Funding the National Pest Management Strategy

5 July 2012

Final Report

A Principles-based Approach

MARTIN JENKINS

Preface

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This Report is issued pursuant to the terms and conditions set out in our Agreement for Services dated 23 March 2012.

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Review purpose

The key purposes of this review are to examine the current cost apportionment for funding the National Pest Management Strategy (NPMS or the Strategy) and to develop a principles based approach which is then applied to the allocation of NPMS costs and collection of NPMS funding.

The costs of the Strategy comprise direct costs (mainly disease control and associated administration costs) and indirect costs (vector control and all remaining administration costs).

Funding of direct costs

The approach that the Animal Health Board (AHB) takes to determining direct costs and how they should be funded is in our view appropriate and there is no need to change this.

Funding of indirect costs

The existing approach to indirect costs is based on a shared funding arrangement agreed in 2003. This involves sharing indirect costs between the Crown (50%), Regional Government (10%) and industry (40%). The industry share is further split between Beef 34.4%, Dairy 60.9% and Deer 4.7%.

There is scope to adopt a more principled approach to the recovery of indirect costs. We have had particular regard to the principles that those who benefit should contribute and those who give rise to risk, or are in a position to manage risk, should also contribute. These are two core funding principles and the Biosecurity Act requires that consideration be given to each in the context of funding the Strategy.

Allocation between beneficiaries and exacerbators

In determining the approach to allocating indirect costs, we have begun by considering economic theory and whether this provides guidance to determining the allocation of funding responsibilities between beneficiaries and risk exacerbators. In general, economic theory does not have much to contribute to the determination of funding shares in this regard, but reference to the Coase theorem provides some support for a 50/50 allocation between beneficiaries and exacerbators. We note, however, that the theorem also lends support to a negotiated approach to determining funding shares.

Funding contribution from beneficiaries

With respect to beneficiaries, the core principle of those who benefit should pay means that we have focused on measures which capture how much each category of beneficiary stands to gain (or lose) through the control of Tb. The economic benefits to industry that stem from the Strategy are particularly important in this regard. These include minimising the loss of

productive value and mitigating trade risks. In effect, the Strategy can be viewed as an insurance policy which guards against these type of potential economic loss and the very large costs that would need to be incurred were Tb infection levels to increase higher levels. Ideally a profit or GDP-based measure would best capture economic benefit, but more work is required to obtain the data needed to support the implementation of one or other of these measures. We recommend that this work be undertaken. As a second-best, either export earnings or farm gate earnings could be used as the basis for allocating funding shares between industry sectors.

In addition to the economic benefits arising from the NPMS and which accrue to industry, the Strategy also helps to protect biodiversity. This has value to New Zealand in general. The intrinsic value of biodiversity is not something that is easily measured and there has been only limited research in New Zealand (that we are aware of) on the value of biodiversity.

The approach to funding outlined in this report seeks to take into account the costs that the Department of Conservation (DoC) avoids in protecting biodiversity as a result of the NPMS. The figure used ($8.2 million) is a DoC estimate and in our view is a conservative estimate. Further work should be done to obtain a more realistic estimate of the cost saved. This work could also extend into costs saved by Regional Councils.

Funding contribution from exacerbators

We have also considered options for apportioning funding contributions between landowners (as exacerbators). Several land-based measures are considered. As noted above, the Strategy can be viewed as an insurance policy against the economic and other consequences of Tb. Consistent with this, landowners as exacerabators should fund the Strategy based on the area of land they have at risk of becoming a vector risk area under a no-intervention scenario. We have modelled the approach to allocating the exacerbator share of indirect costs using total land area as a proxy for this.

Other options

We have considered the option (Option 3 in the report) of funding the indirect costs associated with Tb containment along the lines outlined above and then funding the marginal costs associated with moving to eradication from exacerbators. Estimates provided by the AHB indicate that on an annual basis, the marginal costs associated with eradication are relatively small – in the order of $1.5 million – and, accordingly, we doubt that this order of magnitude warrants a change in funding approach. We recommend, however, that if at some later date the gap between control and eradication costs widens, Option 3 be revisited as a potential funding approach.

The last option we have considered (Option 4 in the report) establishes a framework for a more sophisticated approach to the determination of funding shares for beneficiaries and exacerbators. This option is much more information intensive and requires information and data

that, in some areas (eg biodiversity) do not exist and would require a substantial amount of work to generate.

1. Introduction

Context

A revised National Bovine Tuberculosis (Tb) Pest Management Strategy (NPMS or the Strategy) came into effect on 1 July 2011. Over the period to June 2026, the NPMS aims to eradicate Tb from wild animals over at least 2.5 million hectares of Vector Risk Area (VRA) and continue freedom from infection in vectors in existing Vector Free Areas (VFAs). The revised strategy is aimed at continuing to protect the reputation and value of New Zealand's dairy, beef and dairy exports.

There is a requirement on the Animal Health Board (AHB) when proposing changes to the Strategy to specify how costs are to be funded. In its proposal (submitted in September 2009), the AHB proposed that funding arrangements that existed at the time be carried forward for the revised Strategy. Those arrangements reflected a negotiated outcome between relevant funding stakeholders rather than any particular formula or model.

Review Purposes

The Representatives Committee of the AHB has agreed that it is timely to undertake a review of funding arrangements. A Working Group of the Representatives Committee has commissioned the review, the key purposes of which are to examine the current cost apportionment for the Strategy and to develop a principles based approach which is then applied to the allocation of NPMS costs and collection of NPMS funding. To this end, the review is intended to develop proposals that:

- Allocate costs to funding parties in an economically efficient, transparent and equitable manner which is in accordance with the funding principles set out in section 61 of the Biosecurity Act (the Act)
- Provide for the efficient and secure collection of funds over the term of the proposed Strategy having regard to the requirements of section 69 (2) (b) of the Act (these require there to be sufficient funding for the Strategy in order for it to be approved)
- Provide a robust logic and rationale for allocation of the total cost of the NPMS between the public sector and industry
- Provide a robust logic and rationale for allocating the total industry share of Strategy costs between the beef, dairy and deer industries
- Consider the rationale for a contribution of Strategy costs by landowners in regions and the collection of this contribution by local authorities.

The focus of the review is on how the Strategy is funded. It is not within the scope of the review to assess the objectives, duration, rules or total cost of the NPMS.

Report outline

Beyond this introductory section, the report is divided in to a further five sections as follows.

- Section 2 provides an overview of existing funding arrangements. It summarises current funding contributions and fluctuations in contribution over recent years.
- Section 3 outlines the approach we have taken to the review. It includes a description of the funding principles and framework that we have had regard to in framing the funding options covered in this report.
- Section 4 focuses on the direct cost elements of the NPMS. It assesses the scope of disease control and administration costs that currently comprise direct costs and assesses the need for any change in this regard.
- Section 5 of the report focuses on indirect costs (primarily vector control costs). It presents and assesses three main options for how these costs could be apportioned between industry and the public sector and it also assesses options for the intra-industry apportionment of indirect costs.
- Section 6 summarises our work and provides recommendations for the way forward.

2. Current funding arrangements

Current funding is provided from a combination of Crown, regional and industry sources. The industry funds the direct costs of disease control (together with associated administration costs), and all parties fund the more significant vector control programme costs. The table below shows the funding for the year 20010/11.

Table 1 Funding for 2010/11

SECTOR CONTRIBUTIONS 2010/11, EXCLUDING INTEREST ($000)

Sector	Cattle levies	Industry grants	Crown funding	Regional funding	Other income*	Total
Deer		1,914			11	1,925
Beef	18,646				77	18,723
Dairy	8,880	14,511			84	23,475
Crown			28,812			28,812
Regions				5,842		5,842
TOTAL	**27,526**	**16,425**	**28,812**	**5,842**	**172**	**78,777**

*Other income includes reactor proceeds, gains on disposal of assets and animal identification scheme income.

Regional councils continued to provide funds for the local share of the wild animal control programme costs, according to the funding formula agreed in the development of the National Pest Management Strategy.

In Otago, the regional share of wild animal control was partly funded by Otago Regional Council. The balance of the Otago regional share is funded by a levy on occupiers of rural landholdings, under the Biosecurity (Bovine Tuberculosis – Otago Land Levy) Order 1998 and 2004 Amendment.

Source: Animal Health Board Annual Report 2010/2011

The Crown contributes 50% of the vector control and related administration costs. This funding is appropriated in Vote: Primary Industries (Control of Tb Vectors) on an annual basis. The Government (via Ministry for Primary Industries) has given a commitment to provide $30 million per year through to 30 June 2015. No commitment has been given past this point.

Regional funding has been set by agreement at 10% of the vector control and related administration costs. Individual regional councils are invoiced based on the vector control programme costs for each region. The vector control programme costs for a region vary year on year depending on the stage of the programme in that region. Regional councils collect funding from landowners within their individual regions through rates, with the exception of Otago. Regional councils have voiced concerns about the year by year variation in costs they are expected to fund and the late notification of the coming year costs.

Otago landowners are invoiced directly (rather than through rates) for the vector control costs related to the Otago region. Individual landowner contributions are based on the land value of each property. Again, the nature of the programme creates variation between years.

Industry funds all the disease control costs and 40% of the vector control costs. Industry's contribution to funding is collected through a Cattle Levy of $11.50 per slaughtered head, a Milk Solids levy of 1.1 cents per kilogram of milk solids, a Venison Levy of 4 cents per kilogram and a Velvet Levy of 40 cents per kilogram. In addition, costs associated with Tb testing of deer are paid directly by the individual farmers.

Basis for funding

Direct costs associated with the Strategy are funded by industry (this is discussed further in section 4). Indirect costs (which mainly comprise vector control costs) are funded by the public sector and industry.

In 2003, an agreement was reached among the funding parties that the public sector (central and regional government) would contribute 60% of funding with the balance (40%) coming from industry (beef, dairy and deer). The public sector contribution was split 50% Government and 10% Regional Councils.

As we understand it, the 2003 Agreement resulted in the beef, dairy and deer industries agreeing to the fund the amounts indicated in Table 2. This then led to adopting the percentage shares indicated in the table and it is these shares that have applied since to determining the funding contribution from each of the three industry sectors.

Table 2 Sector funding agreement

Sector	$ contribution	Share
Beef	$8.8 million	34.4%
Dairy	$15.6 million	60.9%
Deer	$1.2 million	4.7%
Total	**$25.6 million**	**100%**

In recent years, there has been a reduction to the funding contribution from the deer industry amounting to $400,000.

Historical funding

The cost of the full programme has remained relatively consistent, aside from 2006, at around $80 million per year. Table 3 below shows the historical funding levels and their source.

Table 3 Historical funding sources

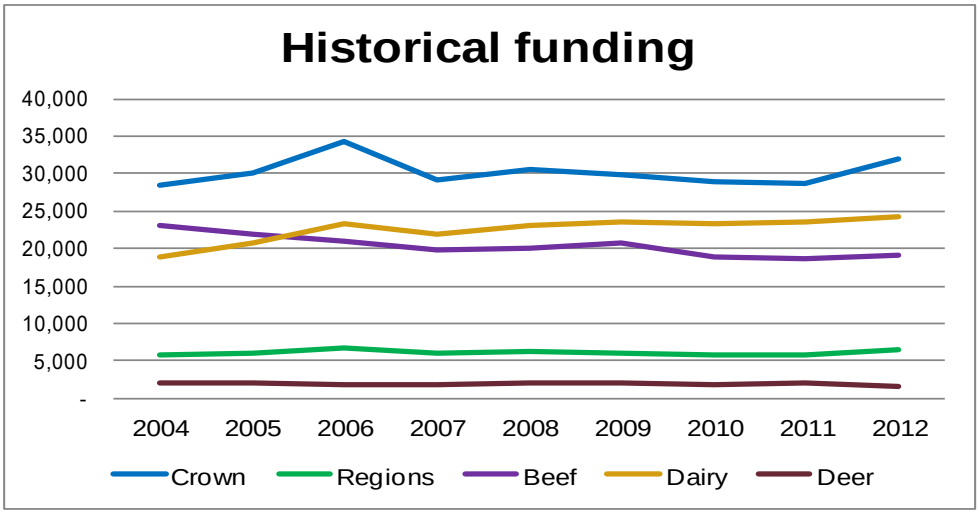
$000 Year\Sector	Crown	Regions	Beef	Dairy	Deer	Total
2004	28,512	5,873	23,138	18,772	2,036	**78,331**
2005	30,035	5,987	21,855	20,773	2,101	**80,751**
2006	34,222	6,710	20,963	23,440	1,799	**87,134**
2007	29,115	5,899	19,766	21,915	1,740	**78,435**
2008	30,671	6,256	20,027	22,991	1,977	**81,922**
2009	29,963	6,074	20,708	23,473	2,103	**82,321**
2010	28,923	5,865	18,990	23,441	1,735	**78,954**
2011	28,812	5,842	18,723	23,475	1,925	**78,777**
2012*	31,900	6,376	19,079	24,355	1,453	**83,162**

*Forecast

Source: Animal Health Board Annual Reports

The graph below shows that the only change in funding of significance is that the dairy sector is now the second largest funder after the Crown, having exceeded the beef sector contributions since 2005/2006. The funding from the dairy sector has increased from $19 million in 2003/04 to $24 million in 2011/12 while the beef sector contributions have decreased from $23 million in 2003/04 to $19 million in 2011/12.

Figure 1 Historical funding sources



Source: Animal Health Board Annual Reports

3. Approach to the review

The AHB requires a funding method that is equitable, transparent and economically efficient and that provides a rationale to support the funding contributions from the deer, dairy and beef industries, landowners, and public sector (regional/central government).

In undertaking this review we have taken a “blank-sheet” approach to review the existing costs and methodology from a principles-based perspective.

The approach we have taken has been to:

- Identify principles that should guide funding allocations
- Review the current costing and allocation model and categorisation of costs
- Develop and assess funding options (with particular focus on indirect costs)
- Model and assess the impacts of the options
- Recommend a preferred way forward.

Funding principles and criteria

In developing a principles based approach to the funding of the NPMS, we have taken a lead from the Biosecurity Act (sections 61 and 92) which sets out some key funding principles. The Act specifies that in setting levies to fund the NPMS, consideration must be given to two principles.

- Those who are likely to benefit from the NPMS should contribute to its funding
- Those who give rise to the need for the NPMS (exacerbators in the terminology of the Act) should also contribute to its funding.

In section 4 five of the report we consider the nature of the benefits that arise from implementation of the Strategy as this helps with identifying who benefits from the Strategy.

For the purposes of this review, exacerbators are deemed to be those harbouring the vectors. This includes landowners with vector habitat and the industry with animals carrying the disease.

Beyond the two core funding principles outlined above, there are other supporting principles to be taken account.

- **Efficiency** – this includes the efficiency of allocation, production and dynamics as well as the public good and private good aspect
- **Revenue adequacy** - the mechanisms used to collect revenues, collect the right amount and do not fluctuate markedly and generate surpluses and deficits for reasons outside the strategy

- **Equity** – funding allocations are fair. Fairness in this context means treating two individuals (or groups) that in like circumstances on the same basis. It also means avoiding placing an unreasonable financial burden on those that contribute funding to the Strategy
- **Transaction costs** - the collection mechanisms are maintained at a low cost level
- **Transparency and ease of understanding** - the method of allocation should be relatively easily explainable and the calculations should be clear and easy to understand
- **Flexible and adaptable** - as the programme costs change and the outcomes of the programme are achieved the methodology should remain viable.

Funding framework

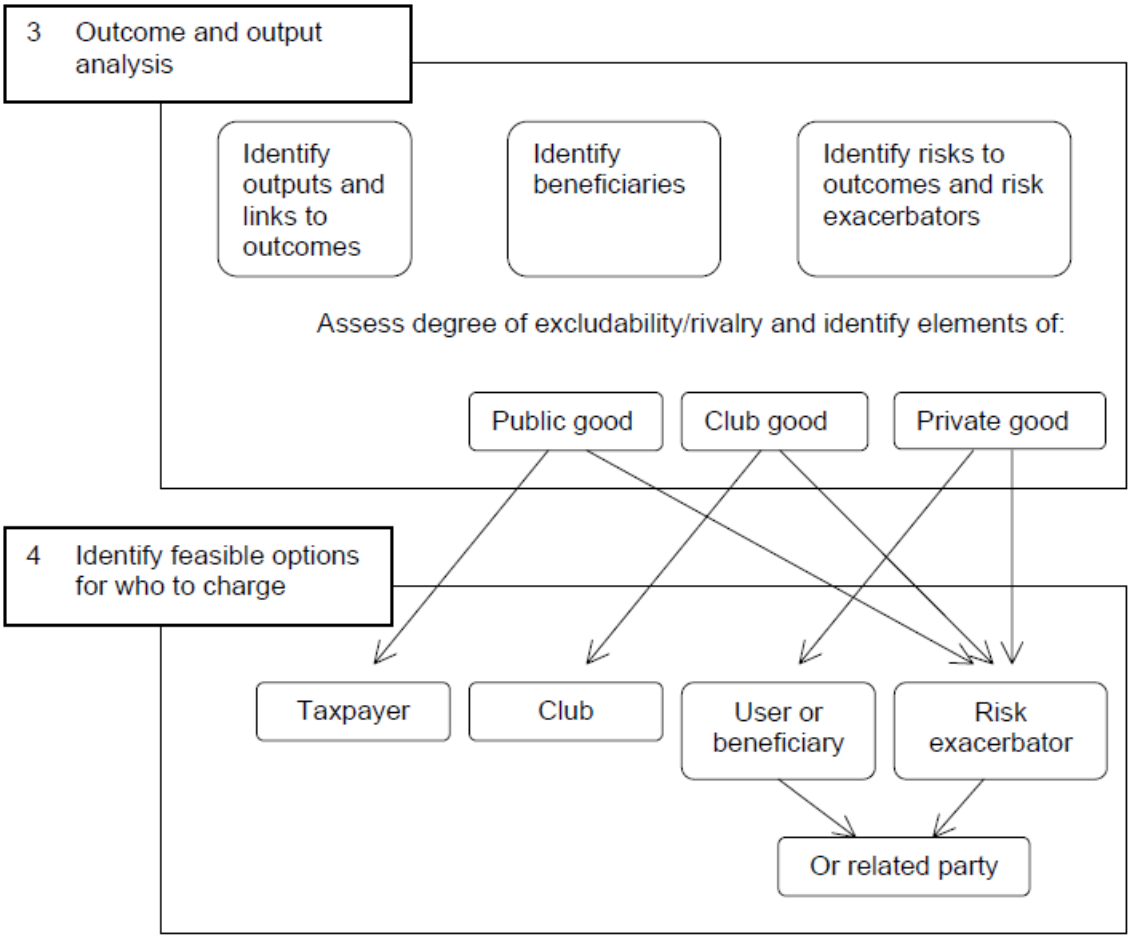
The principles described above go some way to determining how best to recover the costs of the NPMS. It is useful to also consider Treasury guidelines. The framework used in the Treasury guidelines is reproduced below.

In determining how to fund a good or service, the framework included in the Treasury guidelines examines the economic nature of the good/service. In brief, the framework points to the following funding arrangements.

- Those goods/services that have strong public good characteristics tend to be funded either by taxpayers or by exacerbators. Public goods[1] generally confer benefits that are widely felt and it is difficult to identify a specific user, or category of user, who gives rise to the need for the good/service. National security is usually cited as an archetypal example of a public good.
- Club (or industry) goods are those where there may be one or other of the formal characteristics of a public good present (non-rivalry or non-exclusion). Generally club goods are those which benefit a class of users but it is hard to identify a specific user as giving rise to the need for the good. Club goods tend to be funded by some form of levy that is paid by the class of users. The concept of club good is particularly relevant in the case of the NPMS.
- The third category is private good. These are characterised as having clearly identified users who both benefit from, and give rise to the need for, the good. Economic efficiency is best served by charging the user of that good directly for its provision.

[1] The formal definition of a public good is that it is non-rival in consumption (ie one person's consumption of the good precludes somebody else from consuming that good) and it is not feasible or sensible to exclude someone from consuming the good.

Figure 2 Funding Framework (Treasury Guidelines)



We have taken the Treasury funding framework and applied it to the range of activities that are undertaken under the umbrella of the NPMS. We have sought to assign each of the NPMS activities into one of the public, club and private good categories. In broad terms, this has assisted us in determining whether costs should be funded from industry (either in a private or club good context) or from central/local government (either in a public good or risk exacerbator context). Appendix 2 provides detail on the allocation of activities across the private, industry and public good spectrum.

The AHB's financial model

The AHB has a detailed financial model that captures the activities, and associated expenses, that comprise the NPMS. The model has been developed over a number of years. It records transactions, identifies and assigns costs to three main cost pools; disease control, vector control and administration. Appendix 1 describes the expenses included within each of these main categories. The cost pools are then allocated to either industry, central government or regional government based on cost drivers and stakeholder agreements.

Initially the model was developed using a spreadsheet. This model has now been incorporated into the AHB's financial system and is able to extract non-financial data to use as drivers to allocate costs.

We have undertaken a review of the structure in order to understand the composition of the costs and reviewed the allocation process of the existing funding arrangements. Although we have not sought to, or been required to, perform an audit of the model, our impression is that the model is robust and provides a good base from which to consider alternative funding arrangements.

For the purposes of this review, AHB provided a download of the financial data for the last 12 years and a budget for the coming year (2012/13), together with an allocation model in spreadsheet form. The allocation model utilised the source financial data and other manually loaded non-financial data to calculate the share of funding required from each funder.

In developing the allocation options required for this review we have utilised the existing model and financial information as the base and incorporated variables as appropriate.

The AHB has continuously reviewed the cost lines over the last few years, identifying the drivers, what activity they are associated with and the most logical funder. This has lead to refinements and greater clarity and transparency, and enables the cost pools to be split into direct and indirect costs.

For the purposes of developing and assessing funding options, we have used primarily the 2012/13 budget expenditure. We have also utilised historical financial information to assess the impacts of the proposed modelling options on the historical funding allocations.

4. Approach to funding direct costs

Description

Annual direct costs comprise mainly disease control costs (approximately $18.3 million) plus the administration costs incurred in supporting the disease control programme (approximately $1.5 million). Administration costs that support disease control comprise:

- Research and communications related to the disease control programme
- The costs of consultation with the industry through regional Tbfree committees
- A share of those costs related to the review of the NPMS and the national office running costs.

Research work related to disease control is identified within the research programme on an annual basis. The AHB have indicated that research expenses have remained relatively constant over the last few years.

The approach to funding the direct costs is, firstly, to attribute the costs to individual industry sectors using appropriate drivers, and then use the current funding mechanisms (mainly levies) to collect the estimated sector contribution.

Currently, the disease control costs are identified to the sector level and then the individual sectors consider how the costs are to be recovered from farmers within each sector. The dairy and beef industry sectors use levies and the deer industry sector uses a combination of levies and direct charging.

The key to attributing the appropriate level of costs to each sector is to apply the appropriate driver. AHB have reviewed cost lines with a view to identifying the key cost drivers having regard to the nature of the related activities such as animal numbers or reactor numbers. Time recording estimates are applied to personnel costs. Table 4 below shows the allocation drivers and sector impacts for the direct costs.

Table 4 Direct cost drivers

Description	Driver	Beef	Dairy	Deer
Admin Type Charges	Herd numbers	75.9%	19.8%	4.2%
Disease Control	Regional staff time estimates	57.2%	30.8%	12.0%
Laboratory	Number of laboratory tests	16.3%	66.5%	33.5%
Lab costs reactors - beef/dairy	Number of laboratory tests excluding deer	19.7%	80.3%	0.0%
Salaries disease	Staff time	62.7%	33.8%	3.5%
Disease excluding Deer	Actual testing programme	55.0%	45.0%	0.0%

Description	Driver	Beef	Dairy	Deer
Data Entry - Technical	Data entry count	60.6%	32.7%	6.7%
Call Centre Costs	Call centre records	39.0%	46.0%	15.0%
Reactor payments - Deer	Sector specific cost	0.0%	0.0%	100.0%
Reactor payments - Beef	Sector specific cost	100.0%	0.0%	0.0%
Reactor payments - Dairy	Sector specific cost	0.0%	100.0%	0.0%
Animal ID	Tagging inputs	69.1%	8.9%	22.0%
Industry Indivisibles	Current per agreement	34.4%	60.9%	4.7%
Communications	Communications activities assessment	30.4%	52.9%	4.1%
Research	Per research programme	17.2%	29.9%	2.3%

Note: Where specific measures are not available, staff time is used as an activity split.

The total disease control costs for the 2012/13 budget totals $18.296 million. Attributing the costs according to drivers indicated above results in the funding contribution toward direct costs as set out in Table 5 below.

Table 5 Disease control summary

Direct Disease control costs	Total	Beef	Dairy	Deer
Reactor Payments	548,000	128,000	420,000	-
Movement Control, Herd Depopulation, High Risk Herds, 100% FMV	120,000	-	120,000	-
Contract Tb Testing	11,335,000	6,234,250	5,100,750	
Compliance (Incl Contact Centre)	974,127	379,909	448,098	146,120
Laboratory Tests	1,932,200	1,224,344	593,377	114,479
Deer Support Tb Control	365,000			365,000
Disease Control Other	3,022,023	2,280,359	608,290	133,374
Total Disease control	**18,296,350**	**10,246,862**	**7,290,515**	**758,973**

Note: Budget figures for 2012/13 year.

Assessment

The practice of recovering directly attributable costs (predominantly disease control costs) from industry is appropriate and should continue. The existing practice aligns well with cost recovery principles in that it seeks to recover from each industry sector, costs associated with services that are provided for the direct benefit of each sector.

There is no strong reason for changing existing direct cost allocation practices. The majority of the costs can be directly attributed to individual farms. We have reviewed the drivers that AHB relies on to attribute direct costs to each of beef, dairy and deer and see no reason to modify them except for updating for current external data.

The dairy and beef sectors treat disease control costs as a club good. Funding is provided through a Milk solids Levy of 1.1 cents per kilogram of milk solids and a Cattle Levy of $11.50 per slaughtered head. This pays for all the testing, reactor payments, movement control costs and research costs.

The deer industry has levies which part-fund disease control costs. The Velvet Levy is 40 cents per kilogram of velvet and the Venison Levy is 4 cents per kilogram of venison. The substantive costs associated with Tb testing deer itself are paid for directly by the deer farmers.

We have considered an option of applying to the dairy and beef industries, the approach to funding that is taken by the deer industry; that is, recovering the costs associated with animal testing directly from farmers on a fee for service basis. The testing costs are the single largest expense at approximately $11 million and can be attributed directly to farmers.

Possible reasons for the fee for service approach to funding testing costs are:

- It creates a financial incentive on individual farmers to take steps to avoid infection of their herds (rewards those who are Tb free). Attributing the actual cost directly to individual farmers (as in the deer industry) provides an incentive for each farmer to reduce their individual costs and gain a Tb free status as soon as possible thereby gaining benefits from a Tb free status.
- The nature of the service has strong private good characteristics in that there is a clearly identifiable user of the service that gives rise to its cost
- The precedent that arises from the practice in the deer industry.

Notwithstanding these points, we note that there are some potential disadvantages in moving to a direct fee for service, rather than levy funded, arrangement. In particular, a fee for service runs the risk of creating a financial disincentive to ensuring that animals are tested.

Furthermore, notwithstanding the private good nature of testing services, industry as well as individual farmers benefit from testing being undertaken (it provides them with further assurance

that the risk of Tb is being managed). The club approach takes into consideration the view that the sector will ultimately benefit from the testing and therefore, the sector as a whole should contribute to the cost of the entire programme. For these reasons there are good grounds for continuing with the levy (milk solids and slaughter) arrangements.

Overall, for the purposes of the status quo option (and Options 2, 3 and 4), we have assumed that funding arrangements for disease control costs would continue unchanged.

5. Approach to funding indirect (non-attributable) costs

Introduction

Indirect costs comprise vector control costs and the balance of administration costs that are not directly attributable to one or more of the industry sectors. Costs are defined to be indirect because it is either not possible, or desirable, to directly attribute the underlying activity to a specific industry sector (or government/regional council). For example, spreading 1080 poison or laying traps is not directed specifically at any particular industry sector; rather, the activity is undertaken for the benefit of all industry sectors. Similarly, with respect to administration costs, items such as Board expenses cannot be directly attributed to any one of the main funder groups (industry, government and regional councils).

In this section of the report, we focus on options for allocating indirect costs across central government, Regional Councils and the three industry sectors. Each of the options is assessed against the funding principles described earlier.

Option 1 - Status Quo

Description

Option 1 involves retaining existing funding arrangements. This means that indirect/vector[2] control costs would continue to be allocated between industry and the public sector (and across the three industry sectors) on the basis of the negotiated arrangement agreed in 2003.

As noted in section 2, vector control costs (and the indirect element of administration costs) would continue to be shared between the Crown (50%),industry (40%) and Regional Councils (10%). The industry share is further split between Beef 34.4%, Dairy 60.9% and Deer 4.7%. We are unaware of the basis for this particular division of funding shares.

The contribution from Regional Councils is divided between the Councils according to the NPMS programme costs for each Regional Council and taking into account the percentage of rateable land within each Council's jurisdiction. This is designed to cater for regions, such as the West Coast and Tasman District, that have costly control programmes and large areas of non-rateable Crown land, where incurring the full share of vector control costs would be considered to be an unfair burden.

We understand that leading up to the 2003 negotiated agreement, there was some work done to determine funding shares based on an assessment of the land area owned by the Crown,

[2] Because vector control costs represent the majority of indirect costs, we use the terms inter-changeably.

Regional Councils and industry. While this work did not carry through into the determination of funding shares, we understand there was some, albeit only very general, similarity between the shares negotiated and those indicated by the land area analysis.

Assessment

Current arrangements have been in place for approximately nine years and, for this reason alone, could be viewed as having stood the test of time. Moreover, the funding shares reflect a negotiated agreement which suggests that, at the time, the parties viewed the arrangements as being a fair and efficient outcome. Although unclear, it is possible that the negotiated agreement was informed, at least to some extent, by consideration of who benefits and who gives rise to risk (ie the core funding principles).

Because the funding shares are fixed, it is easy to calculate the level of funding contribution and the arrangement is transparent in terms of disclosing the basis upon which the amount owing from the funding parties has been calculated.

In summary, therefore, the status quo could be seen as measuring up quite well against several of the funding criteria and principles sets out in section 3.

Notwithstanding this, there are grounds for considering change to funding arrangements. There is a new strategy in place. Industry economics have changed since 2002 when existing funding arrangements were first agreed. Moreover, we have some concerns with the existing arrangement.

- As far as we are aware, there is not a robust linkage between core funding principles (benefits and risk) and the current funding shares. These are two key funding principles and both are referred to explicitly in the Biosecurity Act 1993. They must be taken into account by the Minister when recommending levies. There is a risk, therefore, that current arrangements could be seen as not being as consistent with the requirements of the legislation as they need to be.

The funding shares are fixed and do not vary according to changes in economic circumstances facing each group of funders. As shown in

- in section 2, overall funding shares (ie including direct costs which vary over time) have remained relatively stable since 2005 notwithstanding that there have been some significant changes in the economic circumstances of the industry sectors. As a result, the funding arrangements do not appear to be sufficiently sensitive to changes in the underlying benefits that each of the sectors derives from the NPMS and the amounts they contribute in funding.
- The lack of sensitivity to changes in economic circumstances is, as we understand it, a key reason lying behind reductions to the funding share contributed by the deer industry (the number of deer has declined by about a third since 2003).

- Because of the absence of any transparent linkage to core funding principles, the current funding shares could be open to challenge (because of the statutory requirement to have regard to the core funding principles).
- The basis upon which current arrangements have been determined in not particularly transparent

The AHB Representatives Committee has indicated a desire to develop a funding approach that is principles-driven and, in so doing, address the various concerns noted above.

Option 2 – Beneficiary/Exacerbator Model

Introduction

The approach to Option 2 seeks to explicitly incorporate into funding arrangements the principle that those who benefit should contribute funding and the principle that those who contribute to, or are in a position to manage, risk should also contribute to funding. The focus of Option 2 is the approach to determining shares for the funding of vector control (and other indirect) costs and, in particular, how to apportion funding contributions between beneficiaries and risk exacerbators. It is important to note that, reflecting the conclusions reached in section 4, no changes to funding arrangements for the funding of direct costs (primarily disease control) are proposed under Option 2.

By way of background, we note that a 2008 Biosecurity funding review and consultation document led to the conclusion that vector control costs should be funded from a mix of funding from the Crown, other land owners/regional councils and industry. However, that review did not provide a basis for determining what share each category of funder should bear. Rather than focusing, in the first instance, on the allocation of funding shares between industry and the public sector, the approach taken for Option 2 is to begin by determining the split of funding responsibilities between beneficiaries and exacerbators[3] and then focus on what this means for the funding contribution from each of the parties.

We note that we have considered alternatives of seeking to determine the level of funding share either with respect to benefits alone; or to risk alone. Neither of these alternatives is considered appropriate because benefits and risks are both core funding principles.

The approach to determining funding shares is structured as follows:

- Firstly, we focus on economic theory to help guide the determination on how to apportion funding shares between beneficiaries and risk exacerbators

[3] For the purposes of this and other funding options, we view exacerbators as being land owners in the sense that landowners, potentially, are in a position to do something about the presence of vectors on their land and, hence are in a position to manage the risks stemming from vectors even though landowners do not, of themselves, create the risk.

- We then address how to allocate funding between beneficiaries
- Lastly, we consider how to apportion funding between risk exacerbators.

Economic theory

We have considered economic theory to help with determining how to allocate funding shares between beneficiaries and exacerbators. In short, we have concluded that economic theory provides only limited guidance in this regard. We have, however, drawn on economic theory relating to externalities and in particular the Coase[4] theorem. This theorem considers the situation where the actions of one party impact (usually adversely) on the rights or interests of another party and those impacts are not otherwise taken into account by the party generating the adverse impact. In the economics literature, this is referred to as the problem of externalities and the example often given is that of a factory that creates air pollution that adversely impacts on residents living near to the factory.

A simple example

In the factory example, if the factory owner does not face the consequences of the pollution created, the owner has no incentives to limit the amount of pollution. From society's overall perspective, sub-optimal outcomes result.

With certain simplifying assumptions, better outcomes are possible if there are clearly defined property rights. There are two possibilities in this regard. Firstly, property rights could be established giving residents the rights to clean air and the ability to hold the factory liable according to the level of pollution emitted. In this case, the factory would have incentives to invest in ways of reducing the level of pollution so as to limit its liability to residents.

A second option is to establish property rights granting the factory the right to emit pollution. In this case, residents would have incentives to pay (bribe) the factory owner to install measures to curb pollution.[5] The factory would have incentives to accept payment if the amount received exceeded the cost incurred in curbing pollution levels.

The insight provided by the Coase theorem is that under either set of property rights, the residents and the factory owner would have incentives to enter into negotiations to arrive at a mutually acceptable outcome in terms of the level by which pollution is reduced and the level of cost that is incurred to reduce pollution caused by the factory. Moreover, the same balance of

[4] Coase, RH., (1960) "The Problem of Social Cost" Journal of Law and Economics vol 3 pp 1- 44. Coincidentally, one of three examples referred to in Coase's paper is that of straying cattle which destroy crops on neighbouring land – an example that is not much different to the situation of an uncontrolled possum population leading to loss of value for cattle (and deer) farmers.

[5] The Coase theorem relies on some assumptions, including an assumption of costless transactions between parties, that although are not representative of the real world, nonetheless provide powerful insights about how to manage externalities and, in the context of this review, how to think about the sharing of cost involved in managing externalities.

pollution and cost would be arrived at irrespective of whether residents had rights to clean air or the factory owner had an unfettered right to pollute. From an economic efficiency perspective, the optimal balance of pollution and cost would be arrived at irrespective of whether residents had to pay the factory to curb its pollution or the factory incurred cost to reduce pollution so as to limit its liability to residents.

Application to funding the NPMS

The factory situation has parallels with that of Tb infection. Assuming that land owners are in a position to do something about the risk of possums infecting cattle and deer, then there are two possibilities.

Either farmers would have the right to be protected from Tb infection in which case exacerbators (ie landowners) would have incentives to incur cost to avoid or reduce their liability to farmers. Alternatively, landowners could be deemed to have no liability to farmers in which case farmers would have incentives to incur costs to reduce the risk of infection either by bribing landowners to take steps to mitigate the risk or by taking on-farm measures to mitigate the risk.

The Coase theorem of itself was not developed to specifically address who should pay to address the costs arising from externalities. A key point of the theorem is that under certain conditions, it is appropriate to let beneficiaries and exacerbators negotiate the optimal outcome for themselves. In this regard, the Coase theorem could be seen as lending support to Option 1 – a negotiated outcome.

However, it follows from the Coase theorem that if it does not matter (from an efficiency perspective) whether property rights are granted in favour of beneficiaries or exacerabators, then either assignment of rights is just as legitimate as the other. On this basis, an argument can be run for sharing the costs of mitigation 50/50 between beneficiaries and exacerbators. This lies at the heart of Option 2.

In summary, we have reviewed economic theory to assess whether it provides insight for the determination of funding shares between beneficiaries and exacerbators. In general, economic theory does not have much to say on this matter. We have drawn on economic theory relating to externalities, in particular the Coase theorem, to provide some basis for the allocation of costs. By extending the conclusions of the Coase theorem, a case for a 50/50 sharing of costs between beneficiaries and exacerbators can be made. We note, however, that the applicability of the theorem is not without challenge because of the assumptions upon which it rests. Moreover, the theorem could also be viewed as lending support to a negotiated outcome (ie Option 1).

Allocation of costs among beneficiaries

Below, we assess the nature of the benefits stemming from the NPMS and what this implies for the sharing of indirect costs between beneficiaries. Our primary focus is on economic benefits and biodiversity benefits.

Economic benefits

The business case prepared in support of the Strategy identifies several categories of economic benefit. These include:

- Carcass value saved. Animals that are detected as being infected with Tb are slaughtered. Although there are compensation arrangements in place which help to mitigate the cost to farmers, the loss of animals is clearly an economic cost to New Zealand as a whole.
- Production saved. There is evidence that Tb in dairy cattle reduces milk production by between 4% and 10%.[6] Infected cows do not produce calves and infected deer do not produce fawns. The cost of this, as reported in the business case, is assessed to be $451 per animal for cattle and $151 per animal for deer.
- Clinical diagnosis costs saved.

Overall, however, savings in these areas is relatively modest. Over a 30 year term, the AHB has estimated the costs saved to be in the order of $230 million in net present value (NPV) terms. Based on the discount rate used by the AHB, the NPV figure of $230 million is equivalent to a constant amount of about $20 million per year.

Beyond these benefits, there are potential benefits in the form of reducing (or eliminating) trade risk caused by the existence of Tb. Humans are susceptible to Tb. There are strict controls and processes in place to manage this risk (eg pasteurisation of milk and meat inspectors), but notwithstanding these, we note earlier advice that Tb poses two residual types of trade risk for New Zealand:[7]

- Harm to New Zealand's reputation as a supplier of high-quality and safe agricultural products
- Prevention from being officially classified as free of Tb by the World Organisation for Animal Health. Many of our major trading partners and competitors (eg Australia) are designated as Tb free.

[6] AHB (2009) Future Bovine Tb Strategy Business Case p27.
[7] Ministry of Agriculture and Forestry Biosecurity New Zealand (2010) Regulatory Impact Statement – Review of the National Bovine Tuberculosis Pest Management Strategy

Moreover, there is evidence in some export markets of growing customer preference to purchase high quality products untainted by association with disease regardless of whether there is any underlying health risk.[8]

The AHB has modelled a range of scenarios under which the presence of Tb gives rise to trade shocks (reduced access to markets). In net present value terms (over a 30 year period), the impact of a trade shock that gives rise to a 10% fall in demand in year one, has been estimated to be $1.2 billion. The flow-on effects to the rest of economy increase this figure to $3.2 billion.

Clearly, these are large numbers and much larger than the direct impact of reduced animal numbers and lost production.

In a sense, the economic value of the NPMS can be viewed as providing insurance against the dramatic consequences that could occur were Tb to get out of control. This includes the loss of productive value, the risk of losing access to markets, and the large cost that would need to be incurred to bring Tb back under control. On this last point, we note that during the 1980s, New Zealand relaxed its national vector control operations. Tb infection rates in herds increased to unacceptable levels and, in response, $1.2 billion has been spent over the period 1984 to 2008 (in 2007/08 dollars) to reduce Tb infection rates.[9] In effect, the current NPMS is seeking to protect the gains from past investments in the NPMS.

A key point to take from the comments above, apart from the scale of the economic benefits, is that industry is clearly a major beneficiary of controlling Tb.

We are aware of a view among some industry participants that the trade benefits associated with the Strategy are overstated in part because of the other processes and controls over and above the Strategy that are aimed at mitigating the risk of Tb to humans. For the reasons outlined above, there are grounds for questioning this position. Moreover, the views expressed relate more to the merits of the Strategy – something that is not part of our brief – than they do to how the Strategy is to be funded. We note that in the lead up to the adoption of the current Strategy, consideration was given to several options ranging from no strategy (and ad-hoc control) through to full eradication. The decision underlying the current Strategy to move toward eradication signals to us a consensus view that there is potentially large economic cost if Tb levels are allowed to return to levels seen three decades ago.

Flow-on economic benefits

The economic benefits that stem from containing Tb have flow-on benefits for the wider economy. In determining how to apportion the indirect costs of the NPMS across beneficiaries,

[8] AHB (2009) Future Bovine Tb Strategy Business Case p2.
[9] Ministry of Agriculture and Forestry Biosecurity New Zealand (2010) Regulatory Impact Statement – Review of the National Bovine Tuberculosis Pest Management Strategy page 2

the issue arises, therefore, as to whether, in addition to industry, the government (and perhaps regional councils) should also be included as economic beneficiaries.

For the following reasons, we consider that industry should be viewed as the primary beneficiary of the economic benefits and that central and regional government should not be included.

- To the extent that eradicating Tb helps industry to grow and, hence, stimulate economic flow-on benefits elsewhere in the economy, the underlying assumption is that those resources attracted to industry would have been used somewhere else in the economy and, in that alternative use, would also have help to stimulate flow on benefits for the wider economy. Possibly, it could be argued that the economic multiplier in the dairy/deer/beef industry is higher than other industries (we don't have any evidence of this) but even if this is the case, we doubt that the difference in multiplier effect would be large.
- From a national economic viewpoint, any increased tax revenue flowing to government from the success of the NPMS is a transfer payment and of itself does not enhance the economic well being of New Zealand.
- In the Coasian frame which underpins Option 2, if direct beneficiaries derive sufficient benefit from mitigating the risk, then they will have incentives to negotiate an acceptable outcome with exacerbators irrespective of any flow on benefits elsewhere in the economy.

We also note that any Government contribution would mean either less spent by Government on something else or higher taxes, both of which have negative economic consequences

In short, the trade and production related benefits that stem from the NPMS are, in our view, benefits to industry and we are sceptical that there is a case for including government as a beneficiary in this regard.

By way of final comment on economic benefits, we are aware of a view that investing in the NPMS is one mechanism by which New Zealand's commitment to biosecurity is demonstrated. This helps to maintain New Zealand's reputation for taking seriously threats to biosecurity. In turn, maintaining New Zealand's reputation in this regard has benefits that spread beyond the beef, dairy and deer industries to include many other forms of primary production. On this basis, potentially case could be made to include other primary industries in the mix of industries that benefit from the NPMS. In practice, we doubt much should be made of this line of argument. Other primary industries could argue that actions they undertake (or fund) to protect New Zealand's biosecurity interests benefit the beef, dairy and deer industries. Trying to estimate the magnitude of impact would be extremely difficult.

Biodiversity benefits

Biodiversity benefits have wide ranging meaning. We have used a definition provided to us by Department of Conservation personnel during the course of the review. Within this definition, biodiversity benefits include, improvements in native species populations, habitat quality and/or ecosystem functioning.[10]

Reducing pest numbers confer a range of biodiversity benefits. Although the NPMS is aimed at eradicating Tb, achieving this goal involves reducing the number of pests – particularly possums.

In theory, the value attributed to biodiversity could be added to the economic benefits discussed above for the purposes of determining the funding contribution of beneficiaries. If this were to be done, the share of funding contribution attributed to biodiversity beneficiaries would probably be paid by government on behalf of all New Zealanders because the benefits of biodiversity are generally seen as being widely felt and public good in character.

There appears to be only a very limited amount of published work in New Zealand on the value of biodiversity. The principal work we are aware of is that by Patterson and Cole undertaken in the late 1990s.[11] Their work estimated the value of biodiversity at $54 billion (measured in 2007 dollars).[12] That work did not seek, however, to explore what proportion of the estimated figure would be affected by the NPMS.

Accordingly, the lack of empirical evidence means that it is not possible to add a value for biodiversity to sit alongside the economic benefits described earlier. On practical grounds, therefore, from a benefit perspective, it is not possible to determine what the split of funding contribution would be between industry (economic benefits) and the public sector (biodiversity benefits).

Costs avoided

Notwithstanding the lack of evidence regarding the intrinsic value attaching to biodiversity, we consider that there is scope to include reference to biodiversity in determining how funding responsibility for vector control costs is to be shared.

The Department of Conservation (DoC) and Regional Councils undertake pest control. Work on the NPMS means that DoC and Regional Councils benefit in that the impact of the NPMS reduces their own work-load. The DoC has estimated that it "saves" around $8 million per

[10] S J Owen Internal DoC memo dated 26 May 2009 regarding possible biodiversity benefits from the proposed bovine Tb NPMS 2010-2030.

[11] For example, Patterson, M. And Cole, A. (1997) "Valuation of New Zealand's Biodiversity" Paper presented to the Australia New Zealand Society for Ecological Economics Conference, Melbourne

[12] As reported in Yao, R., and Kaval, P (2007) "Non-Market Valuation in New Zealand 1974 through 2005" University of Waikato Economics department Working Paper 07/17

annum as a result of the work of the NPMS.[13] This estimate is based on various assumptions including:

- There are no benefits for non-indigenous forest land
- Indigenous forest makes up about 20% of total area
- Of the indigenous forest, about 40-50% is considered to be vulnerable
- Of the vulnerable indigenous forest land, about 20% is deemed by DoC to be high priority and it is this relatively small amount of land that forms the basis for the cost saving estimate of just over $8 million.

In order to recognise this benefit, and take it into account in determining funding shares, it can be argued that the $8 million spin-off benefit that is conferred on the DoC by the NPMS should be paid for by Government. The logic for this is that if the NPMS was not in place, the DoC would be willing to pay up to $8 million to achieve the same level of biodiversity benefit (in areas it deems to be high priority).

In terms of the funding model, we have taken this into account by reducing, from $60 million to $52 million (ie by $8 million), the amount of costs that need to be recovered from beneficiaries and exacerbators. Based on the 50/50 split that derives from application of the Coase theorem, this means that $26 million of indirect costs are to be funded by beneficiaries (ie industry) and $26 million by risk exacerbators (ie land owners).

We note that the $8 million figure is, in our view, conservative because it is based on costs avoided with the 20% of vulnerable indigenous forest land that the DoC sees as being the highest priority. It is reasonable to suggest that through the NPMS, there is also cost saved for important, but not necessarily the highest priority vulnerable forest land. For example, if 40% (rather than 20%) of vulnerable indigenous forest land was taken into account, and assuming that the costs saved were only half as much as that associated with the op 20%, the overall cost saving might be in the order of $12 million per annum.

We suggest that further work should be undertaken to revisit the $8 million figure based on the DoC's calculations with a view to obtaining a less conservative view of the cost saved to the DoC as a result of the Strategy.

The NPMS is likely to also benefit Regional Councils in the same way. That is, the work undertaken under the NPMS reduces the amount Councils would otherwise have to spend to achieve the desired level of pest eradication and biodiversity benefit. We do not have estimates of what this saving is and this could also form part of the additional work suggested.

[13] AHB (2009) National Bovine Tb Pest Management Strategy p29

Equally, the pest management work undertaken by DoC and by Regional Councils potentially benefits the AHB in terms of reducing the amount of work it has to do to address the risks of Tb infection. Again, we do not have an estimates of the cost avoided.

Allocation of costs between beneficiaries

Having determined, at a high level, the split of funding between beneficiaries and risk exacerbators, there is then a need to split costs across beneficiaries (ie the three industry sectors) and across exacerbators.

In allocating costs across the three industry sectors, our objective has been to develop an allocation basis that proxies as closely as possible the relative benefits that each of the industry sectors derives from the NPMS. As discussed above, these benefits are essentially economic in nature.

Several measures have been considered and they are assessed in the following table.

Table 6 Allocation basis - benefits

Allocation basis	Reasons for	Reasons against
Herd Numbers	• More herd implies more to lose if Tb is not controlled and therefore, larger economic benefits from controlling Tb • Data readily available	• Doesn't capture differences in herd size • Different types of herd have different economic value
Livestock Numbers	• More animals implies more to lose if Tb is not controlled and therefore, larger economic benefits from controlling Tb • Animal numbers directly impacted by incidence of Tb infection	• Different values per animal between dairy, beef and deer
Farm Numbers	• In general, greater number of farms likely to signal increased economic benefit stemming from Tb control • Data readily available	• Doesn't capture differences in farm size and so not well linked to economic benefit
Export Value	• Directly linked to consequences if Tb is allowed to get out of control • Incorporates economic contribution of downstream processors • Data readily available	• Export values influenced by wide range of variables unrelated to risks posed by Tb • Doesn't incorporate domestic market • Given low levels of Tb infection, risk of loss of market access deemed to be effectively nil

Allocation basis	Reasons for	Reasons against
		• In case of deer, velvet market unaffected by presence of Tb
Farm Gate Value	• Represents value to the farmers who we see as the direct beneficiaries of the NPMS. • Incorporates domestic market • Data readily available	• Doesn't incorporate downstream processors • Given low levels of Tb infection, risk of loss of market access deemed to be effectively nil • In case of deer, velvet market unaffected by presence of Tb
Farm/sector profitability	• Takes into account impact of access to markets as well as impact of Tb on farm costs and productivity	• Data not available (but potentially could be) • Doesn't incorporate downstream processors
Farm/sector contribution to GDP	• Takes into account impact of access to markets as well as impact of Tb on farm costs and productivity • Incorporates economic contribution of downstream processors	• Data not available (but potentially could be) • Doesn't measure ability to pay as well as profitability measure

In summary, we consider that those measures that link to value are inherently superior to those which measure the number of herds, animals and farms for the reasons that the value based measures inherently proxy more closely the economic benefits that stem from the NPMS. They also link more strongly with changes in the economic situation of the three industry sectors and, hence, changes in the value of the "insurance benefit" that stems from keeping Tb under control.

Of the value-based measures, either sector profitability or contribution to GDP would correlate better with economic benefit stemming from the NPMS than would the export and farm gate earnings options. However, there are issues regarding the availability of this information. We have sought advice from the Ministry of Primary Industries (MPI) and Statistics New Zealand regarding GDP and profitability data. Statistics NZ has GDP measures but it is not categorised down to the level of the three industry sectors that are the focus for this review. For example, sheep, beef cattle and grain farming are combined into a single category. Similarly, poultry and other livestock farming are combined with the deer sector. The Dairy cattle sector is, however, separately identified.

MPI prepares data which discloses gross revenue for each of the three industry sectors but this is not broken down to disclose either contribution to GDP or operating surplus (profitability).

Table 7 below shows the relative funding shares based on the various allocation measures described above for which data is available.

Table 7 Indirect costs - beneficiary allocation

($000)	Beef		Dairy		Deer		Industry	
	Allocation	%	Allocation	%	Allocation	%	Allocation	%
Current split (2013 budget)	8,372	35%	14,564	62%	719	3%	23,655	40%
Modelled								
Herd Numbers	18,545	69%	7,210	27%	1,154	4%	26,909	44%
Livestock Numbers	9,389	35%	15,171	56%	2,349	9%	26,909	44%
Farm Numbers	12,521	47%	13,031	48%	1,358	5%	26,909	44%
Export Value	4,621	17%	21,756	81%	533	2%	26,909	44%
Farm Gate Value	5,819	22%	20,451	76%	640	2%	26,909	44%
Negotiated Value	9,269	34%	16,380	61%	1,260	5%	26,909	44%
Change from current								
Herd Numbers	10,173	122%	(7,354)	-50%	436	61%	3,254	7%
Livestock Numbers	1,016	12%	607	4%	1,631	227%	3,254	7%
Farm Numbers	4,148	50%	(1,533)	-11%	639	89%	3,254	7%
Export Value	(3,752)	-45%	7,192	49%	(186)	-26%	3,254	7%
Farm Gate Value	(2,554)	-31%	5,887	40%	(79)	-11%	3,254	7%
Negotiated Value	897	11%	1,816	12%	541	75%	3,254	7%

Key points to note are as follows.

- The value-based allocation measures result in the largest funding share falling on the dairy industry.
- The share for the deer industry is small under all measures reflecting the small scale of this industry relative to beef and dairy.
- There is not much difference in funding shares between the export earnings and farm gate earnings options.[14] Either option is, in our view, relevant (an average of the two could be taken).

Allocation of costs between exacerbators

Earlier, we have made the point that land owners can be viewed as risk exacerbators in the sense that although they do not give rise to risk, they can be seen to be in a position to take steps to mitigate the risk. A mechanism needs to be found for determining the share of funding to be contributed by the different categories of land owners (the Crown, private land owners and Regional Councils). For the purposes of analysis, we have assumed that funding is to be apportioned between the Crown and Regional Councils with the latter being the mechanism through which funding contribution is obtained from private land owners. That is, it is land owners who are exacerbators in the sense of "harbouring" possums (and other pests) and in the sense that their land either is, or could be, deemed to be a vector risk area.

[14] This is not surprising as 95% of milk is exported and 80% of beef and veal is exported.

A small number of possible measures have been identified and are assessed in the table below.

Allocation method	Reasons for	Reasons against
Land Area	• Data readily available • Includes land that land could become VRA under a no-intervention scenario	• Not all land relevant • Does not take into account relative risk
VRA land	• Data readily available • Directly relates to the NPMS	• Risk extends beyond VRA land and land that adjoins VRA land • Longer term, would result in a small number of VRA bearing the full cost of vector control which may undermine support for the Strategy
Land Value	• Takes into account ability to pay (helps to avoid situation of regional councils with large control programme but small rating base)	• Some gaps in information base - eg national parks not valued • Value not necessarily closely correlated with risk – eg urban land that is high value but low risk from Tb perspective

The options focus on some measure of land as a proxy for the risk Tb infection on the basis that land harbours possums (and other pests) and landowners, in theory at least, can be viewed as being in a position to do something about the risk.

The area based measures are generally preferred ahead of the land value measure for the reason that the greater is the area of land owned, the greater the portion of overall risk accounted for by that owner and, hence, the larger should be the contribution to funding the NPMS. Consistent with the point discussed earlier that the Strategy can be viewed as an insurance policy against the costs associated with Tb risk, it can be argued that landowners should contribute to funding the Strategy based on the area of land they have at risk of becoming VRA under a no intervention scenario.

We have considered an alternative of determining funding shares on the basis of VRA land rather than all land for the reason that VFA does not present risk. This approach would run counter to the insurance based approach.

Over time, the Strategy is expected to reduce the amount of VRA land. Under the VRA funding approach, this would mean recovering costs from a diminishing number of landowners (and, hence, Regional Councils assuming that Councils remain the mechanism through which funding contributions are channelled). We do not see this as being a particularly desirable outcome for the reason that, from an efficiency perspective, it is important to maintain an incentive on land

owners (through Regional Councils) to continue to push for Tb eradication so as to remove the risk of Tb becoming a major and costly issue at some stage in the future.

The table below indicates the share of funding contribution between the Crown and Regional Councils for both of the land area based measures.

As can be seen these measures result in funding being split roughly two thirds/three quarters to the Crown and the other third/one quarter falling to Regional Councils (as a proxy for other land owners).

Table 8 Indirect costs - exacerbator allocation

($000)	Crown		Regional		Total Crown/Region	
	Allocation	%	Allocation	%	Allocation	%
Current split (2013 budget)	30,000	83%	6,048	17%	36,048	45%
Modelled						
Land Area	22,625	67%	10,985	33%	33,610	42%
VRA Land	25,011	74%	8,599	26%	33,610	42%
Change from current						
Land Area	(7,375)	-25%	4,937	82%	(2,438)	-7%
VRA Land	(4,989)	-20%	2,551	30%	(2,438)	-7%

We note that during our discussions with stakeholders, concern was also expressed that there is nothing in current funding arrangements that compels regional councils to make a funding contribution. The underlying issue appears to be concerns held by Regional Councils that they have not been given sufficient forewarning of the upcoming programme of work and that this has caused problems in terms of incorporating costs into rates adjustments. Furthermore, there is an issue of ratepayers seeing the cost of the NPMS as something that is imposed by councils rather than the AHB. Both issues can be addressed and we understand that progress has already been made to provide councils with better and more timely information regarding programme costs. Addressing the issues would, in our view, address the concerns about the lack of mechanisms to compel funding contribution from councils.

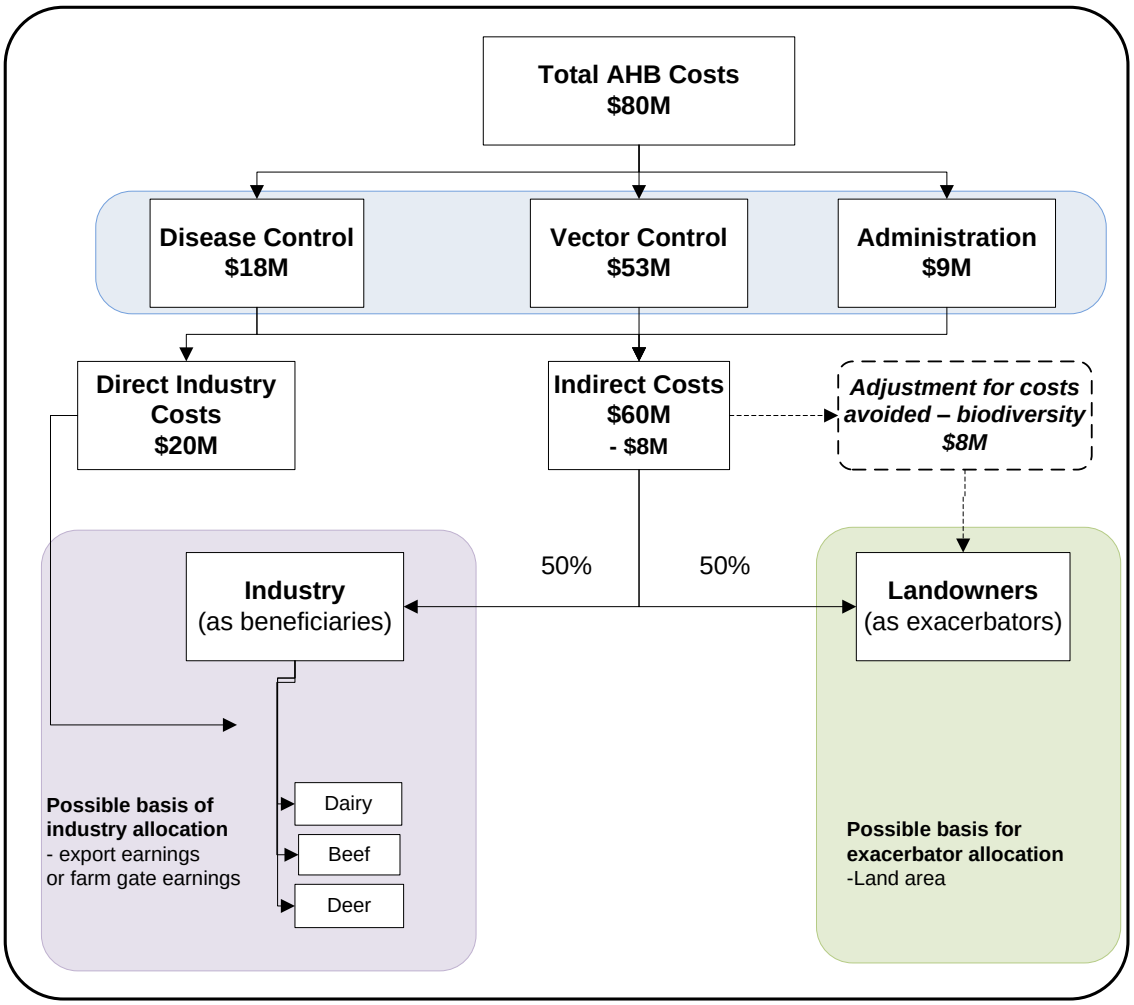
Funding implications

Figure 3 below illustrate the approach to determination of funding shares under Option 2. In brief, the key assumptions are:

- Disease control and the direct cost elements of administration costs are recovered from the relevant industry sector
- The principles of benefit and risk exacerbation are used to split equally the funding contribution of beneficiaries (industry) and exacerbators (land owners) to indirect costs (primarily vector control but with an element of administration costs)

- The costs which the DoC avoids as a result of the NPMS are a charge on the Crown
- Industry's share of funding is apportioned between the three industry sectors according to export earnings or farm gate earnings
- The land owners' share of funding is apportioned according to land area.

Figure 3 Option 2 Funding Overview



Based on the key elements described above, we have modelled what this would mean for funding arrangements. The results are shown in Table 9 below.

Table 9 Funding allocation - total costs

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Budget for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2013	30,000	37%	6,048	8%	18,931	24%	23,796	30%	1,536	2%	80,311	50%
Modelled												
Land Area & Export Value	22,625	28%	10,985	14%	15,198	19%	30,159	38%	1,343	2%	80,311	100%
Change from current												
Land Area & Export Value	(7,375)	-25%	4,937	82%	(3,732)	-20%	6,364	27%	(193)	-13%	(0)	0%

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Budget for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2013	30,000	37%	6,048	8%	18,931	24%	23,796	30%	1,536	2%	80,311	50%
Modelled												
Land Area & Farm Gate Value	22,625	28%	10,985	14%	16,460	20%	28,785	36%	1,456	2%	80,311	100%
Change from current												
Land Area & Farm Gate Value	(7,375)	-25%	4,937	82%	(2,471)	-13%	4,989	21%	(81)	-5%	(0)	0%

The key points to note are:

- Crown contribution is approx $23 million compared to the existing appropriation of $30 million
- Industry's contribution is slightly higher - $47 million compared to $45 million and within this, the dairy industry's share increases while that of beef decreases reflecting the relative economic performance and trends of the two sectors (the size of the change differs slightly between the export earning and farm gate earning options)
- The contribution from the regions is significantly higher in proportional terms ($11 million compared to $6 million) but the extra contribution would be spread across all Regional Councils.

Moving averages

We have also modelled funding shares using the methodology that underpins Option 2 but basing the shares on averages of export value and farm gate earnings over the last 3 and 5 years. The intention behind this is to avoid any distortion to funding shares caused by peaks or troughs in industry performance.

The results of this are shown below and they focus on the split of funding shares between the three industry sectors. Table 10 indicates 3 and 5 year average data based on export value and farm gate earnings. For the three year average, we used data for the three years ending June 2011 (the latest available) and for the five year average we used data going back to 2006/07.

Table 10 Industry funding allocation using rolling average

No Rolling Average - Export value and Farm gate revenue								
($000)	Beef		Dairy		Deer		Industry	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2011	18,723	42%	23,475	53%	1,925	4%	44,123	56%
Modelled								
Export Value	15,158	33%	29,904	64%	1,382	3%	46,444	57%
Farm Gate Value	16,188	35%	28,787	62%	1,469	3%	46,444	57%
Change from current								
Export Value	(3,565)	-19%	6,429	27%	(543)	-28%	2,321	5%
Farm Gate Value	(2,535)	-14%	5,312	23%	(456)	-24%	2,321	5%
Note: NPMS Pg 34	*20,027*		*22,991*		*1,977*		*44,995*	

3 year rolling average - Export value and Farm gate revenue								
($000)	Beef		Dairy		Deer		Industry	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2011	18,723	42%	23,475	53%	1,925	4%	44,123	56%
Modelled								
Export Value	15,366	33%	29,619	64%	1,459	3%	46,444	57%
Farm Gate Value	16,698	36%	28,143	61%	1,603	3%	46,444	57%
Change from current								
Export Value	(3,357)	-18%	6,144	26%	(466)	-24%	2,321	5%
Farm Gate Value	(2,025)	-11%	4,668	20%	(322)	-17%	2,321	5%
Note: NPMS Pg 34	*20,027*		*22,991*		*1,977*		*44,995*	

5 Year rolling average - Export value and Farm gate revenue								
($000)	Beef		Dairy		Deer		Industry	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2011	18,723	42%	23,475	53%	1,925	4%	44,123	56%
Modelled								
Export Value	15,407	33%	29,527	64%	1,511	3%	46,444	57%
Farm Gate Value	16,667	36%	28,172	61%	1,605	3%	46,444	57%
Change from current								
Export Value	(3,316)	-18%	6,052	26%	(414)	-22%	2,321	5%
Farm Gate Value	(2,056)	-11%	4,697	20%	(320)	-17%	2,321	5%
Note: NPMS Pg 34	*20,027*		*22,991*		*1,977*		*44,995*	

In short, using the 3 or 5 year average rather than year end 2011 export value/farm gate earnings data makes very little difference to the funding shares.

Historical comparison

We have modelled the implication for funding shares if Option 2 had been applied in past years. The results of this are shown below. We have chosen three years:

- 2004 being the first full year of the NPMS
- 2008 as it predates the latest version of the NPMS
- 2011 being the most recent complete financial year.

2004

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2004	28,512	36%	5,873	7%	23,138	30%	18,772	24%	2,036	3%	78,331	100%
Modelled												
Land Area & Export Value	21,381	27%	10,557	13%	17,468	22%	28,140	36%	1,338	2%	78,884	100%
Change from current												
Land Area & Export Value	(7,131)	-25%	4,684	80%	(5,670)	-25%	9,368	50%	(698)	-34%	553	1%

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2004	28,512	36%	5,873	7%	23,138	30%	18,772	24%	2,036	3%	78,331	100%
Modelled												
Land Area & Farm Gate Value	21,381	27%	10,557	13%	19,053	24%	26,485	34%	1,408	2%	78,884	100%
Change from current												
Land Area & Farm Gate Value	(7,131)	-25%	4,684	80%	(4,085)	-18%	7,713	41%	(628)	-31%	553	1%

2008

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2008	30,671	37%	6,256	8%	20,027	24%	22,991	28%	1,977	2%	81,922	100%
Modelled												
Land Area & Export Value	23,232	28%	11,493	14%	15,104	18%	30,891	38%	1,413	2%	82,132	100%
Change from current												
Land Area & Export Value	(7,439)	-24%	5,237	84%	(4,923)	-25%	7,900	34%	(564)	-29%	210	0%

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2008	30,671	37%	6,256	8%	20,027	24%	22,991	28%	1,977	2%	81,922	100%
Modelled												
Land Area & Farm Gate Value	23,232	28%	11,493	14%	15,724	19%	30,329	37%	1,356	2%	82,132	100%
Change from current												
Land Area & Farm Gate Value	(7,439)	-24%	5,237	84%	(4,303)	-21%	7,338	32%	(621)	-31%	210	0%

2011

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2011	28,812	37%	5,842	7%	18,723	24%	23,475	30%	1,925	2%	78,777	100%
Modelled												
Land Area & Export Value	21,866	28%	10,599	13%	15,158	19%	29,904	38%	1,382	2%	78,910	100%
Change from current												
Land Area & Export Value	(6,946)	-24%	4,757	81%	(3,565)	-19%	6,429	27%	(543)	-28%	133	0%

($000)	Crown		Regional		Beef		Dairy		Deer		Total	
Actual for year	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%	Allocation	%
2011	28,812	37%	5,842	7%	18,723	24%	23,475	30%	1,925	2%	78,777	100%
Modelled												
Land Area & Farm Gate Value	21,866	28%	10,599	13%	16,188	21%	28,787	36%	1,469	2%	78,910	100%
Change from current												
Land Area & Farm Gate Value	(6,946)	-24%	4,757	81%	(2,535)	-14%	5,312	23%	(456)	-24%	133	0%

As can be seen from the tables, there is little difference in the funding shares across the years with the main impact being a shift in funding away from the beef industry and toward the dairy industry.

Summary of Option 2

Under Option 2, the funding contribution from the public sector reduces by about $2.4 million (with commensurate increase in the funding contribution from industry). This results in a 42% / 58% split between the public sector and industry compared to a 45% / 55% split under current arrangements.

Table 11 below assesses Option 2 against the funding principles and criteria described in section 3.

Table 11 Summary assessment of Option 2

Principle/criteria	Assessment
Core funding principles – benefits and risk exacerbation	Explicitly taken into account Partial underpinning provided by Coase theorem (but in general, economic theory does not have much to contribute on the split between benefits and risk)
Efficiency	No change to status quo because no change to approach to direct costs and continued use of levy funding for indirect costs
Revenue adequacy	The proposed basis for allocating funding shares intra-industry strike a

Principle/criteria	Assessment
	better balance than the status quo between avoiding sudden adjustments to funding contribution and the desirability of ensuring that funding contribution reflects underling economic benefit derived from the NPMS
Equity	Takes into account changes in economic size of the industry sectors and, hence, the amount each sector stands to gain, or lose, through control of Tb
Transactions Costs	Somewhat higher than the status quo because of the need to collect input data and then calculate the funding shares between industry sectors as beneficiaries and between land owners as exacerbators
Transparency and ease of understanding	Better than status quo in terms of transparency of the basis for determining funding shares. More complex, however, to understand
Flexible and adaptable	As scope of VRAs reduce over time, potentially impacts the relative contributions by central government and Regional Councils to the exacerbator share of indirect costs

Overall, we conclude that Option 2 should be considered. It provides a more principled basis to the determination of funding contribution than does the existing negotiated arrangement. There is, however, a significant gap in relation to Option 2 in that the contribution of the NPMS to preserving biodiversity value is not fully captured. This is an area for further work.

Option 3 – Modified Beneficiary/Exacerbator Model

Option 3 is a modified form of option 2. The modification arises to reflect the shift in the NPMS from a strategy based on containing Tb to one or eradicating Tb.

A number of industry representatives interviewed as part of the funding review have commented that from their perspective the benefits of moving from a control to an eradication scenario are relatively small in terms of:

- having no discernable impact on access to markets (either for regulatory or customer preference reasons)
- having only limited on-farm impact in terms of lost production. Latest data indicates that in 2011, just over 1000 (1014) animals were tested as a reactor and slaughtered and, of these only 244 animals actually had Tb. These figures represent a very small proportion of overall stock numbers (in excess of 11 million)

- the difference, in net present value terms, between future costs under a control regime and future costs under an eradication regime is estimated to be $18.2 million[15] in net present value terms over a 30 year period. In annual terms, that amounts to around $1.5 million. That is a small difference. It implies that spending a bit more money now to eradicate Tb does not save much more money in the longer term in net present value terms.

Industry will benefit from disease control costs that reduce over time as a result of achieving eradication, but they are paying for those costs directly under existing funding arrangements anyway.

Given the foregoing, it could be argued that the additional costs involved in eradicating Tb (ie over and above costs that would be incurred anyway under a control regime) should not be paid for by industry. If that argument is accepted, it would mean that the additional costs associated with moving to the eradication regime should fall on land owners (as exacerbators) and the Crown/regional councils reflecting biodiversity benefits (if any).

In terms of what this means for funding arrangements, Option 3 would differ from Option 2 in that the costs associated with a control regime would be recovered along the same lines as Option 2. The marginal costs associated with eradication would be recovered from regional councils (as the mechanism through which costs are recovered from land owners) and from the Crown (as land owner and reflecting biodiversity benefits).

We do not have information regarding the additional biodiversity benefits that might stem from the additional activity involved with eradication over and above a control-oriented strategy. Given that the marginal cost difference between the eradication and control strategies is small, it seems likely that the impact on biodiversity (in terms of additional avoided cost) would also be small (we have assumed it is small enough to be effectively disregarded).

Some caution is needed with arguments that support Option 3. Eradication removes the risk that at some point in the future, Tb returns as a major issue (eg because the NPMS ceases to be effective or is no longer supported). If Tb infection rates escalate to levels previously seen in New Zealand, there will be consequences for industry in terms of lost production and lost sales. In this regard, industry can be viewed as benefitting from the extra expenditure that is incurred as part of an eradication strategy.

Option 4 – Industry/Land Owner Model

Option 4 also seeks to take into account the twin funding principles relating to benefits and exacerbation (of risk). However, it differs from Option 2 in that rather than treating industry just

[15] AHB (March 2009) Review of the NPMS: Future Options for Sustained Control or eradication of Bovine Tb from New Zealand (p 17). The difference in NPV terms is based on a comparison between the containment option and the staged roll-back option (which, in dollar terms, mostly closely reflects the current Strategy).

as beneficiaries and land owners just as exacerbators, industry and land owners are regarded as both beneficiaries and exacerbators. Moreover, Option 4 differs in that it allows for flexibility in the weighting given to benefits and exacerbation. Table 12 below provides a hypothetical example of the approach envisaged under Option 4.

Table 12 Option 4 - hypothetical example

Weighting		Industry share	Land owner share (non-farm)
50%	Benefits	80%	20%
50%	Exacerbation	10%	90%
Overall funding contribution		45%	55%

Benefits

The benefits to industry arising from the NPMS could be assessed in one of at least two ways:

- The first option is to attempt to assess the value to industry of controlling Tb in terms of maintaining access to markets plus the avoided cost of lost production stemming from Tb
- The second option would involve assessing the net present value of vector control costs under the existing NPMS compared to the situation of, initially, no NPMS followed, at some later date, by very large expenditure aimed at bringing Tb back under control.

The biodiversity benefits that accrue to landowners/NZ generally could also be assessed in one of at least two ways. One option is to follow existing practice which is to assess the "value" of biodiversity benefits on an avoided cost basis. This approach, by definition, understates the true value of biodiversity benefits. The other approach is to try and assess the intrinsic value of biodiversity (ie what value does NZ place on maintaining/enhancing biodiversity?). This is challenging territory. We are not aware of an agreed methodology for valuing biodiversity benefits. As noted earlier, we are aware of only one study that attempts to assess the value of biodiversity benefits in New Zealand and we are not aware of any work that attempts to assess the impact of the NPMS on the intrinsic value of biodiversity.

Assuming that the benefits to industry and the biodiversity benefits can be assessed in monetary terms, these values would be used to determine what share of benefits accrue to industry and what share accrues to landowners/NZ generally. In the table above, the hypothetical numbers used are a 80/20 split.

Exacerbators

A mechanism needs to be used to apportion the share of risk exacerbation between industry and landowners. The hypothetical numbers in the table above assume a 10/90 split between

industry and non-farm land owners. Several possible approaches to determining the split could be used including:

- Land area (farm and non-farm)
- Land area adjusted to include only that land deemed to be relevant from a Tb risk perspective
- Land area weighted by the risk of Tb infection (e.g. weighted by the incidence of Tb in animals). VRA land is a proxy for this.

Weighting for benefits and exacerbation

The overall weighting attached to benefits and exacerbation of risk (50/50) in the table above reflects the logic described under Option 2. The weighting could, however, be varied if the AHB representatives committee considered that one or other of benefits or risk exacerbation should be given greater emphasis.

Implementation

Although Option 4 presents the potential for a more sophisticated approach, compared to Option 2, for determining funding shares, it is relatively more data intensive as a result. There are some methodological and data challenges involved in putting this option into practice. In particular:

- There is not (as far as we are aware) a recent measure available of the intrinsic value attaching to biodiversity benefits and no measure of the impact of the NPMS on the intrinsic value of biodiversity
- While the economic benefits to industry are capable of being estimated (on a with and without the NPMS basis), this is far from straightforward. Some work on this has been undertaken by the AHB in the context of the business case prepared in support of the latest Strategy. The business case notes that this is challenging work and that it is very difficult to estimate with any degree of accuracy the potential value of lost trade value.[16]
- It would be administratively burdensome to recalculate from time to time estimates of biosecurity and economic benefit in order to keep the funding shares up to date
- The data used to determine relative shares of risk exacerbation are relatively readily available, but they are also fairly crude approximations of true risk.

In short, we do not have all of the data that would be required to populate this option. Considerably more work would be required particularly on the benefits side of the equation and there is no guarantee that satisfactory progress would be made in this respect. This is not work that is in the nature of weeks or even months to complete.

[16] AHB (July 2009) Future Bovine Tb Strategy Business Case p 42

6. Summary and recommended way forward

The terms of reference have required us to develop principles-based approaches to funding the NPMS. Much of our focus has been on identifying ways in which the share of funding can be apportioned between beneficiaries and exacerbators (as required by the Biosecurity Act) and then how funding shares should be apportioned across those groups deemed to be beneficiaries and those groups deemed to be exacerbators. The options have been assessed against a range of funding criteria.

A case for retaining the status quo could be made on the grounds that existing funding arrangements represent a negotiated outcome and have stood the test of time. With respect to direct costs (mainly disease control costs) the approach that the AHB takes to determining direct costs and how they should be funded is, in our view, appropriate and there is no need to change this.

Recommendation

It is recommended that the Representatives Committee agree that the current approach to the determination and funding of direct costs is appropriate and should continue.

The status quo is not, however, transparent in terms of the basis upon which agreed funding shares have been determined with respect to indirect costs and, in particular, there is not a strong or transparent link with the core funding principles relating to benefits and risk exacerbation. In the case of the deer industry, adjustments to funding arrangements have been made because the fixed nature of funding shares was leading to a situation of an unreasonable funding burden on that industry.

Our main focus has been, therefore, on how best to allocate indirect costs.

In determining the approach to allocating indirect costs, we have begun by considering economic theory and whether this provides guidance to determining the allocation of funding responsibilities between beneficiaries and risk exacerbators. In general, economic theory does not have much to contribute to the determination of funding shares in this regard, but reference to the Coase theorem provides some support for a 50/50 allocation between beneficiaries and exacerbators. We note, however, that the theorem also lends support to a negotiated approach to determining funding shares.

Recommendation

It is recommended that the Representatives Committee note that economic theory does not provide strong guidance for the allocation of funding shares between beneficiaries

and risk exacerbators, but theory in relation to externalities does provide some support for a 50/50 sharing between these two groups.

The 50/50 split underpins Option 2 in our report. We have then focused attention on the nature of the benefits arising from the NPMS and what this means for the allocation of funding shares between beneficiaries. We have also focused on risk and how to apportion funding shares between land owners (as risk exacerbators).

With respect to beneficiaries, the core principle of those who benefit should pay means that we have focused on measures which capture how much each category of beneficiary stands to gain (or lose) through the control of Tb. Economic benefits to industry are particularly important in this regard. Ideally a profit or GDP-based measure would best capture economic benefit, but more work is required to obtain the data needed to support the implementation of one or other of these measures. We recommend that this work be undertaken. As a second-best, either export earnings or farm gate earnings could be used as the basis for allocating funding shares between industry sectors.

Recommendation

It is recommended that the Representatives Committee agree that further work should be undertaken to identify industry profitability and industry contribution to Gross Domestic Product data with a view to using either of these measures in determining how to apportion the contribution to indirect costs between the beef, dairy and deer sectors.

In addition to the economic benefits arising from the NPMS and which accrue to industry, the Strategy also helps to protect biodiversity. This has value to New Zealand in general.

The intrinsic value of biodiversity is not something that is easily measured and there has been only limited research in New Zealand (that we are aware of) on the value of biodiversity. Option 2 seeks to take into account the costs that the DoC avoids (in protecting biodiversity) as a result of the NPMS. The figure used ($8.2 million) is conservative. Further work should be done to obtain a more realistic estimate of the cost saved. This work could also extend into costs saved by Regional Councils.

Recommendation

It is recommended that the Representatives Committee agree that further work should be undertaken to assess the costs avoided by the public sector in protecting biodiversity as a result of work performed under the NPMS.

We have also considered options for apportioning funding contributions between landowners (as exacerbators). Several land-based measures are considered and, among these, we prefer making reference to total land area as this better aligns with the view that the Strategy has a

national perspective and that funding should come from those whose land could be at risk of becoming VRA land under a no-intervention scenario.

Recommendation

It is recommended that the Representatives Committee support reference to land area as a basis for apportioning funding contribution between land owners and support contribution coming from landowners in all areas rather than just those areas deemed to be VRA.

We have modelled the financial implications of Option 2 using current (2012/13) financial data as well as financial data averaged over three and five years. Although there is little difference in funding shares between these approaches, we favour using a moving average approach to avoid sudden and sharp changes to funding contributions.

Recommendation

It is recommended that the Representatives Committee agree that in determining funding contributions, it is preferable to base this on a moving average of historical financial data rather than data from a single year.

In addition to Option 2, we have considered two variations around this main option. The first of these - Option 3 - looks at the option of funding the costs associated with Tb containment along the lines of Option 2 and then funding the marginal costs associated with moving to eradication from exacerbators.

Numbers provided by the AHB indicate that on an annual basis, the marginal costs associated with eradication are relatively small – in the order of $1.5 million – and, accordingly, we doubt that this order of magnitude warrants a change in funding approach. We recommend, however, that if at some later date the gap between control and eradication costs widens, Option 3 be revisited as a potential funding approach.

Recommendation

It is recommended that the Representatives Committee note that the marginal costs associated with eradication do not, at this stage, warrant modifying the approach to funding set out under Option 2, and that Option 3 could be revisited at some later date if the marginal costs become more significant.

The last option we have considered – Option 4 – establishes a framework for a more sophisticated approach to the determination of funding shares for beneficiaries and exacerbators. This option is much more information intensive and requires information and data that, in some areas (eg biodiversity) do not exist and would require a substantial amount of work to generate.

Appendix 1 Expense line descriptions

The tables below provide a summary description of NPMS expenses broken down into the three main categories of disease control, vector control and administration.

Table 13 Disease control costs

Disease control	Description	Allocation
Reactor Payments	Payments to farmers to compensate them for animals slaughtered after a positive reactor test. Offset by some returns (revenue) from slaughter houses.	Industry. Farm specific ie dairy/beef industry cost, funded from slaughter levy of $11.50 per slaughtered cattle beast.
Mvment Cntrl & Herd Depop	Compensation to farmers for movement control restrictions and culling of an entire herd.	Industry.
High Risk Herd Support	Funding for farmers to seek advice on Tb control in high risk areas. (criteria apply).	Industry.
Pch Animals at FMV - Dairy	Purchase of Animals @ FMV. Dairy industry puts in 35% to compensate dairy farmers for stock that tested positive, and then on slaughter proved to be non-Tb.	Industry (Dairy)
Salaries - Disease Control	DDCMs and half NDCMs + IT sal, based on individual time estimates which are reviewed every 6 months. Direct cost of implementing disease control.	Industry
Disease Ctrl Depreciation IT	Depreciation on assets employed for disease control (DMIS).	Industry general
Disease Ctrl Amortisation IT	Depreciation associated with Disease Management Information System (DMIS) database.	Industry general
Disease Control	Audit & Compliance, Reactor Tags, Movement control Tags	Farm specific
Laboratory	Laboratory costs for Tb diagnosis	Relative to testing programme - Industry. Option - Farm
Testing	On farm Tb testing - contracted to AQ on a per test basis (YTD to April 3.36 M tests)	Relative to testing programme - Industry. Option - Farm
Deer	Ancillary testing costs and administration of the Deer scheme.	Deer specific

Disease control	Description	Allocation
Contact Centre Costs	Costs of the contact centre to cater for queries on Tb programmes, mainly from farmers wrt on-farm testing and back office tasks such as Herd Registration details updates, letters to farmers and managing the reactors.	Industry general. Records of activity and costs coded accordingly.
Regional Compliance South	Monitoring of stock movements, Dairy and Beef cattle.	Industry general
Regional Compliance North	Monitoring of stock movements, Dairy and Beef cattle.	Industry general
Case Manager NI	These will take over from the DDCMs.	Industry general
DDCM Costs	District Disease Control Managers - case managers assigned to infected herds to help management.	Industry general

Table 14 Vector control costs

Vector control	Description	Allocation
Vector operations	The cost of vector control operations in regions - Contractors. Largest single cost line $44M - $50M pa. Based on national vector control programme, regional variations depending on priorities.	Public and industry. Benefits and exacerbators.
Vector operations management	The cost of management of the regional operations (includes Office and personnel costs when brought in-house. Only HB still doing the work.	directly related to the vector operations
Vector national costs	The cost of national office staff t nationally including strategy, planning and co-ordinating with other agencies at the national level. Head Office salaries as well as NDCM, Regional Coordinators, and Vector Net system costs.	Public and industry good Supporting vector operations.
	BLIPs (less & Less), LIPs, National Possum Control Association donation. Vector control audits.	Overheads
Otago Levy costs	The administrative cost of collecting the Otago levy - part of the regional operational costs.	Overhead

Table 15 Administration costs

Administration	Description	Allocation
Research	Costs of the Research programme, agreed each year and can be split according to the type of research and which industry will derive the most benefit.	Largely industry, although will contribute to the public good indirectly
Communication	Advertisements on programmes, Website maintenance, Field day displays, Publications, Market research. General costs, not really specific to any area, although some costs could be related to particular programmes.	Industry Is a public good aspect too.
Tb Free	The costs associated with 15 Tb Free committees. Stakeholder/customer interface. Tbfree Committees promote the Tb programme in their regions and are a source of advice and feedback to the Animal Health Board on policy and operational issues.	Industry
NPMS Review	Costs associated with the 5 year review of the NPMS	Public and Industry.
Administration	General support costs of the national office including personnel (incl salaries & kiwisaver), leases, depreciation, office costs. = Corporate Services.	Overhead
IT Expenses	Direct cost of IT systems and support including phones and software licences.	Overhead
Tech Admin Expenses	Costs associated with the technical team providing advice on the technical aspects of Tb. The manager has an overarching role informing the NPMS and programmes. Operational impacts in delivery of programmes both Disease control and Vector control.	Overhead
Disease Central	Support costs related to the Disease and vector control programme. Pulls together all vets and the on-farms services.	Overhead
Strategy and Business	Overall strategy development, ie implementing the NPMS. Op policy.	Overhead
Directors Expense	Board honoraria, travel & accommodation and meeting expenses. Governance structure for NPMS.	Overhead

Administration	Description	Allocation
NAIT	National Animal Identification and Tracing system - consultation	Overhead
Regional Co-ordination	Regional co-ordination office costs. 4 Regional coordinators looking after committees and public meetings for both vector and disease control.	Overhead - Could be Disease and/or Vector O/H and split the same as the salaries for Regional coordinators.
NDCM's	National Disease Control Management operating costs excl salaries, Split 50/50 between disease and vector control, perhaps costs should follow salaries and be all to Disease control.	Overhead
Regional Management	Costs of regional offices - leases, phones, office costs (excl salaries).	Overhead
Funding Expense	Bank charges and interest payments	Overhead

Appendix 2 Private, industry and public good categorisation

We have reviewed the activities that the costs relate to and assessed the categorisation of the activities as either public, private, club or overhead in nature. Below this categorisation is discussed

Disease control costs

Direct disease control costs relate mainly to the actual Tb testing on farms, laboratory testing costs, movement control costs, reactor payments, regional office costs and call centre costs. These are clearly identifiable costs directly related to individual farms.

Call centre staff manage the updating of herd details in the database, answering farmer queries on testing and movement control.

The following table categorises disease control activities.

Table 16 Disease control activity categorisation

Disease Control	Overhead	Public Good	Industry Good	Private Good		
				Beef	Dairy	Deer
Reactor Payments				✓	✓	✓
Movement Control, Herd Support & Herd Depopulation			✓			
FMV purchase of Dairy					✓	
Support - Salaries & DMIS Depreciation			✓			
Disease Control			✓	✓	✓	✓
Laboratory analysis of skin & blood test				✓	✓	✓
Testing - On farm Tb testing - contracted to AQ on a per test basis				✓	✓	✓
Deer Ancillary testing costs and administration of the Deer scheme.						✓
Contact Centre Costs			✓			
Regional Compliance activity			✓			
DDCM & Case management			✓	✓	✓	✓

In summary, direct disease control activities are of the nature of a club (industry) or private (sector/farm) good and should be allocated across the sectors.

Vector programme costs

Vector programme costs are the significant cost for the AHB. The vector control programme does not benefit any specific individual and is of either a public or club good, in nature. Most of these costs are shared between the industry, Crown and regional landowners. The Otago levy collection costs are specific to Otago landowners.

Table 17 Vector programme activity categorisation

Vector control costs	Overhead	Public Good	Industry Good	Private Good		
				Beef	Dairy	Deer
Vector control operations		✓	✓			
Management of vector control operations		✓	✓			
National office including strategy, planning and co-ordinating with other agencies, regional coordinators and Vector Net system support.	✓					
Otago Levy administration (paid as part of levy)		✓				

As can be seen from the table above, the vector control activities exhibit characteristics of both public and club goods. Where the activity is of a public nature then the costs will be shared between the Crown and landowners (through regional allocations).

Administration costs

Administration costs are largely for activities that are truly overhead costs, such as national office staff. There are, however, some activities that are industry or sector related. Research, communications and Tbfree activities are either regarded as club or private goods in nature.

The following table indicates where the nature of the administration activities.

Table 18 Administration activities categorisation

Administration costs	Overhead	Public Good	Industry Good	Private Good		
				Beef	Dairy	Deer
Research			✓	✓	✓	✓
Communication - Advertisements on programmes, Website maintenance, Field day displays, Publications, Market research			✓			
Tb Free committees co-ordination			✓			
Review of the NPMS (5 yearly)		✓				
Administration - National office - Leases, office, support systems & staff	✓					
IT systems support including telephony	✓					
Technical support	✓					
Coordination of vector programme and on-farm services.	✓					
Organisational strategy and business planning	✓					
Organisational Governance	✓					
Funding activity	✓					
National Animal Identification and Tracing system consultation	✓					
Regional co-ordination office costs to support meetings	✓					
National Disease Control Management operating costs	✓					
Operation of regional offices - leases, phones, office costs (excl salaries)	✓					