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A Study of New Zealand Beekeeping —Lessons for Australia—

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by Doug Somerville

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Foreword

The value of honeybees to the Australian economy is undisputed. This has been emphisised by the ongoing media coverage of the potential threats to honeybees (*Apis mellifera*) world wide and the Australian Federal Governments' enquiry into the Australian honeybee industry. One of the key threats to honeybees in Australia is the exotic parasite *Varroa destructor* (Varroa mite). On the world stage, this pest is considered as one of the most serious challenges facing the keeping of honeybees. Australia is the only major beekeeping country not to have experienced the impact of an incursion of this devastating parasite.

Unfortunately, our closest neighbour, New Zealand, has had to deal with Varroa since 2000. Fortunately for Australia, one of the best methods of ensuring the Australian beekeeping industry is across the issues associated with the Varroa mite, is to learn first hand from their experience. A small group of Australians travelled to New Zealand to gather information on Varroa and other topics of importance to beekeepers in Australia.

The group was highly successful in identifying a number of key points that should be carefully considered by the Australian beekeeping industry, in order to prepare itself for the (possible) advent of Varroa.The findings of the study will make the 'readiness' for the incursion of the Varroa mite into Australia more focussed and provide a considerable body of information on a range of other topics including American Foulbrood, pollination and the marketing of honey.

This project was funded from industry revenue which is matched by funds provided by the Australian Government.

This report is an addition to RIRDC's diverse range of over 1800 research publications and it forms part of our Honeybee R&D Program that aims to improve the productivity and profitability of the Australian beekeeping industry.

Most of our publications are available for viewing, downloading or purchasing online through our website www.rirdc.gov.au.

Peter O'Brien
Managing Director
Rural Industries Research and Development Corporation

Acknowledgments

There is a particularly large group to thank for the success of this study. A series of RIRDC Honeybee R & D advisory committees supported the concept of the study. The previous chairman, Mr Keith McIlvride, saw the merit in learning from the New Zealanders the issues associated with managing Varroa mites.

The nine participants on the study all made valuable contributions. Profiles on each member and the key list of points each believed to be important for the Australian beekeeping industry to consider are contained in this report.

The study group comprised of Doug Somerville (NSW Dept. of Primary Industries), Des Cannon (Chair of Honeybee Committee within RIRDC), Rob Manning (WA Dept. of Agriculture), Peter Barnes (QLD), Colin Wilson (NSW), Peter McDonald (VIC), Ian Zadow (SA), Julian Wolfhagan (TAS), and Colin Fleay (WA).

Discussions occurred with a number of people in New Zealand during the planning stages of the study. Michelle Taylor and Mark Goodwin from HortResearch, and Byron Taylor and Murray Reid from AgriQuality were particularly helpful in identifying a route and suitable beekeepers that might be interested in talking to us. Michelle Taylor stood out as very helpful on an ongoing basis, as many emails and the occasional phone call were required to sort out the detail of the study.

AgriQuality changed its name in August 2007 to AsureQuality. For the purpose of consistency the name AgriQuality has been retained through the report as this was the title of this organisation at the time of the study.

All the New Zealanders visited were extremely helpful and very generous with their time. Frequently, we were invited for a meal on arrival. We wish to sincerely thank the following for their time, information and assistance in ensuring that this study of the New Zealand beekeeping industry, from an Australian perspective, was successful:

- Trevor Cullen (Auckland)
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- Frank and Mary-Ann Lindsay (Wellington)
- Paul Bolger (Wellington)
- Doctors and Staff, Tauranga Hospital

Photos by Doug Somerville, Des Cannon, Peter McDonald, Rob Manning, Colin Fleay and Ian Zadow. I would like to particularly thank Mark Goodwin, Murray Reid and Frank Lindsay for reviewing the final report and providing valuable comments on its content, Joanne Ottaway for typing and setting up the final report, and Annette Somerville for editing the final report.

Abbreviations

AFB	American Foulbrood
AHBIC	Australian Honey Bee Industry Council
AQBBA	Australian Queen Bee Breeders’ Association
AQIS	Australian Quarantine Inspection Service
CFU	Colony Forming Units
DECA	Disease Elimination Conformity Agreement
EFB	European Foulbrood
KPA	Kiwifruit Pollination Association
MAF	Ministry of Agriculture and Forestry
NBA	New Zealand Beekeepers’ Association
NPMS	National Pest Management Strategy
NSW	New South Wales
NZ	New Zealand
PMS	Parasitic Mite Syndrome
QA	Quality Assurance
QLD	Queensland
RIRDC	Rural Industries Research and Development Corporation
SA	South Australia
SAAA	South Australian Apiarists’ Association
TAS	Tasmania
VAI	Varroa Agency Inc.
VIC	Victoria
WA	Western Australia

Contents

Executive Summary

What the report is about

A study group of nine Australian beekeepers and scientists travelled through New Zealand in March 2007, discussing beekeeping issues with a range of beekeepers and scientists in the North Island. Many opinions were voiced on a wide diversity of subjects, not always in agreement with other New Zealand beekeepers visited. Even so, there were some very strongly held opinions across the industry and many experiences from which the Australian participants could learn.

The body of this report contains a section on the key reflections from each Australian participant.

Objectives

The objectives of the project were to provide to the Australian beekeeping industry an opportunity to learn from the success and failures of the New Zealand beekeeping industry. Primarily focussed on studying the introduction of the exotic bee mite Varroa, the project also included a study of pollination management systems, the NZ industry-managed AFB control program, and any other aspects considered by the study group to be of value to the Australian beekeeper.

Key findings

In essence, the New Zealand beekeeping industry has similar issues to the Australian beekeeping industry but has progressed further in many respects. The industry-managed AFB program would appear to be, after many years, making headway in reducing the incidence of AFB in New Zealand. This has taken many hours of input from numerous New Zealand beekeeping officials over many years. The concept of employing a person to manage AFB would appear to be quite successful in drawing together the essential elements of the program.

Legislation has been provided by the New Zealand government for this whole process to evolve. This is not currently available in any state in Australia. Even so, the evidence in New Zealand suggests an industry-driven system will be more likely to focus on the primary issues affecting the industry players and more effectively reduce AFB, than a government owned system. Interestingly, the New Zealand government, through its various agencies, still plays a major part in the control and elimination of AFB.

The impression given by New Zealand stakeholders was that when Varroa mites were found in New Zealand in 2000, the industry went into shock. This resulted in a very large outpouring of emotion and some very strongly held views on ‘who is to blame’. These still persist seven years later.

The industry, during this upheaval, saw pollination fees substantially increase, general honey prices increase, and the value of manuka honey (honey from the manuka bush) go through the roof. Thus, the shock of having to live with Varroa was very much cushioned by improved profitability of beekeeping in many areas. The die-off of unmanaged and feral bees was seen as a positive by-product of Varroa, which improved honey yields in managed hives (due to decreased competition from feral bees) and increased the demand for pollination services.

In spite of the experiences gleaned from 2000, Varroa was found in Nelson in the South Island in June 2006. From all accounts, the effort to isolate the spread and to ascertain the degree of invasion quickly was impressive. Unfortunately for many involved, the political decision was made not to attempt eradication. This was based on the estimated cost of NZ$8 to NZ$9 million and the strong probability that a reinvasion from the North Island would most likely occur sooner rather than later. The estimated success of an eradication of mites from the South Island was given at 80–85%.

Another key stumbling block was the difficulty in obtaining the use of the chemical fipronil. The manufacturer would not support its use to kill feral bees using remote poison stations. This chemical had been tested extensively and identified as the most effective for the purpose, far superior to any alternative chemical.

Some of the key points from the study include:

- adult mites live for at least five days with no contact with bees
- very low infestations (1-10 mites) in a hive are virtually impossible to detect
- surveillance systems, using pesticide strips, will only kill mites attached to the adult bees and will not provide information on the number of mites in the brood cells
- an estimate of two thirds of the resident mite population are within the brood cells at any given time
- no Varroa treatments are 100% effective in killing all the mites in a colony
- mites are very mobile and are spread very quickly by beekeepers.

The New Zealand beekeeping industry enjoys rather lucrative pollination service fees, particularly for kiwifruit. The demand for hives to pollinate kiwifruit was still increasing. The down side of kiwifruit pollination is that the blossom does not yield any nectar and the pollen is considered of poor nutritional quality. Research by MAF scientists had demonstrated that periodic sugar syrup feeding of bee colonies while they are on kiwifruit would substantially increase the amount of kiwifruit pollen collected, which assumes an improvement in the size and yield of fruit. This is due to the extra stimulation provided to the bees which induces them to carry out an increased number of foraging flights.

Partly as a result of Varroa, the pollination service fee for all other crops has increased. Where unmanaged or feral bees once provided a pollination service, managed bees are now filling this role.

The retailing environment for honey in New Zealand varies to some degree to that of Australia. Many of the retail packs are opaque tubs and identified as coming from a specific floral source. It would seem that if a batch of honey can be identified as primarily coming from a specific floral source, then it is marketed as such no matter what the flavour of the honey, or the volume.

There exists in New Zealand a higher proportion of producer-packers than is the case in Australia, and there are a relatively large number of “honey houses” selling an extremely wide variety of hive-related products and merchandising paraphernalia.

One of the primary factors supporting the economics of beekeeping in the North Island is the price received for honey sourced from manuka (*Leptospermum scoparium*). The honey from this plant was not that long ago regarded as “rubbish” and was poured down rabbit holes or fed back to bees over winter. Now every skerrick of manuka honey is extracted and sugar syrup provided to avoid starvation of the colony. Manuka honey is active, referring to its multiple anti-microbial properties, or non-active. Active honey prices to beekeepers ranged from $10 to $30 per kg. Non-active manuka honey prices were also well above regular honey prices.

In many cases, whole operations are focussed primarily on the returns generated from the manuka honey crop. In these situations it was interesting to note that the impact of Varroa was not something to dwell upon, it was relegated to history. Rather, retention of sites with manuka and concerns about theft and dumping were considered of much greater importance.

Implications

If the study had to be refined to a key take-home message, it would probably be that the economics of the industry will affect the resilience of an industry to adapt to changing circumstances. Varroa may have been more devastating if the economic returns had not improved at approximately the same time as it was establishing throughout the North Island.

Introduction

The initial objectives of the project were to provide to the Australian beekeeping industry the opportunity to learn from the success and failures of the New Zealand beekeeping industry. Primarily focussed on studying the introduction of the exotic bee mite Varroa, the project also included a study of pollination management systems, industry-managed AFB program and any aspect of value to the Australian beekeeper. The New Zealand beekeeping industry has had the misfortune to be invaded by the Varroa mite. This parasite of honeybees has caused a major shift in the industry. Thus far, the Australian industry has not experienced this problem.

The Australian beekeeping industry is preparing for the eventual arrival of Varroa mites. It is envisaged that this strategic study trip by industry representatives will increase the national awareness of the impact of Varroa mites and heighten the need for surveillance within Australia. Various industry players come and go from key positions within the various state and national beekeeping organisations. In most cases, Australian beekeepers have not seen a Varroa mite or experienced the impact of this major honeybee pest. It was the intent of the study that those who were included in the research would communicate their experiences on their return and increase the knowledge of the impact and management of mites across the Australian beekeeping industry.

The New Zealand government has altered the way it conducts business within the agricultural sector, restructuring the various functions of the Ministry of Agriculture. This was conducted some years ago and, as a result, the beekeeping industry was given the option of the government deregulating American Foulbrood control, the most serious brood disease of a honeybee colony, or taking over the management of the AFB program. The latter was chosen by the New Zealand industry, as it was deemed necessary by the industry that some controls remain in place. The Australian State governments are probably at various stages of a similar evolution.

The various Australian State governments responsible for Agriculture/Apiculture vary in the resources they provide to the honeybee industry for the purposes of managing and controlling AFB. The Australian beekeeping industry has historically found it challenging to agree on a national strategy or even a clear direction within each state.

As various governments reduce their services, they historically provided to the beekeeping industry and concentrate on other areas, it would be beneficial for the Australian beekeeping industry to examine the New Zealand beekeeping industry approach to AFB management.

It was the intent of the study that both the Varroa and AFB experiences, and knowledge gained by the Australian delegates, would provide a catalyst for refocussing the Australian beekeeping industry on these two major international management problems.

Annette & Russell Berry – always happy to see Australian beekeepers

Sign on beekeeper's gate – No, this sign was not located at Auckland airport!

Travel Itinerary

All study participants flew into Auckland 10th March; Whangarei 11th; Kaitaia 12th–13th; Hamilton 14th–15th; Tauranga 16th; Rotorua 17th–18th; Napier 19th; Wellington 20th–21st; flew out of Wellington on 22nd. The month of March was the most appropriate to maximise the groups' opportunity to view Varroa mites. Also, this time of year is less busy for both the New Zealand and Australian beekeepers involved and visited.

Getting around New Zealand – no holiday!

(Note: Throughout this report, prices quoted for Pollination, Honey and other references are in $NZ)

New Zealand Beekeeping

The following information was obtained from the report tabled by Murray Reid, National Manager Apiculture, AgriQuality Limited, Hamilton at the NBA Conference in Dunedin 2007, and published in the New Zealand Beekeeper, Vol. 15 (8).

Apiaries range in number from 16 to 36 hives on semi-permanent sites. The national average honey yields vary, but a six year average for the period 2002 to 2007 was 30.6 kg/hive. The range was 15–40.8 kg/hive. The 15 and 40 kg/hive being extreme, as in four of the six years the average range was 30.2 to 34.7 kg/hive. The estimated crop is calculated over all hives registered not just 'productive' ones.

Individual hives may yield up to 50 kg on a regular basis in some regions. The total annual honey crop was around 9,000 tonnes. Honey is sold on the domestic market and exported. There was no competition from large quantities of imported honey due to biosecurity restrictions.

New Zealand Parliament House – referred to as the Beehive – Wellington

In the 2007 census of beekeepers, there were 2,602 as at June, owning 19,228 apiaries with 313,399 hives, with an average of 16 hives per apiary. Many smaller operations (hobbyists) have smaller numbers of hives per apiary, thus the 16 hives per apiary average is possibly an unrealistic assumption.

Figures from May 2000 until June 2007 indicated a significant reduction in the numbers of beekeepers registered. In the North Island, a reduction of 56% occurred, whereas during the same time frame, there was a reduction of 29% in the South Island. These figures coincided with the finding of Varroa mites in the North Island in 2000. Varroa was not found in the South Island until mid 2006, thus the figures cannot be solely attributed to the impact of Varroa. Still there is a difference between the South and North Island of 27%, which could be contributed to by the extra problems experienced with honeybees due to Varroa mites. Most of the reduction was with hobby beekeepers.

Additional observations from interviews with beekeepers provided information on the style of beekeeping practised as compared to Australian beekeeping. The number of hives in a commercial apiary varied according to the historical honey yields for each site. According to the registration data the average number of hives per apiary was 16 hives but this figure is biased as it also includes apiaries owned by amateur beekeepers. The normal stocking rate was closer to 24 to 36 in many of the apiaries belonging to beekeepers interviewed. The distance between apiaries was as close as one kilometre. Most beekeepers did not travel more than two hours to service any particular apiary. Most beekeeping operations had a reduced time radius. As a consequence, beekeepers were using smaller trucks than Australian beekeepers. With the high value of manuka honey, some beekeepers are chasing early and late flowering manuka in various parts of the country which has necessitated transporting bee hives more than historically has been the case.

National Beekeepers' Association

The National Beekeepers' Association of New Zealand is the peak industry body. There is a competing (smaller) beekeeping association and a number of beekeepers do not belong to any beekeeper organisation. The NBA publishes 'The New Zealand Beekeeper' magazine eleven times a year. This magazine is the national beekeeping journal. The journal is posted to all registered beekeepers twice a year.

These two issues are usually full of information on the AFB National Pest Management Strategy. Subscription to the journal is available to non-members and details can be obtained from the NBA web site www.nba.org.nz.

There are eleven branches of the association, seven in the North Island and four in the South Island. The branches are Northland, Auckland, Waikato, Bay of Plenty, Poverty Bay, Hawke's Bay, Southern North Island, Nelson, Canterbury, Otago, and Southland. The organisation holds an annual conference in early winter that rotates between the South Island and North Island.

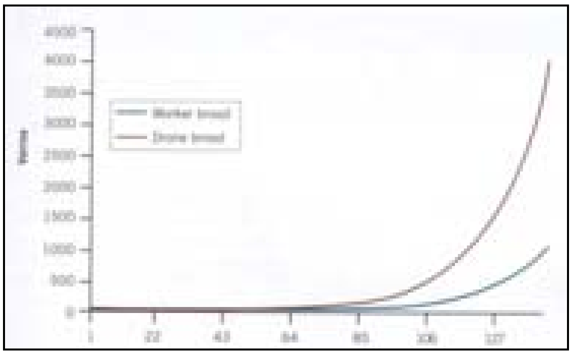
Varroa

Varroa mites are said to be the most serious problem facing the management of honeybees in the world. The tiny little creature is a mite, oval in shape, the size of a sesame seed. The adult Varroa mite "piggy backs" on the adult bees with minimal disturbance to the individual bee. The mite feeds by piercing the body of a bee and sucking its blood or haemolymph. The adult mite is also capable of living away from adult bees for over five days without feeding. The mite almost looks lethargic when observed away from a bee, but when a suitable ride (bee) passes by, the mite literally springs into action and attaches itself to the bee in less than an eye blink. Each adult mite out of the cell is a mated female capable of laying fertile eggs.

For these reasons Varroa mites have been very successful in dispersing themselves across the world honeybee populations. The ease with which they can piggy back on bees and survive for extended periods away from a bee host, helps them spread very rapidly whenever they first enter a new area.

The fertile female mite enters an open brood cell of bee larvae just before it is sealed. The mother mite lays a series of eggs. The first egg develops into a male, with each egg after this developing into a female. A maximum of six eggs are laid by the mother mite. As the eggs hatch the male, which develops first, mates with the maturing females. The male does not leave the confines of the brood cell. The number of mated new female mites varies according to the caste of the bee brood on which they are developing. On average, 1.5 daughter mites are produced from worker bee brood and 2.5 daughter mites are produced from drone brood. Thus, a mite population is able to substantially increase in numbers whenever the honeybee colony (its host) is rearing drone brood.

On initial invasion into a honeybee colony, the mites will continue to expand in numbers wherever there is bee brood for the developing mites to feed on. During periods of no brood in the colony, the mite populations will decline.
A few mites in a colony will not disrupt the colony and generally they will be of little consequence to the health and welfare of a colony of honeybees. Mite populations will increase relatively slowly at first, but as their numbers increase, so will the rate of expansion of the population. In a graph format, this is said to be exponential.



Theoretical population growth curve for Varroa: drone brood v's worker brood
Source: Varroa Control Book

For at least a year and even longer, the mite population will not have an observable impact on a colony. During this period the mites are also dispersing to other honeybee colonies (both feral and managed).

The act of the mites piercing the bodies of developing bees to obtain food is not considered to be fatal to the bee. The problem arises as a result of the transfer and introduction of bee viruses. These are capable of inhibiting the development of the bee and potentially killing the developing bee brood, causing malformation of the bee such as the wings, preventing the bee from flying and being a productive component of the colony or damaging it in some other way which reduces its life span.

Initially, there are no obvious signs of an invasion of mites perhaps for the first 12 months. Colonies with high mite populations can exhibit signs such as scattered and patchy brood patterns, almost similar in appearance to that caused by advanced EFB. This is referred to as PMS or Parasitic Mite Syndrome. Often this is the first indication to beekeepers that their bee colonies have a problem. It was at this stage of infection that the presence of mites in New Zealand became known in 2000.

A beekeeper (amateur) in the Auckland region had observed some unusual symptoms in his colonies and was not aware of the cause. He sought assistance to help identify the reason for his colony's ill health and as they say, the rest is history (the history is covered shortly).

Prior to PMS-type symptoms showing up, crawling drones and worker bees with deformed wings are sometimes associated with significant mite populations. These deformed wings are caused by viral infections introduced by the mites into the developing bee brood.

Deformed wing virus – as a result of Varroa mites

The population of mites is the critical factor in determining treatment protocols. When PMS is obvious, if a colony is not treated to reduce the mite population, it will be dead or will have absconded within weeks. Colonies that maintain a brood nest throughout the year will require more careful monitoring of the mite population. When the colony is rearing drone brood, the mite population is able to increase even quicker.

New Zealand refers to two stages of mite establishment – the acute phase and the chronic phase. The acute phase is when the mites are first establishing themselves in a given region, followed by the chronic stage. Essentially during the acute stage, the mite populations are very unpredictable because of reinvasion from collapsing colonies. The chronic stage is when the mite population is established and reasonably predictable.

Individual hive or apiary management of pests and diseases is usually sufficient to control the impact of any particular issue. The problem arises during the initial invasion of mites when managed bees can be monitored for mite populations and treated, whereas unmanaged colonies and feral colonies are left untreated in the same geographic region. As these colonies become very weak, the mites will disperse, mainly as a result of the bees absconding or drifting. Occasionally these weak colonies will be robbed by bees from more populous colonies. Thus, the mite populations are very unpredictable for at least two to three years after the initial invasion into a region.

For this reason, regular monitoring of mite populations needs to be undertaken during the acute phase to prevent unnecessary losses of managed bees. Depending on the treatment protocols chosen, one or two treatments may be necessary during the chronic phase, whereas three or more treatments may be necessary during the acute phase.

Spread of the Mites

Mites spread primarily by three mechanisms:

1) Absconding – Where adult bees abandon brood, leave their hive and disperse into other hives or form a swarm.

2) Robbing – Bees from one colony rob the honey from another colony. A significant problem when a colony becomes too weak to defend itself due to mites.

3) Drifting – This is usually associated with bees from colonies in close proximity to each other. The exception is that of drones which are known to enter completely unrelated colonies outside of the apiary in which they were reared.

4) Beekeeper – In the process of transferring bees, bee boxes and equipment, the beekeeper will aid in the spread of mites. As mites are capable of living away from bees for several days, a beekeeper could unknowingly spread mites in sticky supers or associated equipment without bees, from an apiary with mites to an apiary without mites several kilometres away from the original site. In the Australian context this could be many hundreds of kilometres.

The degree of mite invasion in a local area is probably influenced more by the actions of absconding and/or robbing bees, whereas the introduction of mites into a new zone or region is most probably as a result of beekeeping actions.

Detecting Mites

Detecting mites can be very difficult when they are in very low numbers.

1) Inspecting combs of bees and careful examination of the resident worker bees is not a reliable method of detecting mites. While the mite is big enough for the naked eye to see, it tucks itself into the segments of an adult bee and becomes only partially visible. Inspecting adult bees will not detect mites reproducing in the brood cells.

2) Using a capping scratcher to remove developing drone brood is a method used to determine the presence of mites. Varroa mites are more attracted to drone brood than worker brood. The technique requires the removal of approximately 200 pink-eyed drones from their cells. The mites are easy to see on the pale, white developing drone brood. This method is not considered reliable and is only effective when the colony is rearing drone brood.

3) Ether roll technique is a method used in New Zealand and the USA, but has its limitations. Approximately 300 bees from two to three brood frames are shaken into a jar and sprayed with ether. In the process, the bees and mites are killed. The mites become dislodged from their host bee and adhere to the side of the jar. This method is said to be not very effective and the ether is flammable, making the whole process potentially dangerous.

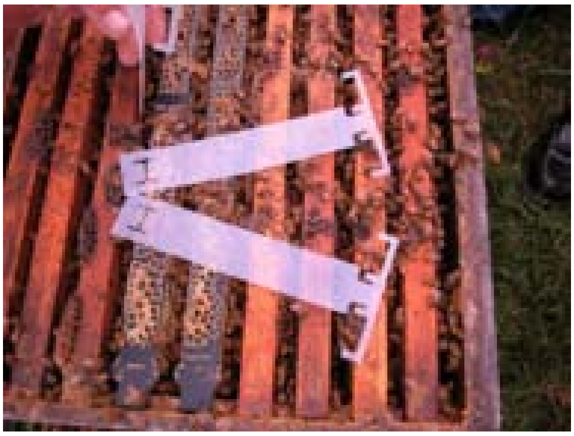
4) The sugar shake technique utilises 300 bees from two to three brood frames. Add bees and a tablespoon of icing sugar to the jar, preferably with a gauze lid. Shake/roll bees for two minutes, leave for a few minutes and repeat once more. Shake mites and sugar through gauze. Release the bees back into the hive. This method is said to be very sensitive, with a 90% chance of finding mites.

5) Washing bees in alcohol (methylated spirits) or soapy water will dislodge the mites. This method is highly sensitive and reliable, but is fatal for the bees.

6) Mesh screens on bottom boards can be used effectively to monitor mite fall. A sticky mat placed under the mesh will collect any mites dislodged from grooming behaviour by the bees. This technique requires the sticky mat to be left in place for three to five days. This method is highly reliable in monitoring mite populations and is a particularly valuable tool for beekeepers to determine treatment intervals.

Varroa mites on sticky mat

7) Miticide strips (Apistan and Bayvarol) are the most sensitive method and reliable in determining the presence of mites and/or the density of the mite population for surveillance or treatments. Two to four miticide strips are placed in the brood nest with a sticky mat on the bottom board. The mat is inspected for mites within 24 hours.



Strips to treat colony for Varroa mites before insertion between combs

None of the methods described will identify every single mite in a colony. Testing adult bees when there is little or no brood will be more accurate in determining the presence of mites and their density, as compared to sampling adult bees when the colony is maintaining a brood nest.

Many of the tests suggested are also destructive to the bees. A combination of three of the non-destructive techniques for measuring mite populations would seem to be the ideal combination. The use of miticide strips, in combination with a sticky mat, will ensure that potentially many thousands of resident bees will be tested, i.e., all the bees that come in contact with the miticide strip potentially will have any attached mites die as a consequence and fall onto the sticky mat.

This method will not account for any mites within the brood cells. To achieve a very high rate of mite mortality, the strips would need to be left in place for six weeks. Even then, this is not likely to remove 100% of the mites within the colony.

This method requires two visits to a colony over 24 hours or longer, and is dependent on the availability of miticide strips. The success of this technique depends on the mite's not developing resistance to the miticide used.

The sugar shake technique is cheap and simple. It is also said to be very effective in dislodging mites from adult bees and is non-lethal to the bees being checked for mites. The results are also instantaneous.

There can be no resistance as the sampling technique is physical. The down side is that when only checking 300 bees, say, out of a colony of 20,000 (single), then only 1.5% of the bees in a colony are being monitored. The success of finding mites with this technique will increase if bees are sampled in the brood area or if the colony is broodless.

Sticky mats permanently placed under a screen bottom board will enable monitoring of any potential mite fall on a regular basis. As mites are reasonably large (the size of a sesame seed), the average person should be able to see them. You only need one mite to confirm its presence. These screened bottom boards can be used to monitor mite levels and assist in determining treatment frequencies. Screened bottom boards are also said to be effective in helping reduce mite populations in a hive. If, for whatever reason, a mite is dislodged from its bee host and falls on the bottom board, it will jump on the next passing bee.

If the mite drops through a screen and is physically remote from the bees, then the opportunity to find a bee is removed. It either dies or is eaten by something else (ants, spiders, etc.)

New Zealand beekeepers used all of these surveillance techniques, particularly during the acute phase of the mite population build up. Now that mites have been established in the North Island since 2000, many beekeepers interviewed had reverted to treating colonies at certain times of the year and fitted the management of their bees around these treatment periods.

An important point not to forget was that a colony left untreated will die. Once a colony demonstrates symptoms of PMS, then treatment of the colony for mites becomes critical.

Treatments

The following table was provided by Mark Goodwin, HortResearch summarising the main methods of Varroa mite control in New Zealand and the effectiveness in reducing mite populations.

VARROA TREATMENTS			
Trade Name	**Chemical Name**	**Effectiveness**	**Comments**
Apistan	Fluvalinate	95% +	▪ 185 times stronger than Bayvarol ▪ Not to use on honey flow ▪ Leaves residues in wax
Bayvarol	Flumethrin	95% +	Leaves residues (less than Apistan) in wax
Apivar	Amitraz	95% + ?	Shelf life of 6 months Residues in wax and honey
Api-Life-Var	Thymol	40–95%	Leaves residues, taints honey
Apiguard	Thymol	20–95%	Leaves residues, taints honey
Thymol	Thymol	40–95%	▪ Crystal form ▪ Taints honey
Formic acid	Formic acid	25–95%	▪ Residues ▪ Personal safety gear a must ▪ Taints honey
Oxalic acid	Oxalic acid	40–60%	▪ Will kill brood ▪ Personal safety gear is a must
Food grade mineral oil	Mineral oil	0 ? %	▪ Possible to blow your hive to bits ▪ Personal safety gear is a must
Screen bottom boards	Non-chemical	5–30%	Work best in combination with other chemical treatments. Cannot control Varroa number sufficiently to reduce the number of chemical treatments.
Cull drone comb	Non-chemical	0–90%	Dependent on system to remove and destroy all drone brood on a regular basis. Time consuming.

Any Varroa treatment effectiveness rating below 95% requires more than two treatments during the year and regular monitoring of mite populations. During the chronic phase Apistan, Bayvarol and Apivar are normally applied twice a year and a 95% kill would be expected. This reduction in mites will ensure that there is no need for re-treatment for six months. When the treatment is less than 95% effective or unpredictable then a mite population monitoring program should be in place and re-treatment could even be on a monthly basis. A decision to apply a treatment is based on mite fall on sticky mats placed under the brood combs.

Bayvarol and Apistan

These products come in sealed foil bags which are opened at the apiary and the strips are placed down between the brood combs. These are plastic, impregnated with synthetic pyrethrin chemicals, fluvalinate or flumethrin. The strips are left in the brood nest for six to eight weeks, which will coincide with at least two brood cycles. This method is said to be highly effective in reducing the mite populations.

Strips in place to treat hive for Varroa

Apistan contains a higher concentration of pyrethrin than Bayvarol. Safety requirements include the use of gloves to handle the strips and the necessity to only use the strips when the bees are not gathering a surplus crop of honey. They are mainly inserted into a colony in the spring period, then again in the autumn.

The frequency of use is very much dependent on the mite population, the effects of reinvasion from untreated colonies and the amount of brood rearing of the colonies through the year. Colonies in New Zealand are normally treated twice a year.

Resistance to this chemical has been reported in the international beekeeping literature. There was no suggestion that the mite population in New Zealand had any resistance to fluvalinate or flumethrin yet. Unfortunately, many beekeepers interviewed could quote an example of a beekeeper who left the strips in a hive for well beyond the recommended treatment period, and beekeepers who re-used the strips on multiple occasions. These practices were identified as increasing the chances of a resistant mite population evolving sooner rather than later.

The use of these two chemicals was the most common treatment for mites in New Zealand by the beekeeping industry. This probably reflects the ease with which it is applied and the current effectiveness of the treatment in reducing mites (95% plus). The principal limitation of this method was that it should not be applied when bees are actively storing honey.

Apivar

This product is a contact insecticide similar in application to the two previous chemicals. It is applied in the same fashion with a plastic chemical impregnated strip containing amitraz. This product can be highly effective at killing mites; unfortunately it has a limited shelf life of six months. Beekeepers report variability in its effectiveness.

Api-Life-Var

ApiLifeVar contains four essential oils, thymol, eucalyptus, camphor and menthol absorbed into a vermiculite wafer. The manufacturer recommends that this product is applied immediately after the honey crop has been removed while temperatures are between 18ºC and 35ºC. The product is sold as a pair of impregnated wafer strips sealed in a bag. The strips are removed, broken in two and placed on the top bars in the corners of the hive. This treatment is repeated every seven to ten days, three or four times according to the prevailing temperature.

Apiguard

This product contains thymol in a slow release gel material. Trays are placed on top of the brood frames and a measured amount of gel is placed in each tray. The trays should be checked in ten days and topped up with more medicated gel. This treatment is applied for a four to six week period. Apiguard is said to work better when temperatures are above 15ºC with efficacy improving at even higher temperatures.

Thymol

This chemical is purchased in a crystal form and either dissolved in alcohol or used in the crystal form. Eight grams of crystals are placed in two shallow containers under the lid or absorbent pads with eight ml of thymol solution placed under the lid. This treatment is repeated every week for three weeks.

Similar safety precautions are necessary, as with oxalic and formic acid. Wear acid resistant gloves, use goggles, and a dust mask. Ensure that water is available to dilute and wash off any spilt thymol solution. Commercially-made gel formulations are available that are easier to use but repeated treatments are needed.

Formic Acid

The desired formulation is made to a concentration of 65% by mixing three parts formic acid to one part water. The original formic acid in this case, is 85% concentrated. The mixing and use of this chemical can be damaging to the beekeeper’s health. Mixing formic acid cold will reduce the chances of inhaling the vapour. Whenever handling formic acid, safety should be a top priority. The wearing of a respirator, goggles, gloves, and apron will be necessary when handling and mixing formic acid.

Formic acid works by producing a vapour that will kill the mites and not the bees. If the acid comes in contact with brood it will kill both the bees and developing brood.

Application methods vary, but essentially the diluted acid is added to an absorbent material and placed on the top of the hive under the lid. The acid evaporates and penetrates the cavity of the hive, killing the mites. This method has to be repeated frequently from one to ten days. Commercially available products which are easier to apply have been manufactured in some countries, based on formic acid.

It is important to use formic acid only when atmospheric temperatures range between 10ºC to 30ºC. Conditions whereby the temperature is cooler or hotter will make the treatments less effective in killing mites and potentially (when hotter) damaging to the adult bees, developing brood and the beekeeper.

Oxalic Acid

This acid is usually purchased in a crystal form as oxalic acid dehydrate. This powder form contains 71.4% oxalic acid. Mix 1 L of water with 1 kg of sugar, plus 75 g of oxalic acid dehydrate. This solution is 3.2% oxalic acid (w/v). This can be directly applied to bees by squirting up to 150 ml over the colony cluster. This method should only be used during winter when there is no brood rearing. General safety precautions include the use of acid-resistant gloves, goggles, and dust mask when making up the solution. Gloves and goggles are recommended when applying in the field. Any spillage should be washed off the skin immediately, thus water should be readily available as a precaution. Oxalic acid is not to be applied when honey supers are on a hive.

Food Grade Mineral Oil

Food grade mineral oil is applied with an insect fogging machine. There are a range of views on the effectiveness of this technique. Some research findings indicate no impact of this treatment on Varroa mite populations. This method is considered to be highly dangerous to the operator. Reports of hives blown to bits are not rare. The vapour is also considered a health hazard to the operator.

Non-chemical

The use of mesh bottom boards will increase the effectiveness of some chemical treatments. The number of mites it removes from a colony is difficult to determine. An estimate of up to 30% of the mites is a worthwhile number, considering the mesh bottoms are working 12 months of a year. This method is not considered sufficient on its own as a control treatment for mite populations. Mesh bottoms with sticky mats allow for the identification of colonies with high mite populations, allowing them to have individual attention to suppress mite populations.

Pseudoscorpion eating a Varroa mite

A survey of an apiary using any technique will not necessarily identify individual colonies with higher than average mite numbers. Apiary treatments may mean the loss of some colonies between treatments for colonies whose mite populations increase to a point where a colony dies.

Culling drone brood combs is likely to remove a large number of developing mites. This is practiced by inserting drone combs into the brood box. Once the majority of the drone brood is capped, the combs are removed and typically frozen. This will kill all the mites and the brood. The combs can then be replaced in the colony to be cleaned up and re-laid.

Another method would be to encourage bees to build drone comb in a designated space, possibly under the brood combs. The brood box is then parted from the bottom board and the brood comb is removed and melted down or burnt.

Do and Don't List

As recommended by MAF on the Varroa Management DVD.

Do:

- Check for Varroa regularly
- Apply spring and autumn treatments
- Sample in mid-summer (acute phase)
- Be prepared to remove honey early
- Follow label instructions exactly
- Use a method that offers protection
- Alternate chemicals
- Make sure the control method worked.

Don't:

- Rely on visual inspections
- Be complacent about Varroa
- Get caught out by Varroa invasion
- Use unregistered products
- Apply chemicals when honey supers are on hives
- Use strips for longer than instructed on label
- Reduce chemicals until after the acute phase

Four points to remember:

1) A colony with Varroa doesn't appear sick even though it is full of bees and honey.

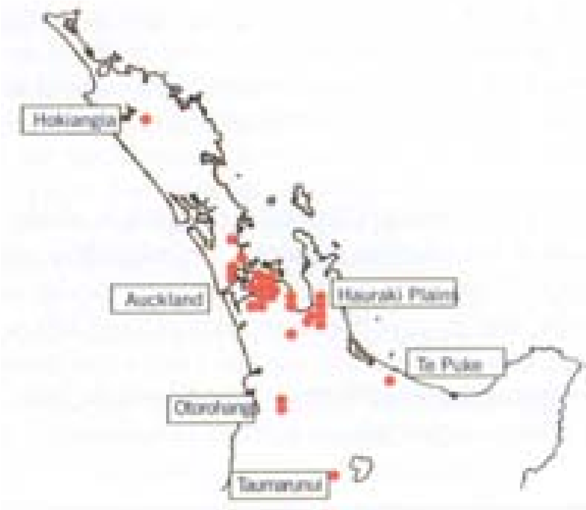
2) Sample mid-summer, this will enable you to identify mite population build-up to damaging levels.

3) Follow instructions on label.

4) You can manage Varroa successfully.

Varroa – The New Zealand Experience

Varroa mites were confirmed in the North Island of New Zealand in April 2000 in the Auckland region. The survey that followed identified mites in a large number of colonies scattered across the northern areas of the North Island.



Distribution of Varroa in October 2000
Source: Varroa control book

After the extent of the spread of the mite had been established, the decision was made to not attempt eradication. Instead the pest was declared endemic and a control strategy was developed. Some criticism was levelled at the government of the day for taking three months to complete the survey. However, given that the numbers of hives to be inspected would have been considerable, the complications of doing surveillance in and around a city, plus the necessity to follow up with all movements of bee colonies over the previous 12 months, probably suggests that to complete the survey within three months was an exceptional feat and a compliment to the government agencies involved.

A series of information sessions were held across the island, providing information to beekeepers on how to manage and test for the mites. A book commissioned by MAF and written by Mark Goodwin and Cliff Van Eaton was published (now published in a revised edition), followed by a DVD with the same title, "*Control of Varroa – A Video for New Zealand Beekeepers*". These publications are well written and represent a thorough coverage of the subject of Varroa. The issue that many beekeepers expressed during the study was the lack of information from the word go. The general fear in the industry of what Varroa would do to each beekeeping business was very strong, causing quite a number of beekeepers to leave the industry. As a footnote, we were told that some of these people have returned to the industry now that Varroa mite management is predictable and the economics of beekeeping remain attractive.

Immediately after Varroa was declared endemic in the North Island, quarantine lines were drawn across the map. These were intended to slow the spread of the mite and delay its impact on the south of the North Island. From the information received, this measure was successful but not without causing considerable grief in some quarters of the industry.

Beekeeping in New Zealand is largely stationary. Apiaries are not generally moved to different honey flows. The exception was the movement of hives onto pollination service contracts and their return to their original sites.

Thus, these quarantine lines invariably adversely effected those who derived income from pollination service fees and/or had apiaries on one side of the line, while their base, shed, extracting plant, etc., were on the other side of the line. Compensation was available for beekeepers that could provide evidence that they were out of pocket as a result of these quarantine lines. To qualify for compensation payments, sufficient records had to be provided and the necessary paperwork needed to be filled in. While some beekeeping systems took all this as a matter of course and were able to obtain some degree of financial assistance, other beekeepers could not, due to lack of records. Quarantine lines also affected those beekeepers that were doing "the right thing" whether they benefited from any assistance or not, whereas it was pointed out that there will always be one or more beekeepers who do not respect the system and any attempts to slow the spread of Varroa.

In conclusion, in relation to quarantine lines, some beekeepers thought they were a good idea and probably saved them money in the short term. Others thought they were a nuisance, if not worse, and believed they caused animosity and dissent amongst the industry. A third group was largely indifferent to the quarantine lines, as they didn't really affect their operations.

As Varroa became established on the "clean" side of the line, the line was shifted in September 2003. By 2005 all colonies in the North Island were believed to have Varroa mites.

An article published by Mark Goodwin in 2004 on Varroa in New Zealand, stated that an incursion into the South Island was but a matter of time. In June 2006 this fear was realised.

A separate incorporated society, "The Varroa Agency Inc." had been established to manage the surveillance of mite's program and information flow for beekeepers. This was established in 2005. In the South Island, 167 apiaries were regularly sampled each year, originating from 10 high risk areas. High risk areas were said to be around seaports, airports, large population areas and tourist areas. The VAI sampled another 13,000-18,000 apiaries for Varroa each year.

Education and inspection programs were paid for by levies on beekeepers and contributions from local councils. For 2006–2007 the levy was $1.38 plus GST per hive, or $10.00 plus GST for beekeepers owning less than five hives. This levy on beekeepers only covered 25% of the cost of conducting the Varroa strategy, the rest of the funds were provided by South Island regional councils.

Once Varroa was found in Nelson city in June 2006, an area of a 5 km radius around the apiary was regarded as high risk. All hives in this area were tested, also any related apiaries outside of this zone. A press release indicated that two apiaries had initially been identified with Varroa (16th June). By the 26th June a press release had identified 18 separate locations. A further press release on the 12th July stated that there were 12 surveillance teams in the field and that 41 sites had been confirmed to have Varroa mites. A briefing paper was prepared for a government decision on whether to attempt eradication or not. Two choices were put forward – the option to eradicate Varroa was calculated to potentially cost NZ$8 to NZ$9 million. Eradication was also given an 80 to 85% chance of success. Due to a number of factors, some of them possibly speculation on the political process by some beekeepers, the decision was made on the 3rd August not to proceed with eradication. Some of the reasons given included:

- Strongly likelihood for a re-incursion of Varroa from the North Island sooner rather than later.
- Legal problems with the use of fipronil to kill feral bees. This chemical has been identified as the most appropriate and suitable for remote poisoning of feral colonies after significant research by New Zealand MAF.
- The terrain around Nelson was particularly rugged in parts which would make the poisoning of feral bees difficult.

A report published in August indicated that 10,033 hives in 909 apiaries were selected to be sampled for Varroa right across the South Island by the VAI program. Further hives where monitored by MAF which brought the total number of hives surveyed closer to 17,000.

Sugar syrup feeding station for eventual poisoning of feral bee colonies

Early attempts by the beekeeping industry to facilitate the eradication of Varroa included the purchase of around 1,000 bee hives in the Nelson area and their removal to the North Island. The announcement by the government not to proceed with eradication was cause for serious disappointment by government MAF staff involved in the whole process and the beekeeping industry in general. In many cases, feeding stations had already been established in preparation to poison feral bees. It is believed, but not officially recorded, that poisoning of feral bees did proceed, but was not facilitated by MAF staff. Subsequent inspections of known feral colonies and observation of flowering plants within the Nelson township indicated that this action was unsuccessful in killing all feral bees in the area.

Paul Bolger providing the post mortem on the South Island Varroa incursion

As a result of the decision not to eradicate Varroa, a movement control line was confirmed across the top part of the South Island, plus a series of workshops were planned for beekeepers, titled “Living with Varroa”.

Varroa Resistance Breeding Program

This program is being managed by Michelle Taylor from HortResearch. The project began in 2005 with donations of stock from beekeepers in the North and South Island. The lines were tested for resistance to Varroa and the 10 best queens were included in the breeding program.

Each year after testing, the 10 best queens are selected for the breeding program. Virgin daughter queens are inseminated with drones produced by their mothers. This is termed a closed population breeding program. Invariably, a degree of inbreeding will occur, although aggressive bees and lines that do not breed well are discarded from the program.

The trait selected for is called delayed suppressed mite reproduction (SMRD). Varroa in colonies with high SMRD have reduced reproductive success.

After three years the program has been able to achieve one line demonstrating 80% of the Varroa are unable to reproduce.

Unfortunately this has been the main focus of the research and selection process and, as such, the ability of each line of bees to produce honey, propolis, or be able to adequately pollinate a crop are unknown. The other major constraint is the expensive nature of the program, with the high labour content required in testing each line, maintaining the colonies and inseminating the next generation.

The program was initially funded by a government fund (Sustainable Farming Fund), HortResearch, National Beekeepers’ Association, the kiwifruit industry and individual beekeepers. This funding is not assured and it is not known how long the program will be conducted. Currently only Italian stock has been included in the program and no dark races have been tested.

Although this is viewed as a strong and sensible way forward, the lack of immediate results, the long term nature of the project and its high cost may see it struggle in the future.

Varroa resistance breeding stock

AFB – American Foulbrood

AFB are three letters well known to beekeepers both in Australia and New Zealand. Both countries have a similar history of government legislation to control and manage this disease, with inspection programs and awareness campaigns. In 1991 the New Zealand beekeeping industry received the news that the government of the day had announced that AFB was not a problem for the country but rather an issue that should be in the hands of the beekeeping industry. No longer was there to be 'free' government support. The NBA was given the legislative power within New Zealand to levy beekeepers and keep the system going.

In 1993 the government announced to the beekeeping industry that the legislation under which AFB was managed was to be repealed. As a substitute the government gave the industry the opportunity to write their own rules. Many of the persons interviewed indicated that this was a time when a number of industry representatives spent many, many hours going over various proposals.

In the view of Mark Goodwin (2005) the disease AFB became an industry problem and not a government problem. A lot more beekeepers started to take AFB more seriously and instead of pretending it was not an issue, started to talk extensively about the subject at meetings and conferences. After much debate and discussion the industry voted 80% in favour to eradicate AFB from New Zealand.

This outcome was significant in its own right as nowhere in the world has AFB been eradicated but as Mark Goodwin (2005) states, this was a feasible and desirable direction to take, as:

- New Zealand can restrict imported bee products to prevent the reintroduction of AFB
- the causative organism is not very infective. Many millions of spores need to be fed to a colony to cause an infection
- examples of beekeepers eradicating AFB from their beekeeping operations are not uncommon
- beekeepers already had a search and destroy mentality in relation to AFB
- surveys have indicated that feral colonies are not a major source of AFB infection.

Thus after 90 years the Apiaries Act which was mainly in place to control AFB was replaced in 1993 by the Biosecurity Act. Under this Act, the NBA created the Biosecurity (National American Foulbrood Pest Management Strategy) order 1998 which came into force on October 1st 1998 with the central focus to eliminate AFB from New Zealand. A user's guide to the Pest Management Strategy can be viewed in Appendix I.

From its inception the Pest Management Strategy was funded from revenue collected under the industry's Commodity Levy Order until 2003, this then changed to an order under the Biosecurity Act. This allowed the management agency, the NBA to compulsory collect levies for the purposes of administrating the AFB NPMS. The levy year is from 1 June to 31 May. The fee consists of a base levy of $20 per beekeeper and a fee of $8 per apiary as of March 2007. Those beekeepers who have registered fewer than 11 bee hives and have less than four apiaries pay the base fee of $20 plus the fee for one apiary only $8, i.e., $28 + GST.

Invoices are sent out in April, with payment due in June. The managing agency appoints a debt collection agency for any outstanding invoices. For the 2007-2008 period the per apiary component of the levy was increased to $8.50 per apiary.

The proposed operational budget for the 2007/2008 period was $236,500. In the order under which the levies are collected the management agency must consult with beekeepers on how the levy money is to be spent. Expenses are divided into administrative and operational. The administrational expenses account for 18.5% of the total proposed expenses. A manager is appointed to coordinate the day to day activities. The operational expenses are divided into the following – disputes, arbitration, review committee, beekeeper communication, beekeeper education, branch visits by manager, DECA scheme and certificates of inspection; AFB outbreak/hotspots, AFB counselling, surveillance program, audit program contractor, annual disease returns, abandoned apiaries, AFB spore testing, AFB drug investigation, operational meetings, default audits and management agency honorarium.

As part of the AFB PMS each hive is to be inspected for the presence of AFB each year by a person trained to detect and identify the disease. All beekeepers are required to complete an annual disease declaration form. This form stipulates when and by whom the hives were inspected for disease.

Most beekeepers agree to a formal agreement between the management agency and themselves by signing a Disease Elimination Conformity Agreement (DECA). A copy of a DECA can be viewed in Appendix II. This agreement sets out a code of beekeeping practice with the aim of encouraging the beekeepers to reduce the incidence of AFB within their hives to zero. The details of each DECA are individualised to accommodate where in the process the AFB elimination program is at in the beekeeping operation.

Beekeepers are then encouraged to become an approved beekeeper whereby each beekeeper studies the yellow book *(Elimination of American Foulbrood without the use of Drugs*) attends an instruction session (usually one day) and sits a test. The test takes approximately 30 minutes and consists of 25 multiple-choice questions. Twenty questions correctly answered constitute a pass as long as five of the 'compulsory photo questions' are also answered correctly.

Once you have a DECA and you are an 'approved beekeeper' you are considered by the management agency to be in a position to identify and eliminate AFB from your beekeeping operations. If you have not negotiated a DECA and not become an 'approved beekeeper' then you will be required to obtain the services from someone who is qualified to inspect your hives. There may be a cost associated with this activity depending on the circumstances. If you do not or cannot supply a certificate of inspection with proof of your hives being inspected by a qualified person then the management agency can arrange for a contractor to inspect your hives. In this case the owner of the bee hives is responsible to pay all associated costs. This system thus ensures that all hives should be inspected at least once per year by a person that has the ability to identify AFB.

Audits

In the AFB NPMS policy the management agency is required to inspect from two to four per cent of all apiaries each year. This should be done both in a targetted and random manner. Known problem beekeepers or repeat occurrences of AFB in a given area will solicit a targeted response. Random inspections are conducted by the contractors as part of their charter. At present the AgriQuality apiculture officers or AP2 approved beekeepers are contracted to carry out these inspections at the directions of the management agency.

Selection criteria for inspectors to target specific apiaries include:

- known history of AFB
- positive honey test
- increased reporting of AFB
- new beekeepers
- older beekeepers with deteriorating eyesight
- those beekeepers who have rapidly expanded hive numbers
- local knowledge from disease coordinators.

General selection criteria may include:

- travel times
- attempt to inspect all apiaries within 3 to 5 years
- exclude previous years inspections unless high risk.

AgriQuality Ltd

This is essentially a government business enterprise and conducts services on a user pay basis. Their clients include the government of New Zealand and the NBA. The New Zealand government pays AgriQuality to carry out certain tasks which include monitoring for exotic pests and diseases. The specific tasks associated with the NBA and AFB for which AgriQuality is under contract includes:

- maintain the beekeeping registration system
- provide the Annual Disease Return forms sent to beekeepers
- provide the certificates of inspection
- Undertake inspections, compliance, audits and sample collection
- administer the Disease Elimination Conformity Agreements (DECAs)
- provide reports to the management agency every three months.

Through these activities AgriQuality Limited is required to provide regular updates to the management agency. The beekeeping services unit of AgriQuality have two staff in the South Island and two staff in the North Island plus 2 part time apiary registrars.

Management Committee

The agency is made up of seven representatives of the NBA made up of seven (including the chairperson) from a range of regions across New Zealand. In the 2006-2007 reporting season the committee met face to face twice and by phone ten times. At the annual general meeting in Hamilton in 2006 it was resolved to expand the committee to better reflect the whole industry. Two new positions were proposed with an independent recruitment professional to oversee the selection process.

Manager

There have been two managers since the AFB NPMS was initiated. Rex Baynes is the current manager and he sees it as his "responsibility to provide the industry, through the Management Agency, the necessary leadership in the fight to eradicate AFB. If this means upsetting those who elect not to honour their legal obligations, then so be it."

AFB Control

Once a hive is identified as having AFB the colony is destroyed. All materials are either burnt or boxes, lids and bottom boards can be hot wax dipped (10 min at 160°C). All other methods of control are unacceptable and regarded as having some risk of reinfection. No antibiotics are applied to colonies in New Zealand.

All beekeepers are encouraged to read and apply the knowledge contained in the 'yellow book'. *Elimination of American Foulbrood Disease without the use of Drugs – A practical manual for beekeepers*, revised edition (2006) by Mark Goodwin, published by the National Beekeepers' Association of New Zealand (Inc.). This is a small 116 page book that provides information on the significance of AFB, life history of AFB, symptoms, how it spreads, inspection and diagnosis, procedures for cleaning up an infection, case studies, management plans and legal obligations.

Many of these are similar to the recommendations in Australia, except New Zealand beekeepers do not have access to gamma irradiation.

Monitoring Progress

One of the stated objectives of the AFB NPMS is to reduce the incidence of AFB in New Zealand to 0.1%. This is calculated on the number of colonies identified each year with AFB divided by the total number of hives registered. Additional techniques used to monitor the levels of AFB in the industry include a survey of 250 commercial and semi-commercial beekeepers which involves the submission of honey samples for AFB culture tests. The results are used to further add to the understanding of AFB levels in the industry and individual results are utilised to investigate possible AFB occurrence in specific beekeeping operations.

On a regular basis, commercial pre-packs are purchased randomly from supermarkets. In 1991 22 packs were tested with 32% positive for AFB. In 2007 45 packs were tested and none had detectable levels of AFB. A similar trend was found with honey samples provided by beekeepers with 12 out of 429 samples positive in 1999 compared to one out of 830 samples positive in 2006. All honey culture tests and reports are conducted by HortResearch.

Pollination

(Note: all prices given in Pollination examples are in $NZ)

Income to beekeepers from pollination in New Zealand is very significant. The discovery of Varroa in 2000 instantly placed upward pressure on pollination service fees, even though the actual impact of Varroa was not felt for another few years. Some of the agricultural industries, particularly the kiwifruit industry, are acutely aware of the value and importance of the beekeeping industry and the need to have a healthy viable supply of honeybees to provide pollination services.

Frame feeder permanently in place

A few examples of pollination service fees obtained by New Zealand beekeepers include:

Kiwifruit

One operation was obtaining $85/hive in 1999. Varroa was reported in April 2000. By November 2000, the pollination fee for the same crop and farms was $110/hive. This figure has risen steadily ever since, to $155/hive for 2006. Another quote received was for $150/hive in 2006 and a projected fee of $180/hive for the 2007 season.

Kiwifruit

Another beekeeper reported obtaining $130/hive. This was dependent on the grower providing sugar syrup to the hives when on their orchard. In this case four feeds of two litres of sugar syrup were made available to each colony while on kiwifruit blossom. Research conducted by Mark Goodwin (HortResearch) provided strong evidence that by feeding colonies sugar syrup while they were on kiwifruit blossom greatly improved the pollination efficiency of the colony.

From discussions with the New Zealand beekeepers, it appears as though most of this sugar feeding for stimulating the colonies is actually carried out by the growers or their employees. Pollination brokers also employ contractors to feed hives in the orchards. Apparently a bottling factory produces containers of sugar syrup for this purpose for approximately six weeks in the year. Kiwifruit blossom does not provide any nectar and the pollen is considered to be of poor nutritional value. Price differentials for pollination services could be explained in part due to the different relationships between growers and beekeepers. Some beekeepers delivered hives to a central dump site and let brokers or growers distribute the bees through the orchard, while other beekeepers placed bee hives directly in the orchard. Some hives are placed as 2 queen hives and command a higher price.

Avocados

This would appear to be growing in importance as a crop requiring honeybee pollination. Pollination service fees quoted ranged from $110, $130–150 and $165. The blossom does produce nectar but the flow can be turned on and off very easily. It also overlaps pollination for the Gold variety of kiwifruit so preventing beekeepers servicing that crop.

Pip and Stone fruit

Only one pollination service fee quoted of $75/hive.

In General

Peak demand for hives for pollination is in November, with approximately 88,000 plus hives in use in 2006. The bulk of these hives, over 50,000, were utilised for kiwifruit pollination. For the other months of the year, approximately 15,000 hives were required in August, 25,000 in September, 45,000 in October and December, 25,000 in January, less than 10,000 in February and a handful of colonies in March.

The crops requiring pollination include apples, apricots, avocados, blackberries, blackcurrants, blueberries, boysenberries, Brassicas, carrots, cherries, clover, kiwifruit (Arguta, Gold, and Green), nectarines, peaches, peas, plums, radishes, raspberries, squash and strawberries.

Most of the demand for honeybee pollination services is in the North Island, with an estimated 78% of all the hives currently rented. This is expected to increase to 80% over the next five to eight years. Peak demand for hives for pollination in the North Island is in November, whereas in the South Island the peak demand is in December for Brassicas, carrots and clover seed crops.

A study by Mark Goodwin, Sandy Scarrow and Michelle Taylor in 2006 indicated that 85% of beekeepers surveyed in the North Island carried out pollination using an average of 69% of their hives. In the South Island, 48% of the beekeepers surveyed carried out pollination using an average of 53% of their hives.

A few beekeepers indicated that they received more than one rental for a bee hive by moving the colony from one orchard to another. In one case, three rental fees were obtained for the same colony. In these situations the beekeepers operated in the same regions as the areas planted to the various crops requiring pollination.
The elimination of feral bees and unmanaged or poorly managed colonies due to Varroa has had the dual effect of removing free pollination services and removing beekeepers that tended to charge a lower fee for pollination, possibly due to their very low management inputs. This enabled the remaining industry to charge a fee that reflected the service provided.

Reasonable wholesale honey prices, particularly for manuka honey, also made honey production very attractive if not more so than providing pollination services. This has probably been an equal factor with the presence of Varroa to increase pollination service fees to beekeepers.

The importance placed on pollination by the kiwifruit industry is very strong in New Zealand.

ZESPRI, a company established to market kiwifruit as a sole desk operator, have produced a “*Kiwifruit Pollination Manual*”. This has been written under contract to Zespri Innovations by Dr Mark Goodwin in July 2000. The manual is 105 pages, comprising chapters on pollination ecology, pollination problems, honeybee behaviour, managing honeybees for pollination, artificial pollination, male vines, effect of Varroa mite on honeybees, and a copy of a contract to supply bees. (The postal address of ZESPRI Innovation Company Ltd. is 400 Maunganui Road, PO Box 4043, Mount Maunganui South. www.zespri.com).

A specialist organisation focussed on kiwifruit pollination also exists. The Kiwifruit Pollination Association (KPA) promotes and encourages the provision of a quality pollination service by beekeepers. The association has established a standard which members are independently audited against each year. Failure to meet the standard consistently will eventually mean the loss of membership to the association. This way, it is hoped that growers see that obtaining bee hives from KPA members provides strong assurance that the best possible service is being provided.

The standard is as follows:

1) Hives must be queen right
   - laying queen
   - good brood pattern
   - all stages of brood present.

2) Quantity of brood
   - full depth = 7 frames 60% covered
   - ¾ depth = 9 frames 60% covered.

3) Quantity of bees
   - full depth = 12 frames
   - ¾ depth = 15 frames.

4) Room for expansion
   - empty comb for brood, nectar and pollen storage.

5) No AFB present.

6) Hives to be managed for Varroa.

7) Stores
   - adequate stored honey and pollen
   - sugar feeders are encouraged.

New Zealand has only a limited number of native bees, approximately 16 to 20 species. None of these were discussed as potential commercial pollinators. Bumble bees and leaf-cutter bees were commercially managed for pollination. At least two companies were said to supply bumble bees to green-house tomato growers. A figure of $2/bee or $140/nest was suggested as the current price for bumble bees.

Beekeepers mainly did business directly with kiwifruit growers. There were examples of brokers acting as intermediaries. Some beekeepers preferred this arrangement, delivering colonies to a central point and letting the broker and grower distribute them throughout the orchards.

Artificial pollination has become more accepted. Mechanical collection, harvesting and application of kiwifruit pollen is a reality. One business was visited which has been in operation for 17 years (www.KiwiPollen.com). Male flowers are picked the day prior to opening, these flowers are milled, and the pollen is extracted and dried.

Orchardists receive $3/kg for the male buds; 120 kg of flower buds are required to harvest 1 kg of pollen. It takes approximately 30 hours to hand pick 120 kg of flower buds. The retail value of this pollen is $2,300/kg, of which 500 g of pollen per hectare is the recommended application rate.

The mechanical application of pollen is gaining in popularity, particularly as the area to kiwifruit continues to expand and the threats to the supply of honeybee colonies continue to exist. This is evolving as a real alternative to honeybee assisted pollination. As a comparison, beekeepers in 2006 were receiving between $130 to 155/colony, multiply the average of $145 by the recommended stocking rate for green kiwifruit of eight hives per hectare for a total cost of $1,160 for bee hive hire/hectare. Thus, mechanical collection and application of pollen to achieve the required fruit set is a real economic alternative. If the price of beehive pollination continues to climb, so will the financial attractiveness of alternative pollination practices.

Flora and Marketing

As many apiaries are permanent, except for seasonal movements for pollination services, colonies are restricted to what they can forage within a one to four kilometre radius, depending on the season. In some cases apiaries are sited to ensure that they have access to one or more specific floral resources.

"Pasture" honey was a word used to describe much of the production on both the North and South Island up to 20 years ago. This was a mixture of white clover and pastoral weeds. White clover honey was identified and marketed at a premium. This is now a vague memory due to the value and importance of manuka honey.

Typical Manuka country

Manuka *(Leptospermum scoparium)* is one of 83 species of the genus *Leptospermum* naturally growing in Australia and New Zealand. Most of the genus naturally grows in Australia (79 species) (Wrigley & Fagg 1993), with 2 species in New Zealand (Walsh 1978). Manuka also has a growing range of both the North and South Islands of New Zealand and various regions within Australia.

Twenty years ago manuka was either avoided by beekeepers or the honey was kept aside to feed back to bees as a winter feed. Presently beekeepers will seek manuka honey crops in preference to any other nectar source and in some areas will reject pollination contracts in favour of a manuka honey crop.

Manuka blossom

One beekeeper gave an example in his enterprise whereby before manuka honey became a valuable honey only 20% of his annual crop was manuka, with 80% derived from pasture including clover. Now 95% of his honey crop is from the manuka bush, with only 5% from pasture. In many cases manuka honey is thixotropic, which means it is jelly in consistency. Special comb prickers are used to disturb the jelly to assist in its extraction.

The reason for this focus on manuka is the discovery of its medicinal properties. Research in New Zealand and more recently in Australia has demonstrated that some manuka honey samples exhibit significant properties that inhibit external skin infections and promote healing of the wound. This effect can be measured and is referred to as a level of activity. Not all manuka honey is active but due to some clever marketing, all manuka honey now receives a premium.

Various prices were quoted for manuka honey. Activity levels can vary from zero to over thirty. Prices quoted include:

- $10/kg base price, plus $1.10 to $1.25/activity point over 10
- $15–$25/kg for medical grade honey.

Interestingly, a few beekeepers indicated that if the honey was stored for 12 to 18 months the activity levels would increase. Storage of honey for greater periods than 18 months was thought to be detrimental by increasing the HMF values and thus reducing the honey's saleability. One beekeeper quoted the cost of a test at $50 for both measuring peroxide and non-peroxide activity levels or $30 for non-peroxide levels only. Beekeepers and honey packers are spending hundreds of thousands of dollars each year testing manuka honey for antibacterial activity. The same drum may be tested several times as well as blends to guarantee the claimed activity level.

Another closely related plant commonly referred to as kanuka (*Leptospermum ericoides*) is also called tree manuka. It would seem as there is no differentiation between the two *Leptospermum* species when it comes to marketing the honey, it is all referred to as manuka.

Taste is a subjective sense!

There is no doubt that active manuka honey is a highly valuable product and unique amongst honey sources commanding a premium price, but this does not support the high price being offered for non-active manuka. It would appear that the word "manuka" now has a strong recognition factor with the consumers who are willing to pay a premium for the product. Thus $5 to $10/kg for manuka honey, no matter what its activity, is far more attractive financially than the $3.50/kg for pasture honey.

By Australian standards $3.50/kg is still a very good return for bulk honey. Specific floral type honeys also attracted premiums. Pohutukawa or New Zealand Christmas tree produces a mild, pleasant tasting honey with a fine grain candy; $5/kg was its quoted wholesale price.

Locally throughout New Zealand each apiary has its own range of flora. Each beekeeper appeared to be well tuned in to this and managed each site by varying the number of colonies. Commercial apiaries thus could vary from 5 to 50 hives/site. The average number of hives per apiary was perhaps 16 to 30 hives.

Gorse

Scarcity of pollen plants in some areas was becoming a major concern. There would appear to be a heavy reliance on willows, broom and gorse in many areas for pollen, particularly in early spring. These three plants are considered by New Zealand governments and the farming community as environmental and agricultural weeds, thus there has been a concerted effort to reduce their numbers. Pollen from gorse is considered particularly beneficial for bees. In recent years experimentation with artificial supplements has been on the increase, this would seem to be a work in progress for the moment.

Honey Processing and Packing

Many beekeepers interviewed also were packers of honey. This seemed to be a reasonably common commercial decision to pack and distribute your own crop. In many cases this was in conjunction with contract extracting, purchasing this honey and combining it with your own crop to increase volume for retail packs.

Contract extracting – note hearing protection

Contract extracting was reasonably common within the New Zealand beekeeping industry. In most cases the beekeeper delivers the full boxes of honey to be extracted and picks up the empty boxes after extraction. Some beekeepers offering the extraction of honey service insisted that the beekeeper or a representative assist in the extraction process. Other beekeeper extraction businesses did not desire the beekeeper to be present.

A pricker – for loosening Manuka honey before extracting

If the honey to be extracted was manuka then it may require extra steps in the extraction process to loosen the honey, this added to the cost.

One beekeeper specialised in extracting medical grade manuka which aimed at having a CFU below 500. CFU is short for Colony Forming Units. This is a measure of the total bacteria present in the honey. This extracting business insisted on special requirements to achieve the desired readings. These included that the honey boxes should be scraped of all burr comb while still on the hive. These boxes are then left on the bees for 24 hours to be cleaned up. All bees are removed from the honey super.

On return to the honey factory the boxes are placed in a hot room with insect zappers to remove all traces of bees. Once the boxes of honey enter the extraction room there are no bees on any combs. These steps ensure that dust and dirt collected during transit is kept at a minimum and that bees are removed from the equation as soon as possible to reduce any opportunity they may have of contaminating honey.

Extracting plant – note polished timber floor

One packer/beekeeper offered an extraction service even for a single box. In this case, the box was weighed before and after extraction. A 2% figure was deducted for loss during the extraction process and the honey was then sold to the business extracting the honey. There was no attempt to isolate each beekeeper's honey in the process and it becomes the property of the honey factory doing the extraction. In this business an estimated 50 to 60 beekeepers took advantage of the service. The cost per box was $5 plus for pasture honey and for manuka honey $10.50 for big lots and $13 per box for small lots. All the beeswax remained the property of the extraction business.

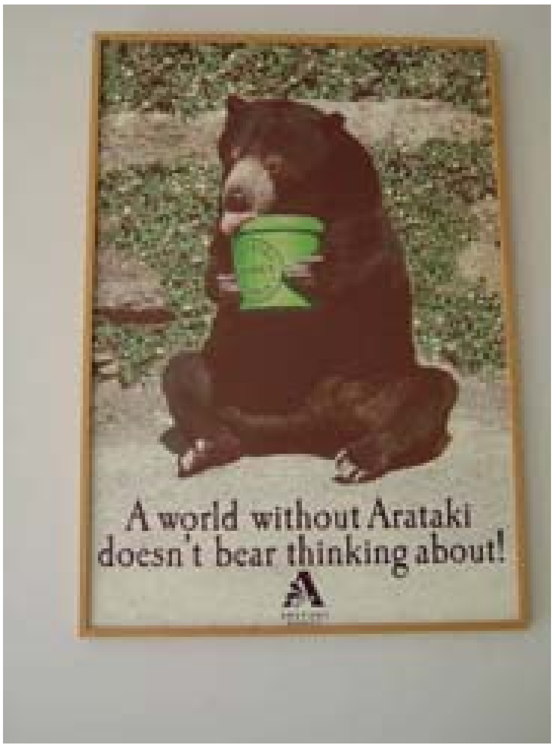
Extracting plant with two pricking machines

Other extraction fees quoted include: *($NZ)*

- $15.50/box = $1/kg approximately
- $10.00/box
- $7.00 to $9 per box – depends if combs need pricking
- $7.00 to $13.50/box
- $6.00/box with the beekeeper assisting.

Different systems of contract extracting were discussed during the study with various beekeeping enterprises. Some of these businesses wanted nothing to do with extracting honey for others, one beekeeper did not own any extracting equipment as they had the view that this is a major investment and not justified while they are able to get someone else to extract.

Some businesses insisted on the owner of the honey boxes assisting in the extraction process, whereas others did not. Where contract extracting was practised in a business, generally staff were employed to carry out this function. A few beekeepers indicated that they thought offering a contract extraction service was a hassle and would like to reduce this activity whereas other beekeepers saw contract extracting as a growth area in their business and a means of obtaining an increased supply of honey for those who also packed honey for retail sale.



Arataki sponsor Sunbear at zoo

Arataki honey shop and factory

An estimated 10% of the commercial beekeepers in New Zealand packed their own honey. Most honey is packed into opaque plastic tubs in a creamed form. These tubs were able to hold considerable graphics and information about the product.

All extracting plants must be at a standard established by government. As bees are classified as animals by the Food Safety Authority, they are subject to similar conditions as imposed on meat handling factories. All extracting plants are audited annually at an average cost of $1,000, range $800 to $1,400, depending on the travel time of the auditor. Inspectors from AgriQuality and

The Food Safety Authority carry out the inspection.

It was stated by AgriQuality that there were 200 processing plants across New Zealand. The beekeepers interviewed during the course of the study did not voice any strong objections to this process although one got the impression that they were not entirely happy forking out $1,000 each year for the cost of the inspections.

During our travels through the North Island four shops were visited which specialised in honey. They were slightly different in their context:

- On a major highway, coffee shop and café included, up to 500 products in the shop that were bee related – honey floral varieties, soaps, creams, comb, candles, etc.
- Outskirts of Auckland on highway, gourmet coffee shop and café, quality gift packs and very classy setting.
- Stand alone shop, part of a larger beekeeping business with large observation bee hive. Very large choice of honeybee products.
- Shop with products primarily from the beekeepers own business, very large and modern premises with an exceptional set up for school children with observation colonies, microscopes, interactive areas, tasting etc. located at Havelock North Each school child also received a free small jar of Arataki Honey, Napier.

Propolis

Propolis mat on top of hive

This is gum or resin-like material collected by bees. It is claimed that propolis has certain medicinal properties and as such the material has some value when harvested by beekeepers. Propolis can be either purpose-collected by inserting a screen into a bee hive or by scraping the propolis out of old boxes, lids, frames, etc.

Propolis collected from screens is of greater purity than that scraped from boxes during any cleaning process. Prices for propolis and yields varied. Some of the prices and yields quoted were as follows:

- $140/kg
- $30,000 for propolis from 300 hives (mats and box scrapings)
- use to be $20/hive/year mats and scraping boxes, now $12/hive/year – not actively chasing.

Propolis mat full – ready to harvest

Comvita would appear to be the main buyer of raw propolis from beekeepers with others being described as various Asian businessmen in Auckland. Comvita is a public listed company with 135 staff, with an international focus. An increasing amount of Comvita’s product is being sold overseas, 60% in 2006.

The products manufactured were mainly derived from honeybee products (90%) with only 10% of the products produced not derived from bee obtained raw materials. A forecast of $100 million turnover was given for the company by 2010. This company has a significant interest in medicinal uses of honey and the development of related products.


Honey wine (mead) for sale


More bee products


Honey tasting bar with information on each honey above the counter


Candles, creams, etc. – all bee products


Bee products galore

Classy café specialising in honey products


Plenty of variety of bee-related products


Public viewing observation hive – Arataki honey

Interviews

There were a number of common themes with the beekeepers interviewed.

1) The blame game. Apparently this became quite destructive and many people became very emotional in relation to how the mite first entered New Zealand and who was responsible. On reflection, many persons interviewed indicated that “if this had been done differently”, or “if that was identified earlier”, then they believe that the story may have been different. As there was no evidence to support these assertions, they remain only speculation. A few beekeepers expressed the point of view that when mites were identified, individuals would have been better served by focussing on the solutions than going on a witch hunt. Having said this, all admit that it was inevitable that there would always be a need to establish someone to “blame” for the mite incursion.

2) Although there was a lot of speculation on how the mites arrived on the North Island, there was no confirmed point of entry. The most widely accepted view was that the mites arrived in a swarm of bees on/in a shipping container.

3) The blame game was the strongest during the acute stage of mite establishment. Once the mite numbers settled and all feral and unmanaged bee colonies were eliminated, beekeepers by and large settled down to manage the parasite. During the chronic phase, beekeepers’ knowledge and understanding of how to manage the mite populations was also at a level that provided some degree of comfort.

4) The information provided by the various government agencies was extremely valuable in learning to manage the acute stage of mite invasion. Manuals, DVDs, and organised seminars held in strategic locations all helped beekeepers to understand how to manage the mites.

5) Once an area had entered the chronic phase, honey crops were recorded to have increased. Although this cannot be categorically proven, theoretically if all unmanaged and feral colony competition is eliminated, then this will leave an increased resource base for the remaining managed bee colonies. Increases of 25% were stated, although this could also be due to seasonal variation. The evidence to support this assertion was the number of beekeepers who made this comment.

6) Beekeeper management of hives was said to be much greater since the arrival of mites. Compared to before 2000, far more attention was now being given to colony welfare. Beekeepers indicated that queen bees did not last as long since Varroa had arrived. As a result colonies are nearly all re-queened on an annual basis, which would improve productivity in its own right.

7) Quarantine lines across the map benefited some beekeepers and seriously affected others. The intent was to slow the spread of mites. Compensation was available for those affected, but this was only on offer to those who had sufficient records to prove their case. As many beekeepers could not furnish sufficient documentation, they were restricted in the movements of their apiaries and were not compensated. Restriction of movement of apiaries was also stated as affecting the “honest” beekeepers, inferring that there will always be some beekeepers that do not play by the rules. In the New Zealand context, apiaries are more or less fixed and movement of apiaries to other regions is perhaps not as common as in Australia. Transport of hives for pollination contracts is common, but the hives are normally returned to their original site.

8) Out of the eight geographic regions south of Auckland, MAF inspections and surveillance identified Varroa first. Only in one region did a beekeeper find and report Varroa before MAF surveillance. Most beekeepers did not actively look for mites, even though being acutely aware of their presence in the country. Kits sent to beekeepers for surveillance were not used by a large percentage of the beekeepers. This method was a cheap attempt at surveillance, but was essentially not effective.

Observations

The Australian participants in the study of the New Zealand beekeeping industry were asked on the final day to jot down key points that they believed to be the most relevant lessons obtained from talking and discussing beekeeping matters with the New Zealanders.

Ian Zadow

1) Education – Educate Australian beekeepers about Varroa mites, their impact, treatments and likely management practices needed to control them. Need to have books and publications available for beekeepers to own and study. Run workshops as well and possibly make a DVD for beekeepers.

2) Registration of treatments – Have registration for all available treatments for Varroa in Australia, as soon as possible. Beekeepers can then be educated on the available treatments and look at how they will tie treatments into their yearly management.

3) Surveillance of hives – Ensure each state has a comprehensive surveillance program that is tied into the National program to enable as early detection as possible.

4) Eradication procedure – Have chemical/s registered for use in an eradication attempt. Design suitable bait stations and, if possible, trial them for experience/knowledge of how to use them. Review the Australian plan. Put compensation protocols in place for hive and production loss as a result of eradication or movement restrictions. Promote need for 100% beekeeper compliance to make eradication successful.

5) Allied industry awareness – Need to communicate with pollination industries about the impact Varroa will have on all parties and seek support from these industries for preparing for Varroa.

6) Pollination services – Educate growers on the values of our Australian pollination services. Set industry standards on pollinating hives and increase pollination fees to improve profitability of pollination.

Julian Wolfhagan

1) Register chemicals in readiness.

2) Review sentinel hive program – redouble efforts – communicate/educate AQIS.

3) Communication - within industry
   - industry to government.

4) Awareness – Look for ways to increase returns to apiary industry participants in preparation for Varroa (and any future challenges).

5) Look for ways to increase public funding for research regarding Varroa.

6) Develop a Varroa strategy – communicate.

Des Cannon

1) Varroa is not the end of the world. As ferals die out, production goes up with reduced competition from feral bees. Pollination goes up (prices) and demand for pollination increases. Need for high education input.

2) Hive management post-Varroa needs to be more intensive. Weak hives cannot be ignored. Varroa does not necessarily need to be monitored, but treatment needs to be administered at right time.

3) Wide variety in quality of New Zealand operations. Some very rough, some extremely high quality and professional. Common theme is that operations which do not adapt to Varroa will fail.

4) AFB PMS as adopted in New Zealand has potential to eliminate AFB, but would probably not work in Australia because of:
   - failure to comply – apiary site registration and desire to eliminate ‘cowboys’
   - Australian beekeeper resentment and individuality, and belief that AFB is the government’s problem, is even more entrenched than in New Zealand. State rivalries would ensure no central control authority would ever be set up.

5) Strong message to Australian packers in the (superior) ability of New Zealand to market honey in varietal lines, and as a functional food with complimentary uses in cooking.

6) Challenge is to get Australian public and growers to appreciate value of and need for honeybees.

7) Demarcation/Restriction zones do assist in limiting/slowing spread, but given Australia’s greater migratory habits, will be difficult to enforce without compensation, which will in turn be:
   - extremely costly
   - abused by the greedy.

8) Need to take an integrated approach to controlling Varroa. Get the whole gamut of needed chemicals registered beforehand to avoid delay once it arrives. Such a delay would probably negate any attempt to think about eradication. Include fipronil, registered to assist any attempt at eradication.

Peter McDonald

1) We need to increase the price for honey, pollination and queens, etc now. Money is what has enabled the New Zealand beekeepers to cope with Varroa. Australian Honeybee Industry Council (AHBIC) should employ a marketer to promote honey and bee products.

2) Register all required chemicals and treatments for Varroa eradication and control so they are ready for use by Australian beekeepers as soon as possible.

3) Review AUSVET plan in conjunction with New Zealand Paul Bolger, to ensure adequate, in light of New Zealand’s two attempts to eradicate and control.

4) Get hold of education materials for beekeepers on Varroa and other things now (books, posters, DVDs). Make available through all state associations and national bodies at meetings and anytime.

5) Ensure compensation for beekeepers is available for those affected by both eradication and control measures. Identify a body to administer.

6) Educate horticultural and broad acre groups of danger to beekeepers and flow-on effects for pollination services, prices and availability.

7) Ensure all states have an emergency response team available to assist in event of an incursion. Identify people and train. These would be beekeepers from across each state to assist government agencies.

8) Communicate all industry information better:
   - update website for AHBIC
   - communicate AUSVET plan to all beekeepers
   - make sure all beekeepers are able to access all information easily if they want.

Peter Barnes

1) Fipronil must be approved by government to be used in the destruction of feral hives if we are to stand a chance of stopping an incursion.

2) Focus on education in surveillance and detection for both beekeepers both small and large. Early detection of Varroa makes a big difference to spread. (Restricting beekeepers movements is a big key to slowing spread of Varroa in early stages).

3) Quality Assurance is an underlying issue. That's why education about the right treatment to use is important for beekeepers. Along with the risks of use both to the beekeeper handling the treatment and the products from the hive. Good management is vital with Varroa.

4) The approach to surveillance needs to be at a national level. Each state needs to adopt the most effective methods of surveillance. Varroa finds the weak link as found in New Zealand. We all need to have proactive, not destructive involvement.

5) Varroa could be wiped out if found early enough. It is slow to spread by itself. However, tough penalties and laws for movement must be in place within containment zones, as well as the right people to enforce them. A speedy response is the key.

6) Price of honey in New Zealand should not be compared to the price we receive in Australia. With smaller amounts of honey produced at greater cost. This is only offset by the rising demand and price paid for pollination and short distances shifted. Totally different beekeeping style.

7) AFB strategy needs to be put in place in Australia. Beekeeping industry needs to come up with a better plan to combat this disease, as it can be done.

8) The apiarists in New Zealand have educated the general public about bees, honey and the problems they face with Varroa. Which in turn helps them with funding and beehive product sales etc. Maybe the Australian industry needs to look into better ways to educate the general public in the importance of the beekeeping industry with more focus on the future.

Colin Fleay

1) Register chemicals for treatment.

2) Sort out Fipronil registration or an alternative known-down for eradication.

3) Commence workshops and produce publications regarding Varroa detection.

4) Get in place compensation mechanisms in event of incursions.

5) Source external funding from grower groups to fund workshops, publications, and research.

6) Continue and enhance research of anti-microbial properties of honey and hive products.

7) Review AUSVET plan.

8) Look at alternative hive products (propolis, etc.)

Rob Manning

1) Do not panic – there is life after Varroa for good operators: higher honey yields for managed hives as feral bees die out; pollination requests will increase.

2) Full availability of all types of treatments in preparation for eventuality.

3) Media warning growers of fruit and vegetables that there will be a pending shortage of bees for pollination that will peak in 18 months–2 years.

4) Workshop training and education critical – plan to be developed (RIRDC funded?)

5) Purchase of Goodwin's book "*Elimination of American Foulbrood Disease without the use of Drugs – A practical manual for beekeepers*, revised edition (2006)" published by the National Beekeepers' Association of New Zealand (Inc.) – stockpile.

6) Employ the use of fipronil baits at first find, making sure some compensation is available to replace hives killed. Monitor program, if Varroa still present, abandon eradication.

7) AFB run by a few individuals – Australia probably doesn't have the drivers to do what New Zealand has attempted. Low membership, etc. illustrates this.

Doug Somerville

Who shrunk the tour leader?

1) One of the primary purposes for the study of the New Zealand beekeeping industry was to examine the impact of Varroa and gain a better understanding of the issues that might occur in Australia. One of the key points of the study was all the positives that may come from the presence of Varroa:

   a) feral bees are all but eliminated
   b) honey yields increase in managed hives due to decreased competition
   c) pollination prices increase
   d) beekeepers who keep bees rather than manage them, give up beekeeping
   e) upward pressure on honey prices.

   Given these factors, it is still better to be in an environment without Varroa than with, although the presence of Varroa creates opportunities for some.

2) The industry managed AFB program in New Zealand has some interesting experiences to pass on to the Australian beekeeping industry. The resilience and effort by New Zealand beekeepers to make an industry managed system work is extremely impressive. The elements of the New Zealand AFB Pest Management Strategy should be carefully considered in the Australian context. Unfortunately it is unlikely to generate a national program in Australia due to the number of state governments and separate beekeeping organisations that need to agree on a common plan. Even so the various state beekeeping associations should carefully consider each of the elements of the New Zealand system that could be implemented in their state to assist in the reduction of AFB.

3) Marketing honey in New Zealand is impressive. The focus on selling honey, based on its floral origin and the unique characteristics of these honeys, is highly commendable. This strategy allows beekeepers to obtain premiums for a significant component of their honey crop, rather than treating honey as a generic commodity.

4) The power of the NBA is quite impressive. Their ability to keep Australian honey off the New Zealand supermarket shelves is short of miraculous. Through sheer persistence, and I assume very significant lobbying, New Zealand beekeepers have been able to avoid competing with imported honey and the resulting drop in price, as is the case in Australia. This is a very enviable situation demonstrating the power of an active and effective beekeeping organisation within New Zealand.

5) The need for fair value for the honey crop was very apparent. Varroa adds extra costs even with possible increases in yields. There is only so much pollination work to go round and these fees can only go up to levels that can be tolerated by growers. At the end of the day the wholesale honey price is the underlying factor in the viability of the New Zealand beekeeping industry. This is also the case in Australia. Without a fair return for honey production, with or without Varroa, the beekeeping industry will struggle to retain and recruit new players.

6) The value of education and communication was well demonstrated. The NBA having control/owning the national beekeeping magazine was seen as positive. Information relevant to what beekeepers wanted to know is well disseminated. The production of the Varroa and AFB books are second to none and provide beekeepers with world class advice. The national beekeeping magazine regularly published notes of executive meetings and notes from branches. This all assisted in a good knowledge by most industry members of the current issues affecting their business and provided sound reasons to belong to the association.

7) The inevitable blame game was highlighted by a number of New Zealand beekeepers. The government was “responsible” for “doing” or “not doing” a range of matters relating to both the north and south Varroa incursions. Some of the measures implemented, such as the quarantine lines across the North Island designed to slow the spread of Varroa were heavily criticised by some and heavily praised by others. In essence, whatever the government agencies did or did not do would be an issue to someone in the industry and, in many cases the responses by individual beekeepers were quite strong.

Col Wilson

1) You can work with Varroa but it will have an impact. Increased cost to manage Varroa by way of treatment, more time and labour is required to manage beehives. There are now 2,000 less beekeepers and approx 70,000 less beehives in the North Island of NZ.

2) All chemical treatments for Varroa must be approved for use in Australia before Varroa arrives.

3) Treatments: Beehives are treated twice a year 2 X 8 week periods when there is no honey flow. Mite numbers double each month. Untreated colonies will die out. A must to use different treatments to extend the time before mites will become resistant to treatments.

4) Pollination: The demand for pollination will increase and fees should also increase.

5) Honey Production: Beekeepers commented that production has increased due to better management and less competition from feral hives.

6) Varroa Resistant Bees: NZ has a selective breeding program and test for suppressed Varroa mite reproduction only. First year 19% of mites did not reproduce on the best line. By the fourth year this has increased to 70% on the best line.

7) AFB: Honey testing is used to detect AFB. All bee sites are registered. Most sites are permanent. If a problem is detected in one area, NZ uses contractors to look for AFB. The contractors are trained approved disease inspectors. The beekeeper has to pay for the inspector. AFB has been reduced to a low level.

8) NZ beekeepers (North Island) appear to be better off now with Varroa. Increased honey yields, higher honey prices, higher pollination fees, more demand for pollination and no imported honey. Australia will not be as lucky.

9) Eradication of Varroa: Varroa spreads quickly to feral colonies. Low infestations of mites are hard to detect. By the time Varroa is detected in managed hives it is usually too late. No country has been able to eradicate Varroa.

Profiles of Australian Participants

Doug Somerville

Doug Somerville is the technical specialist for honeybees with NSW Department of Primary Industries (DPI). He obtained his PhD in 2004 from the Australian National University with the title of the thesis *"The floral resources of NSW of primary importance to commercial beekeeping"*.

Doug has worked with honeybees in the DPI for 20 years and has made 35 presentations to Australian conferences and presentations to seven international conferences. He has published in excess of 325 articles in scientific journals and beekeeping magazines and newsletters. Research publications have included topics on faba bean pollination, supplementary feeding bees, honeybee nutrition, small hive beetle, bee collected pollens and floral resources.

Other duties have included the designing, construction and delivery of beekeeping competency based learning modules and the production of extension materials on most facets of practical beekeeping. Doug has gained experience with commercial beekeeping, working in Canada and the United Kingdom prior to his employment in the DPI. He has owned and operated up to 180 bee hives and currently manages 70 hives which are primarily used for research and honey production.

Rob Manning

Rob Manning has been with the Western Australian Department of Agriculture and Food for 20 years working in honeybee research. He has a PhD from Murdoch University, Perth, Western Australia. His PhD covered the effect of fatty acids on honey longevity and hypopharyngeal gland development.

His bee research interests have covered queen bee breeding, documentation of the floral resource beekeepers use, pollination of orchards and crops, especially high density trellised orchards and canola crops and cost-benefits of diversifying a honey business into other areas such as pollen and package bee production.

His current interest is in the area of honeybee nutrition where honeybees are trialled on different feedstuffs for their influence on longevity and uptake of nutritional elements. Rob has 12 refereed papers published in scientific journals and a substantial number of other written material published as bulletins, magazine articles or published in books. He runs a 60 hive apiary for research purposes which also trials new products developed for the bee industry.

Des Cannon

Des Cannon started beekeeping 28 years ago, with one hive after doing a course on "beekeeping for school science projects" while working as a high school science teacher. That one hive eventually became 1,050 hives and, with his wife Jenan, have been full time honey producers for the past 19 years, working from a base in the Southern Tablelands of NSW about 50 km out of Canberra. In the last four years, Des has moved into pollination as an adjunct to honey production, with most of his hives committed to almond pollination, followed later by cherries.

Along the way, he has been actively involved at industry level, serving two years on the NSW State Executive, one year chairing the NSW Bee Disease Steering Committee, and 18 years as either, Secretary, Treasurer and now President of the Southern Tablelands branch. Des has also spent the last six years on the Honeybee Research and Development Advisory Committee, and has just been appointed as Chairman for that committee for the next two years.

Col Wilson

Col Wilson is a commercial queen bee breeder and has kept bees for over 30 years. A significant number of the queens produced have been exported in the past 18 years. He maintains his own breeding program using AI techniques and also sells breeding stock to the Australian beekeeping industry. Additional to the queen rearing enterprise, Col is a supplier of wooden frames, and both wax and plastic foundation to the Australian beekeeping industry. He operates his own wax foundation plant.

At present Col is the President of the Australian Queen Bee Breeders' Association (AQBBA), the President of the Southern Branch of the AQBBA and the President of the Hunter Valley branch of the NSW Apiarists' Association. He has also served four years on the Australian Honeybee Industry Council (AHBIC).

Colin Fleay

Colin Fleay is a commercial beekeeper in Western Australia, having a 32 year association with honeybees. Initially Colin worked in his father's business until his retirement in 1980. For the last 26 years he has been self employed in his own beekeeping business, "Bee Happy Apiaries". Currently 400 bee hives are managed for a range of products including honey, pollen and beeswax. Organic certification with NASAA for 240 hives ensures a premium for significant proportion of his honey crop. Colin is also in the process of implementing the beekeeping industry quality assurance (QA) system B-Qual.

He is interested in rearing his own queens and maintains 190 nucleus colonies for this purpose. As a result of this interest Colin has been involved since 1997 in the "Better Bees Breeding Program", an initiative of the WA beekeeping industry. In 2003, Colin became skilled in queen bee instrumental insemination which he now uses to assist in maximising the genetic potential of WA stock.

In 1995, Colin was interim, then inaugural president of the WA Pollination Association and served in this position for four years, retiring because of the conflict with organic honey and pollen production. He regularly attends field days and conferences organised by the various WA beekeeping organisations. At these events he has given presentations on bee nutrition, queen rearing, feeding bees, pollen trapping and quality assurance. In 1997, he was involved in the Ag West SQF 2000 Quality Assurance Steering Committee and then the pilot program for mobile honey extraction.

Peter Barnes

Peter Barnes has been working bees for 17 years as part of a family company, Barnes Apiaries (Est. 1945). The family business mainly focuses on honey production and pollination, running 1,400 hives, working in a radius of 1,200 km from their base in Maryborough. He has been a member of the Queensland Beekeepers' Association for 17 years and has been re-elected to the management committee for his second year (2006/07). He enjoys being part of a team working towards a stronger future for beekeeping in Queensland and Australia.

Peter would like to see a greater understanding by Australian beekeepers of issues such as Varroa mites and believes that this is very possible if and when everyone is willing to be actively involved. But, with or without Varroa, he believes paid pollination services are going to become a large part of the beekeepers 'income in the future.

In his spare time he is a volunteer fire fighter with the Tinana Rural Fire Brigade. As First Officer he is on call 24/7. He leads, trains and organises crews to fight fires and conduct hazard reduction burns in his area.

Julian Wolfhagen

From an early age Julian Wolfhagen was fascinated by bees and spent much time finding and observing the wild (feral) honeybees around the family farm. In autumn when the families that worked the farm "took" bee trees for their annual supply of honey, Julian would help out and later in the day return with an old apple case and a sheet of iron to try and save the now homeless bees. Some were successfully saved and so Julian became a beekeeper, going on to make good pocket money from the sale of his honey to the school teachers, family and friends.

Julian studied Hospitality Management and Marketing at the TAFE in Hobart and worked in both restaurants and various specialty food production businesses before being reacquainted with his childhood interest in bees and honey production. Seeing the potential for leatherwood honey as a unique export marketing opportunity, he established the Tasmanian Honey Company in 1982, building the beekeeping operation to 1,500 colonies and developing a "brand" that is now recognised internationally. The business, being built from scratch, has enabled Julian to develop the operation along modern lines using the world's best technologies and efficiencies that have enabled the enterprise to prosper and to meet the most exacting international standards for its honey production.

Julian has been an active member of the Tasmanian Beekeepers' Association for 30 years and has been its President for the past three years. His priorities have been the resource sector due to the diminishing Leatherwood bearing forests through harvesting, developing an "Appellation" for Leatherwood honey, and the maintenance of the "clean green" image for Tasmania and its products.

Ian Zadow

Ian Zadow is a commercial beekeeper based at Tintinara in the Upper South East of South Australia. He is the youngest of the study group, at 27 years old. His beekeeping business is run in partnership with his brother Ross, where they currently run 1,200 hives of bees. They work within a radius of 250 km. The main focus of the business is honey production, with some pollination services. The two main crops pollinated include almonds and lucerne. They operate a mobile extracting plant. Honey is sold to Capilano Honey Ltd. The main types of honey produced include lucerne, blue gum, mallee and salvation jane. A load barrier system is used for disease control which has been successful in eradicating two separate outbreaks of AFB. Most hives are requeened yearly, running 400 nucs.

Ian became involved in the South East branch of the South Australian Apiarists' Association (SAAA), taking on the job of secretary/treasurer for two years, then president for two years. Also he was on the branch committee for several years. He was elected onto the SAAA executive council in 1999, where he has been for seven years. He has been vice president for the last three years and at the 2006 conference, was elected president. For the last three years he has been the proxy delegate for SA at the AHBIC Annual General meeting. He has been a member of several other committees as a beekeeper representative for the SAAA. These include the Limestone Coast Chemcare Committee for three years, the steering committee and operations committee for the Ngarkat Conservation Park Fire Management Plan. For the past year he has also been a member of the SA Honeybee Industry Strategic Plan Steering committee.

Ian would like to see the apiary industry remain a sustainable and rewarding industry for the future. One of the largest threats he believes is the entry of exotic pests and diseases. Quality control, access to resources and also educating the community about our industry are also very important. He believes the industry has a good future in the production of quality honey and with the increasing demand for pollination services.

Peter McDonald

Peter McDonald currently works with his brother Robert and father Bob in the family beekeeping business based at Castlemaine in Victoria. The McDonald beekeeping business has been in operation for 55 years, with currently 1,800 hives moved to sites within a 500 km radius on a regular basis. Honey production is the main focus of the business, producing varieties to suit specific markets. Honey is held for these markets until the customer requires the bulk honey. Pollination of cherries, nashi fruit, almonds, kiwifruit and lucerne would amount to 25% of the beekeeping business. Eighty percent of the replacement queens are reared themselves and 20% are purchased. Approximately 50% of all hives are re-queened annually.

Peter began working in the family business in the mid 1970s during the school holidays. He joined the Australian Army as an electronics technician in charge of communications facilities from 1986 to 1996. Leaving the army, he studied before becoming the computer systems officer with the University of Southern Queensland. Since 2004 he has returned to the family beekeeping business full time. Peter is currently a member of the Crop Pollination Association, Central Victorian Apiarists' Association, Victorian Apiarists' Association and the Victorian Farmers' Federation, beekeeping section within the Horticultural Group.

Industry Communications

Publications

Manning R (2007). Honey Marketing – reflections on my recent tour of New Zealand. *Bee Informed – The Newsletter of the Western Australian Beekeeping Industry*. 6(2), 1–4.

Manning R (2007). Varroa, the New Zealand Experience. *Bee Informed – The Newsletter of the Western Australian Beekeeping Industry*. Volume 6(3), 18-19.

Somerville D (2007). New Zealand Beekeeping Study. *Honeybee News*. March/April, 8(2), 12–12.

Somerville D (2007). New Zealand Beekeeping Study. *Australasian Beekeeper*. 109(10), 20–21.

Presentations

- Colin Fleay — Western Australian Farmers' Federation AGM, June 2007.
- Colin Fleay — Western Australian Farmers' Federation – Disease Workshop, December 2007.
- Doug Somerville — NSW Apiarists' Association Annual Conference, Inverell, May 2007.
- Doug Somerville — North Shore Beekeepers' Association, Sydney, 14 November 2007.
- Doug Somerville — Tocal Beekeeping Field Day, Paterson, 27 October 2007.
- Rob Manning — Western Australia Apiarists' Association, 3 October 2007.
- Peter McDonald — Victorian Apiarists' Association Melbourne Branch, April 2007.
- Peter McDonald — North East Apiarists' Association, May 2007.
- Peter McDonald — Geelong Beekeepers' Club, July 2007.
- Peter McDonald — The Beekeepers' Club, Doncaster, May 2007.
- Peter McDonald — Victorian Apiarists' Association, July 2007.
- Peter McDonald — Victorian Apiarists' Association Bendigo Branch, February 2008.
- Peter McDonald — Victorian Apiarists' Association Gippsland Branch, March 2008.
- Julian Wolfhagen — Tasmanian Beekeepers' Association Conference, 2007.
- Julian Wolfhagen — Tasmanian Beekeepers' Association Northern Branch TBA, 2007.
- Julian Wolfhagen — Tasmanian Beekeepers' Association Southern Branch TBA, 2007.
- Julian Wolfhagen — Tasmanian Beekeepers' Association North Western Branch TBA, 2007.
- Col Wilson — NSW Apiarists' Association Hunter Valley Branch, August 2007.
- Col Wilson — Australian Queen Bee Breeders' Association, 2007.
- Col Wilson — Amateur Beekeepers' Association Central Coast Branch, May.
- Col Wilson — Amateur Beekeepers' Association Hunter Valley Branch, April.
- Peter Barnes — Southern Amateur Beekeepers' Association, Toowoomba, 2007.
- Peter Barnes — Queensland Beekeepers' Association, Management Committee Meeting, 2007.
- Peter Barnes — Queensland Beekeepers' Association, Wide Bay Branch, 2007.
- Peter Barnes — Queensland Beekeepers' Association Conference, 2007.
- Ian Zadow — South Australian Apiarists' Association Conference, 22 June 2007.
- Ian Zadow — South Australian Apiarists' Association Central Branch, April 2007.
- Ian Zadow — South Australian Apiarists' Association South East Branch, May 2007.

References

Goodwin M (2000). Kiwifruit Pollination Manual. ZESPRI Innovation Company Limited.

Goodwin M (2005). American foulbrood control: the New Zealand approach. Bee World.

Goodwin M (2006). Elimination of American Foulbrood Disease without the use of drugs. Revised edition. National Beekeepers' Association of New Zealand (Inc.).

Goodwin M, Scarrow S, Taylor M (2006). Supply of and demand for pollination hives in New Zealand. A briefing paper prepared for the Strategic Pollination Group.

Goodwin M, Van Eaton C (2001). Control of Varroa. A guide for New Zealand beekeepers. Ministry of Agriculture and Forestry.

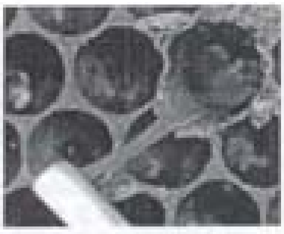
Taylor M, Goodwin M (2001). Control of Varroa. A video for New Zealand beekeepers. Ministry of Agriculture and Forestry.

Taylor M, Cox H (2007). Breeding Varroa-tolerant honeybee stock. Biosecurity New Zealand, Issue 78.

Walsh RS (1978). Nectar and Pollen Sources of New Zealand. National Beekeepers' Association of New Zealand Inc.

Wrigley JW (1953). Bottlebrushes, paperbarks and tea trees and all other plants in the Leptospermum alliance. Angus and Robertson.

APPENDIX I



The Management Agency, American Foulbrood Pest Management Strategy.

Box 234
Te Kuiti

Dear Beekeeper

The management of American foulbrood disease in New Zealand is controlled by law. Currently this law is the Biosecurity (National American Foulbrood Pest Management Strategy) Order 1998. This Order retained many of the provisions of the Apiaries Act which had been in place for over 90 years. Please carefully read the following "User's Guide" and file it away for future reference.

User's Guide to the Pest Management Strategy

Originally prepared by Mark Goodwin, Peter Sales, Bruce Stevenson and Nick Wallingford. Revised in 2003 by the PMS Operations Committee.

BACKGROUND TO THE STRATEGY

The Apiaries Act, which had provided the legal powers to control American foulbrood for over 90 years, was replaced in 1993 by the Biosecurity Act. Using this Act, the National Beekeepers' Association created the Biosecurity (National American Foulbrood Pest Management Strategy) Order 1998, which came into force on 1st October 1998.

The aim of the strategy is to eliminate American foulbrood disease (AFB) from New Zealand.

The PMS is designed to both encourage and require beekeepers to rid New Zealand of American foulbrood disease for good. Elimination of AFB can be achieved.

Beekeepers who put honest effort into reducing AFB will be encouraged to rid their hives of this disease through the agreements (called 'DECAs') they have with the Management Agency. They are able to call on all of the expertise and information we now have available to help them.

Those very few beekeepers who fail to control AFB in their hives, whether through neglect or ignorance, will no longer be able to avoid their responsibilities. They will not be allowed to perpetuate the problem that affects the entire beekeeping industry.

Put simply, if you don't attempt to do the job right, someone will do the job for you and send you the bill. The choice is yours...

PURPOSE OF THIS GUIDE

This guide has been written to make beekeepers aware of their obligations under the legislation. The Guide is not intended to provide all the detail covered in the Biosecurity Act and the PMS Order in Council, but rather to attempt to isolate out most of the important points.

Legal jargon has also been avoided to make it more understandable. This Guide is only a summary of selected parts of the Act and the PMS Order and should be treated as such, rather than as a legal document.

THE MANAGEMENT AGENCY

The legislation names the National Beekeepers' Association as the Management Agency responsible for implementing the strategy.

In fact, the Management Agency employs contractors to carry out many of its duties under the Pest Management Strategy. The main contractor is AgriQuality Limited Any questions you have about the operation of the PMS should be directed to the PMS Committee.

If you are not able to contact the committee members, you can contact the Management Agency directly. Any time you need to write about an 'operational' aspect of the PMS (such as for registering hives, gaining permissions, notifying AFB or notifying actions you have taken, etc.) the correspondence should be directed to AgriQuality Limited unless you are instructed to do otherwise.

AgriQuality will pass on to the Management Agency any of your correspondence that is required by the Management Agency.

FUNDING

From its inception in October 1998 until November 2002 The Pest Management Strategy was funded from revenue collected under the Industry's Commodity Levy Order. This Order has now expired and a new Order under the Biosecurity Act has been approved by the Cabinet Legislation Committee and came into force on the 20th November 2003.

The levy year will be from the 1st of June to the 31st of May. The levy will consist of a base levy, plus an apiary levy. The rates are; a base levy of $20.00, and an apiary fee of $8.00 per apiary, excluding GST. The base levy is the same each year, but the apiary levy may change annually, but is limited to a maximum rate of $15.17 + GST. The levy will be calculated on the apiaries registered on the 31st of March each year.

All beekeepers will be required to fund the levy, although those beekeepers who have registered fewer than 11 beehives on fewer than 4 apiaries will only be required to pay the base fee plus one apiary – ie $28.00 + GST.

When will I need to pay the levy?
In this first year, it will have to be paid within 40 days of the invoice being sent – after that penalties will be applied.

In the following years, invoices will be sent out with the Annual Disease Returns that are mailed on or about the 20th of April and will be due for payment by the 1st of June.

PLEASE NOTE: Penalties will apply to outstanding debts. These will be initially at 10% with 2% for each month (compounding).

When will consultation take place?
It is intended that a budget for the following year, will be drawn up and sent out with the levy invoices. Time will be given for submissions to be received. Notification of the new levy rate for the next year will be notified before the 20th of January of each year.

EDUCATION AND OTHER SERVICES

From time to time the Management Agency may provide educational opportunities that beekeepers should try to participate in. These include:

- AFB elimination field days held throughout the country
- AFB Disease Recognition and Destruction courses, and
- Disease Recognition and Destruction Competency Tests

Contact your local coordinator about these courses when they are to be held in your area.

The Management Agency also provides a laboratory service if you need confirmation of a suspected case of AFB. If you wish to use this service, contact your local AgriQuality Apicultural Officer who will tell you what you need to do to use the service.

WHAT IS A 'DECA'?

A Disease Elimination Conformity Agreement, or DECA, is a formal agreement between you as a beekeeper and the Management Agency. The agreement sets out a 'code of beekeeping practice' to ensure that the incidence of AFB in your hives will reduce to zero over a period of time and remain at that level once achieved. Scientific and case study knowledge show that this goal is attainable if beekeepers follow the correct procedures.

The DECA agreements are tailored to suit each beekeeper's particular circumstances. If you have little or no AFB you won't need to change your beekeeping procedures much, if at all. Beekeepers with a progressively more serious AFB incidence in their hives will need tighter controls and more attention to detail in order to reduce the incidence.

In consultation with the Management Agency or the contractors, you will be able to review your procedures over time to ensure that the goal of AFB elimination is reached. The aim is to use these agreements to ensure that you get all the help and advice available to eliminate AFB from your beehives, and hence, from all beehives in the country!

WHO SHOULD HAVE A DECA?

Hopefully nearly every beekeeper, will eventually have a DECA. Remember, the PMS applies to *any* and *every* beekeeper, hobbyist and commercial. There will be some who, for a number of reasons, will not enter into an agreement to control AFB.

If you take up the offer of a DECA, you will need to show your proficiency in AFB identification and control by passing a Disease Recognition and Destruction Competency Test. This test can be sat "cold" or after completing a Disease Recognition and Destruction course. These courses will be made available to all beekeepers at centres throughout New Zealand.

If you enter into a DECA you will have Approved Beekeeper status and will receive a Certificate of Inspection Exemption. You will *not* have to complete a Certificate of Inspection each year for your hives. However, you must maintain a record of inspection dates and relevant information for audit purposes. As part of the DECA you agree to undertake a test on AFB recognition and control within 6 months of your DECA being approved.

WITHOUT A DECA

Those beekeepers who fail to respond to the Management agency's offer to enter into a DECA agreement will be, for the purposes of the PMS, "unapproved" beekeepers. These beekeepers must furnish a Certificate of Inspection each year for their hives.

This certificate must be completed, and hives inspected by, an Approved Beekeeper, or by Management Agency personnel. Most beekeepers will incur some cost to have this work done for them.

Providing the Certificate of Inspection is *not* optional. If the beekeeper fails to arrange for this to happen the Management Agency will authorise a contractor to do the work and the beekeeper will be liable to pay for the services.

Beekeepers who do not pass the competency test must furnish a Certificate of Inspection each year, again completed by an Approved Beekeeper, or by Management Agency personnel. These beekeepers will need to complete the Disease Recognition and Destruction course and pass the test before a DECA will be issued.

OBLIGATIONS FOR ALL BEEKEEPERS

AFB – Exposure. You must not allow honey bees to have access to any hive, equipment or products that have come from an AFB hive. You must not extract the honey from an AFB hive

AFB – Destruction of Hives. You must **destroy by burning any of your hives that have AFB within 7 days of it being found,** unless you have written permission from the Management Agency to do otherwise.

AFB – Moving Hives. You may not transfer ownership of any AFB hives or infected equipment or products or remove the hives or equipment from the place where it was found without permission of the Management Agency. You may move the diseased hives or equipment, however, if you have a provision in your DECA allowing you to transport diseased hives to a safe place for destruction.

AFB – Notification. If AFB is found in your hives you must notify the Management Agency Contractor (AgriQuality) **in writing within 7 days.**

AFB – Sterilizing. This can only be done with permission of the Management Agency, using methods that they have approved.

Annual Disease Return. Before 1 June each year you must, on the form mailed to you by the contractor:

- record the number of hives you have
- the number of AFB hives found during the previous year (if any), the dates on which they were found and where they were found, and the dates that you destroyed them.
- any changes to the apiary information you have supplied to the Management Agency. Complete all sections
- the dates on which you transferred the ownership of any of your hives to someone else, and provide the name and address of the new owner.

Apiaries – Registration. An apiary is any group of your hives that are more than 200 metres from any other apiary that you have registered. **All apiaries must be registered** with the Management Agency Contractor (AgriQuality) if hives are to remain more than 30 days. When registering the apiary you will need to supply:

- your full name and address
- the number of colonies in the apiary
- the name and initials of the occupier of the property
- the road name and address of the property
- a written description of where the apiary is on the property
- a 260 map series grid reference
- whether it is seasonal (stating the months it is usually occupied) or permanent.

If you have a permanent apiary site that has been unoccupied for 30 days or more you must deregister it. You will therefore need to deregister all your permanent apiaries that are not occupied or alternatively change them to seasonal apiaries if you intend to use them in the next 12 months.

Approved Beekeepers. Any beekeeper can become an Approved Beekeeper by:

- having an American Foulbrood Disease control plan (known as a 'DECA') for their hives that has been approved by the Management Agency Contractor (AgriQuality) and
- having sat and passed, or agreed to sit and pass within 6 months, an AFB Disease Recognition and Destruction Competency Test.

Certificate of inspection. Unless you are an Approved Beekeeper you must ensure all of your hives are inspected by an Approved Beekeeper between 1 August and 30 November each year. An authorised beekeeper must complete the Certificate of Inspection form, which details the inspection, and forward it to the Management Agency within 14 days of the inspection. The Approved Beekeeper who carries out the inspection will need to fill out parts of the certificate, including signing off the form.

Change of ownership. When you transfer the ownership of your hives you must remove or deface all of your codes on the hives and notify the Management Agency that you have done it. You also need to give them the name and address of the new owner of the hives.

Code numbers. The current beekeeper code numbers will continue and new beekeepers will be given new code numbers. The code number must be marked on the outside of one hive in each apiary or on a sign in the apiary. Only the beekeeper who was allocated a code may remove or alter the code (without written permission from the Management Agency).

You should not have any other person's code number on your hives, or any other number that could be confused with a code number. In reality many beekeepers have equipment in their apiaries they have purchased from other beekeepers over the years. Considering the difficulty of removing code numbers it will be considered sufficient in the meantime to remove any confusion by erecting a sign in the apiary with the correct apiary code number.

Compensation. No compensation will be paid by the Management Agency for any losses occurred by beekeepers in having to comply with the Pest Management Strategy.

Drugs. You must not feed any substance to your bees that has the effect of obscuring AFB or attempting to 'cure' it.

Hives – access. You must ensure that the area around your hives is kept free from vegetation to allow normal access.

Hives – moveable frames. You must keep your bees in moveable frame hives. Exemptions may be granted by the Management Agency for research, queen rearing, package bees and public display.

Unregistered/abandoned hives. Please report them to the Management Agency Contractor (AgriQuality) who will take reasonable steps to find the owner of unregistered apiaries. If they are unable to locate the owner they may destroy the hives.

To ensure that the Pest Management Strategy works for the benefit of all beekeepers the Management Agency may have to enforce compliance of the above obligations. This enforcement may take the form of any or all of;

- cancelling a beekeeper's approved status
- conducting the above obligations on behalf of the beekeeper and sending them an account for the work done, and
- bringing a prosecution under the Biosecurity Act.

You will have noticed that you may need to contact the Management Agency Contractor (AgriQuality) to gain permission for a number of things that you have been doing already (e.g. keeping bees in non-moveable frame hives, wax dipping, moving AFB hives to a central location to deal with them etc). This is not a change, as you have always required permission. It was just that it was not enforced before so people didn't bother. The best policy would be for beekeepers to seek permission in writing early on. Indeed, it is an integral part of the DECA agreements that most beekeepers have with the Management Agency. In most cases the permission will be granted automatically as part of your DECA, although the permission will probably be conditional.

SO WHAT DO I HAVE TO DO?

Don't be concerned, having read the information about the PMS in this Guide, that you are suddenly breaching the rules and will have action taken. It isn't going to work that way.

For many/most beekeepers, you can expect a confirmation of acceptance of your DECA application within a short time, though more complicated DECA's may take longer. Please contact your nearest disease coordinator regarding AFB field days, and disease elimination courses and the tests.

All beekeepers will need to complete an Annual Disease Declaration form when it is sent to you next autumn.

CONCLUSION

The prospect of being able to keep bees in a country free of AFB is exciting. It will save the beekeepers of New Zealand millions of dollars, and much stress and heartache. Almost every beekeeper in the country has had to deal with this disease at some time or another. We would all love to see the end of it. It really can be achieved. So let's do it!

ADDITIONAL INFORMATION

If you require additional information on the strategy or AFB control, the following documents are available:

- The Biosecurity Act 1993, from bookshops that supply government publications
- The American Foulbrood Pest Management Strategy from the Management Agency
- The AFB Disease Elimination Manual, from the Management Agency

Varroa Pest Management Strategy

The Biosecurity National (South Island) Varroa Pest Management Strategy came into effect during February 2005. Its objective is to "prevent varroa establishing in the South Island". The management agency responsible for implementing the strategy is the Varroa Agency Incorporated (VAI). The strategy is funded by South Island regional councils and unitary authorities and a per hive levy paid by South Island beekeepers only. More information can be obtained from the VAI, PO Box 304 Mosgiel.

CONTACT DETAILS

Management Agency:

The National Beekeepers' Association

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Executive Secretary
10 Nikau Lane
RD 1, OTAKI
Tel: (06) 362 6301 Fax: (06) 362 6302
E-mail: pamedwards@xtra.co.nz Web: www.nba.org.nz

Contractors: AgriQuality Limited

Hamilton
Murray Reid
AgriQuality Limited
Private Bag 3080, Hamilton
email reidm@agriquality.com
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Byron Taylor
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Cell: 021 918 400

Christchurch
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Email ropert@agriquality.com
Ph (03) 358 1835 Fax (03) 358 6222
Cell: 021 283 1829

APPENDIX II

DECA approved by	
Name	
Signature	
Date	
On behalf of the Management Agency	
Database updated	
AFB book sent	

NATIONAL BEEKEEPERS' ASSOCIATION of NEW ZEALAND (INC.)

DISEASE ELIMINATION CONFORMITY AGREEMENT

In accordance with the National Pest Management Strategy for American Foulbrood, this is an agreement by the owner of beehives, or the representative of a beekeeping enterprise, to be responsible for disease elimination in the beehives the person either owns or is responsible for. The person understands that this agreement will be used to describe the American foulbrood (AFB) control practices used by the beekeeper or beekeeping enterprise, and also agrees to alter these practices, in negotiation with the Management Agency, should the disease incidence in those beehives increase at any time.

Beekeeper Code

I, ______________________________ *(name)*

of ______________________________ *(company)*

____

______________________________, *(address)*

agree to fulfill the duties listed below to the best of my ability.

I have__________ hives, located on __________ apiaries.

The duties are:

Part 1 Compulsory Requirements:

1.1 To keep my bees in moveable frame hives;

1.2 To keep access to my hives clear so that hives are able to be inspected.

1.3 To not expose any bees, bee products, or appliances taken from or used in connection with any beehive with American foulbrood disease, in such a manner as will allow access to those materials by bees;

1.4 To not offer or sell any bees, bee products, or appliances taken from or used in connection with hives contaminated with *Paenibacillus larvae* spores. *P larvae* is the bacterium that causes AFB.

1.5 To not feed any drug or substance for the prevention or control of American foulbrood;

1.6 To register the location of all apiaries, giving the full name of the landowner, the name and number of the street/road address of the owner, a description of the location of the apiary on the piece of land, and a DOSLI 260 series grid reference for the location of the apiary, within 30 days of establishing the apiary;

1.7 To identify each of my apiaries with a registration code issued by the Management Agency, either by marking the registration code on the outside of at least one beehive in each apiary, or on a sign placed in a conspicuous position within the apiary;

1.8 To furnish an Annual Disease Return by June 1 each year.

1.9 Within seven days of finding a clinical case of American foulbrood, to report the case to the Management Agency, kill the bees, and destroy, by fire, all material found with that hive (including its bees, honey comb and frames). Boxes, lids and floors will also be destroyed, unless a negotiated component is included in this document giving consent to sterilize these items by an approved method;

1.10 To pass a competency test in American foulbrood disease recognition and destruction issued by the Management Agency (a course on AFB recognition will be available);

1.11 To supply samples of bees/honey for *Paenibacillus larvae* spore testing when requested by the Management Agency (at no charge to the beekeeper);

1.12 To sign Certificates of Inspection for other beekeepers only when an inspection for American foulbrood has actually been performed in the manner prescribed in the Certificate of Inspection.

Part 2 Negotiated Components:

Tick the box(e' s) which best describe your beekeeping practices. You can tick more than one box

2.1 How many frames do you inspect?

- ☐ Inspect four brood frames per hive
- ☐ Inspect all frames in brood boxes in each hive
- ☐ Other *(please describe)*

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2.2 How many disease inspections per hive do you carry out each year (minimum of one)?

- ☐ Once a year
- ☐ Twice per year
- ☐ Whenever the hive is being worked
- ☐ Whenever anything is removed from the hive
- ☐ Other *(please describe)*

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2.3 When do you carry out these inspections?

- ❑ Any time of the year when hives are being worked
- ❑ When anything is removed from a hive
- ❑ Spring and autumn
- ❑ August to December
- ❑ Other *(please describe)*

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2.4 What system do you use to record inspections, disease found, and action taken?

- ❑ Maintain a disease diary giving dates when disease found, when the Management Agency is notified, and when the diseased hives are destroyed
- ❑ Maintain an apiary work diary which includes inspection and disease information
- ❑ None
- ❑ Other (please describe)

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2.5 What method do you use, or would use, to destroy diseased beehives (including shifting of such hives away from the apiary site where the diseased beehive was found)?

- ❑ Burning the complete hive over a hole dug in the ground
- ❑ Burning all frames and bees over a hole dug in the ground
- ❑ Burning all frames and bees inside a 200 litre drum over a hole dug in the ground
- ❑ At the apiary where the diseased beehive is found, blocking the entrance with a suitable material, killing the bees in the hive with petrol or other suitable substance, loading the hive onto a truck, and taking it to a suitable location to burn using one of the methods identified above
- ❑ Other *(please describe)*

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2.6 Will you attend an annual American Foulbrood Elimination Field Day in your area?

- ❑ Will attend
- ❑ No, will not attend

Part Three: Inspection for, and reporting of, a suspect exotic bee pest or disease - all beekeepers to complete.

3.1 How do you learn to recognize the symptoms of exotic bee disease?

- ❑ Read the exotic disease recognition pamphlet sent out by AgriQuality Limited.
- ❑ Attend disease recognition field days.
- ❑ Other *(please describe)*.

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3.2 When do you inspect for exotic bee diseases?

- ❑ During inspections for AFB
- ❑ Other *(please describe)*.

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3.3 How do you inspect for exotic disease

- ❑ Check frames of brood for symptoms of European foulbrood and presence of mites.
- ❑ Check adult bees for any unusual appearance or behaviour.
- ❑ Other *(please describe)*.

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3.4 What will you do if you find something you suspect might be an exotic disease

- ❑ Advise nearest AgriQuality Limited Apiculture Officer immediately.
- ❑ Send samples to an approved laboratory if required by an Apiculture Officer
- ❑ Other *(please describe)*.

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Signed: ____________________________

Print name: ____________________________

Date: ____________________________

Part Four: Commercial and semi-commercial beekeepers only

Part 4 The following section needs to be completed by commercial or semi commercial beekeepers.

4.1 What type of movement control system/records do you use *(disease control and elimination purposes only)?*

- ☐ Within the disease diary
- ☐ Within the apiary work diary
- ☐ Marking individual hives
- ☐ Marking hives to individual apiaries
- ☐ None
- ☐ Other *(please describe)*

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4.2 What type of traceback system do you use for bee equipment in storage (disease control and elimination purposes only)

- ☐ Marking stacks to show which apiary they came from
- ☐ Marking supers to identify which hives they came from
- ☐ Not necessary, as the hive will have been inspected before equipment was removed
- ☐ None
- ☐ Other *(please describe)*

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4.3 What method do you use to salvage woodenware from diseased hives?

- ☐ Do not salvage woodenware from diseased hives
- ☐ Immersion of all woodenware from diseased hives for at least 10 minutes in paraffin wax held at 160° C or above
- ☐ Other *(please describe)*

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4.4 What system do you use for drying out supers after they have been extracted?

- ❑ No system used; I just store them directly into a shed
- ❑ Place stacks of extracted supers on top of hives in selected apiaries
- ❑ Place supers back on hives/hives of origin
- ❑ Other *(please describe)*

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4.5 What method do you use to decontaminate equipment used in beehive inspections?

- ❑ Sterilize hive tool(s) by fire
- ❑ Scrape wax and propolis off smoker and wash all parts with bleach/detergent/meths (dilution to extinction)
- ❑ Wash hands and gloves with bleach/detergent/meths solution
- ❑ Other *(please describe)*

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4.6 How do you train staff in American foulbrood recognition and destruction techniques *(beekeeping enterprises only)?*

- ❑ Ensure employees attend annual American Foulbrood Elimination Field Day
- ❑ On-the-job training
- ❑ Ensure employees attend American Foulbrood Elimination course
- ❑ Encourage employees to sit the competency test for AFB elimination
- ❑ Engage a training provider to instruct staff
- ❑ Other *(please describe)*

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Signed by: ______________________________

Print Name: ______________________________

Date: ______________________________

A Study of New Zealand Beekeeping
—Lessons for Australia—

by Doug Somerville

RIRDC Pub. No. 08/060

The value of honeybees to the Australian economy is undisputed. This has been emphasised by the ongoing media coverage of the potential threats to honeybees (*Apis mellifera*) world wide and the Australian Federal Governments' enquiry into the Australian honeybee industry. One of the key threats to honeybees in Australia is the exotic parasite *Varroa destructor* (Varroa mite). On the world stage, this pest is considered as one of the most serious challenges facing the keeping of honeybees. Australia is the only major beekeeping country not to have experienced the impact of an incursion of this devastating parasite.

Unfortunately, our closest neighbour, New Zealand, has had to deal with Varroa since 2000. Fortunately for Australia, one of the best methods of ensuring the Australian beekeeping industry is across the issues associated with the Varroa mite, is to learn first hand from their experience. A small group of Australians travelled to New Zealand to gather information on Varroa and other topics of importance to beekeepers in Australia.

The group was highly successful in identifying a number of key points that should be carefully considered by the Australian beekeeping industry, in order to prepare itself for the (possible) advent of Varroa.The findings of the study will make the 'readiness' for the incursion of the Varroa mite into Australia more focussed and provide a considerable body of information on a range of other topics including American Foulbrood, pollination and the marketing of honey.

The Rural Industries Research and Development Corporation (RIRDC) manages and funds priority research and translates results into practical outcomes for industry. Our business is about new products and services and better ways of producing them. Most of the information we produce can be downloaded for free from our website: www.rirdc.gov.au.

RIRDC books can be purchased by phoning 02 6271 4160 or online at: www.rirdc.gov.au/eshop.

Photos: Top – Manuka blossom; bottom left – strips in place to treat hive for Varroa; bottom right – kiwi fruit.

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