National Beekeepers Association

Cost Benefit Analysis for proposed levy structure

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# National Beekeepers Association – Cost Benefit Analysis of Proposed Levy Structure

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# **Executive Summary**

Prepared for the National Beekeepers Association, this report presents cost benefit analysis for a proposed change in the way levy funds are raised from beekeepers. A three levy approach is being proposed as follows:

- 1. A commodity levy under the Commodity Levy Act on "commercial" beekeepers for industry good activities
- 2. A biosecurity levy under Sec. 90 of the Biosecurity Act for the registration of all beekeepers for administration and management of the American Foul Brood (AFB) Pest Management Strategy (PMS).
- 3. A biosecurity levy under Sec. 90 of the Biosecurity Act on all beehives for resourcing and management of AFB under the AFB PMS.

Separate cost benefit analyses are presented for the PMS levies and the commodity levy. In both cases there is a requirement under the relevant Act that the benefits outweigh the costs to those who are required to pay the levy.

Our analysis is a combination of quantitative and qualitative assessment based on research and discussions with industry participants. In considering the benefits to beekeepers of industry good activities (i.e. the benefits received as a result of the commodity levy spending) we have not attempted to quantify benefits. We have however sought to demonstrate the level of benefits that are required to exceed the cost of the levy.

## PMS Levy

The results show that the PMS NPV to beekeepers can be expected to be between \$1.9million and \$15.8 million 90 percent of the time, with an expected value of \$8.49million.

Benefits to beekeepers as a group are significant and easily justify the presence of a PMS. While there will be some smaller (less than 4 hives) operators who are less likely to receive a net benefit, there is a justifiable argument that they should pay and the costs to them are being levied in such a way that the levy payable is a fair representation of the cost they cause the industry.

## **Industry Good Levy**

Costs per beekeeper are not large when considered in the context of the size of benefits required to achieve a breakeven position.

When the size of various beekeeping operations is taken into account, there would still appear to be a reasonable chance that the smaller operators will receive positive benefits. It could in fact be argued that smaller operators stand to receive greater benefit from industry good activities as they have less potential to undertake activities such as research and development on their own in a cost effective manner.

We believe that there is therefore minimal chance that the costs to beekeepers will not be exceeded by the benefits of industry good activities.

# Background

The National Beekeepers Association (NBA) currently has the ability to collect a compulsory levy from "commercial" beekeepers under a Bee Levy Order in Council through the Commodity Levies Act. Levy funds collected are used to support the bee industry and fund the National Pest Management Strategy (NPMS). This commodity levy is due for review and the NBA is proposing a change in the way beekeepers are levied.

A three levy approach is being proposed as follows:

- 1. A commodity levy on "commercial" beekeepers for marketing, research and development
- 2. A biosecurity levy under Sec. 90 of the Biosecurity Act for the registration of all beekeepers for administration and management of the AFB PMS.
- 3. A biosecurity levy under Sec. 90 of the Biosecurity Act on all beehives for resourcing and management of AFB under the AFB PMS.

In proposing this levy structure, NBA is attempting to ensure that the cost to beekeepers is better aligned with the expected benefits and that all beekeepers are contributing where benefits are received. For example, under the current levy order small hobby beekeepers are not contributing to the NPMS costs, although they are quite clearly beneficiaries.

To support the applications for a change in the levy collection NBA requires Cost Benefit Analysis to be undertaken to demonstrate that the benefits outweigh the costs from the beekeepers perspective. No benefits beyond those to beekeepers have been considered. These could be substantial when considering the value of honeybees to agriculture and horticulture in New Zealand.

Separate Cost Benefit Analyses are presented in this report to support the separate applications under the two Acts.

# Approach

Under both the Commodity Levies Act and the Biosecurity Act the Minister must be satisfied that the benefits to the persons responsible for paying the levy will outweigh the costs to them of the imposition, collection and payment of the levy.

Under both the Commodity Levies Act and the Biosecurity Act the applicant is required to demonstrate that the benefits outweigh the costs to those who are required to pay. We have therefore considered the costs and benefits from the beekeepers perspective only. There are likely to be significant benefits to others also, particularly in the Agriculture and Horticulture industries. We have not attempted to quantify these.

We have consulted with industry participants and stakeholders to identify the likely benefits of the levy and presented the findings in this report. Where variables have been identified as having a high risk we have incorporated a risk analysis, assigning probability distributions.

Our analysis is a combination of quantitative and qualitative assessment. Wherever possible we have attempted to quantify the benefits, however in many cases this is difficult and we have provided a qualitative assessment. In considering the benefits to beekeepers of industry good activities (i.e. the benefits received as a result of the commodity levy spending) we have not attempted to quantify benefits. We have however sought to demonstrate the level of benefits that are required.

# Impact of Varroa

The spread of the Varroa mite in New Zealand may have an impact on the incidence of AFB. Various opinion has been sought on this matter. There are valid reasons to suggest that the spread of Varroa will increase the incidence of AFB, however there equally valid reasons as to why the incidence may fall.

A hive becoming affected with Varroa will be weakened and allow any presence of AFB to become more established and may therefore assist in the incidence and spread. Varroa will however mean that beekeepers will have to be more vigilant in managing hives and more efficient to ensure that the added cost of managing hives is recovered. This is likely to lead to "better" beekeepers, with lower performers exiting the industry. This may in turn lead to reduced incidence.

There are many unknowns that still remain with Varroa, including spread rates and long term costs of management, and the impact on AFB can only be accurately assessed once more experience is gained. We have therefore assumed for the purposes of this analysis that the impact of Varroa on AFB incidence will be nil.

## Industry size

Following is a brief summary of the industry statistics used in the analysis. These statistics are based on the June 2001 figures collected by NBA.

Registered beekeepers,	4,100
Registered Apiaries	20,993
Registered Hives	315,900
Beekeeper Classification	
Commercial	940
Hobbyist	3,139
Number commercial hives	290,000

We have assumed that the industry size remains unchanged for the period of the analysis. Recent trends show there has been a considerable reduction in the number of beekeepers, especially amongst the hobbyists. This is likely to be a reflection of Varroa and would seem unlikely to continue at this level.

Given we are looking at the benefits from the perspective of the beekeeper the significance of industry size is not as critical as it would be if the benefits were being considered from an industry perspective. Taking into account the uncertainty we have provided the analysis on the basis that the industry size remains unchanged.

Information regarding industry size in dollar terms is difficult to determine with information not collected on a regular basis. We have however made an estimate of industry size based on known information for 2001 and estimates based on historical production and sales.

Industry Sales		
Honey – domestic	\$39.3m	
Pollination services	\$12.4m	
Honey – export	\$18.6m	
Live bees	\$1.4m	
Beeswax	\$0.6m	
Total	\$72.3m	

## **PMS Levy**

## **Estimating costs**

Costs to the beekeepers are limited to the levy payment made. While there may be some administration cost associated with the requirement to pay the levy, this has been assumed as minimal and therefore not considered. Other costs of imposing the levy are paid out of the levy proceeds by the NBA.

It is proposed that the total levy be collected through two separate levies as follows:

- A "Beekeeper registration levy" to be set at \$16.00 plus GST per registered beekeeper. This levy will be paid by all beekeepers regardless of size.
- A "Hive declaration levy" to be set at \$0.92 plus GST for each hive. This levy is to also be paid by all beekeepers regardless of size.

Because many of the beekeepers liable to pay the levy are hobbyists there will be an additional cost for those who are unable to claim back GST paid. We have accounted for this in determining the costs to beekeepers through assuming that there will be a GST cost to all hobbyist beekeepers.

Based on a total of 315,000 hives and 4,100 beekeepers the total levy to be collected will be approximately \$349,000.

This is budget to spent in the following areas.

Research and development	\$ 58,000
Management agency	\$190,000
Training and education	\$ 42,000
Administration	\$ 20,000
Collection accounting and	
Contract management	\$ 39,000

## **Estimating benefits**

In order to estimate the benefits of the NPMS we need to consider the impact of AFB both with a NPMS and without a NPMS. The difference between the "with" and "without" scenarios gives the net benefit that can be expected to result from the NPMS. The net benefit will be the reduction in loss caused by AFB as a result of the NPMS.

We have estimated the costs of AFB under a with and without scenario. Detailed calculations are contained in appendix one. Key assumptions used in this analysis are outlined as follows:

## **Incidence of AFB**

When considering the incidence of AFB account needs to be taken of the actual incidence versus reported incidence. Estimates of the actual incidence of AFB range from 2 to 10 times the reported incidence. This has a significant effect on the cost of AFB and the benefits of a NPMS. There is no doubt that the actual incidence will be higher than reported. This is a result of the disincentive to report infected hives due to the need for a clear area certificate to be provided by a beekeeper to allow exporting of production. Using a multiplier of 2 to 10 times would result in an actual incidence of between 0.92 percent and 4.6 percent. These figures have been derived after discussions with several industry participants. We have used a mid point of 6 times or an incidence rate of 2.76 percent. We have included this as a risky variable in the risk analysis conducted.

In the "with" scenario we have assumed that the incidence will continue to decline, albeit slowly, from the current level. We have assumed that this decline will occur at a rate of 5 percent per annum, with a range of 0 to 10 percent. We have included this variable in our risk analysis.

The rate of increase without a NPMS is again a risky variable. After discussions with several industry participants we have used a most likely value of 10 percent with a range of 0 to 20 percent.

## Number of hives lost

The number of hives lost is directly related to the incidence rate. We have assumed that where incidence occurs that the hive is in fact lost, with a resultant loss of production and cost of disposal. Although identification and destruction will not occur immediately in all cases we have assumed that it will occur over the longer term.

## **Cost of replacement hives**

A hive replacement cost of \$140.00 has been used as a most likely figure. This price is likely to fluctuate depending on the number of people entering or exiting the industry. Historical levels suggest that the price can range between \$120.00 and \$160.00. We have incorporated this in the risk analysis undertaken.

## Cost of hive disposal

We have assumed that where a hive is diagnosed with AFB that the brood is destroyed. This is achieved in many cases by burning the hives. Larger beekeeping operations are equipped to destroy the bees and treat components of the hive. The cost of either alternative is assumed at \$60 per hive.

## Loss of income

Where a hive is identified with AFB there is a loss of income. We have assumed this to be the income for a full year. Although a hive may be identified and replaced within a year there is likely to have been a reduction in production for a period prior to discovery. Similarly there is likely to be a period after discovery prior to full production being achieved with a replacement hive. We have therefore assumed that the total loss is equivalent to one year. Using the same argument we have assumed that although a full years production is lost there is no corresponding reduction in expenses associated with the infested hive. Based on industry averages we have assumed most likely revenue per hive at \$100.00. This is again a key variable and we have used a range of \$70.00 to \$150.00 in our risk analysis.

#### **Monitoring costs**

Beekeeper monitoring costs are assumed to remain unchanged under both the with and without scenarios. Much of the cost of monitoring is borne by the individual beekeeper and prudent management would see this monitoring undertaken irrespective of a NPMS being in place or not. Additional monitoring costs in the with scenario are covered by the NBA and met from the levies received, and are therefore already accounted for.

#### **Industry size**

The total number of hives has been based on numbers as at June 2001. For the purposes of this analysis it is assumed that the industry size would remain unchanged both with and without the NPMS. Relatively small changes in industry size that may occur are unlikely to alter the costs or benefits to beekeepers significantly. Given we are examining the costs and benefits from the beekeepers perspective and not an industry perspective we have assumed no change to industry size.

## **Cost/Benefit Analysis**

Based on the above discussion, a cashflow model has been developed using the most likely values for costs and expenses (appendix one).

At the most likely values the NPMS would show a net benefit to beekeepers of NPV \$8.41 million and a Net Benefit Cost Ratio of 4.66.

## Risky variables used in estimating the cost

It is recognised that several of the forecast parameters contain a degree of risk.

In discussion with various stakeholders we have identified the key risk variables and developed a risk profile for use in a risk analysis. In undertaking this we have developed triangular probability distributions for each, showing high, low and most likely values.

The following table shows the distributions developed for what are considered the key risky variables.

Key Risky Variables	Minimum	<b>Most Likely</b>	Maximum
Incidence of AFB	0.92%	2.76%	4.60%
Rate of incidence increase without a PMS	0%	10%	20%
Rate of incidence decline with a PMS	0%	5%	10%
Cost of replacement hives	\$120	\$140	\$160
Loss of income	\$70	\$100	\$150

## **Results of the Risk Analysis**

Using the cashflow model we have run a risk analysis based on the probability distributions above. The results show that the PMS NPV to beekeepers can be expected to be between \$1.9million and \$15.8 million 90 percent of the time, with a expected value of \$8.49million. The following table shows the probability distribution of the NPV.



## **Discount rate used**

A discount rate of ten percent has been used. The appropriate discount rate is the opportunity cost of capital to the industry. We have shown the effect a change in discount rate has on the most likely NPV in the following table.

As a general comment we acknowledge that the discount rate is sometimes used to factor in risk. This approach should be avoided as it distorts investment decisions by penalising long-term investments and biasing investment patterns to the short term.

	Discount Rate		
Most likely NPV to beekeepers	<b>8</b> %	<b>10%</b>	12%
	\$9.66m	\$8.41m	\$7.35m

## **Distribution of benefits**

While there are significant benefits to beekeepers as a collective group, net benefits to the industry will not be enjoyed equally among all participants. As an example, a hobbyist beekeeper with one hive will be liable to pay the full beekeeper registration levy and the hive levy for the one hive. This leads to a total cost for the one hive of \$16.70 +GST, and based on current incidence rates it is unlikely that the benefits received will exceed this.

While this is an issue for the small beekeeper, there is a cost to the industry of this person being a participant and they are an exacabator to the problem. The disproportionate per hive costs incurred is a result of the level of fixed costs per beekeeper the industry experiences in operating a NPMS.

Using the most likely values in the analysis, the NPV of the total benefits to beekeepers is \$10.2m. Based on 315,000 hives, this equates to approximately \$32 per hive. For a beekeeper to benefit from the PMS this NPV times the number of hives held must exceed the NPV of the annual costs (which are based on the number of hives). Our analysis shows that the likely benefits exceed the cost once four or more hives are held.

## Conclusion

Benefits to beekeepers as a group are significant and easily justify the presence of a PMS. While there will be some smaller (less than 4 hives) operators who are less likely to receive a net benefit, there is a justifiable argument that they should pay and the costs to them are being levied in such a way that the levy payable is a fair representation of the cost they cause the industry.

# **Commodity Levy**

## **Estimating costs**

As with the PMS Levy, the cost to beekeepers is the cost of the levy, with other costs associated with the imposing and collection of the levy being met from the funds collected.

Based on the number of beekeepers that fit the criteria of "commercial" the total levy to be collected is estimated at \$203,000 (based on 290,000 hives levied at \$0.70 each).

A levy will be charged to all beekeepers however those who have 10 or less hives on 3 or less apiary sites will be able to claim an exemption from paying. This is on the basis that these beekeepers are predominantly hobbyists and are likely to receive little benefit from industry good activities undertaken by NBA. We have assumed that all those who are able to do in fact claim exemption. We have also assumed that all those paying the levy are GST registered and therefore the total cost to beekeepers is excluding GST.

With a levy payable at \$0.70 per hive, the average payment per commercial beekeeper will be approximately \$216.00.

## **Estimating benefits**

The NBA budget for 2002 shows the levy allocated as follows:

Industry Leadership	\$35,000
Industry Representation	\$85,000
Industry Research and Development	\$65,000
Collection, Administration and management	\$18,000
TOTAL	\$203,000

Benefits flowing from the work of the NBA to individual beekeepers will potentially result from:

- Increased production per hive
- Reduced operating costs per hive
- Increased market prices
- Increased market size/access

Benefits of each area of spending are documented in the NBA Industry Good Plan.

## **Quantifying benefits**

It is extremely difficult to quantify the benefits received from the spending of levy funds collected in each of the areas identified. There are often several factors that influence a change in any one area and isolating the benefits attributable to the NBA work is difficult to achieve. This problem is further confounded by the fact that industry funds are at times used to leverage additional funding, and for the true return on industry funds spent to be calculated this must also be taken into account.

We consider therefore that any attempt to quantify benefits would lead to results that may be inaccurate and potentially misleading. We do however believe that we can demonstrate the likelihood of achieving net benefits through examining the size of benefits required in the context of the areas where they may have an impact.

## Benefits: Cost in relation to industry size/income/costs

Given the difficulty outlined above we have not attempted to quantify the benefits received. We have however attempted to demonstrate the level of benefits required for the beekeepers to "breakeven" after levy payments are deducted. The following table provides some examples of this.

	Present	Percentage increase/decrease required
Average Income per hive	\$100	0.7%
Average costs per hive	\$40	1.75%
Average Gross Income per Beekeeper	\$30,850	0.7%
Total FOB value exports	\$20.6m	0.99%
Total volume honey exports	\$18.6m	1.1%
Total Volume honey production per beekeeper at \$2.15 per kg	9,144T	1.0%

## Break even analysis

Given industry size and the levy proposed, it requires a relatively small changes in costs, production or income to see a net benefit to beekeepers.

# Conclusion

Costs per beekeeper are not large when considered in the context of the size of benefits required to achieve a breakeven position.

When the size of various beekeeping operations is taken into account, there would still appear to be a reasonable chance that the smaller operators will receive positive benefits.

It could in fact be argued that smaller operators stand to receive greater benefit from industry good activities as they have less potential to undertake activities such as research and development on their own in a cost effective manner.

We believe that there is therefore minimal chance that the costs to beekeepers will not be exceeded by the benefits of industry good activities.



# Appendix 1

Cashflow projections