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# Apiarist's Advocate

News, Views & Promotions - for Beekeepers - by Beekeepers

## Counting the Cost of Compliance

Individuals and Organisations Try to Curb MPI's Fees

# Can MPI's Fees be Curbed?

Spiralling compliance costs have long been a bone of contention between members of the apiculture industry and the Ministry for Primary Industries (MPI). Now, one honey packer has had enough and has filed a complaint to the Chief Ombudsman of New Zealand against MPI – and they are seeking letters of support from others in apiculture. Meanwhile, industry bodies representing honey producers and packers say they are doing their best to curb MPI's fee increases as businesses grapple for survival in the face of fallen honey prices, but is there any chance the government will act on the pleas?

**"I am saying, 'no'. After 30 years of this I have had enough. This is robbery," says Chris Watkins.**

The Honeylands Naturally owner and director is seeking to reduce both the cost of his own audit and registration fees and that of others in the honey industry with a complaint to the Ombudsman of New Zealand. The Ombudsman handles complaints about government agencies and seeks to resolve them.

Over their 30 years packing and exporting honey, specialising in single servings for the airline, hospitality and healthcare industries, Watkins says he has dealt with a range of agencies from Ministry of Agriculture and Fisheries, AsureQuality, New Zealand Food Safety and now MPI, but compliance costs have never been such a burden on business as what they are now.

"Beekeepers understand there needs to be a form of policing to ensure there are not rogues out there, because some people out there do silly stuff with honey. That is not the problem, it is the escalation of costs, especially from a honey perspective. The rise in honey prices is nothing like the 150 percent MPI has just put through with the bee levy. For a small operator it is crippling," Watkins says.

*Chris and Helen Watkins, owners of Honeylands Naturally in Wanaka, might be all smiles here, but are not satisfied with MPI's escalating compliance costs.*

Last year the annual 'export bee levy', which anyone exporting honey or hive products is required to hold, went up from $1005.70 per annum to $2566.08. At the same time MPI's rate for staff to audit risk management programme (RMP) facilities, which exporters are also required to have, went from $176 to $230.50 per hour.

For Watkins, whose business is based in Wanaka, the straw that broke the camel's back and forced him into action was a remote RMP audit fee of nearly $1400, when previously they had always come in below $500. After questioning the amount charged, Watkins took his complaint to MPI and, after some letter writing back and forward with various managers, two of the $230.50-priced hours were removed from the bill, but the charges are still not accurate he says.

Honeylands is not only subject to the export fee of $2566.08 as well as the twice-yearly audits of their RMP facility, but also required to undergo separate annual Food Safety Programme inspections which cost them around $1600. That despite the inspections largely being a replication of what is assessed in the RMP audits, Watkins says.

He also believes that a set fee for an export bee levy is unfair on smaller operators and a pro-rata system where fees are based on tonnes exported would make for a more just system.

A letter to the Minister overseeing MPI, Damien O'Connor, as well as that of Food Safety, Meka Whaitiri, outlining his concerns was "as good as wasting time". So, Watkins says he has been left with no option but to approach the Ombudsman. He has included letters of additional complaints from others in the industry to strengthen his submission and is asking anyone else who feels they have been subject to inaccuracies or unfairness from MPI to contact him.

"Anything that anyone could give me, I will forward on with the complaint number and it will help paint the picture of what is going on. Beekeepers up and down the country have experienced the same thing," Watkins says.

## INDUSTRY BODIES' ONGOING BATTLES

Watkins isn't alone in voicing his displeasure to MPI, with apicultural industry bodies Apiculture New Zealand (ApiNZ) and New Zealand Beekeeping Inc (NZBI) both notifying the Ministry of their concerns in recent years. Despite this, MPI have forged on with fee increases, although in 2022 the annual domestic bee levy (for honey sellers who don't wish to export) was reduced from $471.80 to $308.

"The domestic bee levy went down because they had surpluses, while the export levy went well up because significant deficits had tallied up. Our view is, keep a tighter watch on it and keep us updated rather than hitting us with a big increase," says Karin Kos, chief executive of ApiNZ.

When MPI proposed levy increases they called for consultation and much of what was provided by ApiNZ and NZBI appears to have been ignored. Among those requests in ApiNZ's submission was greater transparency of costings.

"It would be really helpful for us to understand why those rates are what they are and what is behind them. That is the message we have pushed to MPI through our Standards Focus Group and I have personally too. We want transparency around their cost recovery arrangements. Why is this $230.50 an hour?"

As well as that hourly rate, auditors also bill travel time, mileage, accommodation costs, meals and 'incidentals' to RMP holders.

One supposed win for beekeepers was a change in December 2021 which made available a higher 'step 7' which RMP holders could obtain with sufficient training, meaning they would be subject to annual audits of their facility as opposed to twice-yearly.

However, information obtained under an Official Information Act shows that of the 734 RMP audits carried out by MPI in 2022, only three were on premises at step 7.

*The Honeylands Naturally RMP facility in Wanaka is not large, but is subject to three audits or inspections a year, as well as required to hold a Bee Export Licence.*

*Honeylands has been exporting honey for 30 years, specialising in single servings for the airline, hospitality and healthcare industries. Owner Chris Watkins says compliance costs have never been so overbearing.*


"I doubt whether people are even bothering to do the training," NZBI president Jane Lorimer says.

"They haven't told us how often we will have to do refresher courses on the training required to obtain step 7 and thus annual audits. So, most have worked out it will be cheaper to stay on the six-monthly audit even though it's a pain in the backside and the wallet."

Lorimer says trying to work with MPI is "a real battle" and points to the high number of regularly complying RMP holders as evidence the system is overbearing, with only 10 of the 734 audits in 2022 resulting in noncompliance.

"Our product generally is safe from a food safety perspective. It seems those who are negotiating access for our product offshore are saying 'we can do this for you' to foreign markets and therefore beekeepers are then having to jump through those hoops they set. It creates barriers and we don't seem to be getting a higher return," Lorimer says.

It's a battle NZBI and ApiNZ will continue to fight on behalf of the industry, but Kos says individuals need to step up too and make sure their voice is heard. A prime opportunity to do that is on MPI's Proposed Changes to Cost Recovery which is open for consultation until April 24. Kos says it appears apiculture has largely avoided any further increases in fees under the proposal document, which may be a positive outcome of their advocacy last year, but beekeepers should strive to be heard again nonetheless.

"We do what we can for our members, but I have spoken to beekeepers who don't submit. Often they don't have time, but it would be really helpful if they could, and did, make their opinions known on the issues," Kos says.

Watkins is one such honey trader who has done that, in his way. He says he understands the processes have their place, but the current system is not right.

"We employ the auditors to help our business and if we can make it simpler and take out costs, let's do that," Watkins says, adding "at the same time, let's not increase the costs so it becomes a burden on industry".

***Anyone wanting to contact Chris Watkins and add a contribution to his submission to the Ombudsman can email chris@honeylands.com.***

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# DOC Dodges Fee Changes Despite 2019 and 2021 Review Recommendations

The Department of Conservation (DOC) was made aware of the honey industry's struggles and their own internal review recommended a reduction in the concession fees placed on non-mānuka beehives as early as 2019, information released to *Apiarist's Advocate* under the Official Information Act reveals.

**Concerns about DOC's decision making on whether to allow or deny beekeepers placement of hives on Conservation land were raised in November 2022 in *DOC's Treatment a Bitter Pill for Beekeepers*, including high site fees, over charging due to mis-calculations of fees, impractical ecological assessments and inertia within DOC communications and decision making. Apiculture New Zealand (ApiNZ), on behalf of beekeepers, said they lobbied for a reduction in hive concession fees with DOC, but were frustrated at the lack of action towards change. The Department has stated that a review started in 2021 is "ongoing".**

However, Apiarist's Advocate can reveal that it was in June 2019 that ApiNZ first flagged the struggles of the honey industry to DOC and staff at the Department undertook a "Price Book Review of Beehive Activity Fees" later that year. It recommended a reduction in non-mānuka honey fees from $30/hive to $17, and for mānuka honey producing sites an increase from $75/hive to $89/hive.

The review stated the changes were "considered reasonable given that the fall in non-mānuka honey prices is partly on account of tightening of mānuka honey stipulations outside the

*The Department of Conservation, guardian of New Zealand's almost 8-million hectares of conservation land, are sticking with their current pricing for beehive placements, despite beekeeper complaints for years.*

control of the beehive concessionaires", and for mānuka honey, "the higher recommended fee is reasonable considering continued demand in mānuka honey".

Coming up to four years on from ApiNZ first flagging the issue of depressed honey prices, beekeepers continue to report non-mānuka returns below cost of production, while mānuka honey demand and prices have also fallen sharply for most or all grades, yet DOC has chosen to maintain pricing set during boom years for the honey market.

Correspondence between the Department and ApiNZ reveals the request for fee reduction was rejected in August 2019 because factors at play in the domestic and international honey markets were seen as "temporary" by DOC. While certain market factors have changed in the past four years, ***rising costs and falling returns*** have seen New Zealand's commercial beekeeper numbers drop every year since 2019 and total national registered beehives fall by 20% over the same period as apiarists battle to cover costs.

The Department is not unaware of beekeeper struggles, as they have continued to resource surveys of concessionaires and reviews of beehive activity fees. One example being a May 2021 review which informed DOC decision makers that returns to beekeepers for non-mānuka honey had fallen from $11.30/kg in 2017 to $3.75 in 2021. Again, the report recommended a reduction in fees for non-mānuka beehives and an increase in fees for mānuka honey hives, but specifically those producing a monofloral crop.

The review encouraged a move from two honey categories (mānuka and non-mānuka) to three for fee setting. It found monofloral mānuka producing hives should be charged at $100/hive (up from $75), multifloral manuka producers $40 (down from $75) and non-mānuka $15 (down from $30).

While these changes were never implemented, internal correspondence from December 2022, a month after *Apiarist's Advocate*'s story on concession fees ran, saw DOC management blaming the "system" for their prevarication.

"(The 2021 review) was signed off however, there were implementation issues as our activity fee returns couldn't accommodate for three categories. Based on this, the decision was made to keep the fees as is, and to revisit the pricing in a couple of years once the system was updated," the Department's commercial manager stated.

So, while beekeepers leave the industry and many who remain struggle to keep their business afloat into a fourth year of honey price woes, they will be getting no sympathy from DOC's decision makers – seemingly no matter how many reviews recommend they act otherwise.

# Harnessing the Feeding Power of Pseudoscorpions

Following on from **last month's** profile of Dr Ronald van Toor's extensive work experiences, qualifications and contributions to apiculture in New Zealand, we explore the Canterbury scientist's ongoing research into varroa devouring pseudoscorpions, and dive into his thoughts on New Zealand's biosecurity programme. All while providing a "cathartic" experience for the esteemed scientist.

BY MAGGIE JAMES

**Beekeeping biosecurity and surveillance is a key area of interest for van Toor and since 2017 he has been a member of Apiculture New Zealand's Biosecurity and Government Industry Agreement Focus Group. The committee aims to protect beekeepers from incursions, advising what actions can be taken by the industry with respect to organisms e.g. small hive beetle, and works closely with Government to help keep pests and disease out of New Zealand.**

Of concern to van Toor is New Zealand does not have specific sentinel hives for honey bee surveillance programmes. Rather, under MPI mandate, hives are inspected and samples are collected from privately owned hives within high-risk zones to test for exotic diseases and pests (as detailed in ***Biosecurity Champions Helping to Protect our Bees***).

Van Toor would like to see the surveillance programme extended to include the detection of early incursions of unwanted flowering species of plants. It could perhaps be put into a working system where beekeepers are paid to run hives, with pollen and bees sampled for DNA specific to weeds that are in flower.

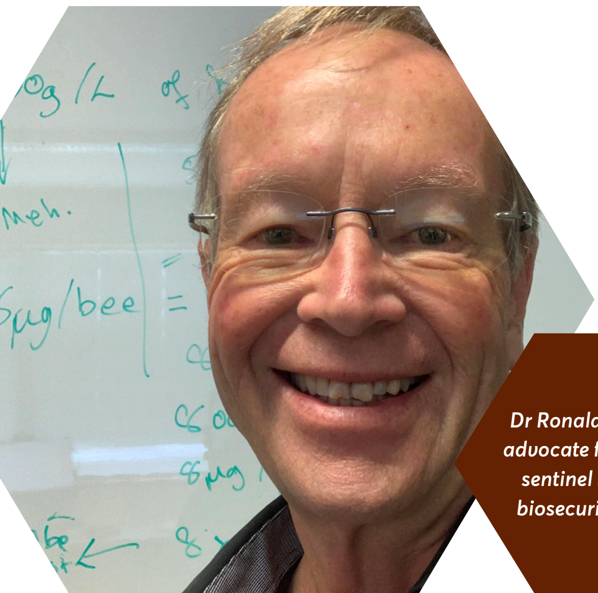
"We are lacking government will to set up sentinel hives for early detection in hotspots around ports," van Toor says.

"Within five kilometres of a beehive, this would be an economic and efficient way of using honey bees to do the job for us, instead of employing inspectors for flowering plant incursions."

Molecular DNA techniques can be used to identify the organisms being brought into the hive, van Toor explains, noting that a microscope is not used and instead pollen has its DNA removed.

Because honey bees will go to the most attractive flowering species for them, weed pest flowering species might have to be of a certain concentration before the system picks up their presence though. Despite that, van Toor would like to see the idea taken more seriously.

"There is potential for this system to work, but if Government are not prepared to fund, there's no point in doing the support science," he points out.



*Dr Ronald van Toor, an advocate for specialised sentinel beehives for biosecurity purposes.*

## CONFIRMED INGESTION OF VARROA DESTRUCTOR BY PSEUDOSCORPIONS

Among van Toor's extensive work for the honey bee industry is research conducted between 2018-2021 into the ability of pseudoscorpions to consume varroa. Pseudoscorpions are related to spiders and New Zealand has 70 species, mainly native. The genus extensively researched by van Toor and found in various parts of the country is the *Chelifer cancroides*, probably introduced accidentally by European settlers in bee skeps, or farming equipment. The European chelifer has evolved with bees in New Zealand and at Plant and Food Research they investigated if they could control varroa in honey bee hives.

Chelifers first paralyse their prey with venom before eating them. A female chelifer lays one to three clusters of 30 eggs or less per year. At the 30°C temperature found in the brood chamber of hives, a female can produce 64 protonymphs (baby chelifers) per year. These young chelifers can eat varroa within a couple of days from hatching from an egg, but they only eat phoretic varroa and dead varroa are ignored, van Toor's research found. This limits their ability to control the parasite, as they have access to varroa for only about four days of the varroa lifecycle, when the mites are roaming around the hive, before going into an uncapped brood cell. There is no evidence of chelifers harming bees.

Adult chelifers can live for four years. However, determining their varroa consumption rate is "tricky" van Toor says, as is a system that allows them to survive and thrive in a beehive.

The chelifers definitely consume varroa though. Van Toor developed DNA tests to undertake on the chelifer four weeks after their last feed, demonstrating varroa in their systems.

"We were happy our controls were valid and that the varroa DNA in the guts of the chelifers were derived from feeding on the varroa, and could have only come from the varroa mite," he says.

This varroa DNA work had never been done before and he says he could not have undertaken it without his experience working with the Scottish Crop Research Institute in Scotland where he gained an understanding of the concept.

"We obtained three years funding from the Ministry of Business, Innovation and Employment to improve the killing potential of cancroides for controlling varroa by raising chelifers commercially in nest-bars. Now three years on, there will be no more research until there is additional funding from industry. However, we still maintain chelifer for research purposes," van Toor says.

*An adult pseudoscorpion eating a varroa mite next to an infested drone honey bee pupa. Photo: Robert Lamberts, PFR.*

Because chelifers also could not remove phoretic varroa directly off bees, at the hive entrance, a device that removed varroa from bees to fall through a mesh bottom board to the chelifers residing below was added to the hive entrances. However, an effective varroa removal device would make the chelifers redundant. In one hive, van Toor observed a prototype device which could remove 20 varroa a day from the hive, with no apparent harm to the bee colony after 18 months. It would be a much cheaper form of control than using chelifers, but more research is required to improve the device's efficacy before it can be commercialised and this would require additional investment, which is being sought.

The work is currently being written up for scientific publication, but more research which seeks to harness chelifer's qualities is also underway, with van Toor and researchers from universities in Europe collaborating. They have extracted the venom from chelifers and identified a wide range of novel neurotoxic peptides that hold promise for use in organic pesticides. Some can also be used to control bacteria, and pathogens in humans, as there are antimicrobial peptides within the venom.

So, van Toor's research continues and he could yet assist the apiculture industry more. For him, sitting back and discussing his work with this *Apiarist's Advocate* interviewer over two articles has been rewarding.

"The process has been very cathartic and extremely reassuring for me," he says, adding "I have always thought, until now, that I had not achieved much in life!"

# Varroa – Managing the Scourge of Modern Beekeeping

Having witnessed the effects of the varroa mite on honey bee colonies across the world and learned from beekeepers about their attempts to control populations, Sebastian Owen, commercial director of Vita Bee Health, has penned three articles on varroa and best management practices. First up, he goes back to basics to assess the nature and impact of varroa on beekeeping worldwide.

**BY SEBASTIAN OWEN**

**No other pest or pathogen of honey bees is known to have such a massive impact as the varroa mite, *Varroa destructor.* The impact has been so sudden and so large because the parasite jumped from *Apis cerana*, the eastern honey bee, which had built up defences to the mite over a very long period of time, to the defenceless western honey bee *Apis mellifera*, the mainstay of global beekeeping.**

In a matter of decades, the mite infested colonies of *Apis mellifera* around the world with devastating results. Only parts of central Africa, some extreme northern territories and some remote islands seem to have escaped the invasion. Australia, varroa-free for so long, is currently attempting eradication after an incursion of varroa mites in New South Wales.

The jump of the parasite from *Apis cerana* to *Apis mellifera* probably happened in several places on different occasions, possibly starting early in the twentieth century, reaching New Zealand in 2000 or earlier, having arrived in China (by 1959), India (by 1961), Europe (by 1977) and North America (by 1987). First reports of the presence of varroa mites are usually a significant time after their initial arrival, as New Zealand discovered and as Australia may now be discovering after the finds around the Port of Newcastle.

*Varroa up close – well adapted to survive in honey bee colonies and inflict damage on the Apis melifera which New Zealand beekeepers keep.*

The mite's presence is not immediately obvious until populations build up and in small numbers. It is seldom visible without diagnostic tests or a knock-down agent and varroa screens. The ability of the mite to hide its presence has assisted its very rapid spread and has been aided by beekeeper colony movements and bees drifting between colonies.

In every region that varroa established itself, it has taken a huge toll on honey bee colonies. At first it was thought that the colony deaths were a direct effect of the mite, but in the 1990s it was discovered that viruses transmitted and multiplied by the mite were the real culprits. Often top of the list are deformed wing virus (DWV) and acute bee paralysis virus (ABPV). These were not new to honey bees, but with the arrival of varroa their impact soared to unprecedented levels.

Initially it was thought that the mite fed off the bee's haemolymph (blood), but recent evidence indicates that it feeds off the bee's fat body. In any event, varroa is a very effective vector of many viruses, and the 'injecting' of these viruses has accelerated their spread within and between colonies, turning previously low-impact viruses into colony killers.

As every beekeeper managing colonies with varroa notices, all sorts of changes become apparent, and the general health of the colony declines, with apparently minor viruses becoming more visible. The immune system of the bee is being compromised, resulting in all sorts of manifestations.

## VARROA MITE CHARACTERISTICS

The tiny mite, oval, flat and red-brown in colour, measures just 1.1mm by 1.6mm and is seldom visible on the body of the bee because it tucks itself away, hidden in the folds of the abdomen. If the mite is visible on bees, even in small numbers, it is likely that the colony is already severely infested.

The female mite enters a cell containing a larva about five-days old, the cell is capped, the mite feeds on the pupa and lays up to six eggs. The developing mites feed on the larva, damaging it and exposing it to pathogens. Adult females leave the cell with the emerging bee while the males and immature mites remain for a time. Drone cells are particularly favoured by the mite because of the additional days that adult drones take to emerge through the capping.

### THE HIDDEN DANGER DEVELOPS

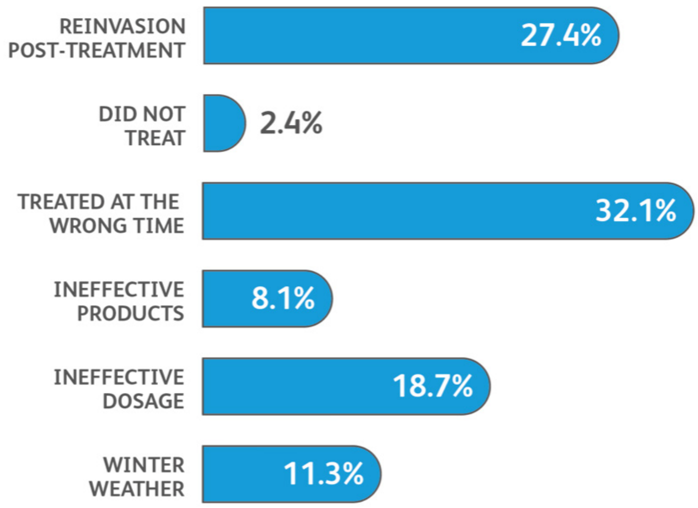
As the season progresses, the varroa infestation can grow at an alarming rate, so that by late summer or autumn the population on adult bees (which are decreasing in number) can increase dramatically. In the UK, a 'varroa calendar' has been produced to show the potential risk that population threshold levels can present at any time in the season – even a natural drop of a few mites in spring (as measured by counting the mites on a varroa screen over a fixed period) can presage an existential threat to a colony by the end of the season if treatment is not applied.

### BEE DEFENCES

Over a very long period of time, *Apis cerana* has developed defence mechanisms against varroa, alongside which it can now co-exist. For example, its worker brood is highly sensitive to a toxic protein from the mite and this counter-intuitively limits the successful reproduction of varroa in drone larvae because the larvae die and disrupt the varroa mites' reproductive cycle. *Apis mellifera* isn't so sensitive to the toxin, so reproduction continues apace. *Apis cerana* also appears to have developed several other defences including

### MAIN FACTORS ATTRIBUTED TO VARROA LOSSES

Single largest factor underlying losses attributed to varroa and related complications, according to respondents




Source: Manaaki Whenua Landcare Research commissioned by the New Zealand Ministry for Primary Industries grooming techniques that inhibit varroa. Generally, its own lifecycle is not so conducive to varroa development.

Unfortunately, *Apis mellifera* is far behind in its evolutionary response to the mite and how quickly it can respond is debated. Meanwhile, the initial impact of varroa on honey bee populations has invariably been devasting with a large percentage of colonies being wiped out within a few years of the parasite's arrival. Honey harvests have been very badly hit, as any beekeeper who has lost colonies will verify, and so too has agricultural pollination, although figures on this are difficult to evaluate.

### VARROA'S SPREAD THROUGH NEW ZEALAND

The first reporting of the varroa mite – in Auckland on 11 April 2000 ¬– was immediately followed by a search of the area which indicated that the mite had already been present, undetected, for three to five years having possibly been brought in through an illegal import of queen/s or perhaps accidentally by ship. Three zones – named 'infected', 'buffer' and 'surveillance' zones – helped prioritise the response, but it was suspected that beekeeper hive movements had already spread the mite considerably. Quickly it was realised that eradication was not feasible in the North Island.

By 2004, the mite had been identified in Canterbury and in 2006 in Nelson. Colony destruction and movement controls had no effect in eradicating the mite and, sadly, it was recognised that the mite was in New Zealand to stay, with only a few small islands and very isolated pockets left unaffected.

### THE IMPACT

Many businesses did recover from the arrival of varroa as they were assisted by the mānuka honey boom, but since that boom the finances of the industry have become stretched and beekeepers have looked for cheaper varroa control treatments, DIY treatments or even no treatment, with many hives being abandoned.

The full economic impact, though a little delayed, was considerable. Both registered hive numbers and commercial beekeeping enterprises have reduced in recent years as New Zealand beekeepers come to grips with a drop in honey prices.

Between 2015 and 2021, the percentage of colonies lost over winter increased year on year and by 2021 beekeepers were attributing losses mostly to the mite, rather than queen problems as previously (as per New Zealand's Colony Loss Survey).

Although once well established, the varroa mite can never be eradicated from *Apis mellifera* colonies, its population numbers can be controlled by treatments – so long as manufacturers' instructions are followed meticulously and IPM (integrated pest management) techniques to alternate treatments from year to year are used to delay or avoid the development of resistance to the active ingredients of the medications.

Therefore, in part two of this topic next month, I will explore the effectiveness of treatments, how to use them effectively, treatment times and how to avoid or at least substantially delay the development of resistance.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# Biosecurity Champions Helping to Protect our Bees

Each year many beekeepers open their hives for surveillance inspection, playing an important role in ensuring exotic pests and diseases are kept out of New Zealand. The National Apiculture Surveillance Programme (NASP) is undertaken by AsureQuality Limited every autumn, on behalf of Biosecurity New Zealand. Several beekeepers at the forefront detail the programme and how it endeavours to protect honey bees and thus beekeeper livelihoods.

BY BERNARD J PHIRI, BYRON TAYLOR (MPI) AND MARCO GONZALEZ (AFB PMP AGENCY)

**From March to May, apiary inspectors visit areas designated as high-risk zones to carry out surveillance activities. These zones are the most likely entry points for exotic pathogens. They include areas around New Zealand's main airports, seaports, tourist destinations, and transitional facilities. Areas of high hive concentration, such as those with crops pollinated by honey bees, are also classified as 'high-risk' zones. Inspectors go to 350 apiaries within the zones to check for signs of exotic pathogens. They also collect samples for testing at Biosecurity New Zealand's Plant Health and Environment Laboratory.**

To make things simpler for beekeepers, inspection data is shared between NASP and the National American Foulbrood Pest Management Plan (AFB PMP). The data gathered during surveillance is strictly confidential and only used for the purpose of monitoring and detecting biosecurity risks.

### WHY IS THE SURVEILLANCE CONDUCTED?

NASP's primary goals are:

- To detect exotic pests or diseases early enough before they can establish in Aotearoa. This gives New Zealand the best chance of nipping exotic pests and diseases in the bud before they have a chance to establish.
- To help New Zealand meet its international reporting obligations and attain country freedom status for trade and export (with respect to exotic pests and diseases). This ensures Aotearoa can access high value export markets for its bee products.

Getting good information allows us to provide the support needed to beekeepers to protect their hives and to protect the apiculture industry from new harmful exotic organisms.

### WHAT IS UNDER SURVEILLANCE?

The surveillance conducted by NASP looks for a wide range of exotic pests and diseases that could cause harm to the beekeeping industry. These include small hive beetle, various bee mites and European foulbrood. This is in addition to keeping an eye out for more 'under-the-radar' types of bees that have undesirable traits such as Africanised, Cape and some Asian honey bees.

The inspectors are also trained to identify and report any AFB infections they find when carrying out their work under NASP.

### WHO INSPECTS THE APIARIES?

All apiary inspectors are experienced beekeepers warranted by


*Be on the look out for tropilaelaps mites – not yet in New Zealand but a serious threat to honey bee colony health should it arrive.*


*Be on the look out for small hive beetle – not yet arrived in New Zealand but knocking on our door from Australia.*

Biosecurity New Zealand as Authorised Persons (Level 2) under the Biosecurity Act. They are trained, operate confidentially and are guided by an Apicultural Officer. The inspectors attend a refresher training course each year to keep their knowledge and skills fresh.

### ARE ANY HIVES OUTSIDE THESE ZONES INSPECTED?

Apiaries who supply bees for export, but are outside the identified high-risk zones, are part of the programme too. Each year 300 of these apiaries send samples of bees for exotic pest and disease testing as part of the export clearance process. Over 2000 apiaries are also inspected under the AFB control programme.

### WHAT CAN YOU DO?

The annual inspection of hives plays an extremely important role in protecting New Zealand's apiculture industry. You can support the future of New Zealand apiculture by allowing your hives to be inspected if they are in the high-risk zone and selected for surveillance.

### EVEN IF YOU'RE NOT IN A HIGH-RISK ZONE OR EXPORTING BEES, YOU CAN STILL HELP...

When you're working your hives, be on the lookout for signs of exotic pests or diseases. There might be an unusual organism, a disease you have not seen before or bees dying in large numbers. Should you notice any of these signs, you should immediately notify Biosecurity New Zealand through the Exotic Pests and Disease Hotline: **0800 80 9966**.

These notifications complement the work of apiary inspectors and are a vital part of our biosecurity system. If you would like to know more about signs of pests and diseases of honey bees, *Biosecurity New Zealand's Bee Biosecurity* website is a great starting point.

Please keep your information in the apiary database as accurate as possible at all times via the HiveHub available at **https://afb.org.nz/hivehub**. This will ensure that apiaries are selected for inspection from current information and will limit the time taken to address incorrect apiary information.

Finally, a special thanks to all the beekeepers that cooperate with our dedicated apiary inspectors during the surveillance season. Biosecurity New Zealand and AsureQuality Limited very much appreciate your time and support, and our honey bees do too.

*MPI's Bee Biosecurity Visual ID Guide is an excellent resource for all beekeepers, so that they can be on the lookout for exotic pests and diseases every time they work a hive.*

# Biggest is Best – How Queen Bee Eggs Measure Up

Have you ever considered the size of the eggs laid by the queen which drives your honey bee colony? Do you think they are all created equal? Not so, and you might be surprised what influences the range in egg sizes laid by not only different queens, but the same queen within her lifetime, and what that means for the emerging bee. Science writer Dave Black takes out the tape measure and explains why 'biggest, is best'.

**BY DAVE BLACK**

**When we think about queens laying eggs it's always about quantity, not quality. Probably that is simply because it's much more difficult to evaluate or express 'quality', whereas counting eggs is pretty straightforward. Singling out one aspect means we could be missing something though.**

Size matters. 'Size' and 'quality' are not synonymous, but for eggs there is enough scientific work to know that size is an awfully good proxy for quality in almost every case. Larger eggs develop faster, survive better, and produce offspring more likely to reach maturity.

In most organisms we understand there is a choice made when it comes to the amount of resources dedicated to offspring and insect eggs have been studied a lot in this respect. We would expect a trade-off between the number of eggs produced and the size of the eggs (physiology says you could have a lot of small ones or a few big ones) but it also depends on other things, like the environmental conditions at the time, or the physical fitness and age of the mother.

*Research has proven the size of the egg laid by queen bees can have a profound affect on the resulting bee in later life.*

In honey bees and other social insects that modify their nest environment, share food, and co-operate to care for their young, what this relationship could be is not obvious. Maybe resource allocation to an individual like a colony queen is not important.

Previous studies of egg size in honey bees observed a lot of things; laying worker's eggs are bigger, fertilised and unfertilised eggs (from a queen) are the same size, eggs can be longer but weigh less, eggs size varies with sub-species, old queens lay smaller eggs, and so on. A lot of numbers, but no coherent explanation. More recently, the science is beginning to tidy some of this up (Amiri *et al*, 2020[1]).

First, there is a significant and systematic difference in egg size within different strains, and between individual queens even from the same line, so comparisons need to be made taking genetics into account. Next, using a pollen trap to reduce the colony's pollen intake and artificially creating a protein deficit increases the size of eggs the queen lays, and the evidence is that the survival at larva, pupa, and adult stage is better for individuals that come from larger eggs in any circumstance. The counter-intuitive observation that pollen limitation increases egg size is one indication that it is actively 'managed' by queens and not merely the passive, fixed, result of just 'getting out what you put in'. It's what biologists call a 'plastic' response (as in bendy, or, malleable).

Another discovery published last year (Han, Wei, Amiri, 2022[2]) that supports this idea is that egg size changes with colony size, but maybe not as you might expect. Queens in large colonies lay smaller eggs than queens in smaller colonies. Swapping sister queens around in big or small colonies resulted in a predictable and reversible increase or decrease in egg size laid by the same queen. Oddly, the change in egg size was not linked to the number of eggs being laid, but to colony size, and the same thing has been observed in termites. It was even sufficient to connect a small colony to a larger colony with a screened tube to cause the smaller colony's queen to reduce her egg size, and that didn't happen when she was connected to an empty box.

It's not known how the queens were able to sense the size of the colony, but this change in egg size was accompanied by a change in ovary size in the opposite direction, and a change in the relative abundance of 290 different proteins (about 10% of those measured!). Among these, one particular protein seemed to stand out as central to the system regulating egg size, and masking the action of the particular protein decreased egg size in experimental queens regardless of what colony they were in. This protein (called *Rho1*) may turn out to be key to the regulation of egg size in all insects.

So, however the starting point is determined by genetic, developmental, or environmental factors, it seems queens are still able to deliberately adjust their egg size in response to unfavourable or unpredictable circumstances (or *vice-versa*). Perhaps it's because in a small colony the survival of each egg is more important and because brood care or food supply is more precarious. Maybe, in a large colony, the queen can reduce her investment in the next generation because she knows other colony members can increase theirs. In honey bees, egg size is not the passive result of resource availability.

Ultimately, there must be a physiological limit on a queen such that there can be lots of small eggs, or a few big eggs, but it looks like social honey bees have managed to set that aside. If these studies are right, we'd expect to see *Rho1* expression linked to queen genotype and age, and further work to explain how a social cue about colony state modifies its presence, but there is another reason they may be significant.

If honey bee queens exercise choice over what size of egg to lay, something we'll call 'maternal choice', we need to think more about other potential choices they make. We also have evidence that they differentiate between worker, drone, and queen cells and lay larger eggs in queen cells (Wei *et al*, 2019[3]). While larval diet ('royal jelly') certainly has a role in producing queens so, it seems, does maternal choice. That is not something we have really appreciated previously.

There is also an interesting connection to a study from 2021 (AL Kahtani, Bienefeld 2021[4]). We have presumed that the most important factor deciding which larvae were selected to be raised as replacement queens, a very important selection in evolutionary terms, was family relationships – plainly, nepotism. This study found that in fact it's more likely to be egg size. Biggest is best.

***Dave Black is a commercial-beekeeper-turned-hobbyist, now working in the kiwifruit industry. He is a regular science writer providing commentary on "what the books don't tell you", via his Substack Beyond Bee Books, to which you can subscribe here.***

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# The Club Drilling Down on AFB with the Foster Test

**Our beekeeping clubs add value to the apiculture industry all across New Zealand in a variety of manners, and one of the most common ways is through increased American foulbrood (AFB) awareness and detection. At the Whanganui Beekeeping Club they have come up with a plan, by embracing new technology, to try get on top of the disease.**

Whanganui club stalwart Neil Farrer says it's not uncommon for club members to visit his property with hive frames for him to assess due to their concerns of AFB infection. So, the club's secretary/treasurer has come up with a plan to "cut right through that".

Over the next month club members will be taking swab samples of their hives using dnature Diagnostic and Research's Foster Test method, which will then be sent to dnature's Gisborne lab for qPCR testing. The test allows AFB infections to be diagnosed, even if there are no clinical symptoms for beekeepers to pick up on.

"Whanganui city in particular, but our wider district too, is a constant AFB threat. A lot of hives have been burnt over the past two or three years," Farrer explains the motivations for the project.

"So, I though the best way to attack it is for everybody to test their hives, see if spores are present and whether there is a serious risk. We will probably nail it down to one or two spots, and I am fairly certain I know where that is, but this will prove it. It will also give people peace of mind to know their hives do not carry spores."

If all club members participate it will be about 50 beekeepers sampling around 200 hives in areas such as Whanganui suburban and surrounds, Marton and north/west to Waverley and nearby valleys. The most efficient manner to test is in collations of 12 samples. For some beekeepers, such as Farrer, these can all come from one beekeeper, but for others with small hive holdings it will be a matter of collating samples into geographic areas as best they can.

At a testing price of $140 for 12 samples it will cost beekeepers $11.66 per hive, with the potential for the club to subsidise financial members.

Once testing has been completed, any positives returned will leave beekeepers with two best courses of action Farrer explains.

"One is to test those 12 samples individually, which is quite expensive. The other is to put those hives into isolation and monitor them over winter and into spring. If AFB is there, that is when it will show up."

Initially Farrer had hoped to organise AFB sniffer dogs to visit hives to try to detect AFB spores, with the club having been among those contributing finances to the keeping and training of Pete Gifford's canines in Manawatu. However, with the AFB Management Agency showing limited interest in furthering the use of the dogs, they have been practical and come up with a new plan.

"That would have been brilliant, but it isn't happening. So, it's this instead," says Farrer.


*Sampling of hives for qPCR testing for AFB is made easy by dnature's Foster Method, using this long swab which is run through the entrance of the hive. Whanganui Beekeeping Club members will be out with the test kits in the coming month.*

# The Benefits of AI in Beekeeping

**Beekeeping has been an important practice for thousands of years, and it continues to play a critical role in agriculture, as bees are essential for pollinating crops. However, beekeeping is not without its challenges, and beekeepers have historically struggled with issues such as pests, diseases, and weather fluctuations. Today, advancements in artificial intelligence (AI) technology are revolutionizing beekeeping, providing new tools and solutions to improve bee health and productivity.**

One of the most significant benefits of using AI technology in beekeeping is the ability to monitor bee behavior and health in real-time. With AI-powered sensors and cameras, beekeepers can track the movement of bees, monitor their hive activity, and identify potential issues such as the presence of pests or disease. By doing so, beekeepers can take proactive measures to protect the health of their colonies and prevent issues from spiraling out of control.

One example of a product that leverages AI technology for beekeeping is BeeHero, a company that offers an AI-powered monitoring system for beehives. The system uses sensors to collect data on hive activity and environmental conditions, such as temperature and humidity, and analyzes the data using machine learning algorithms to identify patterns and anomalies. The system can detect issues such as mite infestations, hive congestion, and poor nutrition, and alert beekeepers in real-time so they can take action to address the problem.

Another benefit of using AI technology in beekeeping is the ability to diagnose bee diseases quickly and accurately. Bee diseases can have a devastating impact on colonies, and early diagnosis is critical for effective treatment. Thanks to advancements in machine learning and big data analytics, AI-powered systems can analyze images of bees and identify signs of disease, such as discoloration and deformities, with high accuracy.

The United States Department of Agriculture (USDA) has conducted research using big data to diagnose larval health and disease in bees. In a study published in the Journal of Economic Entomology, researchers used machine learning algorithms to analyze images of bee larvae and identify signs of disease. The study demonstrated the potential of AI to improve the speed and accuracy of diagnosing bee diseases, which can help beekeepers take more effective measures to protect their colonies.

AI technology can also help beekeepers optimize hive management and productivity. By analyzing data on hive activity and environmental conditions, AI-powered systems can provide insights into when and where to move hives for optimal pollination, as well as when to add or remove frames to promote healthy brood development. AI can also help beekeepers identify the best times to harvest honey and predict honey yields based on environmental conditions and other factors.

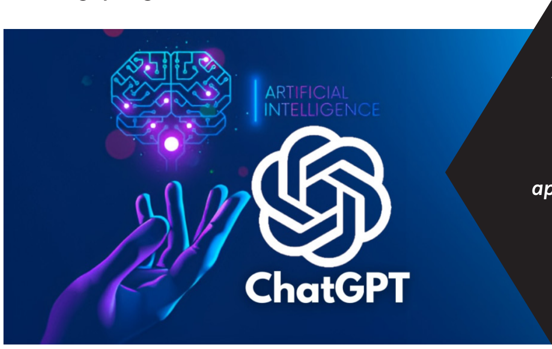
One example of a product that uses AI to optimize hive management is ApisProtect, an Irish startup that offers an AI-powered hive monitoring system. The system uses sensors to collect data on hive activity and environmental conditions, and analyzes the data using machine learning algorithms to identify patterns and insights. The system can provide recommendations to beekeepers on when to move hives, when to add or remove frames, and when to harvest honey, based on real-time data and predictive analytics.

Finally, AI technology can also help beekeepers reduce their environmental impact and improve sustainability. By optimizing hive management and productivity, beekeepers can reduce the number of hives needed to achieve the same pollination results, reducing their carbon footprint and resource consumption. AI can also help beekeepers identify areas where they can reduce their use of pesticides and other chemicals, by providing insights into the best times to apply treatments and identifying natural alternatives to chemical treatments.

In conclusion, AI technology has the potential to revolutionize beekeeping, providing new tools and solutions to improve bee health and productivity, optimize hive management, and promote sustainability. As the examples of Beewise, ApisProtect, and the USDA research show, there are already commercially available products and research efforts that leverage AI technology to benefit beekeepers and the agriculture industry as a whole. As the technology continues to evolve and become more.

**NOTE:** This entire column up to this point was written by an AI program! I simply asked for '500-600 words on the benefits of AI in beekeeping, making a reference to current research and commercial products'. So, they are pretty clever (but the editor says I should have asked for UK-English grammar and spelling – please forgive that and don't blame the 'bot!).

***– Darren Bainbridge is founder and general manager of MyApiary, a provider of beehive, apiary and honey house management software, as well as beekeeping business advisory and consultancy. www.myapiary.com***




*Artificial Intelligence is taking an ever-increasing role in our lives, including apiculture, with ChatGPT from OpenAI at the forefront – and even writing this column!*


*Patrick & Laura Dawkins, meeting individual beekeeper's needs with Pyramid queens and addressing collective beekeeper issues with **Apiarist's Advocate** eMagazine and website.*

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# Calling on Women in Apiculture

How many women are there in the apiculture industry? What are the barriers to entry for women, and what are the reasons they leave apiculture? Those are some of the questions Sol Tejada wants to answer, but she will need to make contact with women in New Zealand beekeeping and the wider industry.

**The Comvita beekeeper, based out of Te Awamutu, is conducting surveys of women in apiculture as part of her Kellogg Rural Leadership training through Lincoln University.**

"I am a beekeeper and I would like to have more women beekeepers in our branch," Tejada says.

"How can we help women in the industry to stay in the industry and how to attract more women to beekeeping?"

She is conducting a series of phone interviews with women in apiculture from all around the country, but needs as many participants as possible by April 17, before moving to the next stage of her studies.

"It is not just about beekeepers either. It would be good to know what happens when women try to climb the ladder, if there are chances to grow," Tejada says.

She is four years into a commercial beekeeping career, and before that has kept hobby hives since 2003.

***Women beekeepers are invited to contact Sol Tejada via email (soledad.tejada@gmail.com) or connect on the Women Beekeepers in NZ Facebook group.***

*Sol Tejada, surveying women in apiculture to get a better understanding of their connection to beekeeping in New Zealand.*

LETTER TO THE EDITOR

# What of New Zealand's Early Hives?

I refer to the beekeeping history article (*Don't' Believe Everything You Hear..*) in the August 2022 issue of *Apiarist's Advocate*. The statement "By the 1840/41 season there was quite a clique of beekeepers in the Northland/Hokianga area" spurred me into research mode. Specifically, I wished to know what happened to the Hobson hives before they succumbed; in Rev. Richard Taylor's words, "they did not increase."

**Hobson's bees arrived on 17 March 1840 at the Port of Russell in the Bay of Islands on the *Westminster*. I assumed that, due to expediency, the hives would have been landed and stored in a suitable situation ashore, hopefully one of relative safety. One candidate would have been Charles Baker's vicarage adjacent Christ Church, Kororareka. Baker, subsequently, greatly assisted Hobson in preparations for the signing of the Treaty of Waitangi on 6 February 1840.**

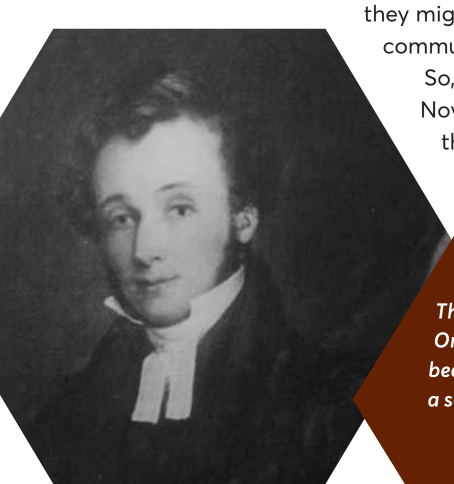
In late February 1840 Hobson suffered a stroke. Richard Taylor brought the stricken Governor from Kerikeri to Waimate around March 9. Hobson spent his convalescence at the house of Mr. Davis until April 16 when Mrs Hobson arrived at the Bay on the *Buffalo*. Hobson and his family moved into Baker's house, located at the far end of Paihia beach, adjacent Horotutu Creek. By mid-May the Hobsons had relocated to James Clendon's former house at Okiato (Russell).

A prime historical reference document (Dieffenbach, 1843) places one hive at the CMS Waimate mission station between late November and 4th December 1840. When that hive arrived at Waimate is unknown. Richard Taylor's journal documents his removal of another hive from Paihia to Waimate on 15 December 1840. "I set off home taking a hive of bees with me. I nearly got bogged in passing the Wawaroa."

On 25 March 1841, Taylor returned one hive to Paihia into the custody of George Cooper, Collector of Customs. It had become queenless, and Taylor thought "by being placed near the others they might accommodate the helpless community with another ruler."

So, for up to five months from November 1840 to March 1841 there were not two but at least three hives in the vicinity: one that Taylor already had at Waimate on 4 Dec., another hive which was taken to Waimate on the 15 Dec., and a third hive located at Paihia on 25 March 1841. This third hive appears to have been a swarm from one of the 'others'.

William Mason, Government Architect and Inspector of Public Works, and a witness to the arrival of the Hobson bees to the Bay of Islands, was quoted by Isaac Hopkins in 1882. He observed from Mason's letter that he "believed they [the bees] remained at the Bay when the Government party left to establish the seat of Government on the Waitemata, now the city of Auckland."



*The Reverend Richard Taylor. One of New Zealand's earliest beekeepers, whose journals are a source of information on hive movements in the 1840s.*

**Regards, Peter Barrett, Caloundra, Queensland.**

**PS – MY BOOKS**

Some of your readers may be interested in my latest book on New Zealand beekeeping history.

***Mary Bumby's Bees, 1839-40, Myth Fact Mystery.*** Self-published in August 2022, I first had to wade through the myriad of inaccuracies out there in articles, books and the net. After much research over several years, I believe I've produced an interesting and very readable insight into the fate of her bees.

Surrounding that is a look into the fascinating people and places that constituted her time at the Wesleyan Mission stations of Mangungu and Pakanae on the Hokianga river in the far north. Her visitors included the ebullient beekeeper William Charles Cotton, the natural history enthusiast Rev. Richard Taylor, as well as Lady Jane Franklin, the widely travelled and outspoken wife of the Governor of Tasmania.

Did Mary bring her bee hives all the way from Thirsk, North Yorkshire, or were they acquired in Tasmania? On board the *James* out of Gravesend on the Thames River in September 1838, there was certainly "the bleating of sheep, the clamour of ducks, the cackling of fowls."

Also of note, I have authored two books on another pioneering New Zealand apiarist, William Cotton. They are ***Cotton's Tomatin Bees, 1841-1842, & other tales*** **and** ***W.C. Cotton, Grand Bee Master of New Zealand.***

***Anyone who is interested in inquiring about any of my works on the pioneer beekeepers of New Zealand is welcome to contact me via email: barrpete@bigpond.net.au***

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