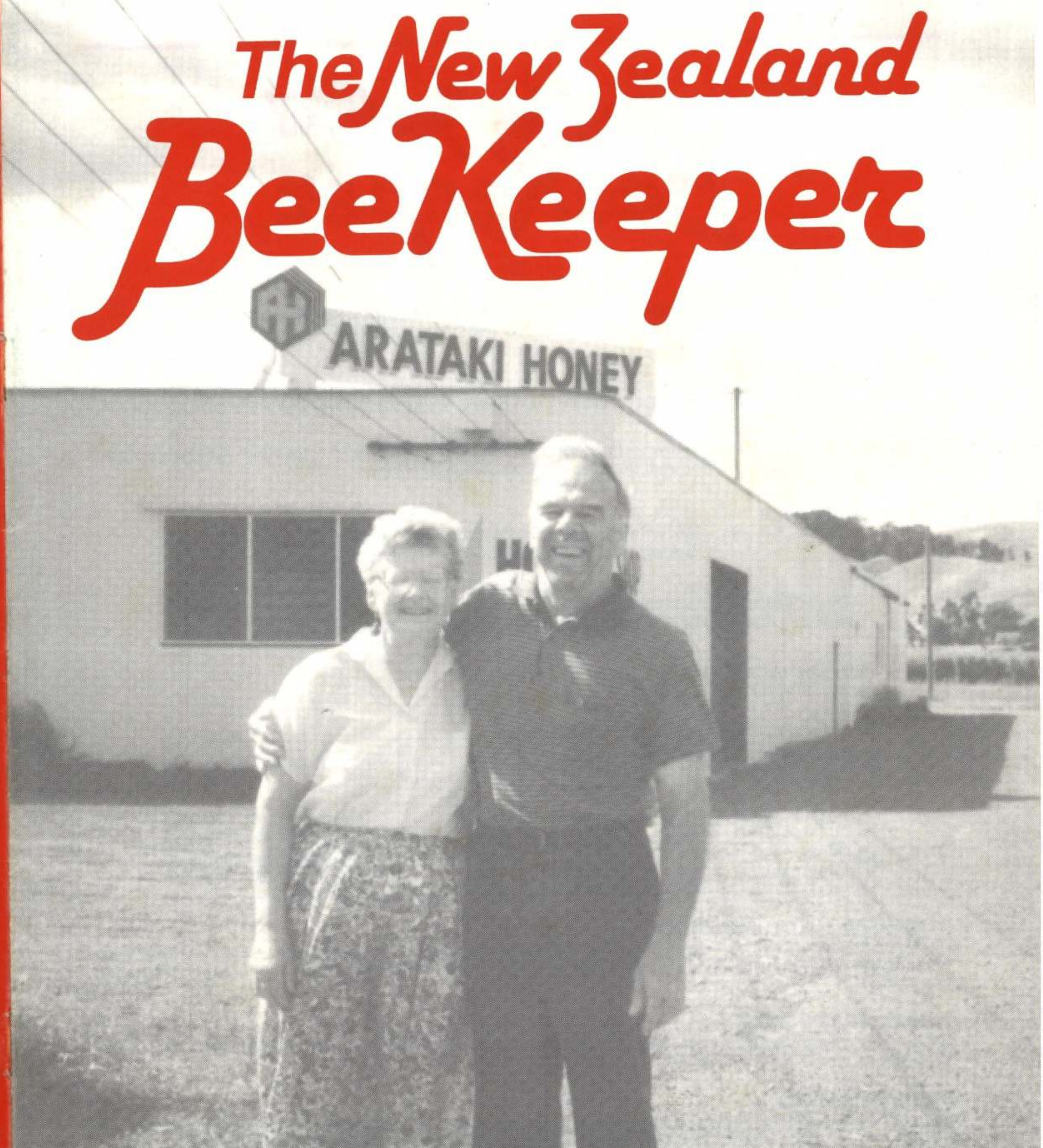
The New Zealand BeeKeeper



1993
AUTUMN
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The New Zealand BeeKeeper

OFFICIAL PUBLICATION OF THE NATIONAL BEEKEEPERS' ASSOCIATION
OF NEW ZEALAND INCORPORATED

CIRCULATION, 1,550...
To Members of The National Beekeepers' Association of NZ Inc. who own more than 50 hives each and so are legally subject to the annual hive levy. **THESE HIVE-LEVY PAYERS OWN APPROXIMATELY 87% OF ALL BEEHIVES IN NEW ZEALAND.**

To Beekeepers with less than 50 hives who subscribe to the journal at $33.75 a year (incl. GST) which also includes membership of the National Beekeepers' Association of NZ Inc.

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IF YOU CAN'T BEAT THEM, JOIN THEM

From A Beekeeper

The holidays serve a useful purpose. They get you out with the family and into places you normally would not visit. Places like the local tourist joints, rip-off alleys, flea markets, and the like. If you are like me, in the course of one's normal routine such places do not rate highly. Yet come the silly holiday season and the family goes into a 'self-destruct' mode, intent on disposing of the ready cash, theirs and yours, at an almost unbelievable rate. Catering for this passion is now big business in our area since a new market place arose like the Phoenix just prior to Christmas, hosting a rash of small business enterprises.

Full marks must be allotted to the ingenuity which spawned the multitude of ways used to part the public from its money. Start with the supply of pre-owned clothing from little old ladies through to mind-boggling posters in excrutiating colours for the younger set. Beady little eyes watch, devious little minds whirr, and soft compelling voices urge one to "Buy, Buy, Buy," whether or not you have any intention of doing so.

My intention this season is to rig myself out with a full bee suit. Cost is incidental, moreso since burning a hole in the one remaining veil fit to wear. Such were my intentions before the family descended in full force in response to the better half's invitation to get together for New Year. It seems one family member, with nothing better to do, scanned the local newspaper, found the advertisement for the new market, and spread the word. Like rumour, word spread fast, all haste was made to transport the entire family from the comfort of home and the soothing drink, before the bargains were snapped up. Everybody, but everybody would be breaking their necks to get there first. I wish they had. Life would have been much more placid.

The first request came from the grandson: he wanted some candy floss. Then the daughters found a "heavenly" supply of materials, the sort someone used to send to the tip until he or she realised that some mug would actually pay good money for it. Son-in-law unearthed a treasure amongst the machinery bits and bobs on the engineering stall. He was a bit light in the pocket, hadn't realised we were coming to this place, could I help out?

As our entourage winded its way through the stalls I became noticably taller, due in great part to the lightening of the pocket book gracing my hip. No longer was it necessary to lean forward to balance. Then Mother decided that icecreams all round was the right thing. Away went more dollars.

That was when I stumbled across the stall selling tourist goodies, that something different to take home to impress the neighbours. The word "HONEY" proved to be a magnet, drawing me rapidly away from the clinging leeches, which fell discarded on the ashphalt. There they were, the smartest looking containers for honey you ever saw, just like mine, except theirs had more colours. Wait a minute — someone must have made a mistake in the price tickets. The prices displayed were way above what I sell my honey for, like nearly double. As I stood transfixed, mesmerised, stunned, there were selling the stuff beneath my nose.

As feeling slowly returned to my system, I saw that there were other types of containers filled with honey. Small plastic "ring" boxes, screw-top jars, fancy shaped containers, all covered with a fanciful label. The standard comb honey box was also on display, gaps existing around two edges where the end section of the comb had been packed into the box, poorly filled comb at that. It gave the impression of desperation overcoming marketing standards. Push it out, the public will buy anything.

By this stage the family had again surrounded me, palms were again visible, and beeseeching voices invaded my senses. In one swift movement the remaining dollars were dispensed with, and only one voice remained to haunt me. There it was, inside my head, saying over and over: "You fool, now you will never get that new veil". But determination is a family trait our clan delight in exercising. All the way home I ruminated on the pricing structure on that stall, how did they have the nerve to ask such prices I wondered.

Son-in-law gave me a hand the next day to wheel our selling barrow out to the roadside. A smart, newly-painted pricing board was evident. In big bold letters, there it was:

TOWN PRICES — XXXX DOLLARS
OUR PRICES — XXX DOLLARS

Only the locals knew that the previous price was XX dollars, and they could still buy for that figure. Sales? A bit slow at first, but gradually they picked up, so much so that I still have an occasional pang of guilt each time I don my new bee suit and sit alongside the stall, reading an interesting book whilst shaded by the new brolly.

What happened to the old bee suit? — well, it would be a pity to toss it out, I'm sure I can patch it up for a little longer to work the hives.

The family still talk of the day grandad woke up — almost a Rip Van Winkle story in the telling. So get out there, find out what the opposition is doing, get up to date, and buy yourself a new bee suit.

Good Afternoon!
We are from Russia. We would like to get any job on your apiaries on contract. We have our personal apiary which consists of beehives modern constructed. We are keeping two queens families in one beehive. The beehives are provided for multiply as small bees so great families of 12-14 kgm ones.

Resume

1. Gerasimov Valentin
Higher education. I've graduated Moscow institute of surveyor engineer in 1972. Age - 45, married, no children. Posses with English (colloquial speech, reading, writing). Haven't any pernicious habits, good health, christian.
2. Dounaeva Valentina. Secondary education. Age - 42, married, one daughter of 13.
Posses with English (colloquial speech, reading, writing). Haven't any pernicious habits, good health, christian - Adventous.

Our addres:
House 13, build F, Flat 5
Jangelya Street
Moscow, Russia 113534
Goodbye

Dear Sir,

I am writing to you as Editor of An Beechaire — The Irish Beekeeper — to ask your permission to crib substantial pieces from an article on grading of queen pupae by Reg Clarke which appeared in the May '92 issue of The New Zealand Beekeeper. One of my regular correspondents — Dr. Michael Clancy — who writes under the heading "Focus on Research" was very impressed by the content of the article in question and if you have no objection he would like to use it for "An Beachaire" with due acknowledgement for its source, of course.

Thanking you in anticipation of a favourable reply.

Eddie O'Sullivan

It is standard procedure between beekeeping magazines that articles may be cribbed provided author and source are credited. I have advised Mr O'Sullivan accordingly, and have asked if he will send a copy of the pertinent issue to Reg Clarke.
Editor NZBK.

Dear Sir,

I watched in sadness as the truck with the long hose crept up the Awakino Gorge, spraying its deadly hormone extract on the beautiful flowering budlia (koromiko) that lines the roadsides where I keep bees. Gone will be this harmless aromatic nectar bearing plant that beautifies our roads, and with it a great food supply for honey bees, bumble bees, monarch butterflies etc.

From time to time I have seen this happening all over the country. Is this really necessary? Is there some other way? What a waste!

Dennis Walton
Awakino
Mokau

Dear Sir,

Now with the expansion of exchangers between different countries and nations in cultural and material spheres, I would offer my services if you find them of any interest to your country. My many years of experience have qualified me to work both as an electrician and agricultural worker (engaged in beekeeping). I would like to work on a countryside farm (bee-garden) in your country.

Should my offer cause your slightest interest, please send me the appropriate immigration form.

You'll find additional information about my qualifications and family in the enclosed resume.

Alexander Kooviatkin
102, Backinskaya St.
Bishkeck, 720019
Kyrghizstan, CIS
Tel. 27-15-60

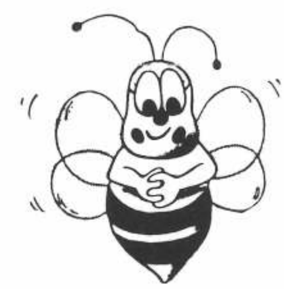
Anyone interested should write directly to Mr Kooviatkin. Resume available from NBA.
Editor

Dear Sir,

I acknowledge receipt of your letter of July 29th 1992.

I would like to express my gratitude to you and your organisation for going to the trouble of publishing my letter in your magazine. This is of great benefit to me in my search for work/study in the area of Apiculture. I look forward to the outcome.

Thomas Carroll



BARRIERS TO BETTER BEES

By David Yanke

The mechanics of heredity are the same for bees or buffalo. In organisms that reproduce sexually, the progeny are not exact duplicates of their parents, but instead usually vary in many traits. This variation is the spice of life. It is what allows a species to adapt and evolve, and it is this natural variation which plant and animals breeders exploit in the domestication of that species. Let us take a look at the mechanics of heredity, so that some of the concepts later on, are easier to understand.

First some basic genetics: DNA is the carrier of the genetic message which is coded into its molecular structure.

Genes are the base units of inheritance. In structure they are a length of DNA, and they are responsible for a given physical trait. Variations of the same gene are called alleles. Every sexually reproducing species inherits two alleles, one from each parent. These pairs of alleles we inherit, interact with varying degrees of dominance of one allele over the other. There may be several different alleles for any given gene.

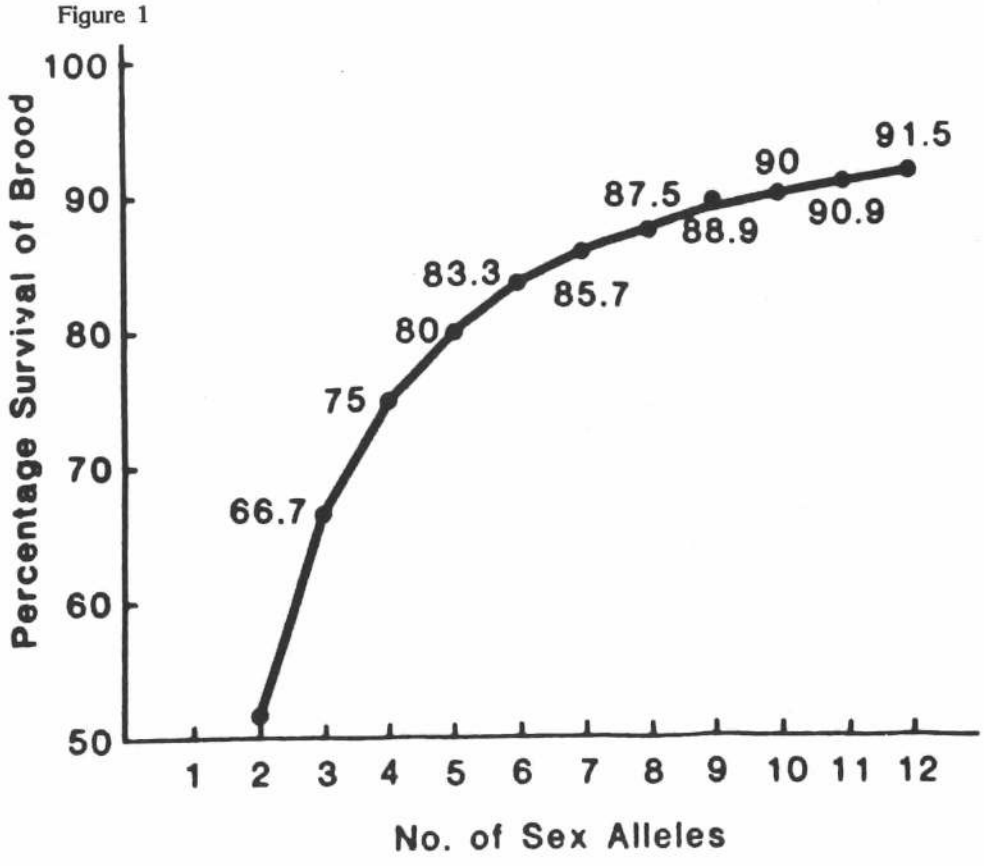
Chromosomes are cellular bodies found in the nucleus of cells which carry the genes. In human terms, we all have in each and every one of our cells the complete genetic blueprint of our being held in two complete sets of genes: one set from our mother, and one from our father. These two sets of genes are carried on a given number of chromosomes characteristic of each species: humans have 40, potatoes 48, and honey bees 32. This number is known as the diploid number of chromosomes. The sex cells have half this number and are said to be haploid. Honey bee drones, because they develop, amazingly, from unfertilised eggs, have the haploid number of chromosomes which is 16.

Something very important happens in the formation of our sex cells, be they eggs or sperm. Early in this process known as meiosis, the chromosomes pairs stretch out and lie close to each other. While they are in this intimate state they exchange sections of the DNA, with each section consisting of one or more genes. This process is known as crossing over. Crossing over is responsible for most of the variation we see in progeny.

The mechanics of inheritance, and the unique reproductive biology of the honey bee promote genetic diversity. So when we apply selection pressure to a bee population in an effort to make the stock more useful, we are bucking the system. We are tyring to modify the frequencies of the genes within that populations, that is, increasing the frequency of the genes responsible for desireable traits, but in doing so we affect other gene frequencies as well, and there can be great peril in that. So the trick is to be able to effectively apply selection pressure to a breeding population over many generations, gently modifying gene frequencies, but maintaining sufficient genetic diversity to be able to avoid the many pitfalls and perils along the way. These are what I see to be the main barriers to bee stock improvement.

1. MATING BEHAVIOUR when the virgin queen is about six days old, and the weather is fine, with light winds and temperatures of at least 20°C, she flies a considerable distance from her hive to mate. Research has shown the average distance between apiary and mating place is 2km. She has been shown to fly as far as 5km. Mating flights last between five and 30 minutes. She will make between one and three flights. The number of flights she makes depends on the concentration of spermatozoa in her spermatheca. Once it reaches a certain concentration she will

Figure 1



not fly again. To achieve this concentration she must mate with several drones — at least seven maybe many more.

The virgin does not fly haphazardly, hoping by sheer chance to encounter the drones she hopes to mate with. The virgin flies directly to drone congregation areas. These areas are, as the name suggests, places where drones congregate. Exactly why drone congregation areas originate where they do is not fully understood but the same areas are used year after year. The drones within any congregation area come from many different colonies, and probably several different apiaries. Drones have a flight range of up to six km with flights of five km common. Thus drones can range over an area of roughly 78 square km. It has been shown using genetically marked drones that virgins very rarely mate with related drones. Even from my scarcely detailed description, we can see that the mating behaviour of the honey bee is very complex and for it to have evolved it must be a significant factor in colony survival. It appears that the benefit it brings, results from the reduced chances of inbreeding.

With stock improvement, the effect of this mating behaviour is that if we allow virgins to mate naturally. We have no control over which drones the virgin mates with. Even with isolated mating yards, control is not absolute. What other plant or animal breeder has to make an attempt at genetic improvement with only control over half of the genetic equation? To compound this, is multiple matings. With each virgin mating with seven or more drones, it means that the population of each colony is made up of seven or more sub-families.

2. SEX ALLELES

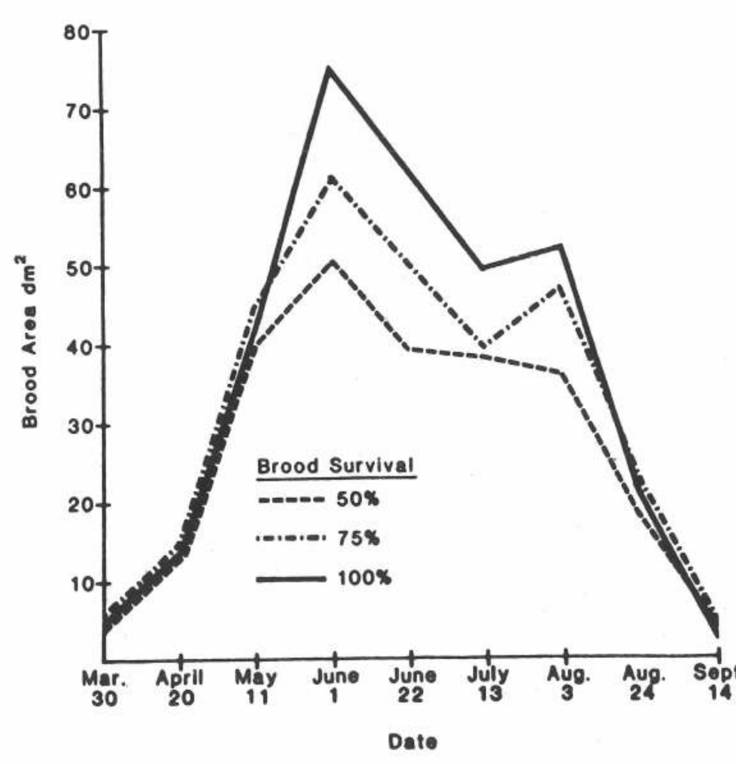
Honey bee drones develop from unfertilised eggs, with the result that the drone carries only one set of genes. It is therefore haploid in chromosome number. Honey bees also determine sex in a more conventional fashion which results in the formation of diploid drones. I say more conventional only because it results in diploid males, but it is still unique. In most sexually reproducing organisms, sex determination is governed by a sex chromosome. Bees have to be different though, and instead of sex chromosomes, sex is determined by a single gene. This gene has many variants or alleles, maybe as many as 18, but you should feel lucky if you can maintain 10 or so in a breeding population. It works like this, if two different alleles come together at fertilisation, a female results, either a worker or a Queen. If two of the same allele come together then a diploid male will result. We never see diploid drones in the hive because when the diploid drone larvae are only a few hours old, they are cannibilised by the workers. What we do see is a hole in the slab of newly-capped worker brood and as the % of diploid drones produced increases so does the spottyness of the brood. So, as the number of sex alleles decreases, the more likely it is that two of the same allele will come together, and therefore the % of diploid drones increases. Fig 1 shows the relationship between the number of sex alleles in the population the survival rate of brood. There is an obvious impact on productivity when the meddling of some well-intention bee breeder reduces the number of sex alleles in the population of bees he is trying to improve, down to lets say seven. Even if the queens he raises are of high physiological quality and of high genetic potential, those queens are handicapped and would struggle to be competitive with any old mongrel queen. The impact on colony population is shown on the graph Fig 2.

The mechanics of heredity and the mating behaviour of the honey bee are geared to genetic diversity, so the mechanism of sex determination in honey bees using sex alleles is allied to this end in that it penalises any narrowing of this natural diversity. The other side of the same coin is the effect of:

3. INBREEDING DEPRESSION

We have all heard of hybrid vigour. It results when two unrelated members of a species are crossed. The vigour of the progeny exceeds that of either of the parents. This extraordinary vigour is also known as heterosis: a mostly unexplained life force. The crossing of unrelated parents, results at a gene level in many more of the pairs of genes carrying two different alleles. When a pair of genes consists of two different alleles that gene is said to be heterozygous. This increase in hererozygosity is responsible for triggering heterosis. The opposite state is when an allelic pair carries two of the same allele. It is then homozygous. The opposite of heterosis occurs as the degree of inbreeding passes down through a critical level. That is called inbreeding depression and is triggered when the % of homozygous genes increases to a certain level. It results in an unexpected loss of vigour — sluggish build-up, loss of disease resistance, decreased production, and higher winter loss. This can be all in spite of selections over generations for the best gene combinations by a well meaning bee breeder. A couple of generations back he probably thought that he was really get-

Figure 2



ting somewhere, but his downfall was that he was ruthlessly applying selection pressure to too small a population. He may not have thought so, because he was selecting his breeders from perhaps hundreds of colonies. Unfortunately, it is not the size of the test population but instead the number of breeders used, which determines how quickly you get into trouble with both inbreeding depression and sex alleles. Fig 3 shows the degree of inbreeding after 10 generations with different numbers of breeders. The critical value of 25% inbreeding is shown by the dotted line. Fig 4 shows the effect on production, caused by inbreeding, using varying numbers of breeders per generation.

4. QUANTITATIVE TRAITS

The characteristics we are tyring to improve in honey bees are complex physical and behavioural traits each involving many genes, and each contributing only small effect. This type of trait is call a Quantitative trait. Compounding their complexity, is the fact that with honey bees, these are not the characteristics of a single breeding individual but, instead, the characteristics of an entire colony with many sub-families.

When trying to improve these traits, it has to be understood that once selections cease any improvement which has been achieved is lost very quickly as gene frequencies return to pre-selection balances. To get anywhere in the first place, you have to pay great attention to detail. Your selections must be done with great care, environmental variation minimised, and you must have absolute control over matings. Besides this you must keep the number of characteristics you are trying to improve to a minimum: one or two. On an encouraging note, the important economic traits such as honey production and winter hardiness, even though they are hugely complex, and controlled by a depressing number of genes, do show a good response to selections. So, if we do things right, we get somewhere. One thing we must do right is:

5. MINIMISING ENVIRONMENTAL VARIATION

Even if we have a breeding program structure which will allow us to apply selection pressure successfully over many generations, we still get nowhere unless our evaluations can reliably indentify the genetically superior individuals in the test population. With honey bees, we are evaluating colony performance in the field so it is hard to control the level of environmental variation by doing such things as: carefully equalising colonies before evaluations begin; minimising drift; not carrying out evaluations between apiaries; and because a queen's physiological quality can have a major effect on some aspects of colony performance we should, to the best of our ability, ensure that the queens undergoing evaluation are physiologically uniform. Even if we take heed of this, and put into our evaluations the care and effort required, it is all for naught, if the genetic superiority we identified with our evaluations is not heritable. Heterosis is not heritable, and leads us on to:

6. RACIAL HYBRIDS

We have two races of honey bee in New Zealand, and unfortunately one of them is the Dark European honey bee; but that is besides the point. Even though most of our bee-breeding effort goes into maintaining our commerical bee stocks as Italian type, the reality is that most of our colonies are to varying degrees racial hybrids. Racial hybrids can be great, and through hybrid-vigour can be very productive, but they are of no breeding value, and provide only red herrings to someone carrying out colony evaluations. To get anywhere, we must breed true to race — what ever that race is. The Dark European honey bee drones, like the All Blacks in the rucks recently, must be very aggressive in the drone congregation areas, because they appear to have a mating advantage of almost Africanised-bee like proportions. So the only way to keep our test population true to race, without colour becoming the major selection criteria and the fear of what those dark drones are doing to our yellow virgins driving us blindly into the jaws of sex alleles and inbreeding depression, is to have absolute control over the mating using Instrumental Inseminations.

7. RIGHT PLACE — WRONG RACE

I left this to last to create a stir, and because it is only a barrier if we choose the wrong option. Italian-type bees, although they have good production potential, can be very costly bees to overwinter. Carniolans are at least as gentle and as productive, and are beyond doubt more cost effective bees to overwinter, besides other little things like tending to rob and drift less than Italians. What I am trying to say is that we have to keep an open mind. It may be a lot cheaper to import a silk purse, then to try and make one from a sow's ear. Taking advantage of different races and breeding work done overseas by importing genetic material could save time and money and be a dramatic shortcut to better bees.

Times have changed. Importations of genetic material can be done safely, whether it be semen or breeder queens. It is a dream of mine to see a participant-funded breeding program maintaining and improving, in parallel, both Italian-type and Carniolan bees. I know there are many areas in NZ where the Carniolan would become the preferred bee, and as those of us who already export queens and packages know, there would be a big demand for them in our markets overseas.

BEATING THE BARRIERS

It is possible to beat the barriers and breed bees. Fig 5 shows the results of 23 years of selections in Germany with

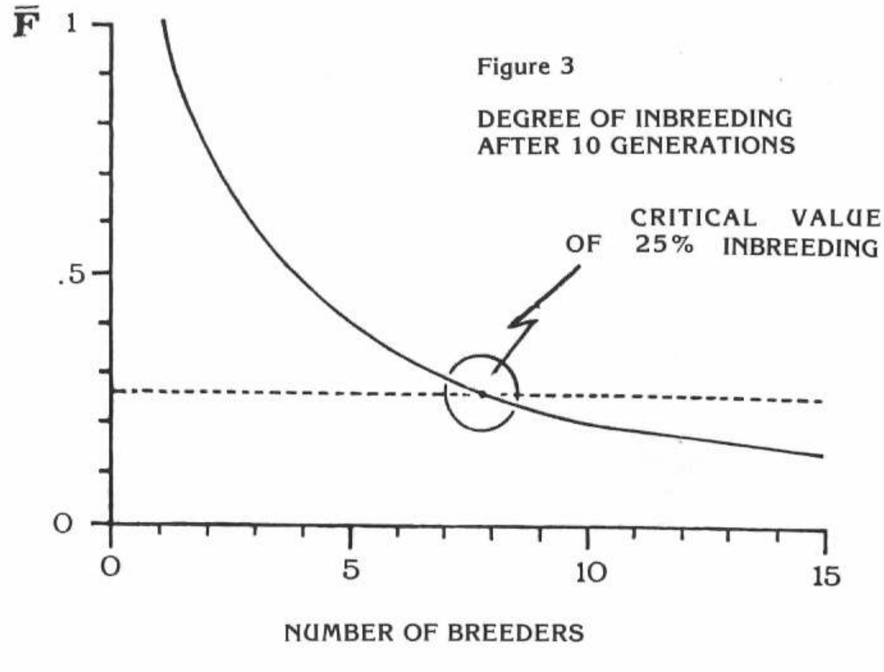


Figure 3

DEGREE OF INBREEDING AFTER 10 GENERATIONS

Carniolans. The progress was slow but it was progressive, and it was done without the aid of knowledge and technique gained from recent research into closed population bee breeding. The results can be a lot more impressive — the Western Australian Department of Ag. bee breeding program, which ran from the mid-80's up until this year, realised a 10% increase in honey production a year.

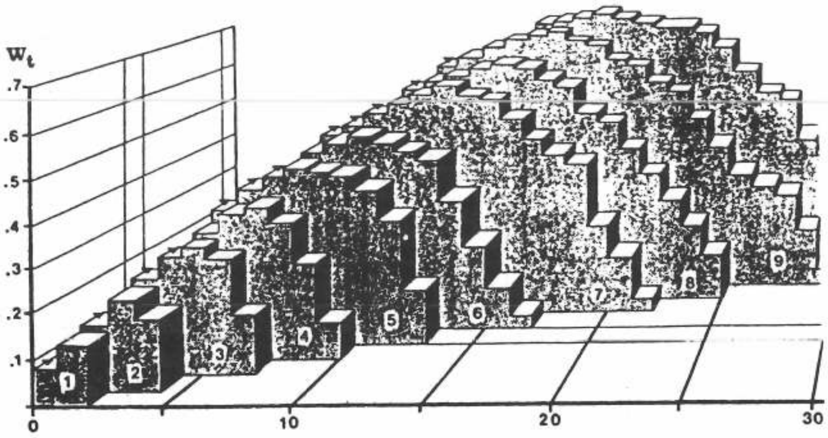
There is a similar program up and running in NZ. It is totally self-funded by its participants, and it has a legal structure of a limited liability company, and goes by the name of New Zealand Bee Genetic Improvement Group. There are 25 participants and each is an equal shareholder in the company. For their investment, they receive improved breeding stock.

The program works like this. The aim is to improve an Italian-type bee in a closed population, maintaining 25 lines — one for each participant. Matings are absolutely controlled using I.I. The semen is collected in equal volumes from each line, then pooled together and homogenised.

The structure of the program may seem simple enough, but it has all the necessary ingredients to beat the barriers to better bees. The foundation stock was contributed from all over the country to maximise genetic diversity. Once the population is closed off, maintaining 25 lines with mother-daughter replacements each generation means that the program can run for more than 25 generations without the introduction of any stock from outside and still maintain sufficient diversity to avoid ill-effects from either six alleles or inbreeding depression.

The use of pooled and homogenised semen has been a most important breakthrough in bee breeding. It maximises genetic diversity and selection pressure. The semen dose each queen receives represents all 25 lines maintained in the program. Also because the semen, although amazingly diverse, is homogeneous, each queen receives an equal genetic dose. Therefore, any genetic variation uncovered by the evaluations, is maternal in origin. That gives the selections more punch, an means an increased rate of improvement. Also I.I. makes maintaining racial purity a piece of cake, you just don't collect semen from darkish drones. The selections are carried out in two parts, looking at winter hardiness and honey production. The first part is done by the participants, and is more broadly based. Each participant receives the daughters of one line in mid-Feb each year. They are introduced into equalised units and equalised again in April. The queens are evaluated for their overwintering ability using the criteria of colony weight loss between May and Sept. They are also scored on brood viability, temperment, hygenic behaviour, and colour. In late Sept, the participants send the two best queens, based on those evaluations, up to me where they are introduced into hives in one large dispersed apiary. They are equalised and in Dec they are evaluated for honey-production potential using short-term colony weight gain. An initial and a final weight are taken 10 days apart. The queen which performed best for each line is chosen and she becomes the breeders for the next generation. Ten daughters are reared from each breeder and they are inseminated with pooled semen. It is these daughters which form the test population for next season's evaluations. It is a lot of work and it is made possible only because it is a co-operative effort, but that is what it takes to beat the barriers and breed better bees.

Figure 4



GENERATIONS

EFFECT ON PRODUCTION

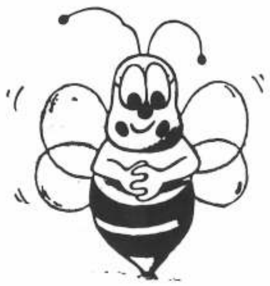
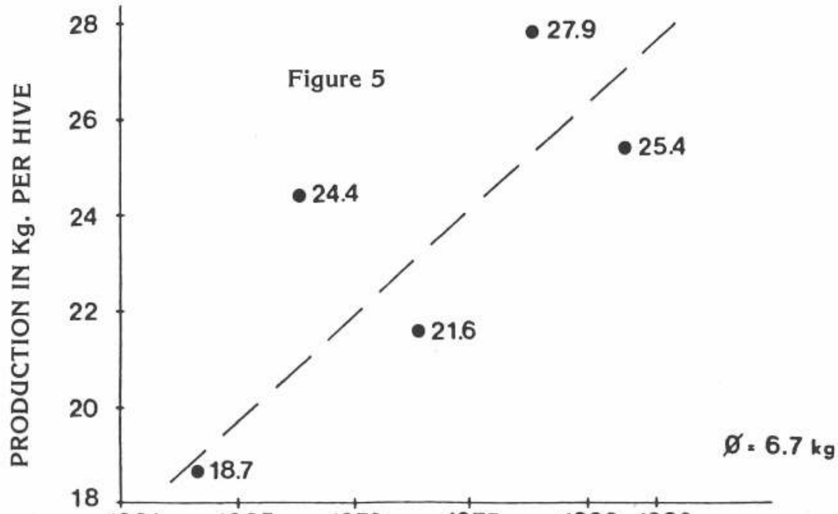


Figure 5



Do New Zealand Bees Have Any Natural Resistance To Nosema Disease?

From Louise Malone, Helen Giacon, and Catherine McIvor

New Zealand honey bees, like those in many other countries, are commonly infected with nosema disease. This disease is caused by a protozoan called *Nosema apis*, which infects only adult bees and produces no obvious external symptoms. In the spring, up to 98% of hives may be infected, with bees carrying around four million spores each. Despite the lack of symptoms, such infections cause significant losses in honey production and pollination efficiency (Goodman *et al.*, 1990; Anderson and Giacon, 1992).

The impact of nosema can be reduced by ensuring that colonies are not stressed or kept under damp conditions. Dosing with the antibiotic, fumagillin, which suppresses nosema development, is the most effective treatment.

Breeding bees with natural resistance to *Nosema apis* infection could provide long-term practical control of this pathogen and substantially improve the health of our bees.

There have been a few reports of resistance to nosema in bees here and overseas, but no clear evidence of a resistant line of bees (Ruttner and Mackensen, 1952; Cloake, 1987). Laboratory studies of bees in the United States have indicated that there is a genetic component to the bee's response to nosema (Rinderer *et al.*, 1983), which suggests that it should be possible to breed nosema-resistant bees.

To assess the potential for breeding such bees in New Zealand, we have measured the responses to nosema dosing of workers derived from queens orginating from 13 different locations.

Most of the test colonies were derived from yellow queens artifically inseminated with pooled yellow drone semen. Two naturally-mated black queens and two hybrid lines derived from black queens inseminated with yellow drone semen were also included. Queens were assigned to colonies housed in single-storey hives, each with six frames of brood, two frames of honey, one of pollen and one feeder.

Nine weeks after requeening, a baseline sample of 60 foraging bees was taken from the entrance of each hive, using a vacuum-powered collection device. Spore counts per bee were estimated by pooling each sample into 12 groups of five bees, mashing each group in 5 ml of water and counting the spores using a haemacytometer. An average count was calculated for each sample. Quite a few of the colonies had nosema at this time, but only at very low levels.

Half of the colonies were dosed with nosema spores a week later (25 February 1992), by which time all bees in the colony were assumed to be the progeny of the new queen. The brood-carrying frames of these hives were sprayed with 100 million nosema spores in 100 ml of sugar syrup. The remaining colonies were sprayed with plain sugar syrup as controls for the experiment. To assess spore loads, samples of 60 foraging bees were then taken from each hive at weekly intervals from 3 March to 12 May 1992 by the method used for the baseline sample described above.

Two weeks after being sprayed with nosema spores, all of the dosed colonies responded with an increase in the spore loads carried by foraging adults (Fig. 1). Maximum loads for the different colonies ranged between 10 and 27 million spores per bee.

After a further two weeks, by which time many of the heavily-infected bees would have naturally died, spore loads began a steady decline and by the 11th week after dosing, levels were similar to those in most of our control bees (Fig.1)

The natural turnover of adult bees within the colony helps to lower nosema levels. The new bees that emerge to replace those that were present at the time of dosing are not subjected to the same high levels of spores in the hive and thus sustain milder infections, resulting in lower mean spore loads per bee.

Turnover of adults is not sufficient, however, to eliminate the disease and infections of up to five million spores per bee are common for at least 12 weeks during the autumn. Loads of this magnitude may still have an economic impact. Goodwin *et al.* (1990) found that fumagillin-treated colonies with average spore loads of 1.8 million spores per bee produced 28.6% more surplus honey than untreated colonies with four million spores per bee.

All colonies, regardless of their origin or race, followed a similar general pattern of increased and then declining spore loads after dosing. Statistical analysis showed that there were no significant differences among the colonies with regard to their response to nosema.

We must conclude therefore, that of the lines of bees we tested, none demonstrated any particular resistance to nosema disease.

There are two possible explanations for this. One is that the bees were all quite similar genetically with regard to nosema response. The other is that there are resistance genes there, but our test failed to pick them up.

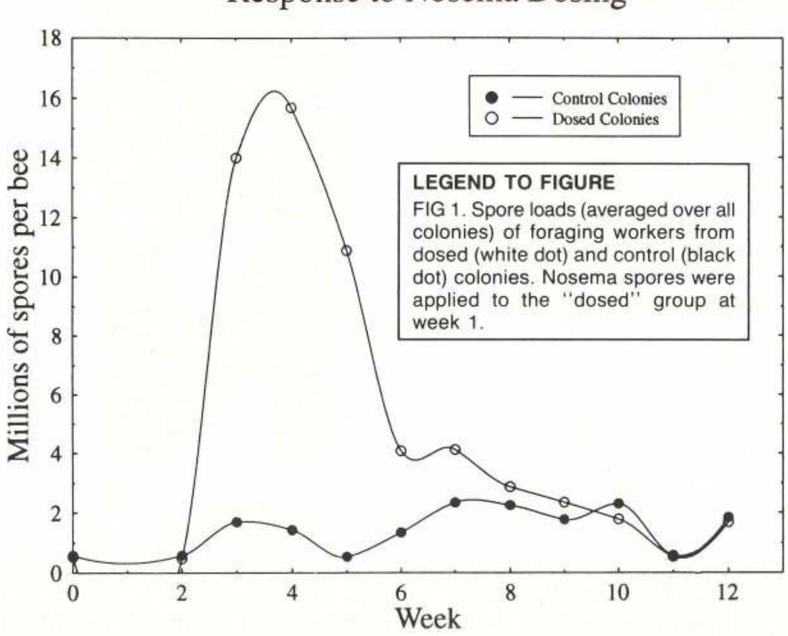
In support of the first explanation, it has been suggested that genetic variation in the New Zealand bee population is likely to be low (Oldroyd, 1988). There have been no legal importations of honey bees into New Zealand in the last 30 years and there is considerable exchange of queens among commercial queen producers (Oldroyd, 1988). Our results certainly showed that there are no dramatic differences in nosema response among the NZ bees that we tested.

This does not rule out the possibility that there is some resistance to nosema in NZ bees, it may just be operating at a very low level.

Resistance might well be controlled by a number of different genes, each with a subtle, additive effect, rather than just one gene with a big effect. If this were the case then our chances of picking up a line with the full complement of resistance genes from such a small sample would not be high. That is, some of our bees may have some of the resistance genes, but they are "hidden".

Such "hidden" genes could be revealed by actively selecting for resistance using some of the lines from this experiment and this is what we are planning to do this season. Bees resistant to a virus disease called hairless-black syndrome have been bred using a similarly small starting population (Kulincevic and Rothenbuhler, 1975). If we can obtain nosema-resistant bees using similar methods, then we will have a measure of the feasibility of incorporating selection for this characteristic into a commercial-scale breeding programme.

Response to Nosema Dosing



LEGEND TO FIGURE

FIG 1. Spore loads (averaged over all colonies) of foraging workers from dosed (white dot) and control (black dot) colonies. Nosema spores were applied to the "dosed" group at week 1.

ACKNOWLEDGEMENTS

We thank David Yanke of Daykel Apiaries, Kaitaia, for inseminating the queen bees and for practical advice.

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BROOD COMB CELL SIZE

by Reg Clarke

Familiarity leads not so much to the "contempt" of the cliche, but to an unquestioning acceptance. So it is with our universal use of standard comb foundation. The practice is convenient to the beekeeper and saves the bees some work. But if worker brood cells are not of optimum diameter, worker bee size (and perhaps productivity also) can be adversely affected.

In a recent letter to me, John Harbo (Bee Geneticist, Baton Rouge, La, USA) reported on a trial of three foundation sizes, where the emerging worker bee's weight was examined in relation to one of three cell sizes. The foundation, supplied by Dadant & Sons, was either 711, 857 or 1004 cells per square decimeter (ie. 100mm sides, cells counted both sides.) As a comparison, the foundation generally used in NZ is an intermediate size - 778 cells dm^2. Harbo was able to show that larger cells produced significantly larger bees, with a 6 mg differential (about 6%) between the large and medium cells, and 11mg between the smallest and largest.

Conversely, it is widely believed that the use of old black combs, where the cell diameter may be reduced by the accumulation of cell lining debris, leads to the production of small workers. I recently compared some old culled comb with new, by measuring the mid-depth diameter. But was surprised to find that any diminution of diameter was too small to measure under a 20 x microscope, and is probably less than 0.2 mm or 4%. The puzzling aspect of this side issue, is that there were only eight to 10 layers of silken cell linings, which is about the number of brood cycles in one season. The combs were hard and black, and probably five to 10 years old: if the bees do not normally remove these linings there should have been over 50 of them, but if they do sometimes remove them, then that would explain the small reduction in cell diameter. The differences between the Harbo samples was much greater than occurs naturally as combs age - ie - 711 [- 20% -] 857 [- 17% -] 1004.

Two aspects of this artificial larval confinement aroused my curiosity. Firstly, is the size we currently use the optimum one for our NZ Bee Stock? And secondly, does the size/weight of queens have any bearing on the cell diameter required?

There are reported to be differences of natural cell diameter associated with race: quoting John Harbo again for lack of any other reference on this matter, we have 857 dm^2 for African bees. However, it seems to me that the primary association is more likely to lie with some physical attribute of the cell building bees, with race only being relevant in so far as it influences bee size.

This project started as a simple one, addressing only the question of natural comb size. If further data gathered in the next few weeks shows no correlation between queen weight and cell diameter, and the natural cell form continues to closely match the standard foundation pattern, then the question need be taken no further.

However, if it can be shown that there is a positive correlation between queen weight (as indicated by pupal weight), and worker cell diameter, then a great deal more work will need to be done. It may be necessary to continue the project for several years, requeening the hives annually with groups of average and large daughter queens from a succession of breeding lines. For each batch of test queens, data will be needed on cell diameter, egg size, worker bee weight and hive productivity. Which serves to show how easy it is to ask a simple question of the bees, and how laborious to produce a definitive answer.

To explore this concept, I have set up two groups of hives, one headed by queens of 265-270 mg pupal weight, and the other by queens of over 320 mg. The plan is to give each hive sheets of flat wax, and to measure the cell diameter produced. It has taken some time to set up the trial, and there have been a number of set-backs due to premature queen failures. So it may be next season before reliable results are obtained; by which time all of the brood combs will have been produced to the diameter determined by the worker bees. But the first cells built have just been measured - from the small queen group only. The measurement used was across the width of 10 consecutive worker cells, giving a length of 55mm to 57mm (mean 55.5). The standard NZ foundation measures 55mm, which seems satisfactorily close. But it is too early to draw any conclusions, and there are several relevant points to keep in mind. The only data I have so far is from hives headed by queens of slightly below average size, produced during a season of unusually adverse weather. The largest pattern tested by Harbo had cells about 9% larger than we are currently using, though we do not know how that may have related to the natural comb diameter those bees would have constructed. I apologise for complicating the issue by using two different methods of measuring cell diameter. However, it is not possible to use Harbo's square measure on naturally drawn combs, as they are too irregular, and any 10cm square will contain a number of drone and intermediate cells. I estimate that Harbo's 711 cell pattern should measure 60mm across the width of 10 cells, and is 9% larger than the pattern used by NZ Beeswax, at 778 cells/dm^2 and 55mm across the width 10 cells.

If it should transpire that the daughters of larger queens produce proportionately larger brood cells, then a number of interesting questions arise as to the cause which will require closer examination. It seems likely to me that it will be found that the workers of large queens will generally be proportionally larger: that is certainly my experience with rearing queens from larvae intended by the bees to be workers. If they are larger, then the cause is likely to be that they come from larger eggs. Again queen rearing experience suggests that egg size is a very important factor in obtaining queen pupae of high weight - a subject on which I hope to write one day when the evidence is clearer. Supposing it can be shown that larger queens do lay larger eggs, and that these result in larger workers when freed from the constraint of too small a cell, it is still of only academic interest unless it can be shown that the resulting colony is more productive as a result.

THE LATE RALPH GLASSON

From Sandy Richardson

It is with sadness that the West Coast Branch announces the passing of one of New Zealand's senior beekeepers. Ralph Vaughan Glasson, of Blackball, Westland, died peacefully on 12 January 1993, in his 87th year. Mr Glasson's wife of 53 years died 18 months ago.

ABOVE: Mr & Mrs Glasson.
BELOW: The New Zealand Annual Conference held at Greymouth in June 1925. Although Mr Glasson does not appear to be in this photo he indeed helped to organise the Conference. For interest, Mr & Mrs Eckroyd are third and fourth from left in the front row, and W.B. Bray is fifth from the right in the second row.

Mr Glasson's involvement with beekeeping stretched over 60 years. He was one of Westland's first full-time beekeepers. His father, an amateur beekeeper, was not keen to see his son enter coal mining, the principle occupation in Blackball at the time, and so Ralph, straight out of highschool, rented land for an apiary site at Atarau, a few kilometres up the Grey Valley. His father helped him install 250 hives and his whole production came from them.

Ralph Glasson became one of the founding members of the Co-operative Marketing Association formed in the early 1930s. By this time his business had expanded. He had become the owner of the first truck in Blackball (a 1924 one-ton Chevrolet), he had hives as far away as the Otira Gorge, seeking rata honey. It was a long trip to tend those hives and all over gravel roads. He would be up at three in the morning and arrive back late at night — punctures permitting.

He helped found a Branch of the Co-operative Honey Producers' Association in Greymouth in the 1930s, and was for many decades an active member of the Beekeepers' Association, both locally and nationally. He was one of the organisers when the Association held its first Conference at Greymouth in the 1920s, and was associated with the three subsequent Conferences in the town. For many years he was Secretary of the local Branch of NBA and a delegate to National Conferences.

When the Royal NZ Institute of Horticulture decided in 1965 to include beekeeping in the Courses it offered, Mr. Glasson was one of about half a dozen beekeepers who were asked to help plan the course. In return he was presented with an honorary diploma in Apiculture. The diploma held pride of place on his living room wall.

In January 1960 Mr. Glasson was made a Justice of the Peace and in July 1971 a Life Member of the NBA.

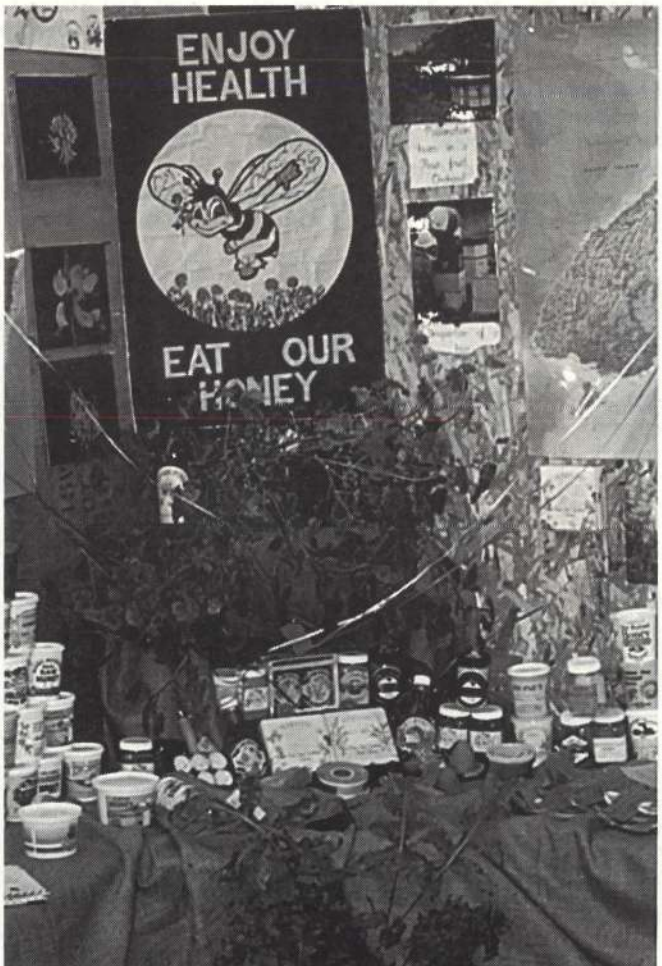
Failing eyesight in his 80s made him hang up his veil and smoker, buy by this time his son, John, and grandson, Gary, were running the family business.

Over the years a stream of politicians, officials, beekeepers, and students from many parts of the world passed through the Glasson home. Many West Coast beekeepers, past and present, learned their beekeeping skills from Ralph Glasson.

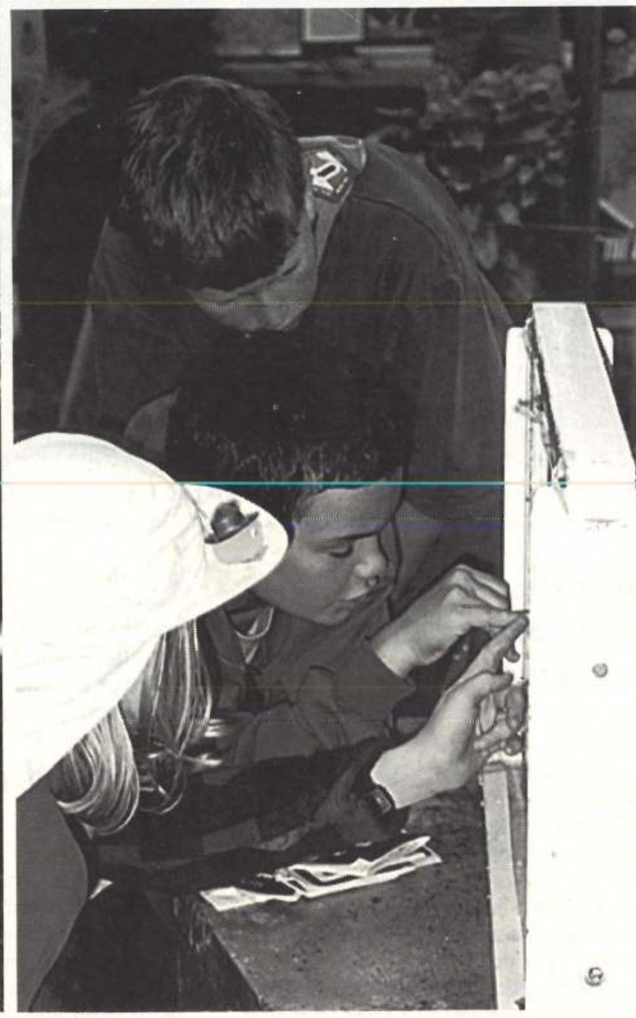
Visits to officials and by officials, the rounds of Conferences and meetings all over the country plus the daily work in the apiary, added up to a full and interesting life.

BEEKEEPERS' DISPLAY AT THE 13th AT TRENTHAM MEMORIAL PAR

LEFT: The beekeeping display at the Jamboree. The centre came from various beekeepers, while Steve Olds, TecPak, provided the flanks. BELOW LEFT: Graham Lusty and Steve Schapel answer questions. BELOW RIGHT: Another shot of the display.

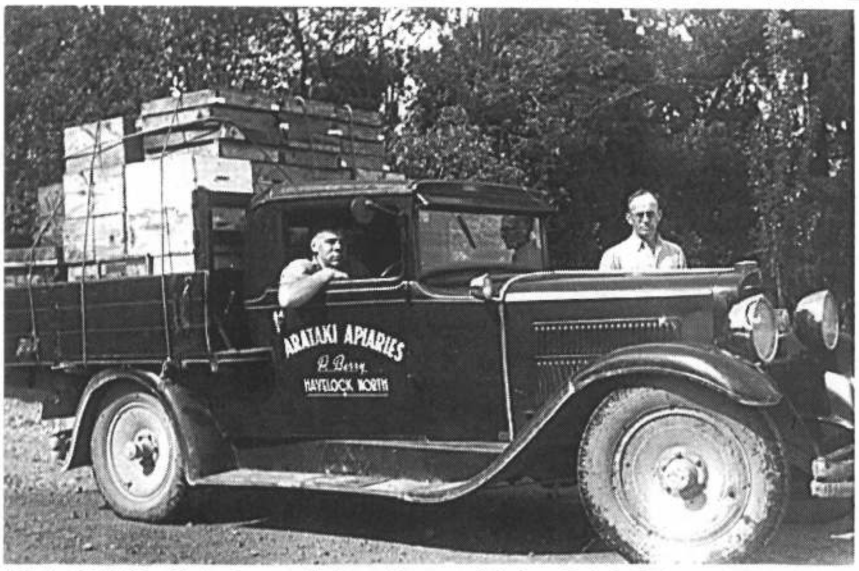


h NEW ZEALAND SCOUT JAMBOREE
RK, 31 DEC 1992 - 7 JAN 1993



ABOVE LEFT: Graham Lusty, a Wellington beekeeper who manned the stand daily. ABOVE RIGHT: Scouts find the queen. LEFT: Scouts looking for the queen.

LIFE MEMBER IAN BERRY



This 1940's shot shows father Percy with Ian behind the wheel of 'Walter', their 1931 Nash car which they converted into a truck.

Began career with shrewd takeover bid.

Life member Ian Berry and his brother Alan began beekeeping in 1941, aged 10 and seven respectively, with a hive each, given to them by their father. Ian bought a wooden Cremoata box for one shilling from the local grocer, and made himself a super during that first year. Thus established as a shrewd businessman, he mounted a successful takeover bid after that first season and doubled his hive holding by buying out his brother. History does not record what that bid was worth or which brother got the better of the deal.

At that time the family lived in Hastings and father, Percy (also a life member), worked in the office at the Tomoana Freezing Works. In 1944 Percy bought a property at Arataki Road, Havelock North, hence the name Arataki Honey. Arataki is now one of the world's largest beekeeping enterprises. Father Percy began full-time beekeeping and Ian, then in the third form at High School, helped. Ian left school at 15, but because there was not enough work to keep him employed full time at Arataki, worked in an orchard for nine months and diligently saved his waged of one shilling a nine pence an hour.

At 16, with Percy's help, Ian bought 326 hives from a Hastings beekeeper and father and son have worked together ever since. Now Ian manages the Havelock North Division while Russell, Ian's other brother, manages the Rotorus Division, and Percy manages the Export Division.

Married in 1954

In 1954 Ian married Pat, the daughter of an orchardist. They have six children: three boys and three girls. Jenny, the eldest, and husband John Dobson own the Bee Farm, Hastings, while twins Peter and John are full-time working shareholders in Arataki, as is daughter Pamela Flack. Barbara Burnett, the youngest daughter works for the Company part-time. Youngest son, David, is training to be a kindergarten teacher but helps out at Arataki during holidays. Three of the older grandchildren also help at times. This means Arataki has four generations of the one family on the payroll.

Another member of the family is Dimitria Kyriakaki. Dimitria has lived and worked with the Berrys' for almost 30 years. She was an assisted immigrant from Greece in 1964.

National President

Ian was on the National Executive for eight years including three years as President from 1984 to 1987. He is also a long serving member of the Hawkes Bay Branch Executive and has spent some years as Branch Secretary and Branch President.

A few tips from Ian on how to run a successful beekeeping business.

Chose Wife Carefully

Use great care when selecting a wife. Not only must she do a good job raising the next generation of beekeepers while you work to build up the business but she can be most helpful in the business itself. She must be prepared to do everything from helping shift hives at night to managing the honey shop or even acting as the weight on the front of the forklift tractor when shifting pallets of hives up steep hills.

Remember that life is far too short to learn all there is to know about bees or running a beekeeping business. Take every opportunity to learn all you can from books, training courses, and listening to beekeepers and other business people.

Remember also that practical recording systems of all aspects of a beekeeping business are a necessary and important tool in today's competitive world and can add greatly to the interest, profit, and enjoyment of the business.

The Future Of Beekeeping

As to the future of beekeeping in New Zealand, Ian suggests that any industry so dependent on the weather will always have its good and bad production years and an industry such as ours will have some marketing problems from time to time. However with new communication technology and better understanding by beekeepers of the advantages of working together, prospects are that there will be a living to be made from beekeeping in New Zealand for many years to come. Even if there isn't there will always be some New Zealanders who will add to their enjoyment of life by keeping bees.

AMERICAN FOULBROOD DISEASE

From R.M. Goodwin, J.H. Perry and H. Haine.

Part 1. The Incidence of American Foulbrood Disease in New Zealand.

American foulbrood (AFB) disease is caused by the bacterium *Bacillus larvae.* The disease was first recorded in New Zealand in 1877, 38 years after honey bees were introduced, and by 1887 had spread throughout New Zealand[1].

Accounts of the levels of AFB in the early part of this century are very sketchy. This was mainly due to the practice of managing AFB rather than destroying contaminated colonies. Colonies that had light infections were "shook swarmed". This entailed shaking the bees from infected colonies into hives that only contained foundation and was often effective at eliminating the disease. Only colonies with heavy infections were destroyed. Because of this, all the early reports only record the number of heavily infected colonies.

Some of these early attempts at management make interesting reading; Isaac Hopkins[1] wrote:

The districts in which the Ruakura State Apiary is situated were amongst the worst in the Dominion for foulbrood. The colonies I started the State Apiary with that were already on the farm were affected. By constant attention and treatment we were able to keep the disease from spreading and when we left for the Christchurch Exhibition there were six out of over 70 slightly affected with foulbrood. When we retuned in the following June we found the disease had spread through robbing to nearly every colony. Early in the following season we treated a number of the worst cases and replaced bad with clean combs. As this did not turn out so satisfactory as we hoped, I hoped to treat the whole of the colonies the next spring. The result was very satisfactory indeed, for although we still get a touch of disease in one or two colonies every season, by strict vigilance it gives us no trouble.

The first reliable report on the incident of AFB in New Zealand was in 1947. Seventy four percent of all the colonies in New Zealand were inspected and 1.7% were recorded as infected with AFB[2]. In 1950 78% of the colonies were inspected and 2.02% found to be infected[3].

It was decided after the 1950 survey that the incidence of AFB could not be reduced if shook swarming was continued. Beekeepers were instructed by the Department of Agriculture to 'destory the contents of all diseased hives, and to sterilize thoroughly any remaining hive equipment by approved methods'[3].

TABLE 1
Incidence of *B. Larvae* spores

	Hives	% Positive
Hobbyist Total	355	11.1
North Island	279	10.8
South Island	76	11.8
Commercial	1681	8.3
Feral colonies	106	6.0
Honey Total	32	25.0
North Island	22	31.8
South Island	10	10.0

There were no reliable disease data between 1950 and 1960. In 1961 only 0.23% of colonies were reported to be infected. This decline since 1950 was possible due to the move away from managing AFB, i.e., shook swarming, to destroying colonies infected with AFB disease. The percentage of colonies reported to be infected has increased by 522% from 1964 to the present (Fig. 1). The number of colonies burnt has increased even more (836%), from 446 in 1964 to 3,733 in 1991, due to the increasing number of hives.

The reasons for the increasing levels of disease that is being reported is unknown. A number of ideas have been advanced ranging from beekeepers looking harder, to the changes required in beekeeping practices to prepare hives for kiwifruit pollination. One hypothesis that has some support is that it is related to the increasing numbers of hives in New Zealand (e.g., Fig. 2). The increase in the percentage of infected colonies appears to follow closely the increase in the number of colonies in New Zealand, with a two year time delay. Whether this does reflect cause and effect is unknown.

All the information on the levels of AFB in New Zealand must be treated with caution. The figures rely heavily on the information provided by beekeepers to the Ministry of Agriculture and Fisheries. Even though it is a statutory requirement for beekeepers to inspect all colonies in New Zealand each year and report any that are diseased, not all colonies are inspected, and not all cases of disease are reported when found. The disease statistics must therefore be an underestimate of the actual disease levels. Whether they are a slight or large underestimate is unknown.

The initial aim of our research programme was to investigate the incidence of AFB in New Zealand. The first problem was to decide what actually constituted an infected colony. MAF considers a colony with one or more larvae or pupae exhibiting AFB disease symptoms to be infected with AFB. However, what about colonies that contain *Bacillus larvae* spores (the causative agent of AFB disease), but do not contain any obviously diseased larvae?

TABLE 2
Number of colonies tested for each beekeeper and the number that tested positive.

Beekeeper	Hives	% Positive
A	400	9.3
B	422	81.8
C	200	10.0
D	200	6.5
E	200	24.5
F	200	0.5
G	200	6.0
H	281	2.8

We decided to look for colonies that contained *B. larvae* spores rather than those that contained obviously diseased larvae. To do this we tested bees and bee products for the presence of *B. larvae* spores by spreading the material to be tested on bacterial plates and looking to see how many *B. larvae* colonies grew. The test is quite sensitive and will detect spore levels which are too low to cause infections. Therefore, the presence of *B. larvae* spores in bees, bee products or equipment doesn't necessarily mean that the colonies will show AFB symptoms. This must be remembered when the results are interpreted. The relationship between *B. larvae* spores and diseased larvae will be discussed in a later article. It is also important to remember that in looking for spores it is obviously not possible to find every one. Just because we were unable to find spores in what we were testing this may not mean that there were none, but just that there were too few to be detected. Likewise any spore loadings described are only relative estimates rather than actual numbers.

We investigated a number of hobbyist, commerical and feral colonies for the presence of *B. larvae* spores. We also investigated a number of lines of honey for spore contamination.

HOBBYIST COLONIES

We tested samples of adult bees from 355 randomly selected colonies belonging to hobbyist beekeepers taken from both the North and South Islands. Most of the hives were in city areas. A total of 11.5% of the colonies tested positive for the presence of *B. larvae* spores. The incidence in both islands was similar (Table 1).

The relatively high percentage of colonies testing positive is interesting in that most of the hobbyists had only one or two hives. There is therefore little chance of the spores having found their way into the hives through cross contamination from the swapping of hive parts, as may occur in a commerical operation. This suggests that most of the spores were either produced inside the hives or were being brought in by the bees rather than being placed there by the beekeeper.

COMMERCIAL COLONIES

The survey of commercial beekeepers was not random because we were collecting the data for another reason. This point needs to be remembered when interpreting the results. We only surveyed beekeepers who had a history of having colonies infected with AFB, which would probably have produced an over-estimate. Although we sampled a large number of hives they only came from a few beekeepers which resulted in the high disease status of some of the beekeepers greatly affecting the average.

The beekeepers who supplied the hive samples were mostly from the North Island. There was a wide range in the percentage of colonies that tested positive (Table 2). If we exclude Beekeeper B whose colonies had a significant AFB problem, 8.3% of the colonies tested positive for the presence of *B. larvae* spores.

FERAL COLONIES

Bees from 106 feral colonies were tested. These were mainly collected from the Waikato; however samples were taken from as far afield as Kerikeri and Invercargill. Six percent of these tested positive.

Although feral colonies are probably a disease problem in some areas this result suggests that they may be as bad as many suppose. This is supported by the observation that a number of commercial beekeepers are able to maintain relatively disease free outfits alongside feral populations.

HONEY

Thirtytwo pots representing different lines of honey were purchased from shop shelves and tested for the presence of *B. larvae* spores. Eight of them (25%) tested positive (Table 1). All but one of the positive honey pots were packed in the North Island; however the North Island packs could have incorporated honey from the South Island.

The 25% incidence of *B. larvae* spores in honey does not of course indicate that 25% of colonies are infected or 25% of beekeepers extract infected honey. The honey from one infected super has the potential to infect a large amount of honey. Whether the concentration of spores found in the retail packs represents a potential disease risk is not known.

The incidence of *B. larvae* spores in honey does suggest that significant amounts of honey are being removed from AFB colonies, either intentionally or unintentionally, extracted and sold. If it is being done unintentionally the wet supers will have been placed back onto clean colonies.

CONCLUSIONS

It would appear from this data that *B. larvae* spores are much more common than the national disease statistics would suggest. Whether this represents the normal situation, or is a reflection of increasing disease levels is unknown. How this incidence data relates to colonies showing disease symptoms will be discussed later.

References

1 Hopkins, I. 1915: Forty two years of beekeeping in New Zealand 1874 - 1915. Some reminiscences. New Zealand Farmer stock and station Journal Dec 1915.

2 New Zealand beekeeper August 1948 P22

3 New Zealand beekeeper August 1950 P16

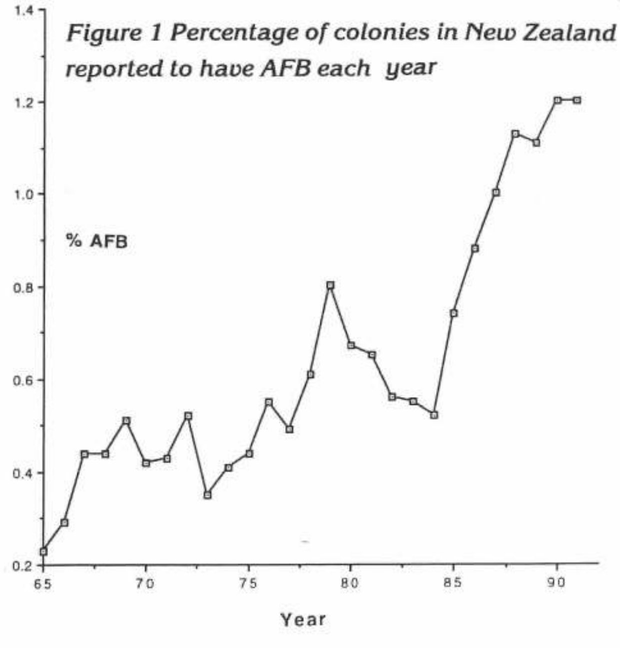


Figure 1 Percentage of colonies in New Zealand reported to have AFB each year

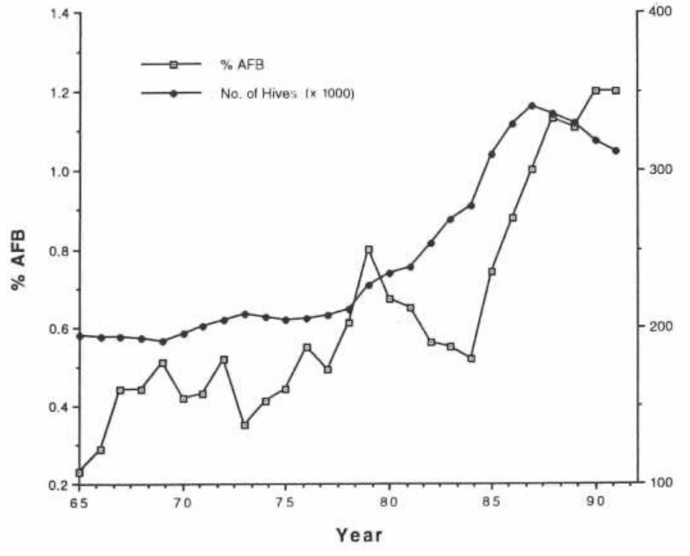


Figure 2 Percentage of colonies reported to have AFB each year and the number of colonies in New Zealand

NATURE'S CHEMISTRY IN OUR HONEY BEES

John Heineman

Some time ago, while doing the rounds for my share of disease inspection, I happened to get into conversation with the owner of some eight hives. He has had these colonies for a number of years. An interesting person, he has a good practical knowledge of nature and things around him. We talked about swarming and supersedure of queen bees, etc and he said suddenly: "All that must have something to do with pheromones. Can you tell me what exactly are pheromones. Are pheromones doing the same job for insects as hormones do for the human body?".

It is not easy to give a clear-cut answer to that question in simple every day language without dragging chemical formulas and terms into it.

The Encyclopedia Brittanica describes pheromones as follows: "any chemical used in intra-specific communication between animals. Widespread among insects, fishes and mammals but unknown among birds. These chemicals may be secreted by special glands or incorporated in other products such as urine. They may be shed freely into the environment as are sex attractants or placed in carefully chosen locations such as the scent trails laid down by ants and the territorial markings of many mammals".

Many of us watch the nature programmes on TV and will recollect scenes of animal behaviour where pheromones play a decisive role. We may marvel at the wonderful ways of nature where the little unseens often lead to great results. It makes one see that our planet is really one big laboratory.

Now what has this to do with bees and beekeeping.

First the difference between pheromones and hormones. Looking at a honey bee's glandular system we find two groups of glands: **a** the endocrine glands and **b** the exocrine glands. The **a** group produces the hormones which do the work needed inside the body to influence many of its functions while the **b** group secretes the pheromones which act to the outside and so influence the direct environment of the bee and thus make the all important communications between the individuals making up a colony of bees possible. Without these pheromones a honey bee colony cannot function. Its social structure depends on it. The same, of course, is true with many variations for other insect species s.a. ants, butterflies, wasps, etc.

Research into this field of nature science has discovered many interest facts in recent years. The term 'pheromone' has only been in use since 1959 and so one does not find this word in a dictionary or encyclopedia issued earlier. At present it seems that honey bees produce a wider range of pheromones than any other animals but that could be due to the fact that probably more is known about bee biology for a longer period of time as bee colonies have been domesticated and managed for so long and lend themselves very well to research, in the field as well as in the laboratory. On-going exploration of this relatively new area of science could well reveal that some other animals make use of a still wider range of pheromones in their life processes.

The basic chemistry of honey bee pheromones is not complicated. They contain carbon, hydrogen, and oxygen. All elements are readily available and so there is no dependence on the collection of rarer materials. We can roughly divide these pheromones into two groups: those for use inside the hive and those for use outside. But as will be seen they sometimes overlap. More is known about the second group than about the first.

Different Glands Produce Different Pheromones

Production of the pheromones takes place in the glandular system of the bee. Different glands produce different pheromones for a variety of purposes. Some of the pheromones are produced by a queen only, others may be produced by workers only, and some by all inhabitants of a hive.

Footprint pheromone. This substance is found all over the body of worker bees. It is produced by the Arnhart's glands and probably by other glands. It is deposited by the bees' feet or the tips of their abdomens wherever they land or walk. It will be spread over the combs, the hive's interior, and round the entrance of the hive. The odour of this pheromone deposit escaping from the hive and that from the "foot prints" on the outside (bees don't wash their socks) assists home coming bees to locate the entrance. This is a homing signal like the lights along the runway or the markers at a harbour's entrance.

At food sources this pheromone acts in conjunction with another important pheromone from the Nasanov gland and enhances its attractiveness.

Drones and queens also deposit this substance where they walk or crawl but the foot-print pheromone of the queen bee is more attractive to the worker bee so she evidently produces some kind of extra substance.

Nasanov pheromone. This is secreted by the gland of this name. It is also called the scent gland and is produced by the worker bees only. It is an orientation pheromone. When a colony is disturbed it will cause many young bees who have not been outside the hive to take to their wings without having made an orientation flight. Many would be lost without some kind of assistance when trying to find their way back home. You can see other bees standing in front of, and with their heads towards the entrance, fanning their wings vigorously and with their abdomens raised. The gland can then be seen exposed near the tip of the abdomen. This is called scenting and the dis-orientated bees will home in on it.

The Nasanov pheromone also plays an important role during swarming. It is released during the swarm's flight and again in abundance at the entrance of their new home. The scout bees also mark the likely nest sites they have selected with this pheromone. However, it is not the only guidance medium which keeps the swarm on the right track. It only works if the queen is with the swarm as her special pheromone together with the Nasanov pheromone is essential to the swarm's cohesion. If the queen did not come, or got lost after leaving the hive, the swarm will soon fall back to the hive it left.

Workers also release this pheromone when foraging for water or an odourless food source such as sugar syrup. Bees attracted by the scent fly upwind towards the source.

The Nasanov pheromone is not colony specific. It can be produced synthetically and that offers some very interesting possibilities such as attracting swarms to empty hives or making certain crops more attractive for pollination visits.

Alarm

Alarm Pheromone. To defend themselves against their many enemies bees have evolved a very efficient defence system, not only for their own little persons but also for their hives with contents of combs, brood, honey, and pollen. Again the system is based on pheromones which are produced by two sets of glands located near the sting and at the mandibles, so at opposite ends of the body.

When guard bees at the entrance become aware of a potential menace they will take up a defensive stance. They lift their abdomens to expose their stings, which may produce a tiny drop of venom, and fan their wings. Some will enter the nest and raise the alarm with the result that large numbers of reinforcements will appear from the hive. They will become excited, often showing a tensed posture. They are ready to face the danger and will attack moving objects near their hive, especially dark coloured shapes and those which carry the small of mammals including humans.

This is the time the bee's sting comes into play. As the sting is barbed it cannot be withdrawn from the victim and will stay behind in the skin together with the venom sac, it's muscle and part of a nerve. That of course is the end of the bee (she does not carry a repeater gun). But what is left behind in the skin still does a job. If the sting is not removed immediately it will continue pumping venom into the victim. At the same time an alarm pheromone is released. That pheromone can stay active for up to five minutes so properly marking the stung object. That alarm pheromone will attract more angry bees ready to do their duty. That is why when once a person has received a sting it is likely that more will follow. Scratching the sting off helps as no more venom will be pumped in and less pheromone will be released. It is not clear which glandular cells produce this pheromone but it is stored near the based of the sting shaft.

Very young bees, queens, and drones do not produce this pheromone. It is the workers that have reached the stage of guard bees or foragers which have the highest production of this pheromone.

Workers' Mandibular Glands also Produce Alarm Phermones

A second alarm pheromone is produced by the mandibular glands of the workers. Again not by queens and drones. It serves as a marker when a bee grips or bites its victim (robbers, strange queens, wasps etc.). It also serves as a warning telling the intruder to "keep off" or take the consequences. It does happen that one can feel a bee bite before or even without getting stung.

It has been suggested that this same pheromone plays a role in the field by marking food sources which have been exhausted and in the broodnest marking larvae which just have been fed.

Using a bee smoker covers the pheromone scent with the smell of the smoke which changes the bees' actions from preparation for attack to that of preparation for another kind of emergency.

Queen substance. This is a mixture of several pheromones produced by the queen. These pheromones have a wide range of effects on the behaviour of the entire colony. The substance is produced by the queen's mandibular glands and is carried all over her body. Her groomers will remove it from her and pass it on to other workers when exchanging food. Thus it becomes an integral part of the whole of the household and is unique to that particular colony. It means that it acts as a recognition signal. It shows for certain who belongs and helps to keep strangers out. Worker bees will recognize a queen when close enough to touch her again thanks to a certain pheromone in her substance. It also acts as a sex attractant during the mating flight.

As queens mate with several drones while on the wing the drones must first locate her. The odour of her pheromone is the medium. It also seems to stimulate the drone nearest to her to an all-out effort. So its function is two-fold, attractant as well as stimulant (or should we say aphrodisiac?). It seems to be effective up to a distance of approximately three meters.

Then some pheromone of the queen's substance acts in conjunction with the Nasanov pheromone of the worker bees to keep a swarm together and on the straight and narrow towards their new home.

And that is still not all about this amazing many sided concoction. Take a queen away from a colony and what happens? The bees will know that they are queenless and very soon queen cells will appear. With the queen gone the source of her substance has also left the hive, a sure sign that emergency measures must be taken. So it follows that an ample supply of queen substance inhibits the construction of queen cells, at least up to a point for there are a number of others reasons why queen cells appear and subsequent swarming takes place.

When a queen ages her output of pheromones will decline. Seeing the crucial role this queen substance plays in relation to the proper functioning and well being of a colony the importance of young vigorous queens producing plenty of it is without question.

So this then is my answer to the question, although perhaps it is more about what pheromones do than what they are. It is far from complete, but then I am neither a scientist nor a researcher. And they have still a lot more to discover.

You may ask: "what is the value of all this to me when I am just keeping X number of hives for a bit of honey, pollination, or fun.?"

Sure, bees have been kept by human kind for aeons without this knowledge and one must admit with pretty good results at times. But there is a lot of satisfaction in discovering **HOW** and **WHY.** Then, too, one will realize that knowledge can assist us in the practical and profitable management of our honey bees.

If you want to know more and be better informed on the subject, plenty of understandable reading material is available.

References: Encyclopedia of Beekeeping by Roger Morse & Ted Hooper, Practical Beekeeping by Andrew Matheson, Bees and Beekeeping, Science, Practice and World Resources by Eva Crane.

LIBRARY NOTES
From John Heineman

Sorry folks, no new additions to report apart from the usual arrival of overseas beekeeping magazines. We seem to experience a dearth just now.

A little warning. A gentleman borrowed a smallish book about queen raising, somewhere along the way it got lost. The fellow, being a gentleman, offered promptly to pay for a replacement. No problem as it is readily available. The cost involved came as a bit of a shock mind you, over $40 and that with a discount for the library. So better watch it. What is borrowed must be returned or replaced. Your responsibility.

Notwithstanding our previous appeal to return overdue books there are still a few people who do not cooperate. P L E A S E.

Southland

Early January and the country is looking great, and the clover flowers best for years. Unfortunately the weather has not been so good, only slightly better than last year. A change from southerly weather last year to westerly weather this year. Only difference is that temperatures are slightly warmer this year. In result there is some honey on the hives but not any record amount. Prospects are still good and will remain so until the days begin to cool as autumn approaches.

Our field day is later this year because of visiting American beekeepers. It is being held at Tony Clissolds' Honey House on February 13, starting at 10am with morning tea.

A reminder. Conference this year will be held in Gore at Croydon Lodge on July 20-23. Looking forward to seeing you.

Alister Lee

North Otago

The almost daily showers and southerly or easterly winds did not assist the bees to gathering nectar this December and January. There is plenty of clover flower but it is all show. All the signs point to the start of the honey flow being about five weeks late.

The inland areas seem to be lacking in moisture so there is not much progress in the hives up the Waitaki Valley so far. However, let us look forward to 1993 and hope that the sun will shine for more than one day a week in February and we may still prosper and gather a little honey.

Algie Lawrence.

Westland

Summer arrived early this year in Westland. The warm dry weather saw one of the best and earliest starts to the honey-flow in very many years. Beekeeper activity was high as hives were hurriedly supered up and the first round of honey harvesting began. By mid-December the prospects of a good crop seemed in the making. But alas, as is so common in Westland, the dry, warm weather came to an abrupt end. The last two weeks of December produced two falls of snow on the mountains with several very cool, near frost, nights and then very unsettled, cloudy weather with considerable rain. Hive activity has been greatly curtailed and although there is still considerable pasture sources available a return to warm, dry weather is necessary before the end of January if we are to receive benefit from it.

It would appear, with the early arrival of wasps, that nests established early with the warm, dry, early summer could be a problem this autumn.

Sandy Richardson

Hawkes Bay

Like most of the country we had a cold wet spring which meant the pollination programme was two to three weeks later than usual. When the hives were moved to the orchards the weather was still unsettled. Petals were falling at one end of the row while the other was still in bud. The orchardists sprayed when they thought conditions were right; but many did not appreciate the effects on bees. Others just did not care! Losses to spray were very heavy in many instances. Until an alternative is found to Carbaryl for thinning, or the orchardists learn when to spray to avoid killing bees there will be problems. One suggestion is that hives going into pollination next season will have to be charged out at a higher rate to cover this season's losses.

Ron Morison

Southern North Island

I don't think I should make any comment on the crop until summer arrives, except perhaps to say our area is very patchy and conditions vary from yard to yard. Most beekeepers have been making their rounds with the aid of an umbrella, looking for hives requiring supering but not finding many. Indications are that most areas are now just starting to work clover flows.

The season all through had been running about two weeks late. This allowed the bees to build up nicely and, earlier on, everything looked good for a bumper year.

The bees put into pollination in the southern area didn't seem to be interested in visiting the kiwifruit until late in the evening. Most mornings they switched their attention to the competing bush nectar flows. Consequently they came out much heavier than normal, however reports indicate the pollination looks good overall in our area.

Some places suffered from price cutting again, and this on top of vine pull-out and reduced hive numbers has caused some of our members to revise their budgets.

Now our weather forecasters are telling us this has been the worst summer since 1945. Skiing during the summer, un-seasonal weather, hail and even snow in some places during the Christmas holidays (rain fell on 23 days in December). This has contributed to make everything about a month behind schedule.

Conditions have been good for the farmers, but with less stock and longer than normal grass, the clover seems to have been strangled. It is not as prominent as in previous years. Things don't look too good for an average crop.

Perhaps we should consider putting research money into producing raincoats for bees or getting the botanists to tissue-culture umbrellas on to our main flowering species. I guess the topics for our March Field-Day in Taranaki could include "beekeeping under water" or "how to budget on a nil income". We have already scheduled the usual seasonal topics of autumn harvesting, handling honey, and autumn requeening. This should be of interest to large and small beekeepers.

Looking on the positive side, the weather is expected to settle in the next few weeks. This may give the bees the opportunity to fill the second box. My fingers are crossed but we can't bank on it.

The display on Beekeeping at the 13th New Zealand Scout Jamboree at Upper Hutt was a huge success. Thanks to TecPac Industries, Ted Roberts, and a lot of small producers for their pots and labels, and members of the Wellington Beekeepers' Assn who "personned" the display over the seven days.

I am told the Governor-General held up proceedings for 20 minutes by going around the display twice. Most of the scouts and their families consume honey and knew their local honeys. Lots of questions about bees were answered, a number of unregistered hives were admitted to, and perhaps a few beekeepers in the making were pointed in the right direction.

One major problem with hobbyists became apparent. "What do you do when the hive becomes aggressive". Most abandoned the hive because they did not know they could requeen the hive. We should be pushing this aspect of beekeeping a lot more.

Frank Lindsay

Marlborough

At the moment the bees are working on a good honey flow, but our season is late due to a cool spring and unsettled weather.

Before Christmas I wondered if we would get a crop. Now I'm more optimistic as the weather has improved and there are plenty of clover and borage flowers about.

In Marlborough the country often dries out early but no so this season. Long may it last. Coming event, Lake Rotoiti Weekend 19-21 February.

Mark Milne

Nelson

This spring will be remembered for its abnormal pattern, a pattern which particularly affected requeening. Each hive seems to have made its own rules. In some the requeening was successful, while others refused to take the introduced queens. The latter had to be united with queen-right colonies. Heavy rain came at the worst possible time. Little nectar has been gathered and, although white clover has flowered prefusely we shall probably have a record for the most and least honey gathered. Some hives have four boxes of honey while others are struggling to produce three or four pounds.

There is a saying that what the bees have not gathered by Christmas and the early New Year will not be. So far little honey has been extracted so no estimate of this year's crop is available. Better weather appears to be coming. If so, large areas of flowering clover could do wonders for hives with enough bees. Of course, with the growing popularity of manuka honey it would be better to get a crop of that.

Ron Stratford

Well-known beekeeper, Ivan Dickinson, who was awarded the QSM in the New Year's Honours. The nomination did not come from the beekeeping industry but from somewhere in Education. Ivan has been involved in education administration at local and national levels. Recently elected to the Clutha District Council, he has also been involved in all aspects of Rotary.

NOTE FOR SCRIBES

Some 'Notes' are still arriving far too late. Two or three days late I can handle, but when they come a week, and sometimes two after deadline, work has progressed too far for them to be included. It means then that your good work has been in vain, and that the rest of the industry is missing out on your points.
EDITOR

PRESERVING WITH HONEY

From Sue Jenkins

February and March are the traditional months of the year when the fruits and vegetables of the summer are harvested and preserved for the winter months.

Honey and sugar can be used interchangeable in preserving recipes, although you may prefer to reduce the amount of honey when using it as a substitute for sugar. 1 cup of sugar measures 250g whereas 1 cup of honey measures 400g.

Use honey to sweeten the syrup for bottling fruit. I find it best to use a mild, delicately-flavoured honey to make your syrup, otherwise the honey flavour could be a little overpowering. Also honey sometimes can make the fluid a little cloudy.

Remember that each honey variety adds its own distinctive flavour to your jars of preserves.

Tomato Sauce

3 kilogram tomatoes chopped
2 onions, diced
3-5 cloves garlic
1½ tablespoons pickling spice
½ teaspoon celery seeds
¼ teaspoon basil
¼ teaspoon marjoram
pinch paprika
2½ tablespoons salt
2 cups honey
1 tablespoon glacial acetic acid
¼ cup water

Place in a large preserving pan the tomatoes, onions and garlic. Tie the spices in a muslin bag and add to the pan. Bring to the boil, simmer for about 1 hour. Add salt and honey, stir until it comes to the boil. Puree. Bring to the boil, add glacial acetic acid and pour into hot sterilised bottles and seal. *(Acetic acid is available from chemists.)*

Spicy Indian Chutney

A sweet piquant Indian Chutney. Delicious eaten with cheese, cold meats, curries, or used as a spread.

2½ kilograms tomatoes
25g garlic, crushed
25g fresh root ginger, grated
3-5 small dried chillies
½ teaspoon salt
1 teaspoon cumin
½ teaspoon cinnamon
½ teaspoon ground cloves
3½ cups malt vinegar
5 cups honey

Chop tomatoes roughly, simmer in their own juice for 20 minutes. Add garlic, grated ginger, dried chillies, salt, cumin, cinnamon, cloves, and vinegar. Bring to the boil, then add honey. Simmer until it reaches a jam-like consistency (approximately 1½ hours), stirring regularly. Test as jam. Pour into hot sterilised jars and seal.

Plum and Honey Jam

1.5 kilogram plums
1 cup water
4 cups clover or borage honey

Chop plums and remove stones. Place plums and water into a jam pan, bring gently to the boil, simmer until fruit is pulped. Add honey and boil quickly for 10-15 minutes. Test. Pour into hot sterilised jars and seal.

Dill Pickles

Select small, freshly picked gerkhins up to 10cm long. Scrub well. Soak overnight in cold water. Drain well and pack loosely into cleaned preserving jars. Recipe sufficient for approximately 5kg gerkhins.

add to each litre jar;
1 or 2 dill sprigs
½ tsp mustard seed
6 peppercorns
for each 5 jars;
½ cup plain salt
½ cup light flavoured honey
7 cups hot water
3 cups wine vinegar

Stir salt, sugar and hot water together until dissolved. Add vinegar. Pour over gerkhins, leaving 1cm at top of jars. Top with boiled seals and screw bands. Place jars in a rack in a boiler with 2 cm water over tops of jars. Bring to boil then boil for 5 minutes. Remove, cool, check seals. Store 6 weeks before using.

Tomato Relish

3 large tomatoes
1 onion
1 teaspoon salt
½ cup bush honey
½ to ¾ cup vinegar
½ teaspoon curry powder
½ teaspoon mustard
1 teaspoon flour
1 chilli

Cut the tomatoes and onion into small pieces. Put into saucepan. Add salt, sugar, chilli, and vinegar almost to cover. Bring to boil, simmer 30-45 minutes. Mix flour, curry powder, mustard to a smooth paste with a little cold vinegar. Add to mixture and boil 5 minutes. Pour into a hot sterilised jar. Cover when cold. (Makes 1 jar)

Turkish Mixed Pickles

These colourful pickles are a pleasant accompaniment to many dishes, including cheese, french bread, salads, antipasto platters.

Use a variety of vegetables which need to be firm, and washed.

* cauliflorats, sliced lengthwise so that the slices are thin but the shape of the floret is retained
* red and green capsicum, seeded and sliced into small chunks.
* small zucchini, sliced in 10cm rounds
* snow peas sliced
* cucumber sliced
* brussel sprouts
* small onions or onion slices
* carrot batons
* beans, either butter or french, sliced into 5cm pieces.

Pack the prepared vegetables into jars. To each litre jar add;

1 sprig of fresh dill seeds
or 2-4 small dried chillies
2 bay leaves
1 tablespoon light-flavoured honey
1 tsp black peppercorns
½ tsp celery seeds
1 tsp mustard seeds
2 cloves garlic, peeled and sliced
1 dsp glacial acetic acid

Pour boiling water over the seals, stand 5 minutes. Fill each jar with hot water, almost to the top. Place on the seals and screw bands tightly. Place in a water bath, cover with water and bring to the boil. Boil for 10 minutes. If they do not seal store in fridge where they will keep for 2-3 weeks. Leave sealed jars 2-3 weeks before opening.

Bread and Butter Pickles

2 litres sliced cucumbers
½ to 1 litre sliced onion
½ cup plain salt
3 cups wine vinegar
1 cup light-flavoured honey
1 tbsp mustard seeds
1 tbsp celery seeds
1 tsp tumeric

Halve cucumbers lengthwise and remove the seeds if watery. Dice the cucumber and onions either by hand or with food processor. Mix with plain salt, leave to stand for an hour, then drain and rinse well. In a large saucepan bring remaining ingredients to boil. Fill hot, sterilised jars almost to overflowing. Seal immediately with seals. Refrigerate after opening.

HOW TO UNDERSTAND THE PESTICIDES ACT

From Ian Berry

The Pesticides' Act 1979 sets up the Pesticides' Board to control the sale and use of pesticides, eg substances used to control pests such as insects, weeds, fungi, and rodents.

Until 1983 control of the sale and use of agricultural chemicals, ie chemicals used on plants, was under the Agricultural Chemicals' Act 1959.

The Pesticides' Act 1979, replacing the Agricultural Chemicals' Act, came into effect on 11 March 1983.

The Pesticides' Act provides an adequate framework for the necessary controls, yet ensures that only those materials that are effective will reach the market.

While great benefits can accrue from the use of pesticides, the potential for harm, particularly from their misuse, means that effective controls are necessary.

An important feature of the Pesticides' Act is that pesticides cannot be sold or imported until they are registered by the Pesticides' Board or have been granted an experimental use permit.

The Act binds the Crown, which means that government departments must comply with all the provisions of the Act in their dealings with pesticides.

Definitions

It is important to understand certain terms in the legislation,

Pesticides: Means any substance for use against unwanted mammals, arthropods (includes insects, spiders, and mites), birds, plants, fungi, reptiles, fish, amphibians, nematodes (and other worms) other than on or in man or livestock. It also includes plant growth regulators, timber perservatives and anti-fouling paints.

Materials used against bacteria and viruses in or on plants are also covered. Bacteria and viruses in other situations, such as in dairy sheds and domestic dwellings, need to be declared by the Governor-General by Order in Council before they come under the terms of the Act.

Proprietor: Means the owner of the pesticide, who if the manufacture (if it is made in New Zealand) or the importer (where the pesiticide is imported into the country).

Sale: Means selling a pesticide which includes giving away samples free of charge, unless the context otherwise requires.

Board: Means the Pesticides' Board constituted under the Pesticides' Act 1979.

Pesticide Board

The Act provides for the establishment of a Pesticides' Board charged with the many complex issues involved in the administration of pesticide sale and use.

Composition of Board: A broad spectrum of representation enables the

Board to deal effectively with the issues that come before it. Membership consists of:

- An independent chairman nominated by the Minister of Agriculture.
- A nominee from each of the following:

Minister of Science
Minister of Health
Minister for the Environment
Agricultural Chemicals and Animal Remedies Manufacturers' Federation of New Zealand
New Zealand Fruitgrowers' Federation
New Zealand Vegetable and Potato Growers' Federation Incorporated
New Zealand Agricultural Merchants' Federation
Wine Institute of New Zealand Incorporated
Federated Farmers of New Zealand Incorporated
National Beekeepers' Association of New Zealand (Incorporated)

- A Registrar who is an officer of Agriculture and Fisheries appointed by the Director-General of that Ministry.

Functions: The most important functions of the Board are to 'promote the prudent, effective and safe use of pesticides' and 'consider and determine applications for registration of pesticides'. This involves such major considerations as:

- effects of pesticides on the environment;
- control of the sale and use of industrial, public health, and domestic pesticides.

In addition to the above the Board is also charged with:

- promoting the undertaking of research into pesticide efficiency;
- disseminating information on pesticides;
- Training persons applying pesticides; and running voluntary registration schemes for that purpose.

Decision-making on pesticides is not an easy matter but critical inputs from Board members, together with information from technical advisors, ensure rational decisions are made.

Technical committees: The Board can appoint technical committees as required, to advise it on issues. Matters involving the use of pesticides are often complex and may require study by experts in particular fields.

Appointment to any such committees which may be set up would be based on the technical expertise of the persons, rather that their affiliation to any particular organisation.

Experimental Use Permits

Proprietors who wish to evaluate a new pesticide must first obtain an experimental use permit from the Board. The Board can grant such permits with the requirement that no product is to be sold, or it may permit a small quantity to be sold. This latter action would be taken where the Board considered a large scale trial would be desirable to obtain 'field evaluation'.

In addition, where a proprietor has a registered product (see below) and wishes to evaluate new uses for it, he must obtain an experimental use permit for each new use before he can begin trial work.

Registration of a Pesticide

Where the Board is satisfied that there is sufficient information on the toxicity, residues, and environmental effects of a pesticide, and that the proprietor has established the pesticide will do what is claimed on the product label, the Board can grant the material registration.

Unlike experimental-use permits, when a product is registered there is no limit on the amount that can be sold.

While data needs for individual applications for registration vary considerably, proprietors can be required to submit data that cover all the areas identified below. As a minimum, the details for the first three items must be supplied for every registration application (unless the information has already been furnished with an earlier application for an Experimental Use Permit):

- names and quantities of the active ingredients contained in the pesticide;
- details of the formulation;
- methods of analysis;
- chemical and physical properties;
- toxicity data;
- efficacy data;
- residue data;
- effects on the environment.

In granting a product registration the Board accepts a label that will contain such particulars as:

- name and address of the proprietor;
- trade name for the product;
- its registration number;
- the amount of active ingredient;
- claims for the product;
- how to use the product;
- precautions to be observed when using the product.

In addition the proprietor is sent a registration certificate that confirms registration by the Board.

Registration subject to restricted use/mandatory label directions:

On granting an application for registration the Board can impose a limitation that it be used only by persons approved by the Board. Such action could be taken when the pesticide was highly toxic or where it could have some adverse environmental effects.

The Board can also declare that some or all directions on any pesticide label are to be mandatory, ie that the users must apply the pesticide only in the manner directed on the label.

Review of registration:

The Board can call for a review of any registered pesticide if that pesticide:

- is no longer similar to that originally registered, owing to change in its preparation or manufacture;
- no longer conforms to standards for it;
- has been shown to have undesirable properties such as reduce efficiency, adverse environmental effects;
- is no longer being manufactured or imported.

The proprietor would be approached for its views and after so responding, the Board would decide whether to revoke the registration or allow the continuation of registration subject to any restriction.

Revocation (cancellation) of registration:

The Board can cancel registration if it receives information after the date of registration indicating the product is likely to:

- adversely affect the health of human beings, livestock, or wildlife;
- give rise to unacceptable residues in food;
- have substantial adverse environmental effects.

As part of this revocation the Board can direct a proprietor to surrender stock on hand at the time the revocation takes effect. On the recommendation of the Board, the Minister of Agriculture and Fisheries can prohibit the use of the pesticide for which the Board is considering revoking registration.

The Board is required to publish in the Gazette those pesticides for which registration has been revoked, with the grounds and effective dates of the revocations.

Pesticide Importation for "Own Use"

The Pesticides Amendment Act 1987 provides for individuals to import pesticides (without registration) for their own use. Such importations can only be made if the Board has issued an authority to import. Under the provision, the importer must seek and obtain the necessary authority from the Board.

Group schemes are permissible but each person in the group must seek (either individually or through a facilitator) approval to import the pesticide.

The Board, on granting an authority to import for own use must be satisfied that the pesticide:

- is of the same formulation type and contains the same active ingredients as a pesticide already registered under the Act;
- is to be imported from a country approved by the Minister of Agriculture;

• Has a label affixed to the container bearing the name and concentration of each active ingredient in English. The rest of the label can be in a foreign language.

The authority issued to import a pesticide for "own use" does not entitle the importer to either sell the pesticide or apply it for reward. Moreover, it is an offence against the Act to sell or apply the pesticide for reward.

Registered Chemical Applicators

The Board runs two voluntary registration schemes for users. One is for the ground applications of pesticides in agriculture/horticulture and related situations, the other for pesticide use in industrial and public health situations.

To qualify for registration a person must complete a course of study, pass written or oral examinations, and have had adequate practical experience in the application of pesticides.

The Board can cancel a person's registration certificate where it is satisfied the operator has been negligent or inefficient in the use of pesticides.

Controlled Pesticides

The Act contains provisions requiring persons who purchase and use certain pesticides to have a licence issued by the Board. The pesticides are detailed in the Act and include 1080, cyanide, and phosphorus.

These materials are all highly toxic pesticides which are used against vertbrate pests such as possums and rabbits.

Before the Board will grant and issue a licence to any person that person must have passed an examination, and have had practical instruction in the safe use of the material for which the licence is sought. The Board issues written material to candidates to enable them to gain sufficient knowledge to pass the examination.

The Board can cancel an operator's licence if it considers the person has misused a controlled pesticide.

1993 CONFERENCE

NATIONAL BEEKEEPERS' ASSOCIATION

Southland, July 19-22

Venue: Croyden Lodge Hotel, Gore.

NBA Seminar

We have yet to finalise speakers, but if you know of someone who should be heard, or a topic that may need to be addressed, please contact the Conference Secretary.

PROGRAMME

Monday 19th	Specialty Group Meetings. (Please contact the Conference Secretary to arrange your group meeting).
Tuesday 20th	NBA Seminar, 9am to 4.30 pm. Sponsors evening 7.30pm.
Wednesday 21st	Conference of Delegates from 9am. Partners' tour of Eastern Southland. Includes the chance for a flight in a Tiger Moth biplane. Conference "Function" evening. Gore is New Zealand's Country Music capital, so bring your western gear for a night of root'n toot'n fun.
Thursday 22nd	Conference all day from 9am.

COSTS

Yet to be finalised but expected to be similar to last year.

REGISTRATION

Please register early in June after the registration form is printed in the Winter edition of the NZ Beekeeper.

VENUE: Croyden Lodge Hotel, set in beautiful grounds including a 9-hole golf course next to the Gore - Queenstown highway.

If you are a prospective registrant, wish to be a sponsor, or to mount a trade display but have not yet been approached contact the Conference Secretary, Michael Lee, P.O. Box 5 Balfour, Southland. Telephone (03) 201-6345. Fax 201-6457.

It appears that in downtown Wellington, at least, bees are into Japanese motorcycles. Anyway, this swarm hooked itself on to the handlebars of this bike and the poor owner could not get near it. However, the cavalry was at hand in the shape of Frank Lindsay.

Classified Advertisements

Available only to registered beekeepers selling used hives, used plant, and other apiary equipment, and those seeking work in the industry. $17.50 for 20 words (inclusive of GST) payable in advance. No discounts apply. No production charges. Maximum size: 1/6 page. No box number available.

FOR SALE

BEEHIVES 65 2 story f/d on good sites Edgecumbe. Plus ¾ manly honey boxes. Other ancilliary equipment Ph (07) 3049576

400 hives hives, two high available. Delivered to North Island sites at $79.00 each plus GST. Supers available. Tel. (06) 329-9837.

For Sale. 9792 shares in the NZ HONEY PRODUCERS' CO-OP LTD. Tel. (03) 762-5809.

Personalised Number Plate 'UHONEY'. Excellent Plate for your business, as well as being a worthwhile investment. Make an offer. Ph (06) 877-5034

OTHER PUBLICATIONS

INDIAN BEE JOURNAL

International in appeal; keeps you update with beekeeping developments in India and the World. Publishes research on Asiatic Honeybees, tropical apiculture and pollination. Solicites your support and welcomes your subscription:

BEE CRAFT

The official monthly journal of the British Beekeepers' Association, covering all aspects of beekeeping in the UK. Annual subscription including postage $37 surface mail $69 air mail to Mrs S. White, 15 West Way Copthorne Bank, Crawley, West Sussex RH10 3QS. Our editor has advised that he has not received a copy of your journal for the last six months. Please could you arrange to resume delivery to him. His name and address are as follows:— Mr R. Young, 23 Beaconsfield Rd, Vincent Park, Sittingbourne, Kent ME10 3BD.

INTERNATIONAL BEE RESEARCH ASSOCIATION (IBRA)

What do you know about the INTERNATIONAL BEE RESEARCH ASSOCIATION? The many books and other publications available from IBRA will deepen your understanding of bees and beekeeping. An IBRA membership subscription — including BEE WORLD, a truly international beekeeping magazine published quarterly in the English language — will broaden your beekeeping horizons. Details and a wide selection of books and publications from New Zealand IBRA representatives, Cliff Van Eaton, MAF, Private Bag, Tauranga or Peter Brunt, Nelson Polytechnic, Private Bag, Nelson.

OTHER PUBLICATIONS

THE APIARIST

A New Zealand Beekeeping Journal. Published every two months. Contains informative and interesting articles on beekeeping in New Zealand and overseas. Subscriptions: Free to all registered beekeepers in New Zealand with six hives or more. $5.00 per annum, if less than six hives. Write to: The Editor, "The Apiarist", P.O. Box 34, Orari, N.Z.

SOUTH AFRICAN BEE JOURNAL

The leading bee journal in Africa for over 75 years. Official organ of the Federation of Beekeepers' Associations, published bi-monthly in English and Afrikaans. Primarily devoted to the African and Cape bee races. Subscription, including postage: R35.00 per annum, payable in advance in South African Rands. Apply: The Federation Secretary, PO Box 4488, 0001 Pretoria, South Africa.

AUSTRALASIAN BEEKEEPER

Senior Beekeeping Journal of the Southern Hemisphere. Complete coverage of all beekeeping topics in one of the world's largest beekeeping countries. Published monthly by Pender Beekeeping Supplies P/L, P.M.B. 19, Gardiner St., Maitland, N.S.W. 2320 Australia. Subscription by Bank Draft. $US27.00 surface per annum.

FARMING UNCLE

Magazine for homesteaders! Covering small stock, gardening, bees, and much, much more. Free information or $US8.00 one year ($US12.00 foreign). Money-back guarantee! Farming Uncle, ®, Box 91E92, Liberty, N.Y. 12754, USA.

THE SPEEDY BEE

Keep up with the latest in the United States beekeeping industry with reports of meetings and developments from The Beekeepers' Newspaper. Published monthly. $20.00 per year (mailed First Class). Write for air mail rates. The Speedy Bee, P.O. Box 998, Jesup, Georgia 31545 USA. Write for free sample copy.

OTHER PUBLICATIONS

SCOTTISH BEE JOURNAL

Packed with practical beekeeping. $4.80 a year from the Editor, Robert N. H. Skilling, F.R.S.A., F.S.C.T. 34 Rennie Street, Kilmarnock, Ayrshire, Scotland.

BRITISH BEE JOURNAL

Monthly — Single copies 22p plus postage. OVERSEAS: Annual subscription 4.20 sterling or $18.40 post paid. Keep up to date by taking out a subscription now from us at — 46 Queen Street, Geddington, Northans, NN14 1AZ, England.

GLEANINGS IN BEE CULTURE

Do you have questions or problems about beekeeping in different areas? Learn how to solve them by reading "Gleanings in Bee Culture", the largest circulation English language bee journal, and made up of articles by well-known professors and beekeepers, like yourself, who tell how they have succeeded in beekeeping. For Subscription rates write to: Gleanings in Bee Culture, P.O. Box 706, Medina, Ohio 44258, USA.

BEE WORLD

World renowned, world respected. A truly international beekeeping magazine published quarterly in the English language. Included as part of membership in the International Bee Research Association (IBRA), the world's leading charitable trust providing scientific and practical information on bees and beekeeping. For full details of IBRA services and membership contact: International Bee Research Association, 18 North Road, Cardiff CF1 3DY, UK. Tel: (0222) 372 409 Fax: (0222) 665 522 or New Zealand IBRA representatives, Cliff Van Eaton, MAF, Private Bag, Tauranga or Peter Brunt, Nelson Polytechnic, Private Bag, Nelson.

THE SCOTTISH BEEKEEPER

Monthly Magazine of the Scottish Beekeepers' Association. International in appeal, Scottish in character. Subscription rates from: D.B.N. Blair, 44 Dalhousie Road, Kilbarchan, Renfrewshire, PA10 2AT, Scotland, U.K. Sample copy on request — $1 or equivalent.

AMERICAN BEE JOURNAL

Subscribe now to the oldest bee magazine printed in the English language. Amateur, professional and scientific news makes ABJ an attractive buy for any beekeeper. World-wide crop and market page an outstanding feature. The American Bee Journal is the largest monthly apiculture magazine in the world. Enquiries to American Bee Journal, Hamilton 1U.62341 USA.

HONEY INDUSTRY TRUST

Honey Industry Trust applications close twice a year, on February 15 and August 15.

Application forms are available from the NBA, Box 4048, Wellington.

Applications will be considered within six weeks of receipt of recommendations from the NBA Executive.

PRICE LIST
AS AT FEBRUARY 1993

		Excl. GST	Incl. GST
BEE BLOWERS			
Spare Hoses	each	60.62	68.20
Spare Nozzles	each	13.82	15.55
BEE ESCAPES			
Porter or Round Plastic	each	2.62	2.95
	per 10	23.91	26.90
Round Galvanised	each	3.11	3.50
	per 10	28.00	31.50
Eight Way Plastic	each	4.18	4.70
	per 10	37.78	42.50
BEE ESCAPE BOARDS Complete			
Porter or Round Plastic Bee	each	6.53	7.35
Escape mounted in a Hive Mat	per 10	61.16	68.80
Round Galvanised Bee Escape	each	7.11	8.00
Mounted in a Hive Mat	per 10	65.33	73.50
Eight Way Plastic Bee Escape	each	8.44	9.50
Mounted in a Hive Mat	per 10	76.00	85.50
BOTTOM BOARDS			
Commercial Type	10	66.00	74.25
With tanalised bearers	100	600.00	675.00
Reversible Type	each	7.96	8.95
	per 10	76.18	85.70
BOOKS ON BEEKEEPING			
ABC and XYZ of Bee Culture - A I Root	each	73.33	82.50
Arthritis - Malone	each	28.66	32.25
Apiaries Act - May 1987	each	4.67	5.25
Beekeepers Handbook - Sammataro	each	51.11	57.50
Beekeeping Questions and Answers	each	29.69	33.40
Bees, Vision, etc - Frisch	each	29.55	33.25
Beeswax - Taylor	each	7.56	8.50
Contemporary Queen Rearing	each	38.67	43.50
Cookin' with Honey	each	6.93	7.80
First Lessons in Beekeeping	each	7.91	8.90
Hive and the Honey Bee	each	112.44	126.50
Honey Bee Brood Diseases	each	20.44	23.00
Honey Bee Colouring Book	each	1.78	2.00
Honey Bee Study Prints	per set	77.33	87.00
Honey for Health - Tonsley	each	8.44	9.50
Honey in the Comb	each	29.69	33.40
Honey Wines & Beers	each	28.86	32.25
Honey & Health	each	13.11	14.75
How to make Beeswax Candles	each	8.53	9.60
Life of the Honey Bee	each	6.93	7.80
Making Mead	each	19.38	21.80
Manual for NZ Beekeepers 1848	each	35.11	39.50
Nectar and Pollen Sources of NZ	each	3.51	3.95
Practical Beekeeping - Chapman Taylor & Davey	each	35.51	39.95
Truck Loading Code		15.07	16.95
Putting it up with Honey	each	23.96	26.95
Queen Rearing Simplified	each	21.33	24.00
The Honey Kitchen	each	22.67	25.50
The Wonderful World of Honey	each	22.67	25.50
Wall Cahrt - The Life Cycle	each	22.18	24.95
BRUSHES			
Holterman - Standard	each	12.67	14.25
Holterman - Long	each	14.44	16.25
CAPPINGS SCRATCHER	each	12.00	13.50

COMB FOUNDATION	Sheets per Kg approx	Kg per Carton	Price per Kilogram (Excl. GST)	Price per Kilogram (Incl. GST)
'Acron' Weed Process				
F.D. Medium Brood Carton Lot	17.5	*12.5	9.96	11.20
F.D. Medium Brood less than Ctn Lot	17.5	12.5	10.76	12.10
¾ Medium Brrod Ctn	23	12.5	9.96	11.20
¾ Medium Brood Kg	23	12.5	10.76	12.10
F.D. Thin Super Carton	26.5	16.0	1053	11.85
F.D. Thin Super per Kg	26.5	16.0	11.38	12.80
¾ Thin Super Carton	43	15.0	11.16	12.55
¼ Thin Super per Kg	43	15.0	12.09	13.60
H.D. Thin Super Carton	59	15.0	11.69	13.15
H.D. Thin Super per Kg	59	15.0	12.62	14.20
F.D. Seven Sheet Carton	15.5	13.5	9.82	11.05
F.D. Seven Sheet per Kg	15.5	13.5	10.58	11.90
F.D. Heavy Brood Carton	13.5	16.0	9.64	10.85
F.D. Heavy Brood per Kg	13.5	16.0	10.44	11.75

*F D M B is also available in 6Kg (100 Sheet) Carton

		Excl. GST	Incl. GST
DO BEES — 20cm Display			
Toy	each	17.73	19.95
Drip Trays — Plastic	each	10.67	12.00
	10	98.00	110.25
EMBEDDERS			
Electric Transformer complete with Leads	each	106.22	119.50
Spare Leads	each	11.51	12.95
Spur Embedder	each	11.11	12.50
EXCLUDERS - All wire with wooden frames (26 per Carton)			
1-9	each	13.11	14.75
10-49	each	11.47	12.90
50 and over	each	10.93	12.30
Unassembled 50 and over only	each	10.74	12.08
Extra Wood Frames for above	each	1.24	1.40
	per 10	10.40	11.70
	per 100	91.56	103.00
FEEDERS			
PLASTIC FRAME TYPE			
F.D. 8 litres and F.D. 5.5 litres	each	9.42	10.60
	10	85.78	96.50
	100	790.00	888.75
F.D. 3.5 litres and ¾ D. 4 litres	each	8.71	9.80
	10	79.20	89.10
	100	750.00	843.75
ENTRANCE	each	3.11	3.50
	10	29.78	33.50
FRAMES			
Hoffman Full Depth, Three Quarter Depth and Half Depth			
Section Frames Full and Half Depth, Manley Three Quarter Depth			
(100 per Bulk Carton)	10	9.33	10.50
	100	66.58	74.90
	1000	594.67	669.00

Note: Full Depth Hoffman Frames are supplied with Three Hole 33mm End Bars. Frames with Four Hole or 35mm End Bars are available on request at no extra cost

		Excl. GST	Incl. GST
FRAME PARTS Hoffman			
End Bars	100	15.64	17.60
	1000	142.20	160.20
Bottom Bars	100	15.07	16.95
	1000	137.11	154.25
Top Bars	100	28.27	31.80
	1000	256.44	288.50
FUMIDIL B			
0.5g Bottles	each	17.33	19.50
19.5g Bottles	each	124.00	139.50
GLOVES Leather Ventilated Beekeeping			
Small, medium, large, extra large	pair	39.82	44.80
HATS Ventilated Bee Helmets			
Woven Fabric	each	23.56	26.50
Moulded Plastic	each	23.55	26.50
HIVES			
Complete Two Storey Hive (A6)	each	91.11	102.50
HIVES MATS (22 per Carton)			
Hardboard with Wood Rim	each	3.96	4.45
	10	34.53	38.85
	100	310.67	349.50
Frames only for Hive Mats	each	1.42	1.60
	10	10.84	12.20
	100	100.89	113.50
HIVE STRIPPERS			
EMLOCK TYPE			
Complete with Galvanised Strapping	each	7.91	8.90
	10	75.11	84.50
	100	695.00	781.88
Without Strapping	each	6.00	6.75
	10	54.22	61.00
	100	510.00	573.75
Extra Galvanised Strapping	per lgth	1.24	1.40
	per kg	4.89	5.50
	50kg	195.00	219.38
NYLON TYPE			
Complete with Four Metres of Nylon	each	4.00	4.50
Strapping and Plastic Buckles	10	35.55	40.00
	100	320.00	360.00
HIVE TOOLS			
Fuller 10 Inch	each	8.44	9.50
Kelley 10 Inch	each	11.73	13.20
Maxant 10 Inch with Hook	each	20.09	22.60
HONEY CONTAINERS			
Cut Comb Boxes (250 per Carton)	each	69	78
	250+	58	65
140gm Clear Plastic Polyjars	each	36	41
with White Screw Caps	100	32.00	36.00
250gm Clear Plastic Polyjars	each	40	45
with White Screw Caps	100	36.00	40.50
500gm Clear Plastic Polyjars	each	40	45
with White Press On Lid	100	36.00	40.50
500gm Clear Plastic Polyjars	each	44	50
with White Screw Caps Square or Hex	100	40.00	45.00
1kg Clear Plastic Polyjars	each	80	90
Hexagonal with White Screw Caps	100	66.00	74.25
500gm Plastic Safe-A-Pak	100	26.22	29.50
Coloured with White Lids	1000	213.33	240.00
500gm Squat Clear Plastic	100	33.33	37.50
Safe-A-Pak with White Lids	1000	256.00	288.00
1kg Plastic Safe-A-Pak	100	44.27	49.80
Coloured with White Lids	1000	360.00	405.00
2kg Plastic Safe-A-Pak	each	84	95
Coloured with White Lids	200	149.33	168.00
2kg Pre-printed with New Zealand	each	95	1.07
Honey	200	167.11	188.00
6kg Plastic Safe-A-Pak	each	2.67	3.00
Coloured with White Lids	100	195.56	220.00
30kg Polypails Plastic	each	11.73	13.20
White with White Lids	per 10	105.78	119.00
HONEY CONTAINERS			
2kg Plastic Safe-A-Pale Pre-printed with "Pure New Zealand Honey"			
HONEY EXTRACTORS			
Lega Four Frame Stainless Steel			
Hand Driven	each	617.78	695.00
Ecroyd's Four Frame Plastic Hand Driven	each	400.00	450.00
Replacement Gears for Extractors			
- Nylon	per set	14.67	16.50
- Metal	per set	70.67	79.50
Clear Hinged Covers	per set	32.00	36.00
HONEY GATES			
CAST IRON THREADED			
60mm OD	each	53.24	59.90
75mm OD	each	61.33	69.00
IN-LINE BALL VALVES			
25mm ID		30.05	33.80
32mm ID		41.60	46.80
38mm ID		54.84	61.70
51mm ID		87.56	98.50
NYLON THREADED WITH BACK NUT			
47mm OD	each	21.69	24.40
60mm OD	each	31.56	35.50
HONEY LABELS			
"Pure Honey" 75mmx60mm	10	*1.07	1.20
	100	8.89	10.00
HONEY PUMPS			
Ecroyd's Gear Type	each	475.00	534.38
Honey Pump Unit Complete	each	POA	POA
Lega, 2000kg per hr, complete		1800.00	2025.00
Mono, Complete or Bare	each	POA	POA
HONEY STRAINERS			
28 Mesh Nybolt for Polypail	each	20.27	22.80
Nybolt strainer bags - made to order		POA	POA
HONEY REFRACTOMETERS			
Kikuchi or Atago (Price on application) approx		550.00	618.75
HONEY TANKS			
Plastic 30kg with lid			
and 47mm Honey Gate	each	33.42	37.60
Stainless Steel, with lid, gate and stand	50g	149.00	167.63
	100kg	199.00	223.88
	200kg	279.00	313.88
	400kg	499.00	561.38
METAL REBATES	pair	93	1.05
	per 100	39.07	43.95
MOULDS			
WaX Mould. Five Rectangular	each	6.93	7.80
Wax Mould. Six Hexagonal	each	13.78	15.50
Wax Mould. Three Hexagonal	each	13.78	15.50
Queen Bee Wax Mould	each	21.24	23.90
Candle Mould - Large Skep	each	20.18	22.17
Candle Mould, Hive	each	20.18	22.70
MOUSE GUARDS	each	1.73	1.95
	10	15.56	17.50
NAILS (Prices per kg)			
FLAT HEAD VINYL COATED			
12 x 1.0 per kg		17.33	19.50
12 x 1.0 25 kg Case		389.33	438.00
30 x 1.6 per kg		9.73	10.95
30 x 1.6 25 kg Case		222.00	249.75
40 x 1.6 per kg		10.00	11.25
40 x 1.6 25 kg Case		228.00	256.50
60 x 2.5 per kg		4.62	5.20
60 x 2.5 25 kg Case		93.78	105.50
FLAT HEAD GALVANISED			
50 x 2.5 per kg		7.82	8.80
50 x 2.5 25 kg Case		163.56	184.00
60 x 2.5 per kg		5.87	6.60
70 x 2.5 kg Case		121.33	136.50
60 x 2.8 per kg		4.80	5.40
60 x 2.8 25 kg Case		97.33	109.50
NUC-BOXES			
Galv Entrance Disc	each	1.42	1.60
	10	11.82	13.30
Wooden Five Frame Box and Bottom	each	12.00	13.50
no Roof	10	115.56	130.00
OVERALLS			
White Cotton or Polycotton, Zip Up Overalls, Sizes 5 to 12			
Firsts	pair	48.00	54.00
P.D.B. (Paradichlorbenzene) Wax Moth Exterminator			
1 kg	each	7.11	8.00
2.5 kg	each	16.40	18.45
25 kg Bag	each	132.89	149.50
PARAFFIN WAX			
28 kg Carton	per kg	3.11	3.50
Less than Carton Lots	per kg	3.73	4.20
POLLEN TRAPS	each	60.89	68.50
PRICKER			
Revolving for use with Thioxotropic Honey	each	190.00	213.75
QUEEN REARING MATERIALS			
Jenter Complete Unit including 100 Plugs, 100 Cups, 90 Cup Holders and Pre-Dawn Comb	each	124.00	139.50
Jenter Extra Plugs	per 100	15.73	17.70
Jenter Extra Cups	per 100	15.73	17.70
Jenter Extra Cup Holders	per 50	15.73	17.70
Jenter Queen Clamp	each	18.00	20.25
Plastic Cell Cups	each	.15	.17
	per 100	13.24	14.90
Bozi Cell Cups	each	.15	.17
	per 200	25.07	28.20
Bozi Cell Bars	each	1.60	1.80
Chinese Grafting Tool	each	5.78	6.50
Grafting Brush 000, Sable	each	5.42	6.10
Grafting Brush 000, Synthetic	each	4.27	4.80
QUEEN CAGES			
White Two Piece	per 10	4.49	5.05
	per 100	40.80	45.90
Brown One Piece	per 10	4.00	4.50
	per 100	33.73	37.95
RATCHET TIE DOWNS			
25mm, Five Metre, 1200 kg	each	24.00	27.00
50mm, Six Met4re, 2000 kg	each	52.80	59.40
50mm, 8.5 Metre, 2000 kg	each	57.60	64.80
ROOFS (10 per Carton)			
Without Iron	each	8.98	10.10
	per 10	88.44	99.50
Iron Only	each	6.67	7.50
	per 10	60.00	67.50
Plastic Roofs	each	14.66	16.50
	10	133.33	150.00
Tin Roofs	each	10.40	11.70
	10	84.00	94.50
	100	790.00	888.75
SCRAPERS			
Wooden Handles with Metal Blade			
Four Inch	each	13.29	14.95
SECTIONS Fine Sawn Finish			
With Foundation Slit	100	23.91	26.90
	1000	198.67	223.50
	10000	1805.78	2031.50
Without Foundation Slit	100	21.78	24.50
	1000	178.80	201.15
	10000	1625.78	1829.00
SEPARATORS	each	.53	.60
	100	45.24	50.90
SMOKERS			
80mm Galvanised	each	33.33	37.50
100mm Galvinised with Shield	each	41.24	46.40
80mm Stainless Steel with Shield	each	48.27	54.30
100mm Stainless Stell with Shield	each	50.58	56.90
Replacement Bellows - Lega	each	21.24	23.90
- Dadant	each	35.11	39.50
STICKERS			
Lega Bee 100mm	each	.53	.60
	10	4.44	5.00
Lega Bee Large	each	3.38	3.80
STINGOSE			
Spray-on Lotion to minimise swelling from stings and bites	each	6.18	6.95
STOREYS			
LOCK CORNERED ¾ Inch Rebates (Metal Rebate required)			
Full Depth 1.9	each	11.51	12.95
10-49	each	11.07	12.45
50 and over	each	10.04	11.30
COMMERCIAL TYPE with Half Check Corners and ½ Inch Rebates (¾ Inch Rebate available on orders of 50 and over)			
Full Depth 1-9	each	9.73	10.95
10-49	each	9.02	10.15
50 and over	each	8.22	9.25
Three Quarter Depth 1-9	each	8.09	9.10
10-49	each	7.56	8.50
50 and over	each	6.89	7.75
Half Depth 1-9	each	6.53	7.35
10-49	each	6.18	6.95
50 and over	each	5.56	6.25

Note: Metal Rebates EXTRA, if required, on ALL Storeys

		Excl. GST	Incl. GST
TOGGLE CLAMPS			
For Wiring Boards	each	34.67	39.00
UNCAPPING EQUIPMENT			
24 foot Heat Tape	each	112.00	126.00
Electric Uncapping Knife	each	146.67	165.00
Steam Heated 10 Inch Knife	each	65.33	73.50
Plain Medium Duty Knife	each	29.96	33.70
Steam Hose	per metre	4.89	5.50
VEILS			
Standard Wire Mesh	each	11.78	13.25
Woodman Wire Mesh	each	12.67	14.25
Round Plastic Mesg	each	14.67	16.50
Hood, Long Sleeved	each	74.22	83.50
Suit, One Piece, Sizes Five to 12	each	101.33	114.00
WASP KILLER			
250ml Bottles, No Wasp	each	12.00	13.50
100g Jar, Carbaryl	each	7.02	7.90
Two kg Box Carbaryl	each	68.44	77.00
WICK - per metre	each	.45	.50
per roll (approx 100m)	each	35.11	39.50
WIRE 0.46mm Galvanised Frame Wire			
200g Reels	each	4.40	4.95
400g Reels	each	7.56	8.50
3.0 Reels	each	39.11	44.00
WIRE CRIMPER			
Plastic	each	22.04	24.80
Spare wheels for above	pair	7.56	8.50

NOTE: Freight or postage is additional to the above prices.

Ecroyd Beekeeping Supplies

P.O. Box 5056, Papanui, Christchurch Telephone (03) 358-7498, Fax (03) 358-8789
26B Sheffield Crescent, Burnside, Christchurch, New Zealand. Hours 8.30am-5.00pm Monday - Friday