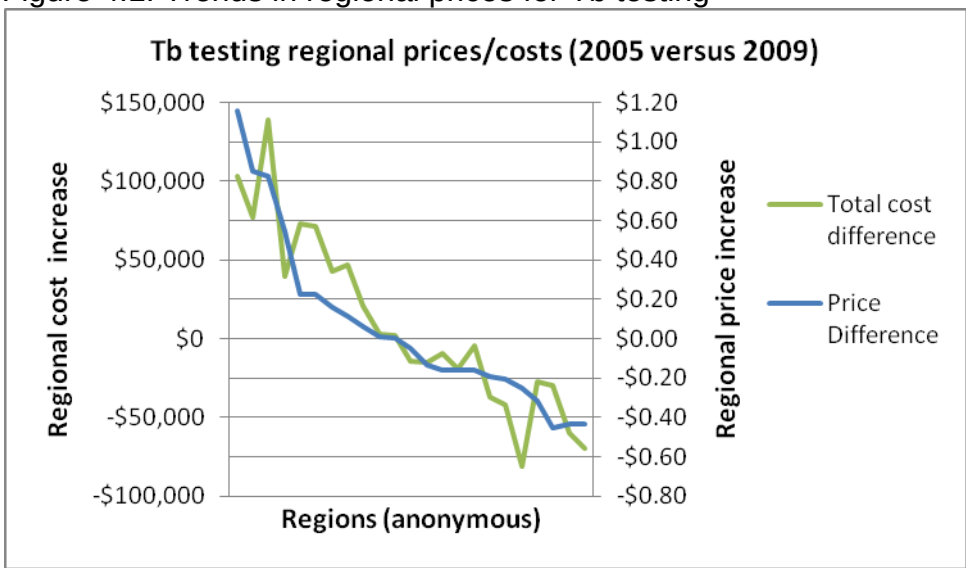
3. Economic
   The benefits should exceed the costs, considering test specificity, sensitivity and benefits of prevention.

These issues are discussed in detail below.

4.3.2.1 Unit cost

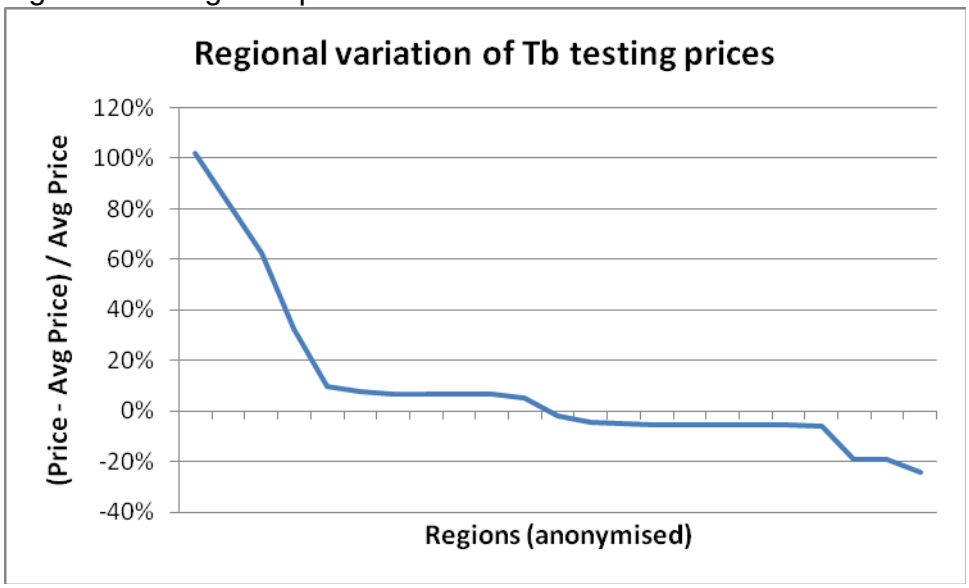
We have observed little historic change in the unit cost for primary Tb testing, and in the most recent tender, total Tb testing costs rose by approximately 2% from 2005 to 2009 on an inflation adjusted basis. Figures 4.1 and 4.2 illustrate the outcome from the 2009 tendering round where prices were sought against indicative volumes in each region.

Figure 4.1: Trends in regional prices for Tb testing



Source: AHB

Figure 4.2: Regional price variation in 2009



Source: AHB

At the regional level there are large variations in price reflective of utilisation and access issues, and some significant price shifts from 2005 to 2009 caused by unrealistic prices set in 2005 by an under-performing provider, who has subsequently been removed. The unders and overs in the tender round have largely cancelled themselves out to produce a 2% increase overall.

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Benchmark comparison to an external jurisdiction provides a useful comparison for the price that New Zealand farmers are paying for this service. Table 4.2 reports the US$ costs of Tb testing in New Zealand versus the UK.

Table 4.2: Cattle testing in New Zealand and UK

Jurisdiction	Per Test cost (US$)	Per Test cost local currency	Primary Tests (m)	Reactors slaughtered	Staff cost (admn + investigation)
NZ 08/09	US$1.5	$2.6[7]	5.0	980	$4.6m
Ireland (Eire) 06	US$3.5	€3.6	9.0[8]	24,173	€33.8m
England 07/08	US$4.1	£2.7	4.6	27,000	£13.0m

Source: AHB, DEFRA disease 2009, ClearStats 2009, DAFF 2007

New Zealand costs are approximately 40% of that in the UK and Ireland. The explanation given for the low costs in New Zealand is that the farmer funds the programme, and the testing programme is designed with efficiency in mind:

> *You have to be an accredited tester to undertake TB testing in New Zealand and TB testing of cattle is [*largely*] done by lay people, rather than veterinarians as in the UK. Further, in New Zealand, cattle are injected in the caudal fold, rather than at the mid-cervical site on the neck. The caudal fold site is slightly less sensitive than the mid-cervical site, but we try to counteract that by using a more concentrated form of tuberculin than is used in the UK to improve the sensitivity of the test. As you can imagine, the caudal fold site is easier to get to than the neck, the site doesn't need clipping and as a consequence relatively large numbers of cattle can be tested in a day. Thus a tester may start in the morning with a dairy herd and test them as they milk and then test some beef cattle or young dairy cattle during the middle of the day and then another dairy herd at the evening milking. Thus a tester would look to test approximately 1,000 cattle per day. This helps to keep the cost of testing down.*[9]

4.3.2.2 Quality

The quality of a testing regime is measured by its ability to define and target risk. Tables 4.3, 4.4, and 4.5, report Tb test results[10] for New Zealand and the UK. Missing from this data is the Tb detected via post-mortem examination at normal slaughter. I.e. normal slaughter typically occurs in cycles which range from 1-3+ years depending whether the animals are managed for meat, dairying, breeding etc, and it provides an alternative method of Tb detection. In some jurisdictions, detection at normal slaughter or as symptoms arise, has been used as the main Tb surveillance method when the incidence of disease is low enough to justify it.

[7] Includes the Bovigam blood test used to confirm Reactor status in New Zealand
[8] Eire follows EU directive 64/432/EC which nominally requires annual testing irrespective of risk and re-test for movement. Hence the test burden is high with 1.44 tests per animal. The unit test cost is for public purchase of surveillance and breakdown investigation. Movement testing is privately funded by farmers and is approximately twice the unit cost. (See DAFF 2007).
[9] AHB response to question from an UK interest group retrieved from http://www.clearstats.co.uk/docs/costs_newzealand_comments.pdf.
[10] Tb detected at routine slaughter is not included

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Table 4.3: Reactor Yield in New Zealand in 08/09

Risk category	Tests	Reactors slaughtered	Reactor yield	$ per Reactor[11]
Movement Control (high risk)	1,517,753	621	0.04%	$5,691
Annual	1,794,436	166	0.01%	$25,172
Biennial	940,002	88	0.01%	$24,874
Triennial (low risk)	729,217	111	0.02%	$15,298
Total	4,981,408	986	0.02%	$11,765

Source: AHB

Table 4.4: UK test results in 2005

Risk category	Tests	Reactors	Reactor yield	£ per Reactor[12]
Annual (high risk)	3,275,000	8,180	0.25%	£1,081
Biennial	788,000	1,165	0.15%	£1,826
Triennial	31,000	18	0.06%	£4,650
Quadrennial (low risk)	725,000	364	0.05%	£5,378
TOTAL	4,819,000	9,727	0.20%	£1,338

Source: ISG 2007

To maintain economic efficiency, the Cost per Reactor should be consistent across risk categories, assuming no variation in the 'value' of a Reactor and in cost of testing.

At first glance, it appears there is room to improve the disease testing rules so that the testing programme is more efficiently targeted at disease. However the economics of disease testing needs to consider the following additional factors:

1. Risk of disease
   Reactors are not equal. A Reactor in a low-risk region is likely to incur potentially more cost in terms of infection spread within and between herds and to wildlife, and subsequent need to test and control, relative to high-risk areas. This needs to consider the risk of disease arising from wildlife, livestock, recrudescence, and from movements in either wildlife or livestock. For instance testing outside of movement control areas is largely designed to provide an 'early warning' of any geographic expansion of wildlife infection, and triennial testing is designed to detect occasional movement of infected livestock which escapes pre-movement testing. Failure to detect such infection on a timely basis may result in infection spreading to other livestock and into non-infected wildlife with consequential control costs.

2. Slaughter surveillance
   Slaughter surveillance provides a default detection system where sensitivity of detection is largely determined by the age at slaughter for animals in typical cattle, deer and dairy herds.

[11] This is an average over the category and does not capture the testing in adjacent herds and wildlife when a Reactor is confirmed.
[12] Costs have been estimated using the unit cost for England in 2008 of £2.70 which is reported by ClearStats using DEFRA data

3. Wildlife detection
   In some areas, detection of wildlife infection can be more efficiently performed by testing livestock than performing wildlife surveys.

4. Test cost
   Test costs have some regional variation.

5. International harmonisation
   Harmonisation with international requirements is required to attain and maintain Tbfree status.

Hence a more sophisticated analysis would include the impact of the above factors in the different risk areas.

4.3.2.3 Economics

We examined the process used by the AHB to set the disease control rules in the National Operations Plan, where the dominant factors were:

1. International harmonisation
   The rules are nominally based on OIE requirements modified to account for local conditions such as wildlife vectors. The risk boundaries defined by those rules are re-evaluated and submitted for stakeholder approval on an annual basis.

2. Cost/Benefit considerations
   In 1999 Lincoln University performed a Cost/Benefit analysis on a proposal for more widespread movement testing to achieve closer alignment with OIE standards. The proposal was not economic and hence not adopted. .

In our opinion the economic analysis on the rules for testing is largely historic and should be updated.

4.4 Administration and IT

The investment in the Disease Management Information System used to manage the surveillance and quarantine programme is largely historic and has not been considered. Administration and IT efficiency has been examined in the chapter on governance and administration.

4.5 Lab services

The current provider dominates this market and the barriers to entry for other local suppliers are high. AHB manages this by negotiating alternative input arrangements, such as alternative Bovigam test kits, and developing the capability of an alternative provider as required.

In conclusion, the service is subject to monopolistic pricing and control. However the AHB have explored methods of reducing this dominant affect.

Outcome Management Services

4.6 Sale-yard monitoring

This service is out-sourced since it requires a regional presence wherever stock is being sold. The efficiency of this service was not reviewed.

4.7 Contact centre

The Contact Centre generally employs young tertiary trained people with the workload largely determined by the rules defined in the National Operations Plan. In 08/09 it received and made 112,000 calls, managing surveillance, breakdowns and quarantine, in conjunction with the disease investigation vets and regional managers. Customers of this service have commented favourably on how the contact centre reacts to service gaps, manages the turnover of staff, and is providing a good level of service that meets farmer needs.

The cost per call is approximately $7/call and is determined by the following factors:

1. Time on a call, the expertise required and service provided during the call
2. Caller waiting time and utilisation of staff time on calls
3. Other duties performed by staff

A quick comparison to other call centres indicates the unit cost is nominally comparable, being higher than a large centre providing a fault finding service, and lower than a health call centre providing a counselling service. However a full analysis to test the efficiency of the contact centre was not made for the following reasons:

1. Unique service
   A 'like with like' comparison would require more information than was readily available. In addition the contact centre provides additional benefits than a pure call centre, i.e. it is an efficient source of recruits and training ground for the AHB.

2. Service quality
   Customer feedback has been positive indicating that management is responsive to issues raised, and there is no driver for change.

3. Viable options
   A more efficient outcome such as moving the contact centre to cheaper places such as India or the Philippines was not considered viable due to the high level of local and technical knowledge required to service the sector.

4. Sector developments
   The AHB have suggested that the future capacity and capability of the contact centre will depend on developments for NAIT, FarmsOnLine, and possible changes to testing rules, and should be re-assessed when policy is better defined in those areas.

In summary, the contact centre provides a good service and there appears to be little that could be gained, and something that could be lost. if the service was outsourced or restructured.

4.8 Summary

The unit cost of Tb testing (inflation adjusted) has increased by 2% from 2005 to 2009. This appears to be a good outcome for the AHB's procurement strategy considering that a dominant position was created when two state-owned providers were allowed to merge during that period. Compared to the UK/Ireland, New Zealand costs are 40% lower on a per test basis[13], reflecting the efficiency of the local programme which uses a contestable market and lay personnel to test at the caudal fold, as opposed to vets using the cervical site in the UK/Ireland.

The risk of Tb in New Zealand is falling, and one would expect that less capacity should be required and costs should decline in disease control activity. However we observe that unit costs relative to the number of Reactors slaughtered is rising, suggesting costs are 'sticky', driven by a conservative approach to risk and the sentinel role that cattle testing plays for detecting Tb in wild animals.

Risk based testing[14] could improve the efficiency of the disease control service, and we understand the AHB is already considering this. In addition it would be useful if there was more documentation on the Cost/Benefit criteria underpinning the Tb testing rules.

[13] This is thought to be a minimum difference since state funded vets perform Tb testing in the UK and Ireland and it is uncertain whether their costs are included in this analysis.

[14] For instance one approach is to reduce the testing frequency in AHB's low risk categories, i.e. the Annual category could become Biennial, Biennial become Triennial, and so on. This will detect more Reactors per $ spent on testing, but will also increase disease since evidence suggests that an infectious animal undetected for a year in New Zealand is likely to cause 5 other animals to catch Tb (pers. comm. AHB).

5 Research

5.1 Introduction

This chapter considers the efficiency of the investment into research and the process for prioritising and 'operationalising' results into the field.

5.2 Efficiency of research spend

5.2.1 International comparison

Table 5.1 reports comparisons to other jurisdictions.

Table 5.1: Research investment

Jurisdiction	Research spend	Total spend	% of total	Source
Ireland 2006	€1.5m	€90m	2%	DAFF 2007[15]
AHB 08/09	$2.5m	$81m	3%	AHB
UK in 2006	£7m	£87m	8%	DEFRA and DAFF 2007

The AHB's research effort appears to be mid-range, being more than in Ireland but significantly less than in the UK where their research programme has recently been boosted with £5.5m invested in 07/08[16] for vaccines for badgers and cattle.

In conclusion, it appears that AHB's research is nominally in line with other international jurisdictions where wildlife vectors are a significant factor in persistent herd breakdowns.

5.2.2 Setting priorities

The AHB's research programme is focused on achieving operational outcomes, and filling gaps in longer-term public good science research funded by the Foundation of Research, Science and Technology (FoRST). Among science researchers the AHB's method of allocating its research funds is considered to be 'best of breed' for funding this type of short-term research. The process is considered to be focused on sector priorities, efficient, considerate of provider capacity planning cycles, and well governed. In addition it has the capacity to react quickly to need, for instance when DoC suspended aerial operations when Kea were affected, and a research project was immediately convened to produce a Kea proof solution.

The research funding is allocated in the following manner:

1. Priorities are first set via consultation with the wider sector and advised by a Technical Advisory Group (TAG) which is drawn from the sector
2. Providers submit brief expressions of interest on those priorities
3. Detailed bids are requested from selected providers in a contestable bidding process which is open to a range of research groups from Crown Research Institutes (CRIs) through to commercial entities.

[15] Costs are made up of €36.1m programme costs, of which Tb testing is €12.7m to which must be added €20.2m farmer contribution for the 9m tests @ €3.6/test, and staff costs of €33.8m. See DAFF 2007 chapter 5.

[16] See http://www.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/research/vaccine.htm

4. TAG then advises on the best value bids taking account where members are conflicted

The process uses the TAG to advise on priority and value. However the process incurs conflicts of interest since it draws from the most experienced practitioners in the sector, including both pure and commercially focused research, and research proposals are available to all members of TAG. The AHB actively manages debate to minimise the issue affecting funding outcomes, however, if research proposals contain IP which proposers wish to protect in the submission phase, this is a risk which needs to be managed.

One solution to this issue would be to involve researchers from other jurisdictions, as is typically performed within other scientific decision making committees. Offsetting this are the cost, logistical constraints and uncertain value that an international researcher brings to the local environment.

5.2.3 Managing capacity and capability

There is a need to manage capacity and capability within this market in the same manner as for the other markets that AHB operates in. However we are not aware that the contract management process overtly considers this aspect of market management, possibly since most providers have alternative sources of funding, such as FoRST, teaching or the commercial market. Hence issues related to market dominance are not viewed with the same concern for research, as in other areas of AHB's work.

5.2.4 Benefits of research

As with all research, the benefits are notoriously difficult to quantify since cause and effect is usually uncertain, serendipity plays a large role and returns occur over long timeframes. We examine the following case-studies that are relevant:

a. Evaluation of pre-feeding in aerial operations
b. Chew Track Cards
c. Decision support system
d. 1080 impact

5.2.4.1 Evaluation of pre-feeding in aerial operations

Pre-feeding was originally developed by vector controllers to improve the reliability of aerial control operations. It requires a pre-feed of non-toxic bait followed by another aerial drop of toxic bait, with the theory that the pre-feed dramatically increases the possum uptake of the toxic bait, and significantly improves overall effectiveness of the control operation. However it also doubles the cost and the science community was initially sceptical about the overall effectiveness.

Following extensive evaluation researchers now understand the mechanism by which pre-feeding works, its effectiveness is proven, and the practice is now institutionalised in the standard operating procedures for aerial operations.

In conclusion, research has acted as an 'accounting function' to quantify and confirm that which everyone thought they already knew. In this case the benefits flow from the confidence investors in the business now have to continue to invest.

5.2.4.2 Chew Track Cards

Chew Track Cards (see details Attachment Three) provide a cheap way to identify where possums are living and therefore to target control actions where it is needed. It is especially useful where all equipment must be moved by foot. The Chew Track Cards were originally developed to track possums for pure research, but their usefulness in commercial operations has been identified and they is now high expectations resting on a trial in the Hawkes Bay.

If initial expectations are correct, Chew Track Cards have the potential to improve the efficiency of the survey component of ground operations by 30%.

In conclusion, the Chew Track Cards are an example of serendipity where research is innovative and introduces new methods that radically alter the way things are done.

Planning budgets and scientific capacity to develop an idea such as Chew Track Cards is virtually impossible to predict, and comes around infrequently, perhaps every 10+ years or so. In the case of Chew Track Cards the idea is simple and could have been raised 10-20 years ago. However 10-20 years ago minds were focused on getting possums simply under control and the need to target effort at low-density hotspots was not needed. However possums are now at low density and a new tool is needed to target control, and as they say, '*cometh the hour cometh the man'* or in this case, core flute card impregnated with peanut butter.

However throwing more resources at this line of research is unlikely to generate the same commercial returns as the initial investment. Research seldom behaves like manufacturing or other predictable activity, where application of more effort is most likely to result in greater productivity.

5.2.4.3 Decision Support System

LandCare Research are currently developing a decision support system to use information from VectorNet to optimise the eradication strategy by making optimal decisions on control activity and to set risk parameters around Tb in wildlife.

This approach is a culmination of many years of research and practice in the commercial control of vectors and related Tb infections, and reflects the new found ability to measure and control low density populations.

The system competes with the decision making by experts who rely on their experience and recall of vector and control circumstances across the nation. There is a general expectation that the system is likely to do better than 'ready reckoning' and should achieve efficiencies of the order of 5% of vector control spend by optimally choosing the duration to maintain control actions in pursuit of a wildlife eradication strategy.

In conclusion, the system is an example of using research experience built up over decades to capture the information needed to optimise decision making and to get the additional efficiencies possible, relative to a 'ready reckoning' approach.

5.2.4.4 1080 impact

Research into the environmental impacts of 1080 is a regulatory requirement stipulated by ERMA. Hence there is an ongoing stream of research to understand the impact that 1080 has on environment, especially around waterways.

In conclusion, this research is a compliance requirement. It is not intended to improve operational efficiency but it may influence operations around sensitive areas to mitigate impact on water users and valued wildlife populations such as kea.

5.2.5 Setting the budget

We understand the research budget is set on an historic basis, but could be expanded if a worthwhile project is missing the 'cut', although this has not happened to date.

Hence the budget is generally fixed and does not flex significantly over time depending on the value of projects arising. This is consistent with the long-term nature of research, and the difficulty of making early judgement on the value of the need for capability and specific lines of enquiry.

5.2.6 Operationalising research output

It is acknowledged that the process used to operationalise research output is not as well developed in comparison to the process used to allocate research funds. The explanation being that most research is long-term, the output from prior research is considered when setting the annual research priorities and projects, and there are forums in place for disseminating the results of research to the wider possum control community, such as via the National Possum Control Agency's (NPCA)[17] annual conference, among other avenues.

5.3 Summary

AHB's use of research is highly regarded and has been previously presented as an example how pure and applied research can work with industry to solve economic challenges (see Rosevear 2003).

The ability for the AHB to apply research and to 'optimise' the allocation of control and testing resource to detect and control Tb is critical to AHB's future success at eradicating Tb in wildlife. This area may be under-resourced and there may be an argument that more cost needs to be incurred to strengthen this component of AHB's operations.

In conclusion, there may be areas in which the application of research to AHB activities could be improved. However AHB's investment in research has had significant pay-back and it is uncertain whether different arrangements would significantly improve on this.

[17] See www.npca.org.nz.

6 Governance and administration

6.1 Introduction

This chapter compares the costs of governance and administration to the wider market. AHB presented a full summary of costs since 1999, and we selected the larger and less self explanatory costs for more detailed analysis, since other costs appeared in line with expectation for an organisation of the type and size of the AHB.

6.2 Governance benchmarking

The AHB is an incorporated society where an independent board of 6 directors are appointed based on the recommendations of the Representatives Committee consisting of up to six members. This method has been used to get strong governance while at the same time reflecting the interests of the sectors who fund the agency.

Comparison of the AHB's directors fees cost with that of other agencies is shown in the table 6.1. These agencies were selected for comparison because they had some characteristics similar to the AHB, and as public agencies their financial information was published. The information published did not necessarily align with that published by the AHB and in some instances the statistics stated below were calculated from other information provided in annual reports. The comparison statistics should therefore be regarded as indicative.

Table 6.1: Governance benchmarks

Agency	Number of Directors	Directors Fees Paid 2009 Total $k	Chair/Director $k	Agency FTE's	Agency Expenditure Internal $m	Agency Expenditure Grants or Contracts $m
ERMA	8	$364	$72/$(23 to 35)	<90	$155	NA
NZTA	7	$280	$68/$33	1,300	$275	$1,624
DairyNZ	9	$337	$65/$34		$33	$30
MeatNZ	8	$235	$62/$26		$10 est.	$32 est.
Maritime NZ	5	$123	$39/$20	141	$28	NA
Civil Aviation	5	$149	$38/$24	204	$99	NA
Pharmac	6	$131	$36/$18	59	$23	$653
Legal Services	5	$96	$32/$16	219	$24	$140
Arts Council	7	$65	$24/$9		$9	$33
AHB	6	$211	$58/$29	93	$20	$62

As compared with the other agencies, the AHB directors' fees are reasonable, especially when compared to other agribusiness agencies who collect income via levies to deliver public good services.

AHB and many of the other agencies listed have other committees representing external stakeholders or technical advisory representatives. AHB has the Representatives Committee. For example Pharmac has a main technical advisory committee and numerous special interest committees. In some instances the cost of

these other committees are reported as governance costs, but are excluded from the table above.

6.3 Administration benchmarking

6.3.1 Salary

The AHB uses a market-based salary structure established by an external provider with a salary range spread for each position which allows for a minimum salary level at 80% of the market median and a maximum at 115%, with an average salary of 93.7% of market, and an average income per employee of $80k.

6.3.2 Span of control

On average, managers have 10 direct reports. This varies from 15 nominally recorded at the top end to 2 at the lower end. The CEO has two direct reports who do not manage teams but who provide long term AHB experience, act as advisors, and help provide critical succession planning support.

6.4 Change in capacity

Table 6.2 indicates the change in AHB headcount over the last four years.

Table 6.2: AHB headcount

Agency	05/06	06/07	07/08	08/09
Business strategy and systems	3	1	1	2
Finance	2	3	4	4
Corporate	3	2	2	2
Communications	2	2	2	2
Operational policy				1
IT	5	7	10	15
Technical	8	9	7	7
Vector operations	4	4	4	5
Regional vector management			10	24
Disease operations	25	26	29	31
TOTALS	52	54	69	93

The growth in regional vector management reflects an effective ‘transfer’ of people from regional councils to the AHB. Total costs for this regional management service have fallen, with little overall change in service level to the vector control contractors, i.e. service has improved in some regions but where regional offices have been staffed by new people, service levels and relationships are still evolving.

The growth in IT represents a new service which we investigate in the next section.

6.5 IT benchmarking

AHB has invested heavily in IT to support its operations. This has been the main contributor to headcount increases in the overall administration category. The total direct cost (not loaded) of the IT function is $2.6 to $2.9 million. The variation reflects

depreciation changes as an item becomes fully amortised. The major costs incurred by IT can be best viewed and benchmarked in the following elements:

1. CAPEX: for software development (VectorNet, DMIS)
2. OPEX: for systems support, licenses and enhancement
3. Common cost; network, servers, management

Benchmark data used to estimate the efficiency of this cost is:

1. Software CAPEX
   Costs typically range from $10k per user to $70k per user[18], depending on the level of functionality, the technical architecture used, and the degree of commonality of system requirements with the wider industry. Custom built software developments for small organisations delivering to a relatively unique set of requirements are typically at the higher end of the market, although a quick examination of the literature indicates large commercial systems can easily approach the upper end as well[19]. Hence making 'like with like' comparisons is notoriously difficult.

   AHB has two major software systems to support core operations, VectorNet (vector operations) and DMIS (disease operations). The original cost of the software which has still to be fully amortised is $4.5 million. For the number of internal users of those two systems the capital cost per user is at the upper end of the typical range observed above. This analysis does not include contractors who use VectorNet to enter contract responses and who download data into AHB's systems from PDA's and GPS devices, on the basis they are not 'power users'. However if the contractors are included, then the cost per user starts to approach the mid-range.

   AHB has invested more in IT than most other organisations relative to its size. However those systems are critical to AHB achieving its objectives and have been subject to appropriate planning, cost benefit justification and governance scrutiny in their development.

2. Software OPEX
   Software support agreements range from 15% - 20% for off the shelf systems which cover minor enhancements but usually exclude major developments. AHB supports the VectorNet and DMIS systems in-house. Typically there are 10 staff involved in supporting those systems, and of that some 5 staff are undertaking the ongoing support activities that would be covered under a support agreement of a comparable off the shelf system. The other staff perform roles such as business analysis and data administration that would be required regardless of the source of the systems, plus ongoing enhancements that would fall outside typical software support agreements. The AHB is currently finalising an information systems strategic plan for the next 3 to 5 years. This plan does not envisage the need for any significant capital expenditure on new software. Rather it focuses on incremental software technical and functional improvements to meet the needs of the changing

[18] By term 'user' generally denotes 'power users' whose job significantly depends on being able to access the system, and who spend a reasonable amount of time 'logged in'.
[19] See http://computerworld.co.nz/news.nsf/printer/71BE6D6D2135474CCC2572C3001A5570

environment AHB operates in. These improvements will be done within current staff numbers. The ongoing expenditure in supporting AHB's software is considered reasonable relative to the scope and cost of the software and despite the difficulty of like for like comparison, within the norms observed for software acquired off the shelf. It is noted that prioritisation and funding allocation for further development of the software is decided upon by the business managers in conjunction with the IT team.

3. Common Costs
   The cost of the network and user devices (PC's, printers etc) is in the order of $3k to $3.5k per user. This is well within usual norms. All AHB's computer equipment is owned by AHB while network and hardware support services are outsourced. The outsourcing structure is currently under review as part of AHB's ongoing focus on cost effectiveness.

6.6 Property Leases

AHB leases some 2,200 square metres of office space and associated storage at an average cost of $290 per m2 per annum. Utilisation is 21 square metres per person occupied, inclusive of storage spaces, or $6k per head. Of the 105 persons occupied (includes seconded staff) 64 are in Wellington where the cost is less than $5k per head. This reflects the better utilisation of space possible in a larger centre with a greater headcount and also the storage space required in regional operational areas. Overall the AHB property lease cost is considered reasonable.

6.7 Kiwisaver

The Kiwisaver compulsory employer contribution was introduced to start at 1%, progressing to 4% over time, but in 2009 any compulsory increase over 2% was put on hold.

At the introduction of Kiwisaver the AHB decided to start its contributions at the maximum (4%) level, matched by employees, in order to encourage saving by staff, and in 08/09 contributions were approximately $250k[20].

In order to compare the AHB's contribution to that used by most employers, Table 6.3 reports the employer contributions as reported by the IRD annual report on Kiwisaver in 08/09.

Table 6.3: Kiwisaver contributions

Employer contribution	Percentage of employees
0%	3%
2%	90%
3%	4%
4%	3%

Source: IRD[21]

[20] We note that the employer contribution greater than the compulsory 2% is taxed so that only part of the excess contribution goes to the Kiwisaver fund.
[21] See http://www.ird.govt.nz/resources/2/3/236969804fea97e9881ceb53c1fd2485/ks-ar-2009.pdf

Outcome Management Services

AHB's contribution to Kiwisaver is at the upper end of the range adopted by employers, but it also represents the only staff benefit provided other than base salary, since government superannuation is not available to the AHB. We understand this benefit is considered when AHB salaries and benefits are benchmarked to the wider sector in the job sizing evaluation.

6.8 Regional stakeholder management

The need to communicate with regional stakeholders is expected to grow as access to land to undertake control activity and negotiations over regional funding become more demanding. AHB's management of communications with regional stakeholders is performed via a combination of:

1. Tbfree committees
   The Tbfree committees are a voluntary resource intended to provide a communications conduit between the AHB and stakeholders, mainly farmers. In some regions their performance is exceptional, and even extends to assistance with negotiations over funding issues and access to land for control activity. However in other regions the service is not as strong or the needs are not as great.

2. Regional co-ordinators
   This resource is based in the regions and is part of the communications team. They work with the Tbfree committees and others to resolve issues around communications, especially when a breakdown occurs.

3. Communications team
   The communications team is Wellington based and supports regional AHB staff in communications planning, publications, media liaison etc

4. Senior managers
   Issues around regional funding generally involve the senior manager group and the board, and may involve the local Tbfree committee chair, depending on the relationships which the Tbfree committee brings.

The above arrangement has the potential to be very efficient and effective at getting the Tbfree message out there. In particular most stakeholders see the regional co-ordinator, working in with the local Tbfree committee, plus other AHB staff, as being key in this success. However there is a feeling in some regions that the process could work better. Some local Tbfree chairs feel their committee is not valued sufficiently for the contribution they make to the work of the Tbfree programme. They are a resource that has local connections, and is available to assist on a range of operational and communications issues, and yet some report that their advice and participation is not always requested.

The variation of views reported to us reflects in part the variation in personalities of TbFree committee members and the circumstances of the region they serve. With the extent of comment received we believe that the AHB should review further, perhaps together with other industry bodies, whether greater benefit from and harmony within the committees might be possible. We understand that at various times TBFree Committee Chairs have been provided with training in areas such as media skills, meeting management and conflict resolution. The AHB may wish to consider investing

in a programme to grow the capability of the Tbfree Committees to integrate and contribute to the wider Tb strategy using mentoring and training, especially in regions with high public relations needs, where an effective person in the local rural community would be useful.

6.9 Regional funding

Table 6.4 reports the variability of regional funding over the last six years for the major regions.

Table 6.4: Regional funding ($ks)

Region	2004	2005	2006	2007	2008	2009	2010
West Coast	$117	$462	$598	$619	$951	$856	$791
Hawkes Bay	$398	$504	$634	$659	$758	$755	$665
Christchurch	$766	$885	$760	$820	$818	$625	$654
Waikato	$591	$719	$668	$605	$656	-$2	$650
Wellington	$512	$494	$485	$657	$522	$610	$575
Manawatu/Wanganui	$721	$359	$875	$676	$765	$553	$414
Southland	$633	$697	$575	$457	$395	$384	$358
Otago	$376	$206	$216	$197	$307	$274	$302
Marlborough	$273	$208	$245	$290	$229	$265	$255
Tasman	$106	$187	$209	$206	$216	$150	$194
...							
ALL REGIONAL REVENUE	$5,261	$5,446	$6,103	$5,328	$5,676	$5,457	$4,951

Source: AHB

We note the significant growth in activity in the West Coast and the volatility in regions such as Southland, Waikato, Manawatu/Wanganui.

The AHB estimates that negotiating this funding cost approximately $480k in 09/10 based on the travel time and cost required to attend meetings, mail-outs to farmers, and an estimate of $10k per region to complete an annual submission to councils and to finalise and document annual funding agreements. Compared to the negotiation cost with other stakeholders contributing to vector control, this cost is out of proportion to the revenue.

The more important cost caused by this volatility of regional funding can't be directly measured. It relates to the loss of skilled contractor capacity and the challenges it creates for building a sustainable sector when the capacity needed for vector control is excessively volatile.

6.10 Summary

Governance costs are similar to the market that AHB competes in for experienced agribusiness directors, using levy income to deliver public good outcomes.

The management overhead as expressed by the span of control is reasonable given the skill base and type of work being undertaken, and salary costs are aligned to the market with sound process to review this alignment relative to job sizing and review.

Outcome Management Services

IT costs have been scrutinised because they represent the largest single functional cost and have grown significantly over the last 5+ years. AHB's investment in software is in the upper range of expenditure for its size compared to commercial organisations. However such expenditure is subject to appropriate management and governance disciplines. On an ongoing basis, the maintenance/support costs of the software, and the per user cost of the network, are reasonable.

Property leases cost an average of $290 per square metre per annum, or $6k/head with Wellington providing the least cost per head due to the better space utilisation achieved with the larger headcount. This is comparable to other commercial arrangements.

We note the Kiwisaver employer contribution is greater than the compulsory amount.

The Tbfree committees appear to be a resource whose capabilities need to be assessed, developed and used more efficiently. The specific use of mentoring and training to improve their capability to integrate and contribute to the wider Tbfree programme may be worth considering.

7 Other issues

7.1 Introduction

In the course of this assignment other issues have been raised which impact efficiency but are not directly related to our terms of reference. This section briefly summarises these issues.

7.2 Stakeholder management

The AHB has a focus on ridding New Zealand of Bovine Tb and manages its disease control and vector control programmes to that end. The results speak for themselves. The incidence of outbreaks in herds is at or below target and significant progress has been made in the fine tuning the business of vector control.

However times change, and there are some who are saying this single minded focus has come at cost to old relationships which form the basis of arrangements for funding and support. This is at a time when arguably the Tb strategy needs greater support from the farming sector since there are many farmers who have not experienced the threat of disease and therefore their support needs to be continually won over, and can't be assumed. Hence looking to the future in implementing the strategy of eradicating Tb in wildlife, it is envisaged that expenditure will remain at the same level and Tb incidence will fall further. As a result it is likely that communications and liaison with funders and the wider stakeholder community will need to be strengthened if funding and farmer support is to be maintained at current levels.

We have been told that the Tbfree Committees are a possible key to this future success, despite this resource being made up of volunteers with the associated implications for variability in commitment, quality and experience. However they have the potential to provide a strong conduit for communications between the AHB, farmers and the wider sector, such as Regional Councils, and farmer organisations which currently levy on behalf of the AHB.

If these relationships were to start breaking down, the AHB would need to explore other funding arrangements, such as:

- Direct AHB levies on landowners in regions to raise the regional funding share, instead of funding via regional councils. However experience from Otago, where revenue is collected by the AHB from land occupiers rather than being collected via the Regional Council, indicates the collection cost in terms of consultation, database maintenance, invoicing, etc, are nominally 16% of income and are reasonably significant.

- Direct AHB levies on dairy and venison production, to raise the dairy and deer sector contributions in the same way that funds are obtained from beef farmers via cattle slaughter levies. This would replace discretionary funding provided by the external industry levying agencies DairyNZ and Deer Industry NZ.

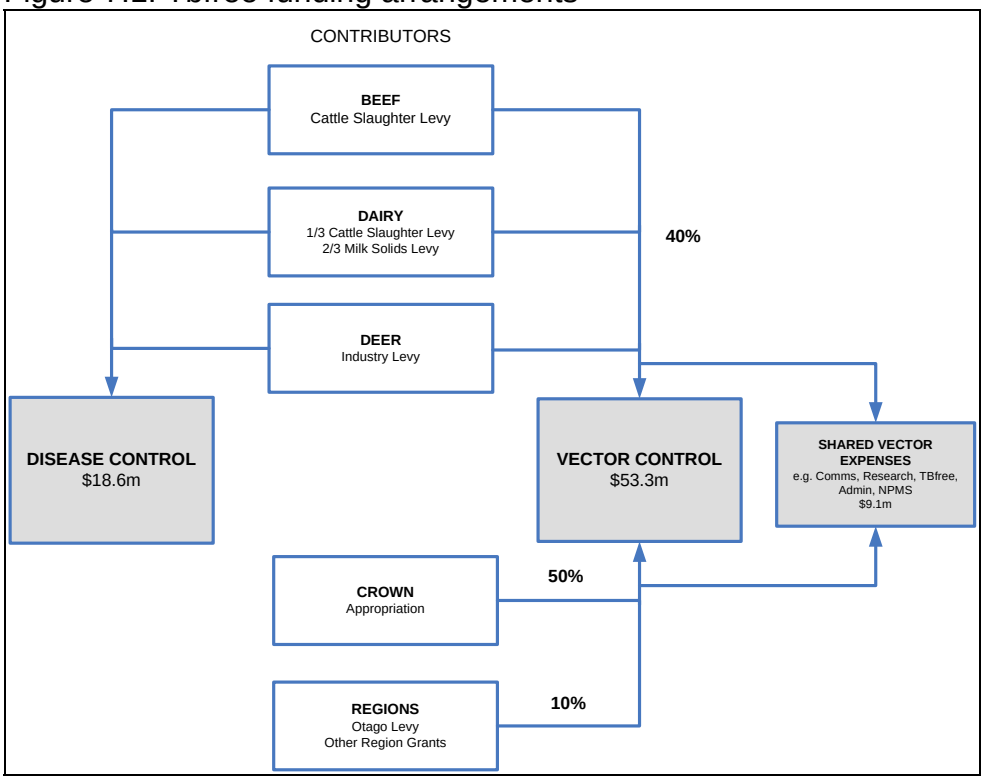
It has been said by one stakeholder that the Tb strategy is like gold but it is not valued as such by the agencies which levy farmers on behalf of the AHB. While individual

farmers value the programme and what it has achieved, the levying organisations often see just a compliance cost. Alternative funding arrangements such as levying stakeholders directly is likely to incur significant negotiating and administrative cost. Hence some stakeholders have requested us to comment that stakeholder relationships need to be managed in addition to operational results, to maintain support from the rural community.

7.3 Funding arrangements

Figure 7.1 records the current funding arrangements for the Tbfree programme nominally based on an assessment of exacerbators and beneficiaries, and willingness to pay at the time the scheme was initiated.

Figure 7.1: Tbfree funding arrangements



We understand that the arrangements with levying organisations such as DairyNZ, Regional Councils etc was a historically convenient method to collect funds, since those organisations already had mechanisms in place to collect money from farmers and rural landowners. However what started out as an efficient method of gathering income has become a forum to debate the value of the Tb strategy and many argue it is now inefficient, since it consumes a disproportionate amount of governance and senior manager's time, and causes volatility and uncertainty in funding with consequential impact on contractor capacity and control outcomes.

In particular the Regional Councils are driven by three yearly cycles when they review their Long Term Council Community Plans (LTCCP) and set funding priorities, but must also set budgets on an annual basis. The value delivered from the Tb strategy must be compared and contrasted with the other priorities and interest groups represented by Regional Councils. Hence the process requires frequent, detailed and expensive commitment of time to negotiate access to regional funding. Because of

the nature of Regional Councils and the involvement of elected councillors the AHB chief executive, chairman and other directors are directly involved with negotiations. In addition, funding from Central Government and from the industry sectors is conditional on contributions from the Regional Councils, and thus the importance of local funding can often exceed its absolute dollar amount. Conversely the National Pest Management Strategy is reviewed on a five yearly cycle.

Under the current funding arrangement it is expected that funding volatility will increase and more resources will be needed to negotiate funding as the memory of disease outbreaks fades, but the demand for funding remains the same or grows.

An efficient implementation of the wildlife eradication strategy will require adherence to a plan over 10+ years to fully capture the value to the economy of ridding the threat of Bovine Tb. However the current funding arrangement introduces uncertainty at a regional and sector level, and it would be more efficient if funding was matched to the national dynamics of the Tb programme. This will require a greater role from central Government, and may require legislative change.

Whether the current method of negotiating for regional funding is efficient or not, depends on alternative funding arrangements and the costs involved in supporting each one, which we briefly summarise below.

1. Mandated regional contribution
   Regional Councils levy and fund programmes on the basis of the LTCCP. Hence funding is tied to the LTCCP cycle and consultation arrangements. We presume that to change this arrangement so that the cycle was longer and on a prescribed basis would require a change to legislation, and is probably impractical.

2. Direct from farmers and landholders
   The AHB could collect funds directly from farmers and rural landholders rather than indirectly via levy organisations (Regional Councils, DairyNZ etc). Levy making mechanisms for this are available under the Biosecurity Act and are already used in the cattle slaughter levy and levy on rural land occupiers in Otago. However this will add cost, for consultation and a system to collect fees relative to some formula according to how much stakeholders cause the problem and/or benefit from the solution.

   This would require the AHB to develop a direct relationship with farmers rather than working second hand via their levying organisations. However forming a direct relationship with farmers may be useful, albeit costly, since some say the views of levy organisations are out of alignment with the views of individual farmer on the value of the Tbfree programme.

   Experience from Local Body levying agencies indicates that collection of rates by agencies that have a collection process already in place can incur an additional 2% to 4% collection fee, in addition to the consultation cost.

3. Central government
   The AHB administers a National Pest Management Strategy justified due to the strong national interest involved, and the potential impact on the wider economy, rather than a regional or sectoral economy. Hence there is an

argument that government should fully fund the programme as a representative of 'NZ Inc', rather than as an exacerbator due to its landholdings.

4. Biosecurity levy
   We understand there is discussion about a possible Biosecurity levy to fund a range of services related to controlling outbreaks, such as NAIT, FarmsOnline, AHB etc. If such a levy were aligned to the AHB's strategy and its review timeframe, this would be an efficient solution, although it would be subject to a collection fee and consultation cost.

In conclusion, the current funding arrangement is creating a significant distraction and incurring cost for negotiating with levying organisations, especially the Regional Councils. However the AHB is set up as an operational agency, and the time and effort of the chief executive and directors required to lobby and negotiate funding on an ongoing basis, are not seen as value adding activities. Additionally the uncertainty in funding has consequential impacts on contractor capacity and control outcomes.

It raises the question as to whether the current funding arrangements are efficient for managing the next phase of the eradication strategy, being a national programme to eradicate Tb from wildlife.

If a change in funding arrangements is considered, an evaluation will need to analyse carefully the efficiency implications for both stakeholder consultation and levy collection. This will need to consider the value that Regional Councils and other levying organisations provide, versus the costs and benefits of a future alternative arrangement where the AHB may face the full cost of issues such as stakeholder communications, consultation, levy collection and debt collection.

7.4 Summary

Issues related to stakeholder relationships and funding have been raised since they are causing distraction at a governance and senior management level, and consuming more resource than should be required, to negotiate funding arrangements.

The current funding arrangement appears to be inefficient and either requires a different set of skills to manage this issue, or a different funding arrangement.

Since the AHB's operations are governed by a plan constituted under a National Pest Management Strategy, it seems logical that its funding should reflect national priorities, and be aligned to the need and review timeframes specified in that plan.

8 Findings

8.1 Introduction

This section addresses each question within the terms of reference and provides summary answers in each case, based on the evidence that has been summarised in this report.

8.2 Response to questions

The questions raised are intended to address the major issues of:

a. Are the preferred option costs appropriate?
b. Is the strategy delivering a quality programme?
c. Does the AHB maintain, and deliver to, established standards?

The specific questions are listed and addressed below.

8.2.1.1 Governance and administration

Are governance, administration and management costs appropriate given the purpose of the organisation and the scope and size of its operations?

Governance costs are aligned with similar organisations delivering public good outcomes. Administration and management costs are appropriate given the purpose of the organisation, scope, nature of, and size of its operations. The organisation is output focused and professional, and the cost elements are discussed in chapter 6.

8.2.1.2 Consistency

Do the vector control and disease control programmes demonstrate consistent costs nationally or are there major unexplained variances across regions?

Per unit costs vary across regions caused by local supply/demand circumstances in the contracting market, geography and the logistics of contracting. The processes and specifications used for awarding contracts are consistent across regions consistent with managing contractor capacity in regional markets. These are documented in chapters 3 and 4.

8.2.1.3 Contestability

Is the AHB taking reasonable steps to promote contestability within the market for provision of vector control and disease management services?

The market for contractors in vector control and disease testing has recently evolved from a regulated market, and challenges differ by market. Disease testing is controlled by a dominant provider. Ground control of vectors is characterised by many small regional operators, and aerial vector control work is mainly performed by larger firms who are mostly deregulated Regional Council works units. Hence matching capacity to demand is challenging, and the AHB adopts a range of approaches to manage this market to ensure contractor capacity is preserved and a contestable market maintained. This is intended to manage issues such as ‘home patch’ advantage,

abuse of a dominant position, contestability, and the logistical issues which drive cost such as stakeholder liaison and post-operational monitoring etc.

It is considered that the AHB is taking reasonable steps to promote contestability or provision of vector control and disease management services. These issues are presented in detail in chapters 3 and 4.

8.2.1.4 In-housing regional vector management

Has the AHB derived the expected outcomes from bringing the vector operations management in-house?

The move to in-house regional vector management has saved significant cost and introduced a consistent approach to contracting. However it has been at the expense of losing expertise in some regions, and opinions vary on whether the level of service has been maintained. In some regions service is said to have improved, while in other areas the regional teams are still 'learning their trade'. However the long-term expectation is that change was inevitable and there is little appetite to return to the previous arrangement. This move has potentially destabilised funding arrangements in some regions, although we understand that regional funding for the 2010-2011 financial year is in place.

8.2.1.5 Outsource versus in-source

Are there in-house operations that should be outsourced or any currently outsourced operations that should be brought in-house?

No services are currently being considered for outsourcing. To test this situation we examined the potential for outsourcing the contact centre. The unit costs of this service were found to be reasonable, farmers value the level of service they get and it provides a useful training ground for the rest of the organisation. Hence there is little to be gained and a lot to be lost by outsourcing this service.

There may be some areas where services which are currently outsourced could be in sourced. However these areas are minor.

8.2.1.6 Efficiency and effectiveness

Are the vector control and disease control programmes clearly specified, applied consistently, with optimum efficiency and effectiveness, and demonstrating cost reductions over time.

The contractual specifications, and standard operating procedures have been progressively tightened over time to improve outcomes and value for money. It is considered that control programmes are clearly specified and applied consistently, and there is a process of ongoing improvement in place.

Local supply/demand dynamics impact cost and in most areas of AHB's activity costs are rising, driven by a combination of market factors and additional service requirements, which are outlined in the chapters on vector control and disease control.

Chapter 4 documents the disease testing service where efficiency may be improved by better targeting testing at Tb risk.

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8.2.1.7 Consistent tendering

Is the AHB tender process applied consistently and robustly?

AHB's contracting targets contestability within the constraints of maintaining a sustainable market. A robust external audit process validates contracting outcomes against SoPs and the objectives of the market management process.

8.2.1.8 Funding

Is there anything in the funding mechanisms and processes that is adding costs or causing difficulties?

The costs of negotiating funding with the Regional Councils are estimated by the AHB to be $480k/annum as reported in chapter 6, with further comment on alternative arrangements in chapter 7. The process of using levying organisations is creating inefficiencies for governance and senior managers, but is arguably more efficient than invoicing farmers and landowners directly. However it is arguably not as efficient as a single funding agreement aligned to the needs and timeframe of a national pest management strategy.

8.2.1.9 Research

Is the AHB utilising research to derive value and business improvements so as to increase the efficiency and effectiveness of strategy implementation?

The use of research to derive value to the business is robust and functional, and although we have proposed some change it is difficult to see whether it would make a significant improvement. See chapter 5 for more details.

8.2.1.10 Benchmarking

Is bench marking applied to help determine the reasonableness of costs across regions and between suppliers?

Prices are different across regions driven by the local market, operational logistics and different needs, and benchmarking is used by the AHB to strengthen its understanding of the issues that drive price variability and the contestable market.

8.2.1.11 Communications

Are the AHB's communications and engagement processes sufficient to give assurance to stakeholders and funding partner that funds are being spent appropriately?

Some stakeholders have commented that stakeholder relationships and communications need to be improved if the eradication strategy is to be successful. See chapter 7 for more details.

8.2.1.12 Systems

Are there systems for controlling costs and reviewing expenditure and are these effective?

Financial management systems are effective. This includes the human and software systems used to plan activity, approve projects according to operational priorities, budgeting, review progress against plan and report financial and operational results.

8.3 Summary

This chapter summarises the findings of the evaluation against the specific questions in the terms of reference.

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10 Attachment Two: People Consulted

The following people were consulted in this assignment:

Person	Position
William McCook	AHB chief executive
Nick Hancox	AHB operational policy & issues manager
Joy Tracey	AHB finance manager
Dr Paul Livingston	AHB technical manager
Mathew Hall	AHB vector operations manager
Kayo Sakey	AHB business strategy & systems manager
Mike Harre	MAF Biosecurity
Helen Lash	TBFree Chair West Coast
Michael O'Brien	TBFree Chair Southland
Malcolm Gilbert	TBFree Chair Canterbury
Bruce Dornbusch	TBFree Chair Manawatu/Wanganui
Dennis Mitchell	TBFree Chair Hawkes Bay
Bernard Carr	Minister's representative on the Representatives committee
John Dalziell	AHB chairman
Keith Sutton	AHB director and ex deputy chair
Andrew MacPherson	AHB director
Ted Coats	AHB director
Bronwyn Monopoli	AHB director and chair of audit committee
Duncan McMoran	Connovation Ltd
Phil Cowan	LandCare Research
Vector control contractors	A range of contractors covering ground, aerial and monitoring were consulted
AHB Representatives committee	Consulted as a group

11 Attachment Three: Case studies

11.1 Tapanui Farmland Operation

Farmland Operation

- Tapanui Otago
- 13,230 Hectares
- Last worked November 2009
- Price $35,700 = $2.70/ha

Operational inputs comprised of:

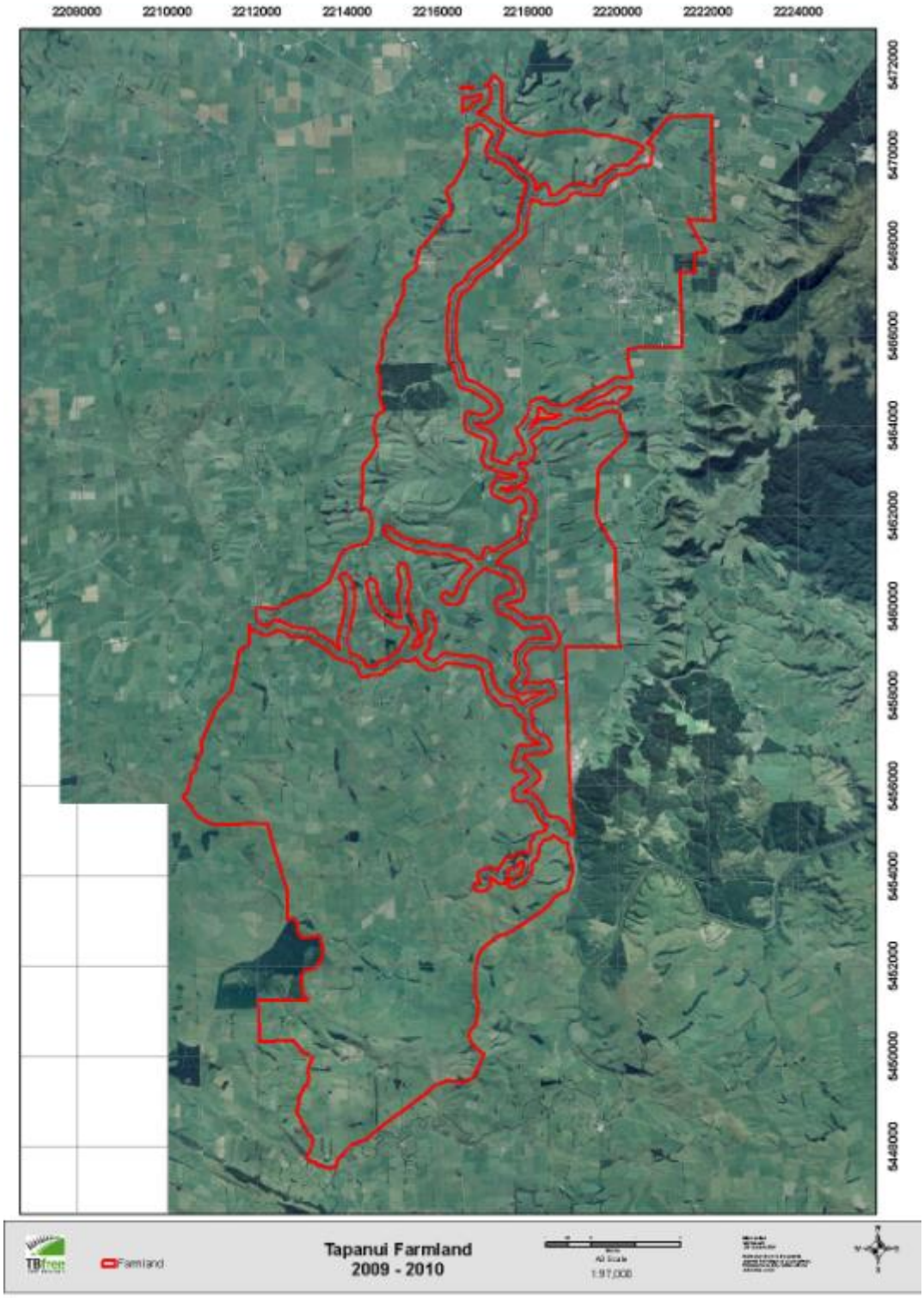
- Traps only

Area description

Cover is mostly shelter belts and small exotic plantations, some scrubby gullies and stream and river edge cover.
This area is readily accessible by vehicle and or motorcycles/quads and the contractor lived within 20 km of this contract area
An easy to work area, with well defined strata, and coverage of possum habitat straight forward.

Tapanui Farmland Habitat

Tapanui Aerial Map Showing Stratum Worked



11.2 Mouseback Bush Aerial Operation

Bush Aerial Operation

- Mouseback Southland
- 1,484 Hectares
- Last worked July 2007
- Price $44,479 = $29.97/ha (2007 prices)
- Estimate 2009 cost = $36.26/ha

Operational inputs comprised of:

- Pre-feed application rates of 3.0kg/ha (1,484 ha)
- Toxic application rates of 3.0 kg/ha (1,001 ha).
- In addition 483 ha were covered by hand laid 1080 (cost not involved in this figure)

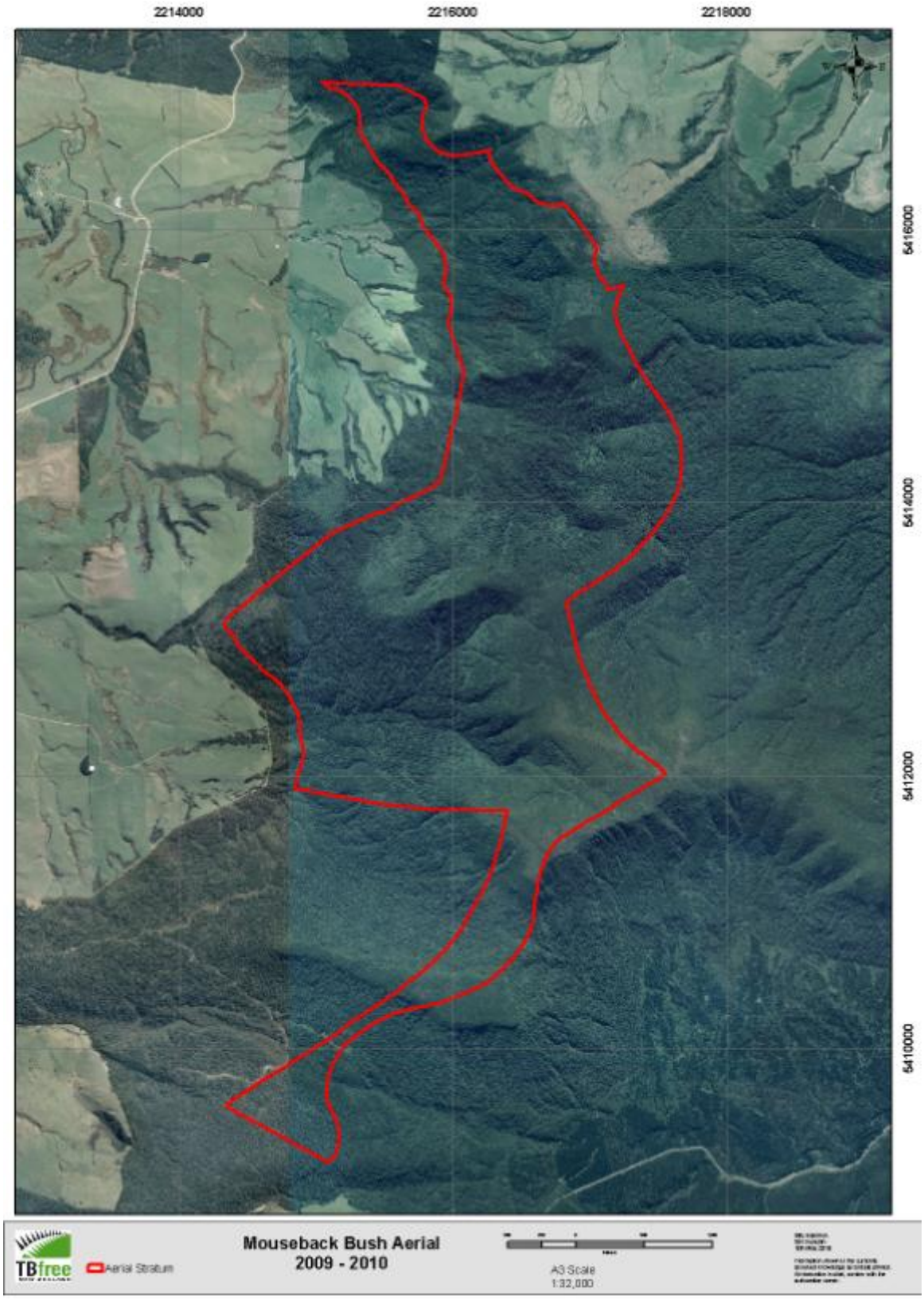
Area description

This area is part of the Catlins forest park and approximately 20,000 ha were aerially sown at this time and all surrounding land had ground control carried out.

Aerially sown 1080 pellets was the preferred method because of the size and remoteness of the area, also the benefits of having the whole area being treated in a single day so all possums have access to the poison at the same time.
Parts of the Catlins have previously been controlled by ground methods however contractors were in some cases failing to meet targets and were consistently exceeding timeframes.

Mouseback Bush Aerial Habitat

Mouseback Aerial Map Showing Stratum Worked



11.3 Lee Stream Farmland Bush Operation

Farmland Bush Operation

- Lee Stream Otago
- 443 Hectares
- Last worked February 2010
- Price $9,131 = $20.64/ha

Operational inputs comprised of:

- Feratox™

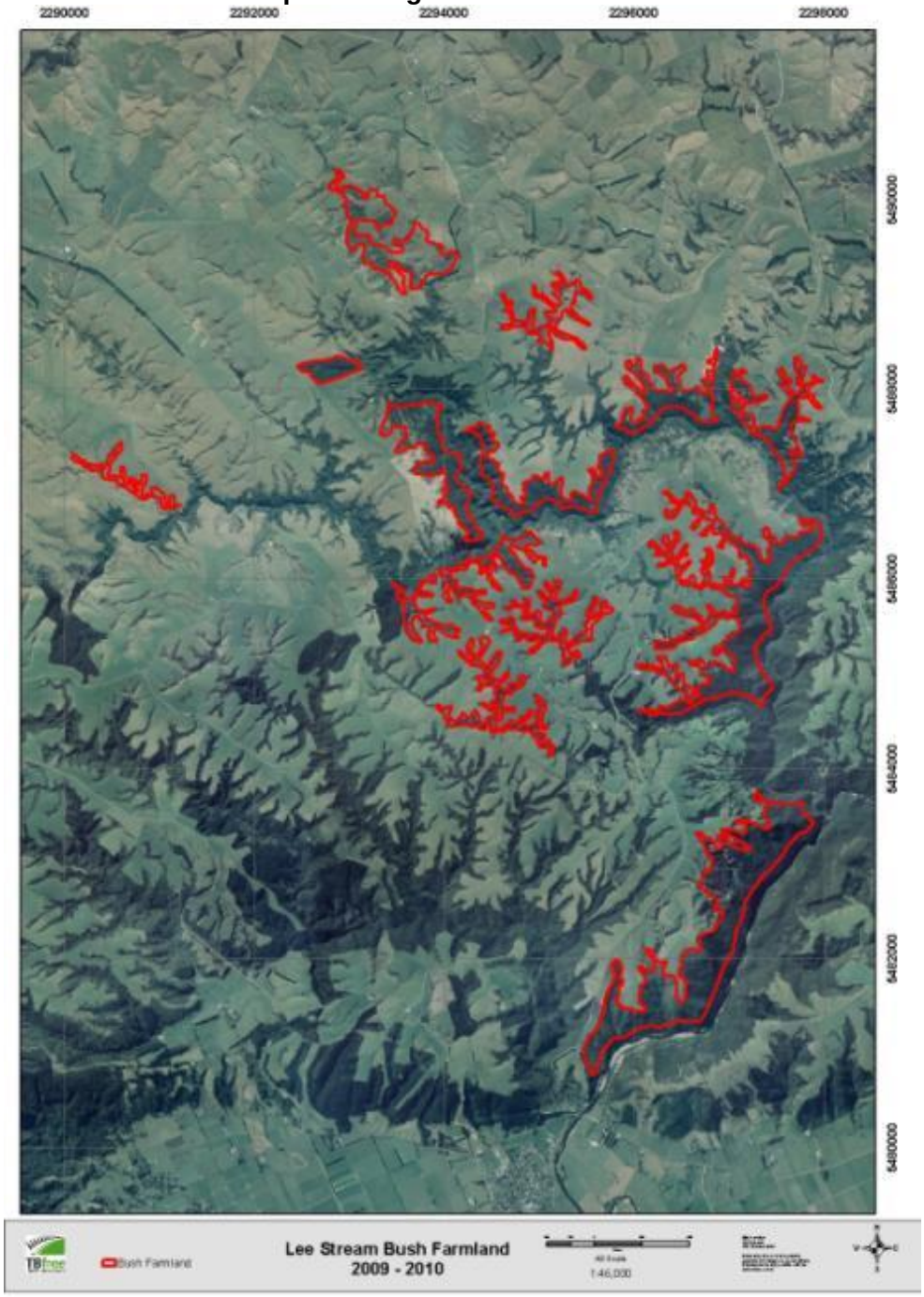
Area description

This type of habitat generally contains fingers and patches of small area native bush and scrub bordering or adjoining a modified farming landscape. Possum distribution can be patchy. The bush habitat can be made up of very tight scrub and/or gorse making control time consuming.

These areas also carry a risk of failure due to the difficulty in accessing all available possum habitat. With such a risk, price/ha can be inflated to cover extra operational costs.

Lee Stream Farmland Bush Habitat

Lee Stream Aerial Map Showing Stratum Worked



11.4 Deep Creek Tussock Operation

Tussock Operation

- Deep Creek Otago
- 10,595 Hectares
- Last worked July 2009
- Price $35,000 = $3.30/ha

Operational inputs comprised of:

- Cyanide paste and Feratox™
- Traps

Area description

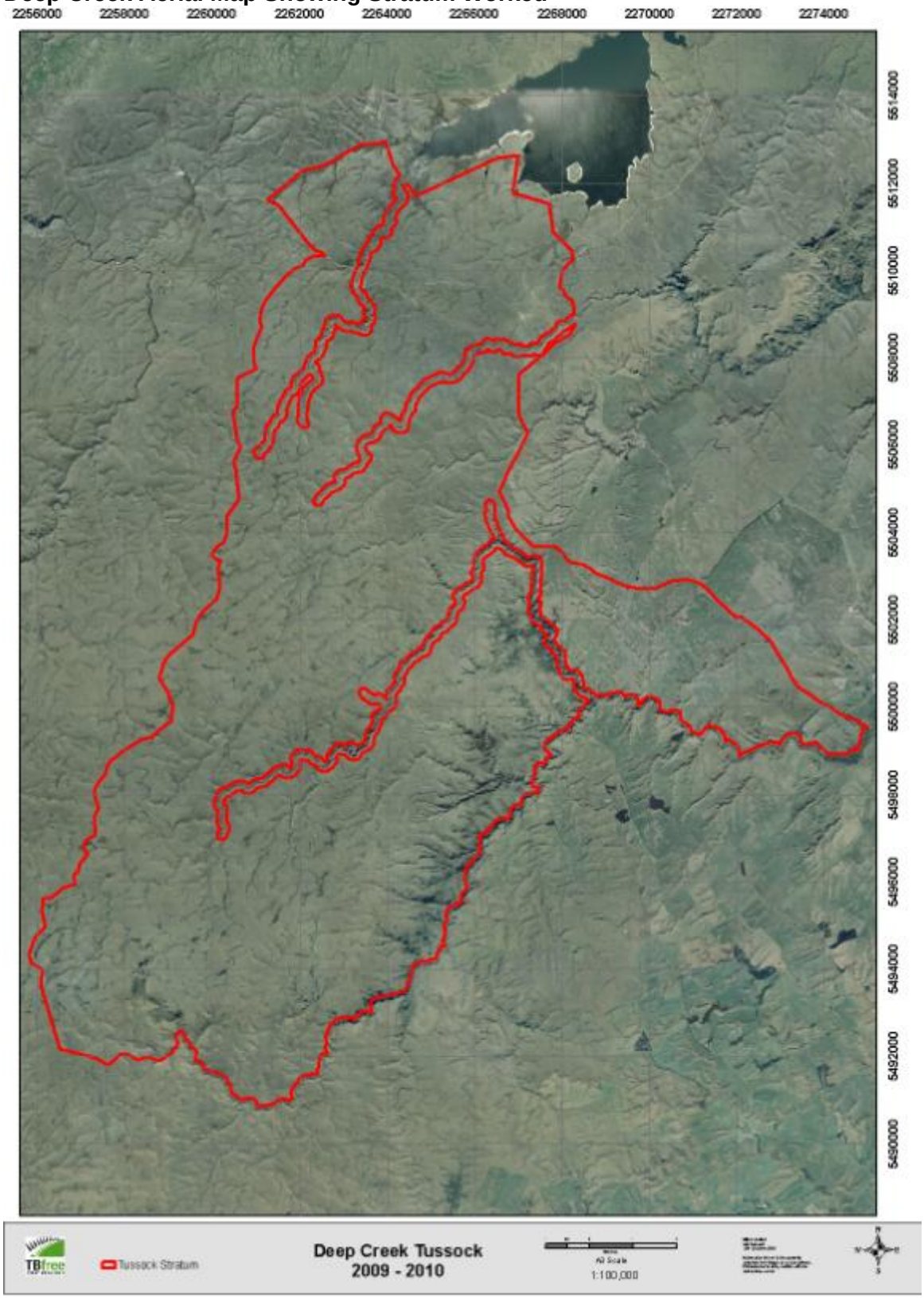
Possum habitat consists primarily of tussock stream margins, scrubby matagouri gullies and the vegetative cover around rock tors which provide suitable possum den sites.

Large expanses of this stratum can yield few possums whilst productive gullies can hold significant pockets of animals. This heterogeneous animal distribution presents a risk of failure for performance based contracting.

Access into these areas is often problematic with significant areas having to be accessed on foot.

Deep Creek Tussock Habitat

Deep Creek Aerial Map Showing Stratum Worked



11.5 Kumara aerial and initial ground control

Input Aerial Operation

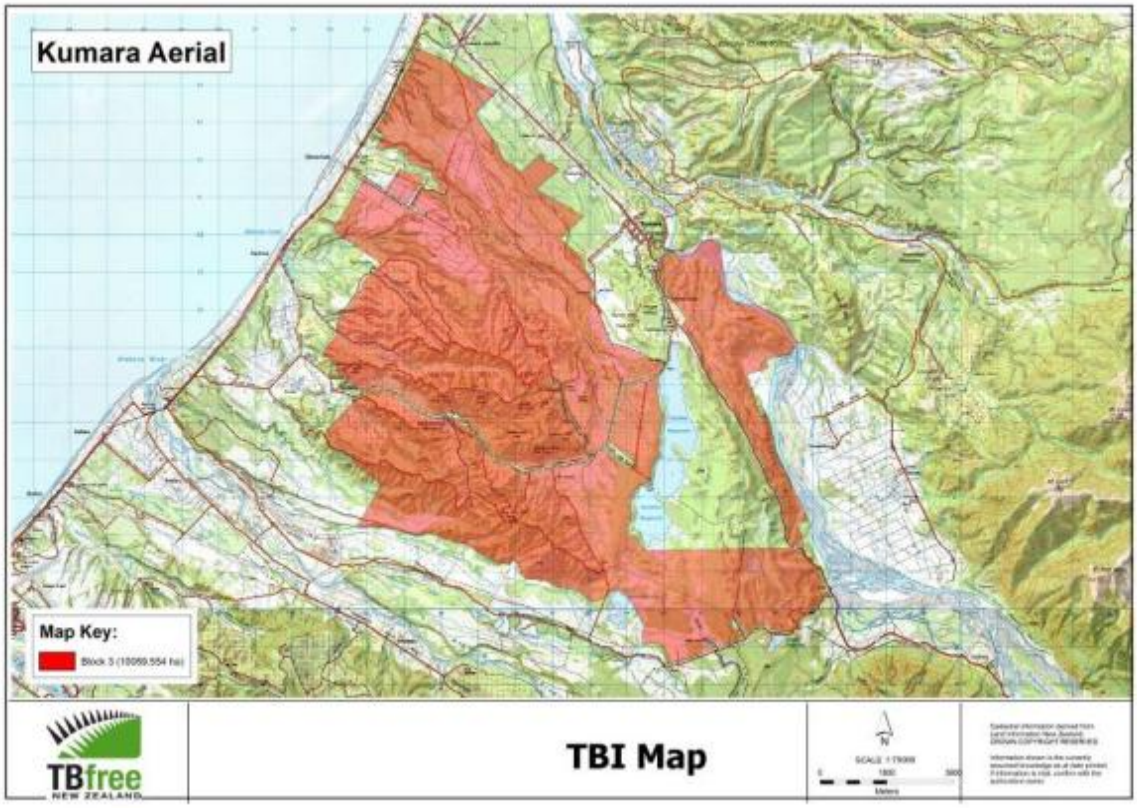
- Kumara: Westland
- 10 059 Hectares
- Flown, Initial : June 2008
- Price $230 599 @ $23/ha

Operational inputs comprised of:

- 1080-impregnated baits at 0.15% 1080.
- No. 7 cereal baits should be used,
- Toxic application rate should be at a minimum of 2.5kg per hectare.
- The toxic application must be preceded by a single pre-feed with non-toxic bait, at a minimum of 2.0 kg per hectare (cereal).

Area description

Kumara aerial block is an undulating stretch of country consisting of 20% exotic forest and low lying inaccessible swamps. The area has in the past been subject to some clear felling and has secondary native growth existing in about 80% of the block. Whilst relatively flat this block consists of thick scrub and low lying wetland/swamp. It makes ground accessibility and coverage very difficult.



Kumara Block 3; Input Initial Ground Operation

Outcome Management Services

- Kumara: Westland
- 1105 Hectares
- Initial : June 2008
- Price $93 273 @ $84/ha

Area description:
Block 3 is an extension of the aerial block. This area was removed from the aerial in an attempt to gain public acceptance to the aerial operation. It had never been done before and was considered as an initial control.

Operational inputs:
The Board undertook a commitment to deliver a ground control input contract that would mimic as close as possible the results of an aerial.
As a result the design of the control in this block was extremely intensive, which was necessary to achieve the coverage that would normally be delivered by an aerial operation. In order to achieve the required coverage block 3 was divided into three sub blocks.
This made the delivery of the intensive input specifications manageable. Please refer to map 2 below.

Individual sub block input details are listed:

1. BLOCK ONE

Tracks will be cut and marked on a grid bearing of 270 degrees.

The tracks will be spaced at 100m intervals
Flower pots will be erected at 70cm height at 20m intervals
Two pre-feed applications at 7-10 day intervals will be carried out
One application of encapsulated cyanide paste will be applied to all pots
The pots will be detoxified a week later

2. BLOCK TWO

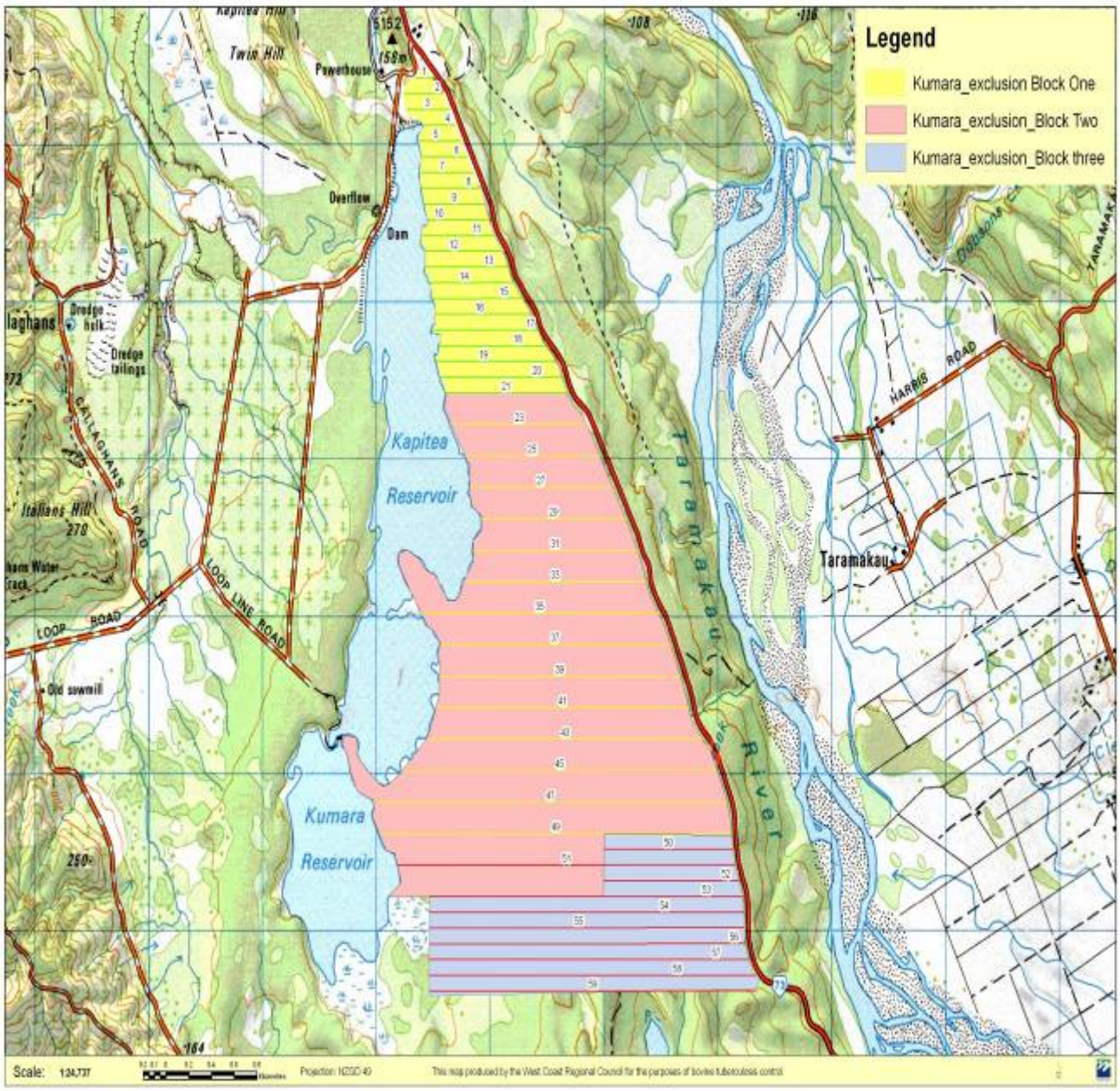
Tracks will be cut and marked on a grid bearing of 270 degrees.
The tracks will be spaced at 200m intervals
Flower pots will be erected at 70cm height at 20m intervals
Two prefeed applications at 7-10 day intervals will be carried out
One application of encapsulated cyanide paste will be applied to all pots
The pots will be detoxified a week later

3. BLOCK THREE

Tracks will be cut and marked on a grid bearing of 270 degrees.
The tracks will be spaced at 100m intervals
Flower pots will be erected at 70cm height at 20m intervals
Two prefeed applications at 7-10 day intervals will be carried out
One application of encapsulated cyanide paste will be applied to all pots
The pots will be detoxified a week later

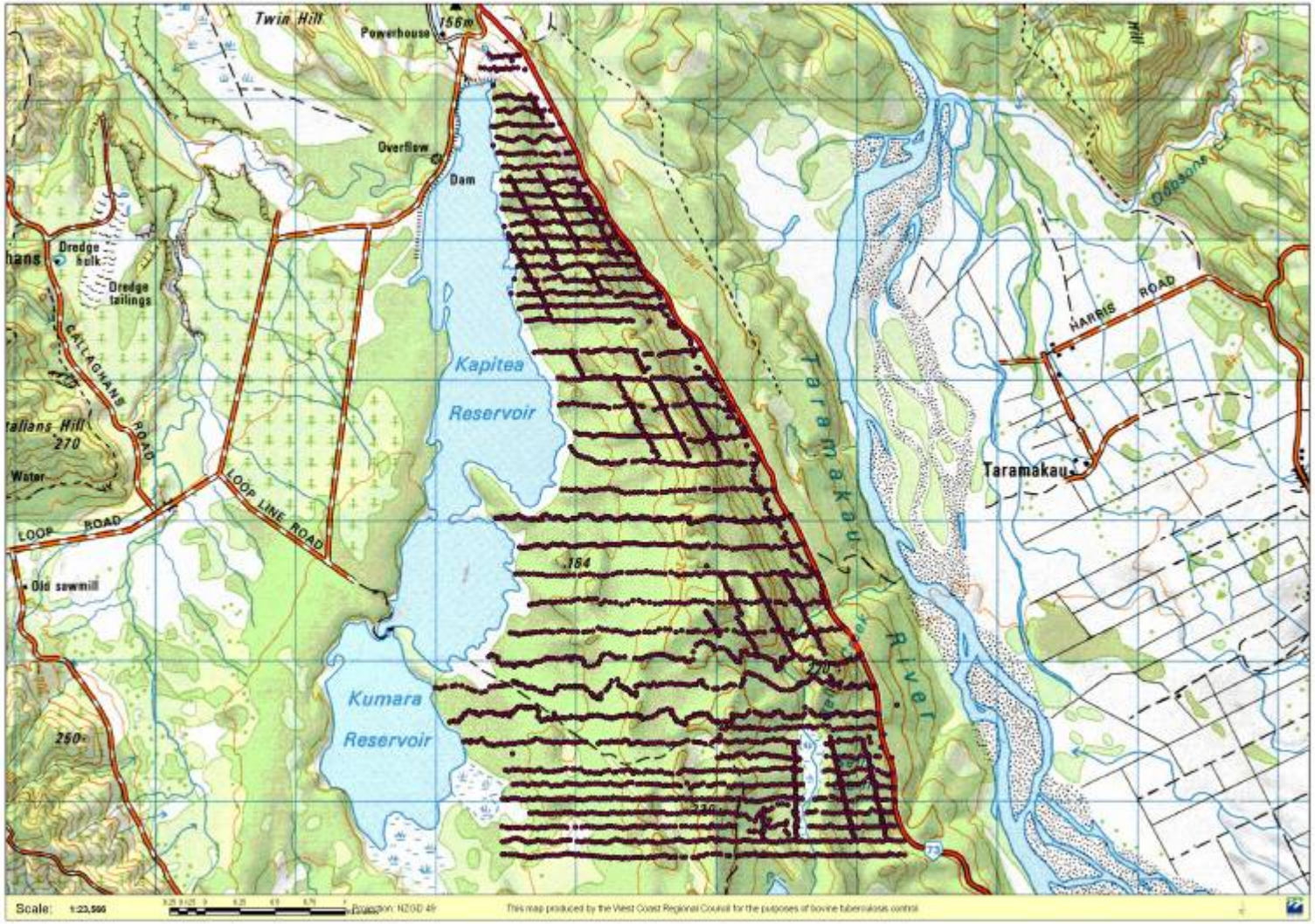
The following resources were used for this operation:

- 1,000 Victor #1 leg hold traps and running boards
- 40 Cage traps
- 5 Timms kill traps
- 10,000 flowerpot bait stations
- 300 Philproof bait stations
- 10,000 poison bait bags
- Toxins, (1080 paste, Cyanara paste, Feratox pellets, Cholecalciferol



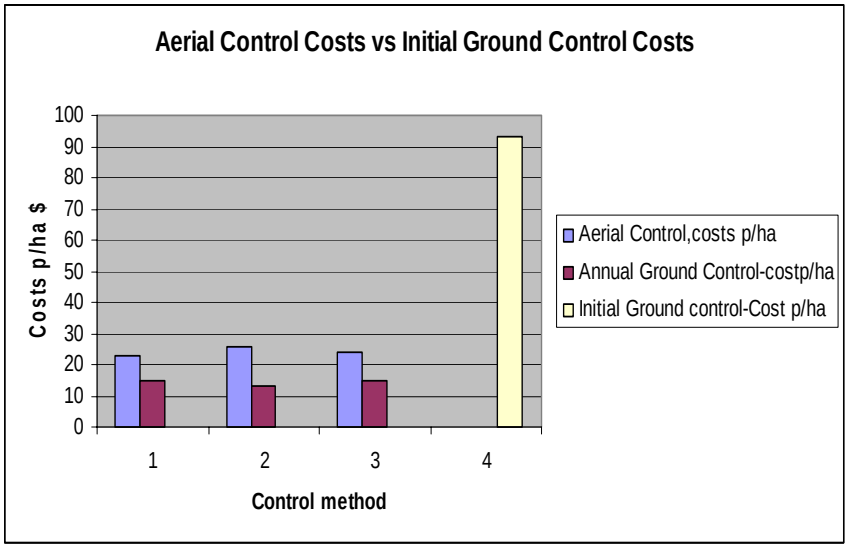
Map 2: Input specifications kumara Block 3 ground Control

Block 3 Actual Pot line coverage, attempting to effect similar Aerial coverage



Together with the above specifications the following inputs were required

- **CARCASS RECOVERY AND MONITORING**
  - Possum carcasses were removed from open pastures, roads, public walking tracks and public areas.
  - Any suspect or TB infected possum carcasses will be recovered, and their position will be GPS'd and forwarded on to PM for post mortem.
  - Carcasses decomposition sites were set up monitor the breakdown of carcasses within the site.
  - These decomposition sites will be GPS'd and their coordinates supplied to the Programme Manager.



11.6 Chew Track Cards

11.6.1 Definition[22]

Chew-Track-Cards (CTCs) are a multiple species detection device specifically designed to cheaply map the distribution of low density small mammalian pests, principally possums but also rodents and other pest species. It is an interference device, left in the field for about a week, which identifies animals present by tooth impressions (and foot prints if ink is used) made as they investigate and consume bait material applied to the cards. Presently the standard design is a 9 x 18 cm card made of 3 mm white plastic coreflute. Attractant bait is applied to the internal channels at either end of the card (photo 1) using (5:1 smooth peanut butter and icing sugar plus 10% by volume lucerne chaff or honey). Cards are applied to tree trunks, 30 cm above the ground.

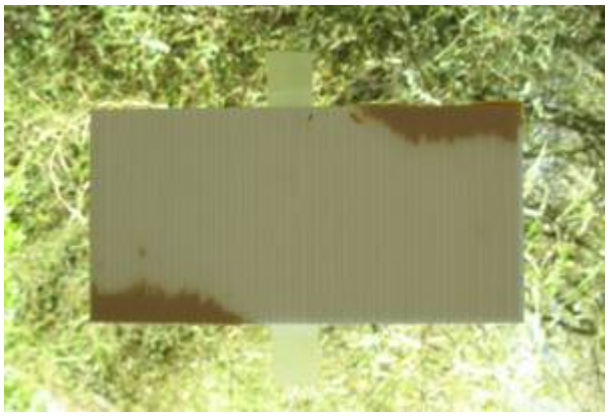


Photo 1. Bait placement on a CTC.

Photo 2. A CTC mounted on a tree

Possums usually extensively chew and crush the card margins.

11.6.2 Economic Implications

The Chew Track Card system was developed mainly for pure research so that a low-cost method could be used to detect possums, especially at ultra-low density. Initially it did not have commercial value since up until recently the commercial need was simply to knockdown possums from their initial uncontrolled densities. However as much of the country has now come under pest control, and needs have changed from control to eradication, techniques are now required to efficiently target remaining 'hot-spots' in blocks with ultra low density of possums.

The Chew Track Card system is an example of pure research being transferred to the practical realm as needs change and the sector has evolved from using relatively crude 'knock-down' control methods which tolerates a low density of possums, to targeting eradication of all possums from a block.

[22] Adapted from Landcare Research at http://www.landcareresearch.co.nz/research/research_details.asp?Research_Content_ID=263

12 Attachment Four: Background to Bovine Tb

12.1 Bovine Tb

12.1.1 The wasting disease

Tuberculosis (Tb) and its animal equivalent Bovine Tb are chronic bacterial infections known from antiquity as consumption or the 'wasting' disease. Severe infections cause lesions in the lungs and lymph nodes which severely limit physical activity and prior to medical developments in the early to mid 20th century, the disease was little understood and largely untreatable.

12.1.2 Causes of Tb

Tb is spread from animals and humans living in close proximity and coming into contact with bodily fluids of infected animals, such as aerosols, saliva, blood, milk etc:

> *Tuberculosis (TB) is an infectious disease of both animals and humans. It is caused by three specific types of bacteria that are part of the Mycobacterium group: Mycobacterium bovis, M. avium, and M. tuberculosis.*
>
> *Bovine TB, caused by M. bovis, can be transmitted from livestock to humans and other animals. No other TB organism has as great a host range as bovine TB, which can infect all warm blooded vertebrates. M. avium can affect all species of birds, as well as hogs and cattle. M. tuberculosis primarily affects humans but can also be transmitted to hogs, cattle, and dogs.*
>
> *Bovine TB has affected animal and human health since antiquity. Once the most prevalent infectious disease of cattle and swine in the United States, bovine TB caused more losses among U.S. farm animals in the early part of this century than all other infectious diseases combined. Begun in 1917, the Cooperative State-Federal Tuberculosis Eradication Program, which is administered by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), State animal health agencies, and U.S. livestock producers, has nearly eradicated bovine TB from the Nation's livestock population. This disease's presence in humans has been reduced as a result of the eradication program, advances in sanitation and hygiene, the discovery of effective drugs, and pasteurization of milk.*
> Source: USDA 2009

Bovine Tb can infect humans, but pasteurisation, sanitary practices and eradication from domestic animals mean that cases are rare in the absence of immune suppression. Incidence is 0.3 per 100,000 (3% of human Tb infections), where infection from aerosols from coughing and sneezing is generally considered the highest risk (NZFSA 2009).

Figure 11.2 depicts dead tissue in the lungs resulting from Bovine Tb:

Figure 11.2: Lesions in cattle lungs due to Bovine Tb

Source: Michigan Department of Agriculture[23]

12.1.3 Economic impact of Bovine Tb

The historic impact of Bovine Tb on animal production and on disease in humans has led to the current control protocols of surveillance and culling. In brief the economic impacts are:

1. Lost production
   Infected animals lose condition and associated loss of production is estimated to range from 4% to 17%, as found by measuring milk production in skin-test positive versus negative animals in a herd (see Hermandez et al 1998, Boland et al 2010 and Rahman et al 2008).

2. Infectious transmission
   Transmission within a herd is mainly from aerosols, and close contact for extended periods increases transmission risk. One study found a 22% infection rate when calves were housed with infected animals for a 7-11 week period (ISG 2007). Due to its infectious nature, the risk of one infected animal lowering production throughout the whole herd would appear to justify the economics of culling Reactors, apart from other risks, such as reduced consumer demand, trade ban, and risks to human health.

3. Human infection
   The disease is rare in healthy people, since they seldom come into contact with infected animals or food, and vaccination confers some immunity.

12.1.4 History of controlling Bovine Tb

12.1.4.1 Human Tb in the early 1900s

In the 1900s it was estimated that 10% of all human deaths were due to Tb, and of that 5% - 10% was due to Bovine Tb, mainly caught from raw milk. The wasting nature of Tb also incurred costs to run Tb sanatoriums, and reduced the potential of sufferers to contribute both economically and socially.

12.1.4.2 The rights of 'consenting consumers' in the UK

At the turn of the century (1900) many farmers had moved from crops into dairying and by the 1930s it was estimated that 24%-40% of UK cattle were infected with

[23] See http://www.michigan.gov/emergingdiseases/0,1607,7-186-25804-76372--,00.html

Bovine Tb. Awareness of the problem, and the advent of the Tuberculin test and pasteurisation in the 1920s led to debate as to the preferred control measure, with voluntary schemes preferred such as Tuberculin tested milk, since testing was deemed to be less controversial than pasteurisation.

It was not until the 1950s that human exposure to Bovine Tb was controlled when pasteurisation of milk became almost universal (compulsory in Scotland in 1983), and compulsory control of Bovine Tb was started in the 1960s (see reviews by Waddington 2004 and Smith 2000).

It is interesting to note that the UK's anti-pasteurisation lobby still advocates for the rights of 'consenting consumers' to have access to un-pasteurised milk (Smith et al 2000).

12.1.4.3 An impossible task in the US

By contrast Bovine Tb in US cattle was less advanced than Europe, and in 1900 it was estimated that 5% of US dairy cattle were infected, and 2% of range cattle.

In contrast to the voluntary approach in the UK, the US State and Federal governments actively sought to combat this disease. In 1917 compulsory Tb controls were started and in 1941 all US counties were declared Tb free. The programme slaughtered 3.8m cattle out of a nominal total herd of 66.4m, and it is said that the cost savings in terms of lost productivity and value at slaughter were estimated to be 10:1, relative to the costs of control and compensation. The control programme combined with compulsory pasteurisation of milk in 1936 reduced death due to Bovine Tb from 20 per 100,000 in 1900, to virtually zero by the 1940s (see Olmstead et al 2004).

12.1.5 Approach to control of Bovine Tb

The standard approach to controlling Bovine Tb used by most developed countries and nominally specified by the World Organisation for Animal Health (OIE) is:

1. Surveillance
   A routine programme of herd testing is used to detect infected stock. The frequency of testing is determined by the risk of Tb infection, and in New Zealand ranges from annual or higher testing in high risk areas to triennially in low-risk regions.

2. Quarantine
   Movement controls are used to restrict the movement and management of herds with a high risk of Tb, including re-testing where movement is allowed.

3. Cull
   Once the test is confirmed reactors are slaughtered. New Zealand pays compensation at a rate of 65% of market value for most cattle but up to 100% for some dairy cattle. Deer farmers carry their own cost, and the deer industry's contribution to AHB is appropriately adjusted.

4. Detect at slaughter
   Slaughter houses are required to have the capacity to detect and report any Tb in animals sent for normal slaughter. This acts as a fall-back system if there is failure in the primary surveillance programme.

Where Tb has become established in wildlife additional controls are required:

1. Control wildlife vectors
   A surveillance and control programme for vectors is required where wildlife vectors are infecting farmed animals.

2. Prevention
   The UK is currently developing a modified BCG vaccine (similar to the BCG vaccine used in humans) for both cattle and badgers (DEFRA 2009), and New Zealand is investigating the feasibility of using vaccines to control Tb in possums.

Treatment by drugs is generally not favoured in most developed countries and illegal in some, due to the risk to humans from drug-resistant strains developing. In additional animals remain infectious for a long time after the cure is started with the risk of re-infection (CFSPH 2007).

12.1.6 Eradication programmes

There have been long-standing programmes in most developed countries to eradicate Bovine Tb from domestic animals using slaughter and quarantine methods. These have largely been successful with many developed countries now declared Tb free.

However reservoirs of Bovine Tb in wildlife are causing concern in some jurisdictions, as indicated in table 11.1.

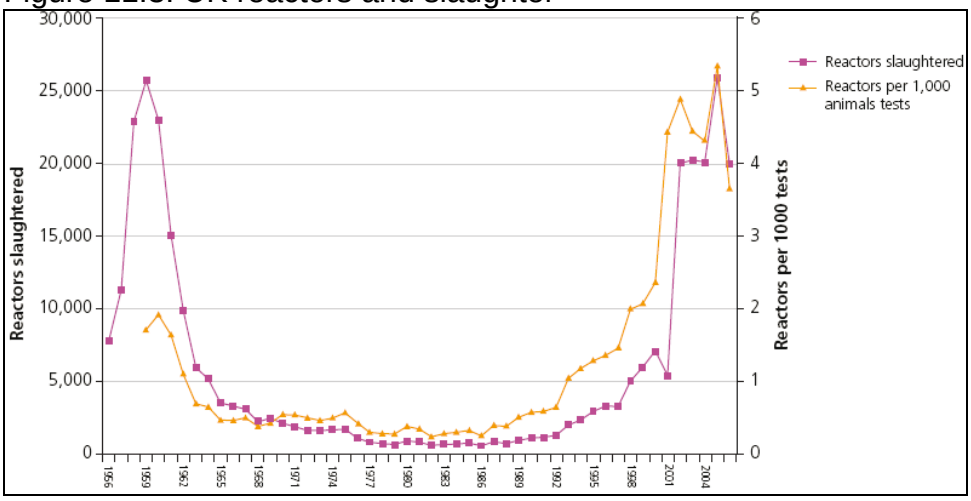
Table 11.1: Wildlife infection by jurisdiction

Jurisdiction	Wildlife vector	Cattle Reactors slaughtered	Source
UK	Badger	34,765	DEFRA 2009 stats
Ireland	Badger	24,000	EIRE 2007
New Zealand	Possum and ferret	986	AHB 08/09
Michigan USA	White tailed deer	31	Estimate based on Michigan 2010

12.1.6.1 UK

Bovine Tb in West and South-West UK is approaching epidemic levels, and is compounded by differences in view on the cause and the solution, such as the role of the badger, changing farming practices, and causes related to outbreaks of BSE and foot and mouth (ISG 2007 and House of Commons 2008). Figure 2.3 illustrates the evolution of Bovine Tb over time.

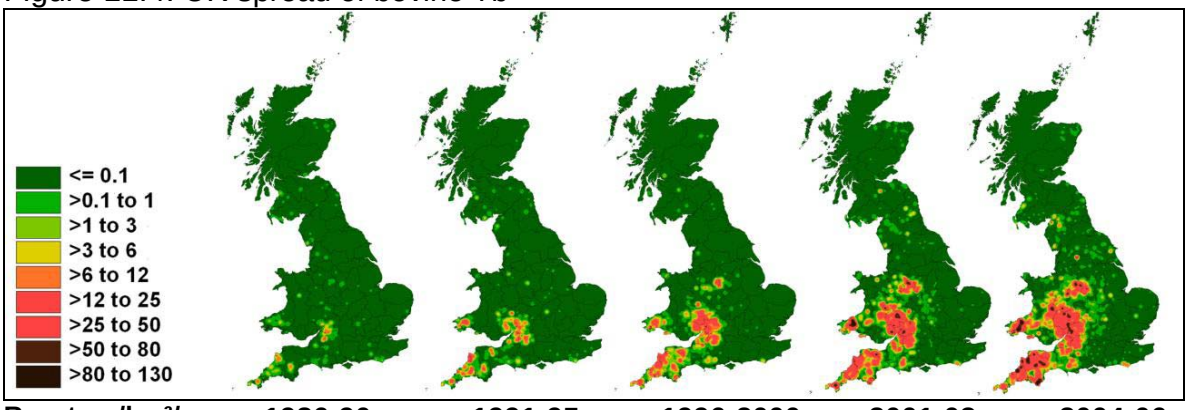
Figure 11.3: UK reactors and slaughter



Source: ISG 2007

Figure 11.4 illustrates the geographic spread of Tb throughout Britain from 1986, indicating the failure to control the disease spreading from the 'hot-spots' in the South and South West. To be noted is a ten-fold increase in wildlife population such as badgers and moles from 1993 to 2003[24].

Figure 11.4: UK spread of bovine Tb



Source: DEFRA 2009

In response the UK Department of DEFRA has outlined a strategy involving vaccination for both wildlife and cattle, in addition to revised control standards. However the culling of badgers, as the main wildlife vector, remains controversial.

12.1.6.2 Ireland (Eire)

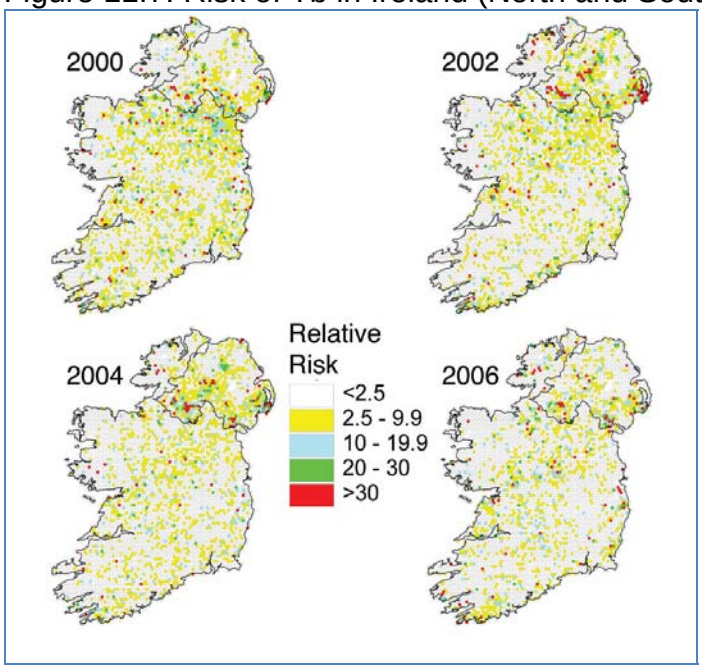
Eire has an endemic Tb problem and has been slaughtering approximately 24,000 Reactors per annum from 1960 to the present day, or 0.4% of the total herd. Eire complies with EU directive 64/432/EC which requires at least annual testing (relative to risk) and pre-movement testing for export. However despite using 1.44 Tb tests per annum per animal, the problem persists, due to wildlife vectors, principally the badger. In 2002 the culling of badgers in selected areas was initiated with a dedicated wildlife unit (See DAFF 2007), despite the badger's status as a native

[24] See BBC: http://www.bto.org/research/reports/researchrpt_complete/RR404_BBS_mammal_report.pdf

animal. As in the UK the culling of badgers is controversial and an alternative control is preferred.

However while Eire's Tb problem persists, it is not growing unlike the situation in the UK. Figure 11.7 presents the evolution of Tb risk throughout the island, where there is some evidence that the more intense measures being applied in the South are more successful than in the North.

Figure 11.7: Risk of Tb in Ireland (North and South)



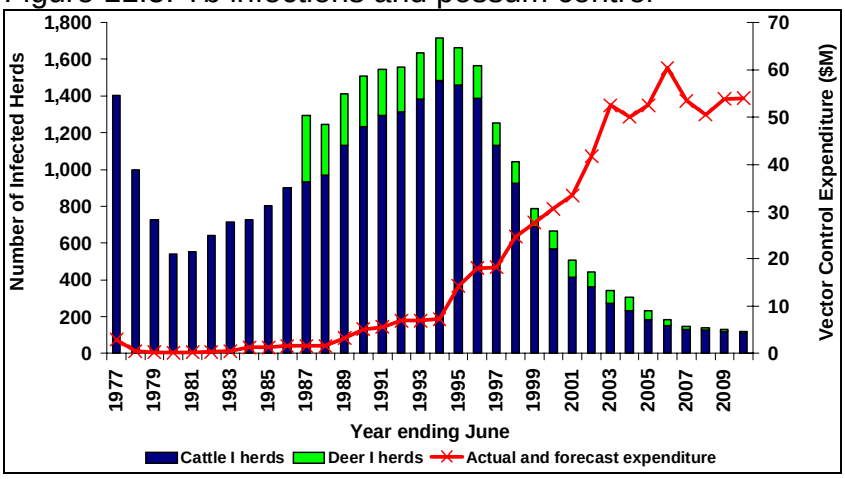
Source: EIRE 2009

12.1.6.3 New Zealand

Bovine Tb in New Zealand is now endemic in possums and ferrets to a lesser extent, and is sustained by high density living, such as possums in excess of 2/ha (AHB pers. comms.). This also results in secondary infestation in feral populations of deer, pigs and goats.

Figure 11.5 illustrates how the relaxation of controls during the 1980s led to resurgence in the disease which started to abate when controls were reinstated over the 1990s. The target of Tb Free status by 2013 appears to be well within grasp and the AHB is now looking to eradicate Tb from wildlife.

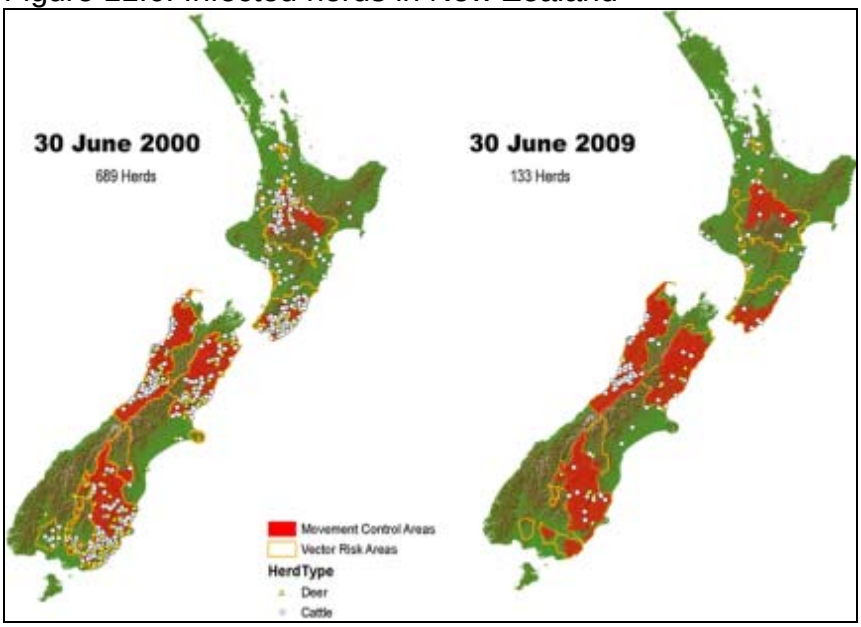
Figure 11.5: Tb infections and possum control



Source: AHB

Figure 11.6 indicates the geographic spread of infected herds and their association with Tb in wildlife. As vector control becomes more successful an increasing % of Tb infection is related to recrudescence where the disease reappears after many years and movement of animals out of Tb risk areas, where movement testing has failed to detect the disease.

Figure 11.6: Infected herds in New Zealand

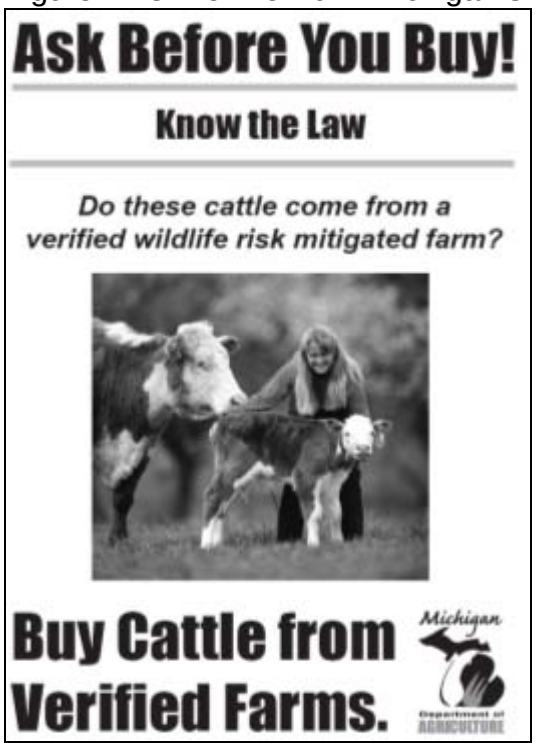


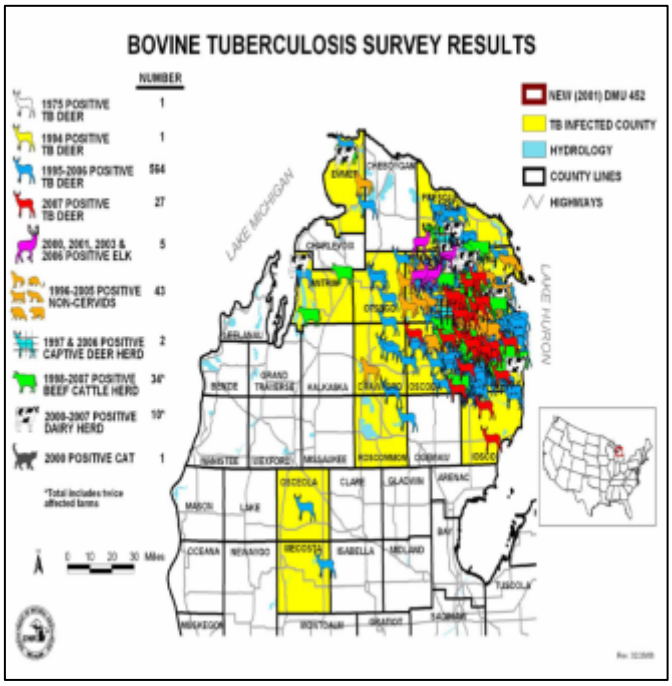
Source: AHB

12.1.6.4 Michigan

In 1917 it was estimated that 1 in 20 cattle slaughtered in Michigan had Bovine Tb and the disease was having a serious impact on cattle and humans. A test and slaughter control was started which was restricted from the 1950's to tracing infected animals detected at slaughter. In 1974 Michigan was declared Tb free but in 1994 Tb was found in feral white tailed deer, linked to human feeding of the feral animals, and infecting farmed animals. Controlling this wildlife reservoir is said to be complicated by the strength of the hunting lobby and the presence of private militias in this region (MI 1998). Figure 11.8 presents a poster and incidence map from Michigan.

Figure 11.8: Bovine Tb in Michigan since 1975





Source: MI 2007

12.1.7 Surveillance

The history of Tb control in the UK and New Zealand suggests the importance of ongoing surveillance and control, especially when the disease appears to be waning. However a surveillance regime is expensive and needs to be targeted at the risks considering the costs and the ability to detect Tb. The tuberculin skin test is the primary screening test used since it is economic given its unit cost and accuracy. It involves injecting Bovine Tb antigens under the skin and then examining after an incubation period for swelling which nominally indicates the animal has been exposed to Bovine Tb. However this is complicated by:

1. Interference
   Other species of *Mycobacterium* which are not as infectious as *M. Bovine* can interfere with the test. For instance *M. Avium subspecies paratuberculosis* is said to be responsible for a rise in deer reactors in recent times.

2. Recrudescence and anergic animals
   If the immune system is suppressed due to stress, birth, infections (including Tb), etc, then antibodies do not form in a detectable manner, and the animal is termed anergic. Hence while the bacterium is present, the disease remains undetected, but can arise many years later. There is a recent example reported by the AHB of recrudescence where Tb has reappeared 10 years after the herd was known to be infected, and the herd was not subject to age related depopulation (AHB 08/09 annual report).

As a result, the tuberculin skin test has the following performance (DEFRA 2009):

1. Sensitivity: 80%
   20% of animals with Tb are not detected. This performance can be improved by using a more sensitive and expensive test, or adjusting the skin test parameters, but the latter causes an increased likelihood of non-infected Reactors being culled. In areas of high Tb risk, re-testing using a more expensive and sensitive blood test can be used to confirm negative Reactor status.

2. Specificity: 99.9%
   1 out of 1,000 Tb free animals are identified incorrectly as having Tb. This performance can be improved by re-testing using a more expensive and more specific blood test. To minimise the culling of otherwise healthy animals, approximately 97% of primary test Reactors are subject to a more specific and expensive blood test to confirm Reactor status.

Table 11.2 summarises the performance of the testing protocol in New Zealand and the UK.

Table 11.2: Confirming Tb in Reactors and at slaughter

Jurisdiction for cattle	Tb Control Spend	Animals (m)	Tests (m)	Reactors	Reactors with Tb	Tb detected at slaughter (% of total Tb)
UK cattle 06	£99m	9.8	5.5	19,963	38%	5%
NZ cattle 09	$79m	9.6	5.0	986	34%	32%
NZ deer 09	$4m	0.5	0.4	566	1%[25]	76%
Ireland 06		6.2	9.0	24,173		37%

Source: AHB 08/09 and DEFRA CVO 2006, DAFF 2007

We note the following:

1. Jurisdictional differences
   Both the UK and New Zealand apply OIE standards for surveillance and control of Tb. However there are major environmental differences such as the over-wintering of cattle, control policy on wildlife vectors, and outbreaks of other diseases (BSE and *foot and mouth*) which affect the epidemiology of Tb.

2. Detection of Tb in deer
   The low detection of Tb in deer Reactors and the relatively high detection of Tb at slaughter appears to be due to inference from a closely related bacterium which causes Johne's Disease, which raises the question whether the testing protocols are appropriately targeted.

3. Detection of Tb at slaughter
   We observe the difference in cattle detection rates between the UK and New Zealand, which is presumably due to different post-mortem protocols. In New Zealand slaughter houses specifically examine lung tissue for Tb, with an 85%

[25] We understand that *Mycobacterium avium* is common in deer, and interferes with the Tb tests and is probably responsible for the low rates of Tb in Reactors.

accuracy rate (AHB pers. comm.), whereas a different protocol appears to be used in the UK.

Based on the known failure rate of the tuberculin Tb test, we would expect 20% of Tb cases to be detected at slaughter, on a risk adjusted basis, compared to the 32% observed for cattle in New Zealand. The difference is probably explained by under-reporting of Tb in Reactors which has been observed in the UK (ISG 2007).

12.2 Vector control in New Zealand

Bovine Tb has been observed to spread approximately 3km/annum across deep bush, in one cases crossing the mountains of the Kahurangi National Park into Tasman, originally from infected cattle in the West Coast (pers. communication AHB), with possums acting as the host vector in this process due to their high density living arrangements. The spread of disease is said to be due to the migration by juveniles[26], or may also involve other more mobile species such as deer or pigs (who are infected from possum carcases or aerosols), since the spread over the mountains in the Kahurangi involves multiple catchments and some major rivers.

In the early 1990s a serious programme to control possums was started with the objective of controlling the disease in bush around farmed land by holding possum density beneath a Residual Trap Catch (RTC)[27] of 2% for 5 years, at which stage there is a 95% chance that Tb has been cleared.

In the 1990s possum density in 'virgin' forest was typically 40%-80% RTC determined primarily by food availability, and it was typical for aerial operations to reduce density to 5%-10% RTC, although results were variable and patchy. By contrast an aerial operation in 2010 typically achieves under 2% RTC, where results are even and reliable (AHB personal communication).

As a result of advances in the technology and economics of vector control, it is now possible to conceive of eradicating Tb from wildlife on a national scale. Offsetting these advances is a ground swell of public concern at past practices in aerial operations which were associated with by-kill and other risks.

12.3 Summary

Bovine Tb is a highly infectious disease which causes a wasting condition mainly caused by contact between cattle, deer and possums (known as Tb vectors). In addition to the loss of production, the disease is a threat in overseas markets. In 1998 the Animal Health Board (AHB) was appointed under the National Pest Management Strategy to achieve the international standard for Tb freedom, nominally to reduce herd incidence beneath 0.2%.

[26] Approximately 20% of juveniles migrate approximately 3-4km on leaving the nest
[27] 1 possum/ha is nominally equivalent to 5%-10% RTC