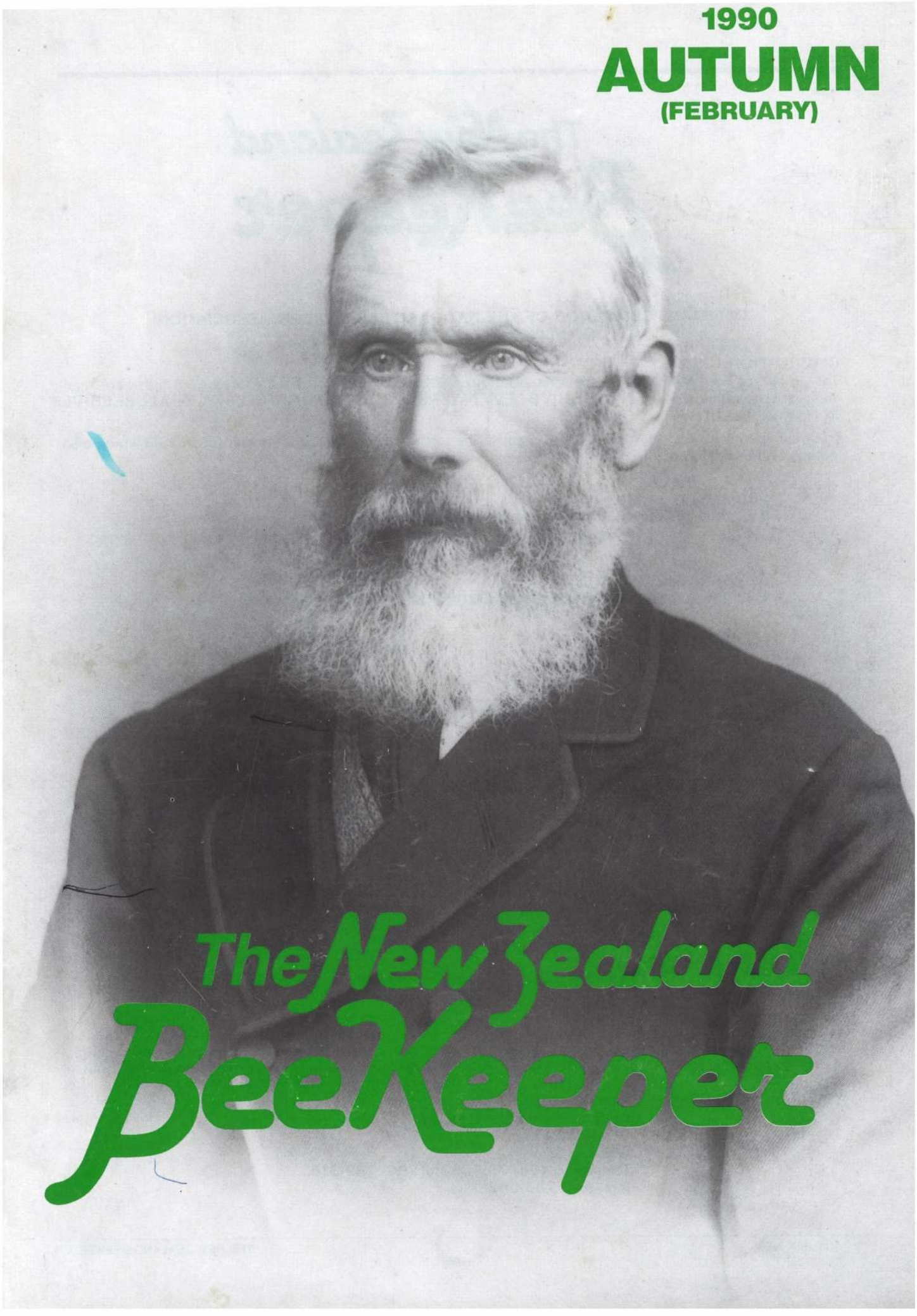
1990

AUTUMN

(FEBRUARY)



The New Zealand Bee Keeper

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 $22.00 a year (incl. GST) which also includes membership of the National Beekeepers' Association of NZ Inc.

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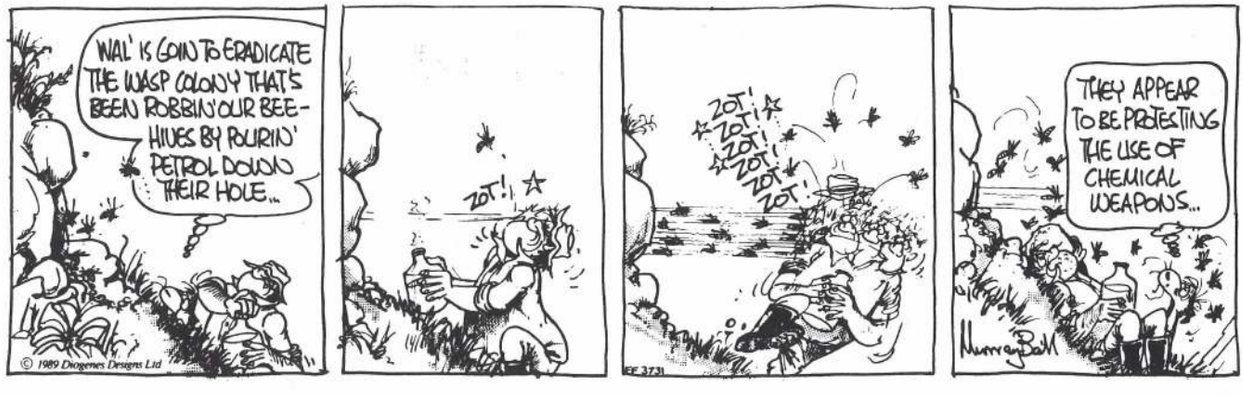

FRONT COVER: Charles Shearer, an early West Coast beekeeper.
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Wham, bam, thank you Sam

From Ham Maxwell

A recent visit to a fieldday saw a collection of beekeepers, young and old, newcomers and stalwarts, all eager to hear the visiting speaker give forth with his thoughts on raising queen bees. Despite the bad weather, the initial bad start, which left many unable to hear properly, the information imparted by the guest was one of the most freely forthcoming dissitations heard by this beekeeper. The speaker started with a backgrounder, then led into the development of his interest in queen rearing, and the subsequent trials which had been undertaken. The talk moved on to cover the methods presently used by queen breeders. The ideas and motives advanced in regard to nutrition of the queen brood were absorbing, the facts on the measured increases in body weight of new queens enlightening, and the promulgation of this one beekeepers' methods fascinating. The very fact of support from the NBA served well to underline the importance our industry places on bettering queen production.

Now here were something like forty individual beekeepers hanging on to every word. These people were there to learn, and eager to glean information. The fact that information was so freely forthcoming, particularly in response to questions, was most gratifying. If only all speakers were so willing to pass on information so freely, how much benefit would accrue in this industry of ours. Not everyone was there to establish his or her own queen breeding outfit: far from it. By being able to understand the difficulties experienced by queen breeders, realising that some breeders at least are endeavouring to improve the quality of queens must hopefully lead to more tolerance. In turn, the expectations of the end users, the beekeepers, will be more realistic, and more support for those prepared to venture into the tricky world of queen raising will be forthcoming.

To some, the ideas promulgated may not be radically new. Been there, done that! To others, their thinking may have been completely turned round. Still others may wonder at the lack of genetic appreciation in the studies described. To each his own, 'tis said; but by attending the field day, by listening, by discussing with other beekeepers the factors presented, this session will have, in its own small way, advanced the industry. In future, when ordering queen bees, many will hark back to this field day, and begin to seek more information from the breeders, before ordering.

What do we really know about the quality factors possessed by our queen stock? We do know that random mating techniques are still the mainstay of the queen breeding industry. Sure, there has recently been a more scientific approach adopted, the results of which are yet to be seen.Will you or I be able to take advantage of this? Hopefully we can. By persistently asking our queen breeders for information on the quality of their stock, we should finish up better informed. That to date few queen breeders have seen fit to publish information regarding their stock is disquietening. Do they know? Why is it that so much supercedure is found in stocks of queen bees exported? Do they know?

When an advertisement says stocks have been carefully selected for this and that, do they know by other than rule of thumb?

Those who have suffered the results of accepting, in blind faith, the claims of our queen breeders, will certainly welcome new approaches and interest in the science of queen breeding. Stories abound of sterile queens, cages arriving minus queens, queens being superceded after introduction to the hive, queens proving totally inadequate, queens throwing a strain of bee so vicious that they are unpleasant to work, queens which simply give up the ghost and snuff it over the winter. To this

chronicle you too may be able to add your own pet peeve. To add to injury, the unfeeling response from the queen breeders when their customer acquaints them with what has occurred adds further weight to the needs for a more scientific approach by the breeders. Add to that a better understanding of marketing methods.

A beekeeper of long standing recently remarked that he was no longer able to express confidence in the ability of queen breeders to supply him with stock to meet his needs. He wanted a strain of bee which would be quiet and easy to work, he never wore a veil or used a smoker. Come to think of it he wore only shorts and jandals in summer when working the hives. He recently had supercedure of queens, something he was unused to. His supplier brushed him off by saying he could not have introduced the queen "properly". Be careful when you tell a beekeeper of over thirty years experience what to do. The laying patterns of some queens was spasmodic, to say the least. His supplier saw fit to tell him that it was normal for a few cells to be missed here and there. His last queen stayed for a brief visit, then took off — with some bees of course. He was still waiting for her to return on my last visit, and commented that she must have been crossed with a carrier pigeon!

Now it is time to really study the stocks we employ. Not only from the genetic base, but also for nutrition, temperament, productivity and reproduction. Are we best served by the current wham, bam, thank you Sam, mating methods? Is our breeding industry going downhill without any thought of the consequences of failing to meet customer needs? Show me a queen breeder who is prepared to scientifically improve the breeding stock and that's where my money will go. The fact that the cost of the queens will rise is hopefully to be offset by the increases in production from the hive. A doubling of today's prices will be tolerable if a noticeable improvement in performance can be guaranteed by the breeder; and it will be necessary for the breeder to supply a guarantee. Any business supplying stock from stud lives or dies by its reputation in the industry. Quality stud stock in sheep and cattle carries a premium price, along with a guarantee of results. Sterility automatically assures the purchaser a refund.

Those electing to supply guaranteed breeding stock to beekeepers will have to align their thinking with that of other stud stock suppliers. Beekeepers for too long have meekly accepted that which has been doled out to them. Questions remain unanswered, in fact are unwelcomed by breeders in today's market. That the export market has seen fit to question the viability of the queen stock shipped overseas is indeed a welcome start, but why did the local market remain passive for so long in this regard? The move to introduce new strains of bees simply by-passed the questions being asked about our current breeding stocks.

So roll on the day when a queen breeder will make the marketplace ring with an announcement of guarantees with stocks supplied, backed by a proven record of scientific research. Until buyers start demanding better things from our queen bee breeders and back up these demands by a willingness to pay a premium price, the current stagnation will continue. The remedy is in our hands. Breeders need buyers support, buyers need breeders support. The formation of a mutual admiration society would not go amiss.

Dear Sir,

NZ's national honey consumption is one teaspoon per human per **YEAR.** That's exactly half the national honey crop. Therefore can't it be seen that only a teaspoon of advertising needs to be done to increase it to two teaspoons? Then that's it, bingo the national honey crop is consumed.

Then why the hell try and introduce another rip-off and unnecessary tax (for honey advertising) which beekeepers cannot afford to pay anyway?

NZ has only got to increase its consumption a fraction per annum and then look out its imports. We all know what that means for bee diseases. So hang on a minute please. Please DON'T do any advertising.

The national honey crop and consumption is pathetic and it just shows up how much of a corrupt grip the animal murder farmers have over these islands. Propped up again and again by consecutive and ignorant governments who are too gutless to step in and dictate environomic land use to the animal and soil murder so called "farmers".

It's time the NZBA spent time directly assuring the government into taking ACTION by destocking ALL waterways, marginal forest lands and degrading environmental farm practices which affect us **ALL.**

This can also be achieved by introducing the gradient act on hill and high country through the criminalisation of overstocking, and burn-offs. Make these criminal acts illegal.

Let's face it, when you look closely at NZ's clean, green image, underneath it's actually riddled and pock marked with scars of brown erosion and etc.

Introduce at least 10 cents/litre on all fossil fuels at the pumps. This goes directly to the National Tree Nursery Account which can be used to foster and establish deciduous coppice lots, seed banks, land and tree nurseries for propagation for replanting damaged catchments, forests, mountains, hill and high country erosion zones.

Repeal the so called "Noxious Plants Act." Dissolve the Noxious Plants Boards and scrap the use of **ALL** laboratory chemicals, defoliants, herbicides and insecticides which are now proved to be deadly in many ways. For example, beehives that miss out on gorse at early spring build up are not strong enough to pull in an actual crop of dandelion and willow. So we **ALL** miss out on this delicious honey. Can't the NOXIOUS BOARDS see how delicate the environmental web actually is? As a result of THEIR laws, the honey crop is dramatically reduced AND highly likely to be polluted.

This outlines some facts as to why the national honey crop is **pathetic.**

Beekeeping directly reflects the state of the environment.

B. King
Blenheim

Dear Sir,

Could you please provide me with information as to where advice may be obtained in order to acquire or build a few hives for a small farm lot.

I look forward to hearing from you.

Yours faithfully,

John R. McAleese
c/o Feilding Intermediate
East Street
Feilding

Would a local beekeeper care to get in touch with John? Editor

Bryan Evans, VSA volunteer in the Solomon Islands

Bee-keeping is an underutilised craft in the Solomon Islands. A Kiwi apiarist currently working there with Volunteer Service Abroad wants to change that. Bryan Evans of Great Barrier Island thinks that the honey industry has a lot of potential, both to increase the income of rural villages and to boost the national coffers as well.

Of Welsh background, Bryan built up his own beekeeping business before making his home in Great Barrier. His yearning for new challenges led him to the Solomons, via VSA.

There he is involved in a project to revitalize local bee-keeping and produce appropriate equipment for local conditions.

Bryan Evans promoting the honey of the Sunshine Islands.

Bryan Evans, bee-keeper, at work, producing a valuable resource for the Solomons.

Observations on queen weight

By Reg Clarke

Summary:-

This study analyses the weights of 204 young queens from nucleus colonies, and 72 queens of various origins and ages from full strength colonies. The objectives were to study the influence of the queen mother on daughter weight, to compare grafted queens with emergency queens, and in mature queens from full strength colonies, to study the influence of origin (swarm, supercedure, and grafting) on weight.

INTRODUCTION

This Spring I have weighed as many queens as opportunity allowed. This was primarily to determine the value of weight recording as a breeding tool, and partly as a guide to breeding progress. A better understanding of the way weight is influenced by various factors will also prove useful in interpreting published data on queen physiology. The results in general confirm what is already known, but there were some unexpected results.

As most beekeepers will have noticed, the size (and weight) of a queen varies widely in response to seasonal factors. Queen weight can be conveniently regarded as having two components: the first being related to physiological size is relatively constant, and the second reflects the activity and weight of the reproductive organs and fluctuates widely and rapidly according to environmental conditions. This should not surprise us, as at 1500 eggs a day, the total egg weight is 50% to 75% of the queen's weight, and can only be sustained by an equal or greater food intake.

This variability reduces the value of weight as a breeding tool. However, it is the only measure we can conveniently get from a live queen. So I try to make full use of it, while recognising that caution is needed in dealing with so elastic a quality. Weights were taken on electronic laboratory scales, accurate to one milligram. As the queens were not anaethetised, their movements have reduced accuracy to plus or minus 2mg.

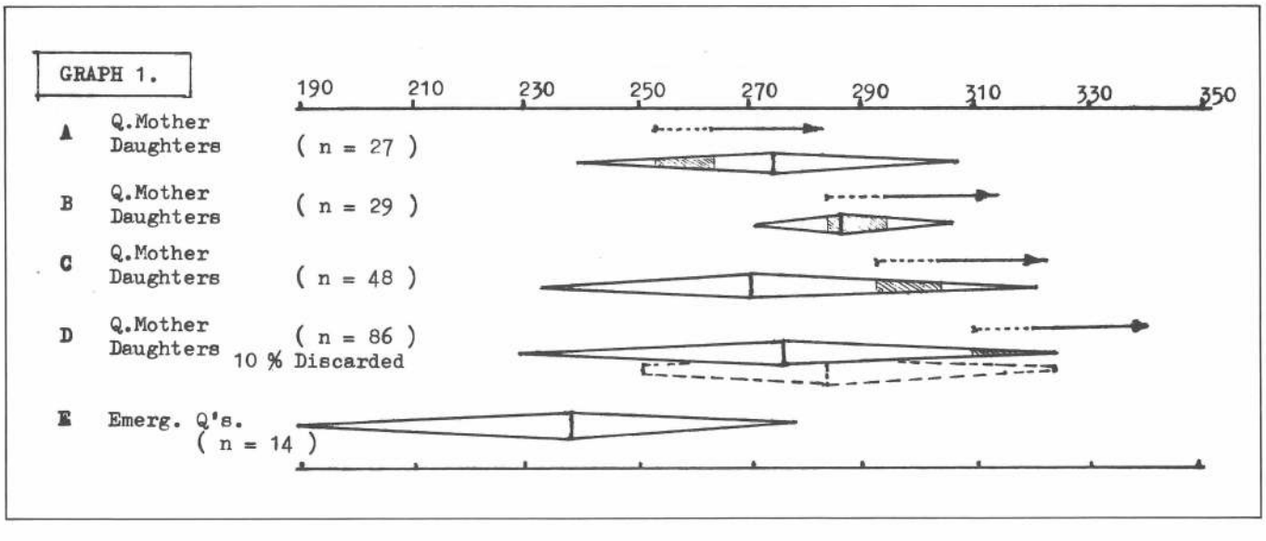
INFLUENCE OF QUEEN MOTHER ON PROGENY WEIGHT. Graph 1

The data shown in graph 1 was collected during the Spring of 1989, and shows the relationship between the weight of mother queens and their daughter queens. It also gives the weights of all emergency queens identified, for comparison with grafted queens. The spindle shaped symbol shows minimum, mean and maximum weights of young queens five to 10 days after the start of egg laying. (recorded one to four hours after caging). The nucleus colonies used have 3 3/4 size langstroth frames. The arrow symbol gives the queen mother's weight at its pointed end; the values shown are the highest of several checks and were recorded within five minutes of caging. As these queens headed expanding colonies filling 1 1/2 to two full depth boxes, the weight is probably the maximum attainable by those queens. In contrast, the weight of young queens was limited by the reduced egg laying space in nucleus colonies. To illustrate the probable range of this differential the arrow tail is extended backward over 20 to 30 mg. Reading from the tail of the arrow will give a better idea of the probable relationship between mother/daughter weights, were their colonies of equal size.

Queen Mother A. Three years old, of dark colour and believed to be hybridised with A.m. mellifera. Old age may have reduced her weight, as the mother/daughter relationship of this queen is markedly different to the others depicted. Data is from a single batch.

Queen Mother B. A young queen, instrumentally inseminated with semen from a single drone, and supplied courtesy of David Yanke of Daykel Apiaries, whose expert assistance is gratefully acknowledged. She is untested for production and is used only to obtain closely related (full sister) experimental queens. Close observation of this queen has provided a convincing demonstration of the value of single drone I.I. in stock improvement, as in addition to her very quiet temperament the brood pattern and brood viability are exceptionally good. As might be expected in such closely related queens, the range of weight variation is much reduced. Note that the mean weight (286mg) is the highest of any group tested, despite the queen mother being lighter than C or D. Data is from a single batch.

Queen Mother C. A 1987 queen selected on her excellent production



record. Of Italian character, but 10% of progeny show some hybridisation, which probably depresses mean daughter weight slightly. Data is combined from four batches.

Queen Mother D. A 1988 queen, that gave exceptional production in the 1988/89 season. She has good character traits, and breeds true to Italian type. The dotted symbol shows the effect on mean weight of discarding those queens within 10% of the minimum weight. This eliminated 18% of the queens, but even so the mean weight is below that attained using the inseminated queen mother B. Data is combined from six batches.

Emergency Queens. These were queens raised by nucleus colonies following failure of the introduced cell. Only a few were of good weight; of these two were from a hive that showed strong hybrid vigour, and aggressive temper. The low average weights and unreliable parentage are two good reasons for discarding all emergency queens.

OTHER INFLUENCES ON QUEEN WEIGHT. Graph 2

This graph shows the weights recorded for queens taken from full strength colonies, according to their origin. Data from Spring and early Summer, 1989. Queens were weighed within one to four hours of caging.

Line A. Queens originating from natural supercedure in 1987 and 1988. The group included good queens and a number of very small inferior queens; hence the wide range of values. Many of these colonies were of hybrid ancestry and uncertain temper, some of which had rejected introduced queens.

Line B. Queens from hives which swarmed in 1987 and 1988. The sample size is smaller than desirable, but weights are almost identical to those in the larger sample in line C below.

Line C. Swarm queens of the current season, removed and weighed one to two weeks after starting to lay. They are mostly derived from the 1987 population.

Line D. Queens from grafted stock, 1987. The sample size is too small for reliability. This is a remnant population of which inferior queens have been replaced, and the most vigorous have swarmed. A few exceptional queens appeared in that population, and the two selected for breeders have had a major influence on later generations.

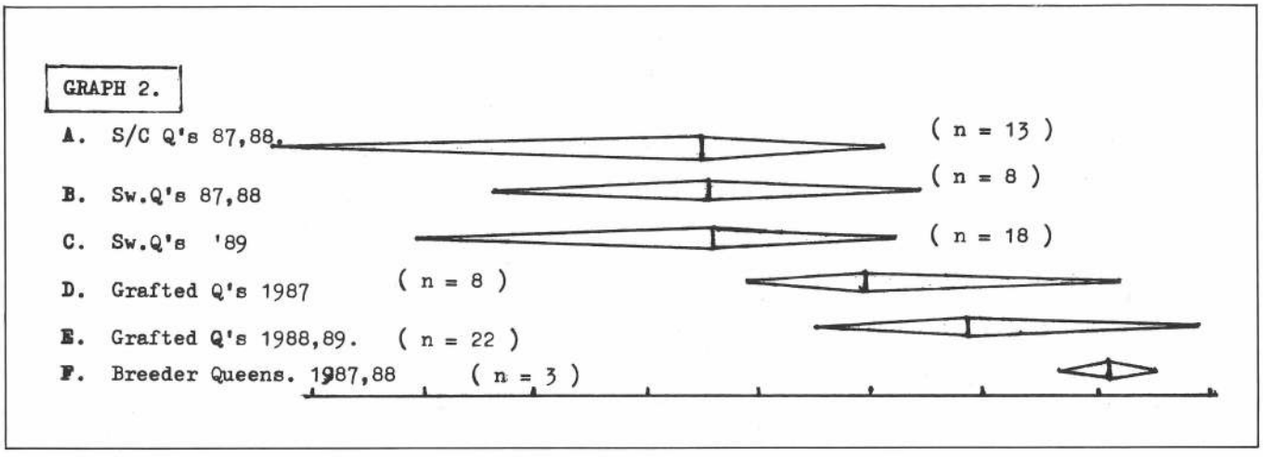
Line E. Grafted queens from Spring 1988 and Autumn, 1989. Note the marked increase in weights.

Line F. Weights for three top breeder queens. They were selected on honey production, not weight: the two 1987 ones are the mothers of about 50% of the queens in line C. Two of them also appear in Graph 1, lines C and D.

RESULTS AND DISCUSSION

The data so far accumulated on factors related to queen weight points to a number of interesting conclusions:-

1. Old declining queens can still produce high weight daughters.
2. There appears to be a relationship between mother queen weight and mean daughter weight, suggesting that weight is partly an inherited characteristic.
3. In all batches of daughter queens there is a small percentage which is heavier than the mothers when an adjustment for the effect of different colony size is made.
4. There appears to be a racial component to weight, with black queens (A.m.mellifera) being the lightest and those most true to Italian type the heaviest. Hybrids are on average of intermediate weight. Since this black component comes from unselected feral stock, it does not indicate the true potential of the dark races of their hybrids in the hands of a skilled breeder.



5. Under local conditions (Marlborough, NZ), Italian type bees generally outproduce others, and for the last three years no queen of supercedure, swarm or hybrid origin has equalled the production of grafted queens in my apiaries.
6. Supercedure queens show a wide weight range, but on average are very similar to swarm queens. Age differences do not appear to affect weight so long as the queen is able to maintain egg laying rate.
7. The mean weight of grafted queens is markedly heavier than that of swarm or supercedure queens. This is contrary to the finding of some other authors, but may be partly due to the greater readiness of darker (hybrid) bees to swarm or supercede, and partly to the influence of selected breeding stock and improved production technique.
8. The weight of queens in nucleus colonies varies widely according to bee numbers and comb space, and this must be allowed for when assessing the potential of an individual queen. The differential is about 30mg between full combs and empty, with a further 20mg gain likely when transferred to a full size colony. For caged queens introduced to large colonies, gains of 80 to 100mg over eight days have been recorded.
9. Instrumental insemination seems to offer a route to high mean queen weights, with the disadvantage that it is necessary to use a virgin queen of unproven production capability.

CONCLUSIONS

Queen weight recording or sampling is a usefull tool for the queen producer, supplementing but not replacing the experienced breeder's eye appraisal. High weight is only one desirable quality among many, but it is closely associated with high ovariole number, sperm volume, and high productivity.

Breeding stock should be selected on performance rather than weight, but this study suggests that the best breeders are likely to be found among queens of the highest weight. Overseas data on Italian queens suggests that weights over 400mg are possible, but may not be attainable without a closed population breeding programme.

The average queen weight of a given population (and by inference its average production) can be increased considerably by eliminating all low weight queens. Firstly, discard queens within about 10% of the minimum weight, and all emergency queens. Secondly, replace all supercedure and swarm queens with grafted stock of selected parentage.

OBITUARY — HARRY CLOAKE

(Courtesy The Apiarist)

It is with sadness and a great deal of respect that we record the death on Friday 18 August of Harry Cloake of Fairview, South Canterbury. He was 74.

Harry was a man of great strength and stamina and was not one for giving up easily. This was certainly borne out in his remarkable seven year battle against cancer through which he showed great courage and willpower. A typical example is Harry turning up at a West Coast field day after one of his many stays in Christchurch Hospital, after which most people would be convalescing at home.

Throughout his illness Harry spoke openly about it and was not afraid to face up to the reality of his situation.

Harry was a former President of the National Beekeepers Association and a Life Member, Deputy Chairman and Board Member of the N.Z. Honey Marketing Authority. He was a founder member and a driving force behind the establishment of the N.Z. Honey Producers Co-op on which he served as a director and vice chairman.

Harry attended many conferences and always had a great deal of positive input. He had a great presence when he spoke and will be remembered for his wonderful ability to state a complicated case clearly and succinctly in terms which all could understand. Harry was also a no nonsense man and called a spade a spade and fought vigorously for what he believed in.

Harry was born in South Canterbury and spent his early childhood in the McKennzie Country before his family moved to their Springbrook farm where he attended primary school before going to Timaru Boys High School. While at high school Harry performed with distinction in athletics and held titles and provincial records in shotput, hammer throw and discus.

On leaving school he worked on various farms around South Canterbury for about ten years before joining the N.Z. Police Force in 1939. Harry served in Wellington and then on the West Coast where according to Harry 'a stern word and a good boot in the seat of the pants' was the accepted remedy for minor transgressions of the law. This is where Harry, through a twist of fate, narrowly missed involvement in the Stanley Graham affair in which several of his colleagues lost their lives.

continued on page 20

A Chemical Procedure for the Characterization of New Zealand Thyme and Willow Honeys

Seng To Tan (A), Alistair L. Wilkins (A), and Murray Reid (B)

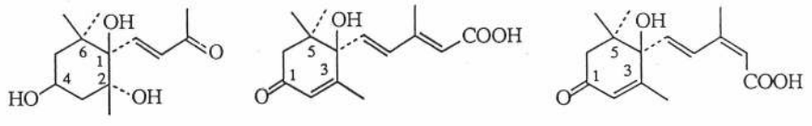
(A) Chemistry Department, University of Waikato, Private Bag, Hamilton

(B) National AAO, Ministry of Agriculture and Fisheries, P.O. Box 14-061 Enderley, Hamilton

In previous issues of this and other journals we have demonstrated[1,2,3,4] that the floral source of some New Zealand unifloral honeys can be reliably determined from gas chromatographic (GC) analysis of the non-carbohydrate substances present in the ether extracts of the honey sample. Our approach appears to represent a plausible alternative to floral source identification by pollen analysis, especially so for honeys such as heather and thyme honeys which exhibit low pollen counts[5]. Alternative procedures for the verification of floral source have been sought for sometime by regulatory authorities.

We have shown that while only low levels of non-carbohydrates extractable organic substances are present in the ether extracts of New Zealand clover *(Trifolium repens)* and rewarewa *(Knightia excelsa)* honey samples, substantially higher levels of extractable substances are present in the ether extracts of ling-heather *(Calluna vulgaris)* and manuka *(Leptospermum scoparium)* honey samples. The ling-heather honey extracts included a series of substances, which because of their apparent relationship with carotenoids (a class of pigments found in plants such as carrots), are usually described as degraded carotenoids.

In an extension of our work we have determined the gas chromatographic profiles of the non-carbohydrate organic substances present in some thyme and willow honey samples (see Figures 1 and 2). These profiles were found to be different from those presented previously[1,2] for clover, rewarewa, manuka, and ling-heather honeys. The dominant substance occurring in thyme honey extracts was shown by X-ray crystallographic analysis[6] to be the degraded carotenoid trihydroxyketone (1) (peak 206). Different degraded carotenoids, in the main *trans-trans*-abscisic acid (2) (peak 214) and *trans-cis*-abscisic acid (3) (peak 222), were found in the ether extracts of a willow honey sample. *Trans-trans*-abscisic acid is a well known plant growth inhibitor hormone; the production of this substance in elevated levels during early autumn initiates leaf shedding in woody plants.



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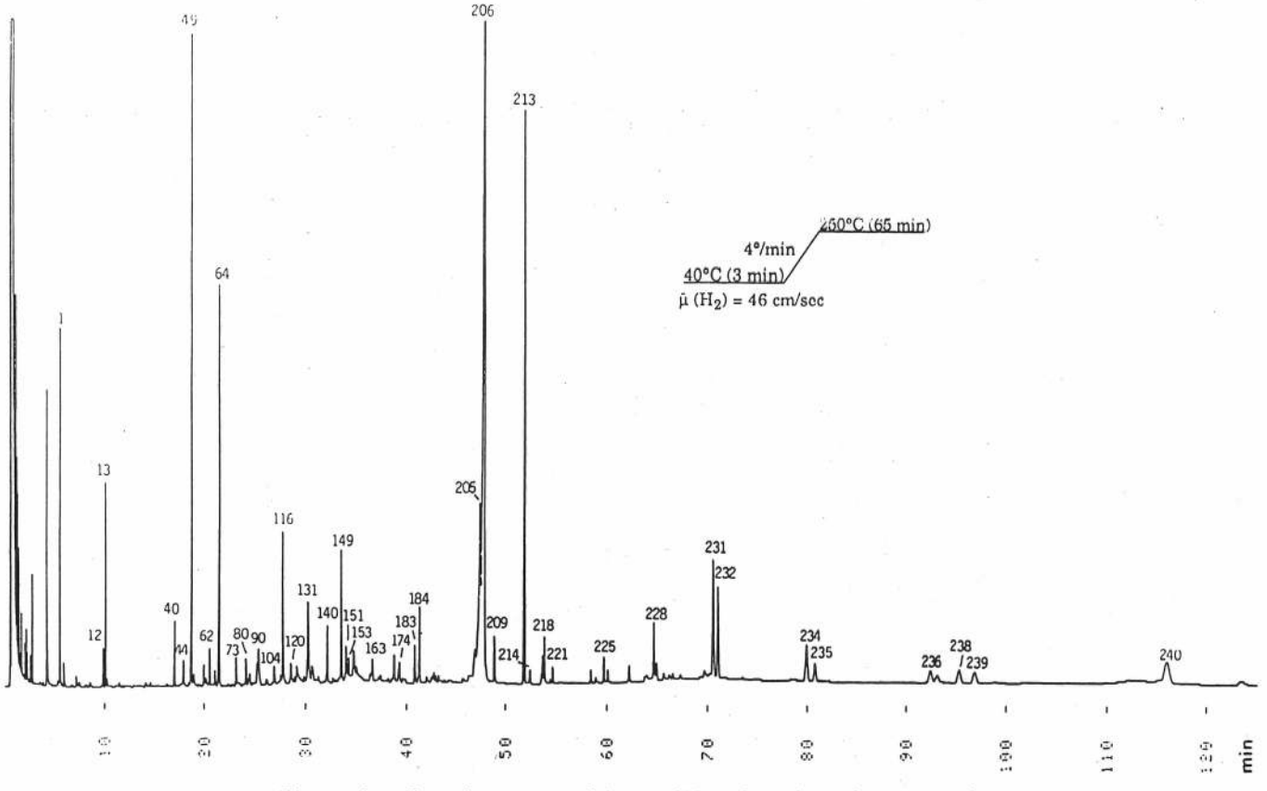

Figure 1. Gas chromatographic profile of a thyme honey sample.

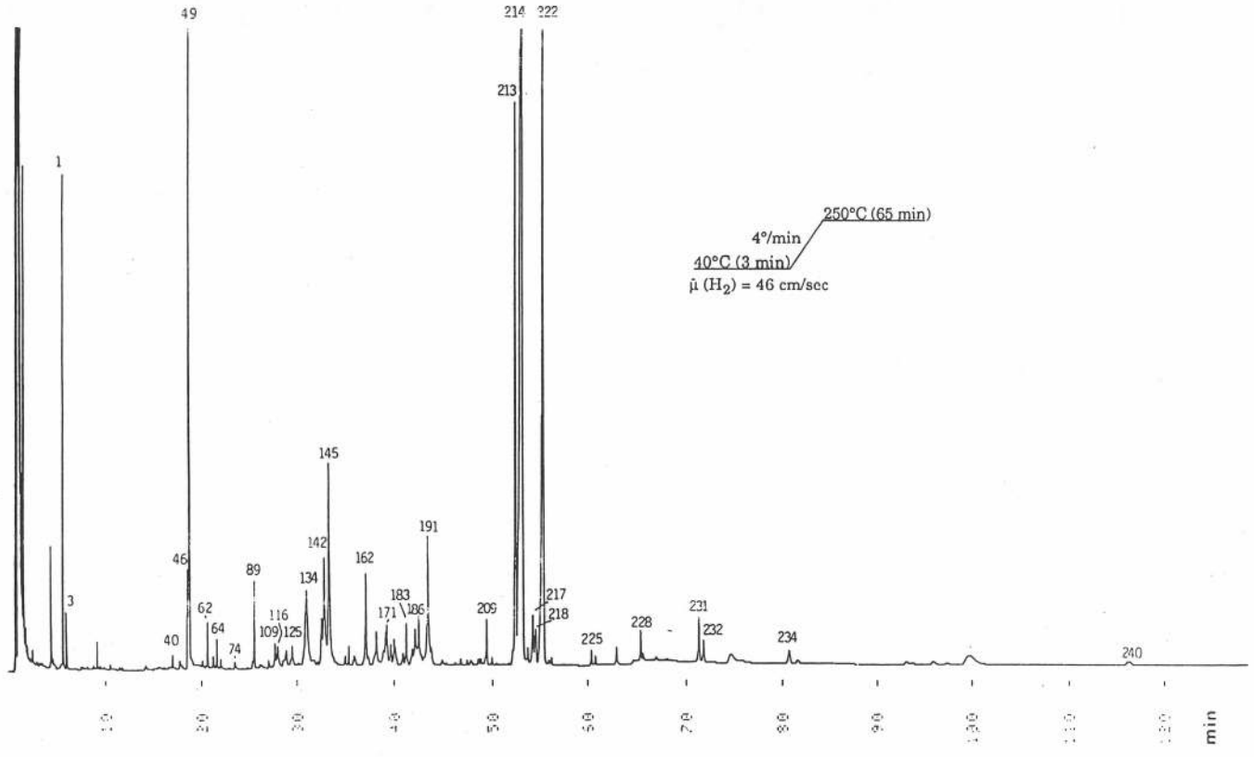

Figure 2. Gas chromatographic profile of a willow honey sample.

We have examined the extractives of more than two hundred New Zealand honey samples and found the occurrence of the trihydroxyketone (1) to be confined to samples which include a thyme contribution, while abscisic acid isomers (2) and (3) occur in samples with a willow contribution. Hither-to degraded carotenoids have only been found in ling-heather honey, however the degraded carotenoids which occur in his honey differ from those found in thyme and willow honeys.

Since thyme honey commands a substantial premium in the market place it is not unknown for honeys of dubious floral integrity to be described as thyme honey. In our opinion the floral integrity of New Zealand thyme honeys can now be verified by a chemical procedure.

Acknowledgements

The authors wish to thank the National Beekeepers' Association, Wilson and Neill-Hororata Honey Exports Ltd., Hororata, and the co-operation of many apiarists and apicultural advisory officers of the Ministry of Agriculture and Fisheries for support throughout the course of the research. The assistance of N T Moar, Botany Division, DSIR, Christchurch, for pollen anlayses is also gratefully acknowledged.

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A new way of suppressing nosema disease

By Andrew Matheson, Apicultural Consultant, Ministry of Agriculture & Fisheries

Nosema seems to be one of those diseases we discuss a lot, but do little about. I suppose the main reason for this is the lack of reliable field symptoms. Despite all the good, scientific evidence of nosema's effects on honey production, if we can't clearly see nosema and its consequences we remain unconvinced.

There are standard recommendations for controlling nosema disease: feeding fumagillin to suppress the active stages of *Nosema apis,* the organism responsible, and regular comb replacement or fumigation to remove the spore stages.

Drug feeding is usually recommended as follows: two doses of fumagillin in sugar syrup are fed in autumn to reduce the level of spores in faeces deposited in the hive over winter. This is followed by two more doses in spring to suppress any nosema disease caused by faecal contamination. One dose, for a full colony, is normally 4.5 grams of Fumidil-B per 3.8 litres of 2:1 syrup. Without fumagillin treatment, nosema disease peaks in spring (September and October) and affects the brood-rearing capabilities of the colony.

Even though fumagillin is recommended for controlling nosema disease, we know that most beekeepers either don't use it, or don't follow up autumn treatments with the vital spring ones. This is partly because of the lack of field symptoms I mentioned above, but it's also due to the problems of syrup feeding. Not everyone is set up for using syrup, and it's hard to convince yourself that you need to poke litres and litres of syrup into hives that may already be bursting with honey.

A simpler and cheaper method of administering fumagillin in spring could be useful. I know that a lot of beekeepers have asked me about alternative ways of feeding the drug. Fumagillin doesn't always work when fed in pollen supplement patties, or in candy to large colonies.

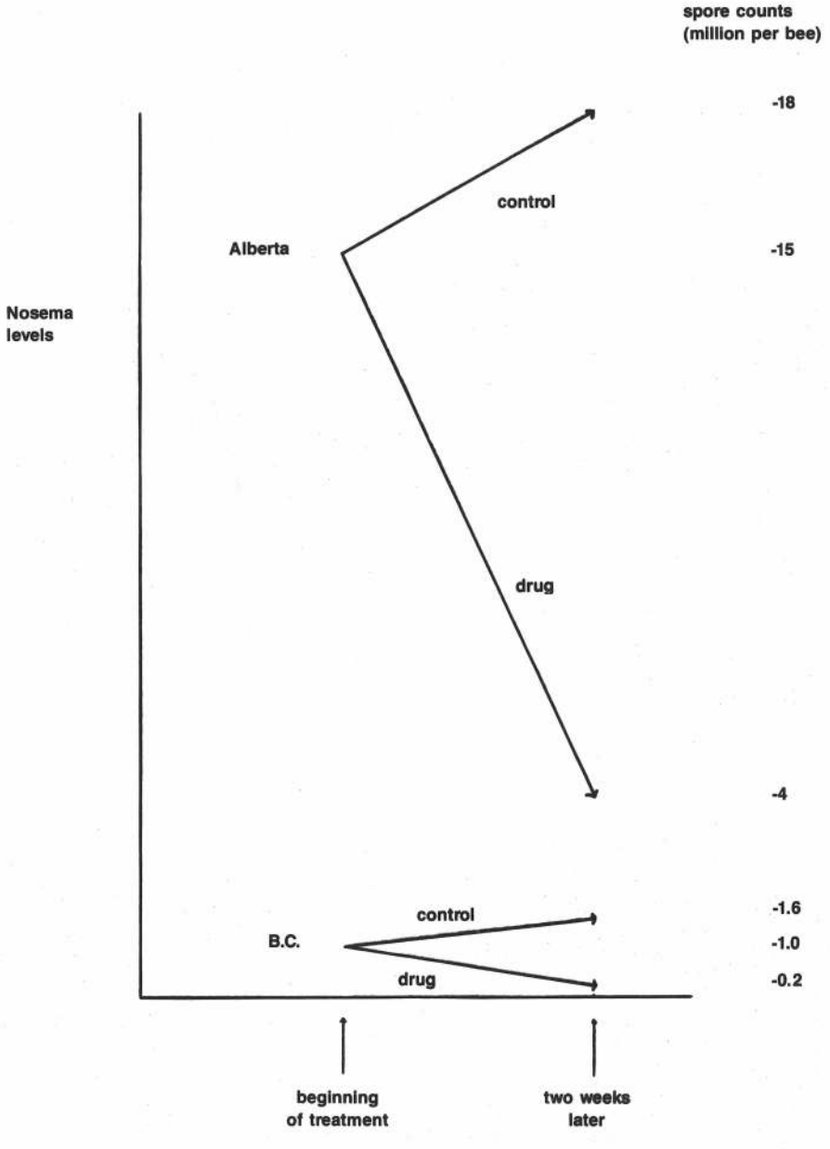
Two studies reported in the **American Bee Journal** give the results of applying fumagillin mixed with dry icing sugar. One experiment was carried out in British Columbia, and the other in Alberta.

Both studies started by feeding the standard autumn dose of 200mg of fumagillin in sugar syrup to each colony. In spring the nosema levels were very different: less than one million spores per bee in BC, but an average of 15 million per bee in Alberta (this is why autumn feeding on its own can be a waste of time).

Then the treatments were applied: fumagillin in syrup, fumagillin in icing sugar, and no fumagillin. The diagram shows the results: both dry feeding and syrup feeding of fumagillin dramatically reduced *Nosema* levels, while the untreated colonies went through the usual spring peak.

How much fumagillin? In the BC trial three doses, each of 100mg, were applied. The first treatment dramatically

Effects of feeding fumagillin and dry sugar on Nosema levels



reduced *Nosema* levels, the second did little, and the third did nothing.

In the Alberta experiment, which you'll remember started with the massive spore count of 15 million per bee, they used only 42mg of fumagillin. Yet this reduced the spore level to four million. That's still a high level, and the authors concluded that 100mg probably would have eliminated **Nosema,** at least to below economic levels.

How much and what sort of sugar? Both studies used ordinary icing sugar. The BC team put in 3.2kg per hive, but only so that those colonies would receive as much sugar as the ones being fed syrup. They report that other researches have successfully used smaller quantities — down to 50g.

The Alberta scientists administered one part Fumidil-B to five parts icing sugar, and 12 level teaspoons of this mixture gives 100mg of fumagillin. They spooned it onto a square of paper resting on the top bars of the second brood box.

So what changes will this all mean to us in New Zealand? Remember that spring feeding of fumagillin must be coupled with autumn feeding for best results. But now we know that dry-sugar feeding of fumagillin is OK for spring. It will be a lot easier (and cheaper) for some beekeepers than syrup feeding. Give each hive 100mg of fumagillin — reducing this dose may make the whole exercise a waste of time.

Remember these other points about using fumagillin:

- ★ we're still stuck with syrup feeding in autumn for the time being.
- ★ fumagillin use must be coupled with a routine comb replacement programme to remove the reservoir of spores in faecal contamination.
- ★ this may also be done by fumigating combs with ethylene oxide (10,000 ppm — the same dose as for wax moth control), to destroy the spores.
- ★ the drug fumagillin is sold under the brand names Fumidil-B, Nosem-X and No Ceema Fix.
- ★ both fumagillin feeding and comb treatment should be combined with good management: young and vigorous queens; high autumn populations; sheltered, sunny and dry apiary sites; adequate stores, especially pollen.

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NOSEMA.DIS

Patented mouse heralds new era for animal husbandry

In the United States the first-ever patent for a genetically engineered animal has been granted. Stirring up a storm of controversy out of all proportion to its size, the newly patented mouse strain was developed by two Harvard researchers.

They introduced a gene to the mouse at its very earliest stage of life — while the embryo was forming. The gene is one that makes animals particularly susceptible to carcinogens.

This breakthrough will be important for cancer research, providing a reliable means for evaluating both carcinogenic products and cancer drugs.

Predictably it has stirred strong feelings in the United States, from animal welfare groups and religious leaders who condemn the research, through to farmers who actively support it as a gateway to keeping American farming competitive. Although this one patent has been granted, pressure from various groups could see further patents on animals legally blocked in the United States.

While the new strain of mouse goes to work in cancer research, biotechnology is producing some other interesting results.

One very exciting prospect is the development of animals that will secrete human pharmaceutical proteins which could be "harvested". Already this has been achieved on an experimental basis in Scotland, where a sheep is producing human clotting factor in its milk.

It may not be too long before we see specialised strains of animals being farmed for human health products that are either extremely difficult or expensive to produce in other ways.

Insulin is another case in point. Traditionally recovered from the pancreas of pigs, it is now possible to produce it using genetically engineered bacteria. The resulting product is much "cleaner" than the animal-derived insulin.

For food and fibre production, the possibilities offered by bio-technology are endless. In the widest sense it can be used to improve reproductive performance and growth rates. It can confer resistance to pests and diseases, and it can circumvent years of selective breeding to change the qualities of milk or fibre to match what the market wants.

To the farmers and food producers of the 21st century, today's methods of husbandry could look as antiquated as the horse-drawn plough appears to us.

Proposed closed-population breeding project — a reaction

From Arif Effendi

Introduction

In the November issue we saw David Yanke's proposal for a joint beekeeper/NBA closed population breeding project. It is an excellent idea to seriously consider improving our breeding stock. Improved and proven performance will open up new export markets for queens and will improve honey production in New Zealand. The question is whether the proposed programme will fulfil its purpose for New Zealand. This reaction is written as a contribution to the discussion on if and how the programme should be conducted.

The current NZ stock

That NZ has not imported genetic material for 40 years, need not be a bad thing. Some of the finest strains of bees have evolved in isolation. Such isolation, often a result of mountain chains creating barriers for bees, has allowed the development of eco-types or completely different races. Example are the Carnolian bee and the Caucasian bee. In New Zealand we may find some eco-type evolution in relatively isolated areas such as the West Coast of the South Island.

The dark strains we have are likely direct descendants of the original British bee. That bee has since been extinct in Britain because all kinds of exotic stock were imported. However if we are to believe Brother Adam, this bee was one of the finest and gentlest. We in NZ may have the rare opportunity to gather dark material and start a separate selective improvement programme on some remote island or peninsula. One of the priorities of such a programme should be the removal of excessive defensive behaviour, a result of 150 years exposure to predators.

The yellow strains of bees are, according to David, suffering from inbreeding. This may be so for small apiaries with a very limited number of colonies. However, Woykes' work shows that loss of sex alleles is unlikely for larger apiaries. Even if the products of individual breeders would have some inbreeding, it will be unlikely to be significant on a national scale. Drawing genetic material from 20 breeders by itself will dramatically improve production, as we may expect heterosis effects by crossing partially inbred lines.

Breeding for honey or pollination?

It may well be that the bees we need for honey are quite different from those required for pollination. Low-temperature flying and high-brood rearing are very desirable for pollination colonies. Some of the darker strains fly at very low temperatures. We may have to set up a separate breeding programme for the ideal pollination bee. I am sure that there is a demand for such bees world-wide.

The proposed programme

Mixing 10% of West-Australian sperma into the sperma-pool **annually** is, I think a great mistake. The effect of each addition of 10% WA semen is that the NZ genes will be reduced by a factor 0.9. This means that the overall effect will be a gradual elimination of the NZ content by WA genes.

	NZ gene content
after 1 generation	90%
after 2 generations	81%
after 3 generations	73%
after 4 generations	66%
after 5 generations	59%
after 6 generations	53%
after 7 generations	47% etc.

I think it is desirable to add some WA genes to increase variability into the stock, but it would not be good to replace the NZ genes by WA genes in the long run. For these reasons, I would suggest limiting the addition of WA semen to 10% on a "one-off" basis.

Selecting the best queens out of the daughters produced must be carried out in the best possible way. In my opinion this should be done by setting every young queen up as a nuke with an equally weighted amount of young bees and with a box of comb foundation. If we are using the queens to replace the old queens, we are clouding our vision by giving some queens a slightly better start than others. Weighting the colonies before the swap is no answer as we may weigh pollen in one colony and capped brood in the other.

Marking of queens and clipping (avoiding late mating flights) will have to be carried out in the inseminating table. The apiary lay-out needs to be such that drifting of bees does not happen between the colonies under evaluation. Pollen supply needs to be good. Some planting of pollen supplying trees or shrubs should be considered.

Financial chapter

The programme will tie up at least 100 hives permanently. We will have to be realistic about the cost of equipment, including replacements and depreciation, currently not included in the costs. On the other hand, the potential revenue earned may be optimistic. At least in the first years, without proven high performance, it is unlikely that breeders can be sold for prices higher than the commercially available queens.

Conclusions

My conclusions are:

The programme is a very worthwhile proposition, however it will mainly benefit honey producers rather than pollinators.

Mixing WA semen into the pool should be done on a "one off" basis at approx. 10%.

Setting up the young queens should be done without clouding our vision.

The cost of the programme needs a more realistic approach.

LIBRARY NOTES

From Mr Malcolm Scrivener, Dunedin we received a little antique treasure: BEEHIVES and BEEKEEPERS APPLIANCES, edited by Paul N. Hasluck, printed in MCMV which means 1905, UK. It shows you through text, diagrams, and engravings how to make different items of bee equipment from frames and hive bodies to feeders and solar wax melters. Interesting to browse through its 160 pages. It may be outdated but a lot of things are used today, practically unaltered. The original price of this book was the royal sum of one shilling.

A VIDEO has been donated by Andrew Matheson, Apicultural Advisory Officer, Tauranga. It shows:

AFRICANIZED BEE ALERT. (USDA, 10 min.)

NO FLIES ON US. (MAF Quarantine, 10 min.)

LIFE OF THE HONEY BEE. (Canadian, 25 min.)

Just the kind of video to show at a Branch or Club meeting this coming winter.

Thank you Malcolm and Andrew, your donations to the Library are much appreciated. **John Heineman**

A beekeeping pioneer

from Sandy Richardson

Some of the stories about Westland's beekeeping past are indeed interesting. One of the earliest successful beekeepers of the province was Charles Shearer, born in Scotland in 1826. As a young man he spent some time as a pioneer in Canada, then went placer-hunting (gold prospecting) in California. From California he joined the great gold rush to Victoria about 1866. He was at Ballarat during the historical miners' riot.

Charles Shearer emigrated to New Zealand with his wife and family. They arrived at the thriving West Coast gold town of Ross, south of Hokitika, about 1868. He was essentially a self-reliant man, perhaps why he preferred to live out of town rather than in it.

Eventually he took up a small holding on the south bank and near the mouth of the Mikonui River, five kms south of Ross. After being flooded out he removed to higher ground and in addition to stock rearing he began beekeeping as an extra source of income. He developed his beekeeping business to such an extent that his apiaries became celebrated far and wide.

With characteristic judgment he selected an ideal site for his apiary. He cleared an area of thick bush near his residence which, having a northern aspect, was sheltered by timber from the southerlies and westerlies and had the full benefit of summer sunshine. The thousands of hectares of virgin forest extending to the south were the foraging ground for his populous colonies which stored up their honey in such quantitites that markets had to be found in the larger centres outside of Westland. There it established a reputation for excellence which underlined the name of its enterprising producer. To deliver his products to the outside world meant reaching the Hokitika wharf by fording the as yet unbridged Mikonui River with his horse and dray. From Hokitika his honey was shipped to other parts of New Zealand as well as overseas.

At the New Zealand International Exhibition of 1906-1907 in Christchurch, Shearer displayed samples of extracted honey in glass, and bees-wax. He received first place and a gold medal for his honey, and a silver medal for his wax.

It is not known what earlier contact he had with AI Root in the USA, but in 1887 he received an autographed copy of the 1st Edition of ABC in Bee Culture from AI Root. It appears evident that Charles Shearer had had earlier experience with bees before establishing his apiary at Mikonui. It should be remembered too, that Shearer was in Canada and the USA until 1866. In the introduction of AI Root's 1st Edition of ABC in Bee Culture an explanation by Root of his first contact with bees is recounted. Quote: 'About the year 1865, during the month of August, a swarm of bees passed overhead where we were at work, and my fellow workman, in answer to some of my inquiries respecting their habits, asked what I would give for them. I, not dreaming he could by any means call them down, offered him a dollar, and he started after them. To my astonishment, he, in a short time, returned with them, hived in a rough box he had hastily picked up, and at that moment I commenced to learn my ABC in bee culture.'

Was there any connection between these two men? That question prompt-

ed the Late Peter Lucas, a well-known West Coast beekeeper from Harihari, who had come into possession of Shearer's copy of ABC in Bee Culture, (it having been given to him by Charles Shearer's grandson), to write in 1967 to the Root Company asking if any record of the name of the 'fellow-workman' who hived the swarm was kept. In reply HH Root, the youngest son of Al Root, replied with interest, but was not able to verify whether Charles Shearer was the workman involved. Perhaps a long shot but interesting nonetheless. So the question still remains: Did Charles Shearer request a copy of ABC in Bee Culture himself, or did Al Root send a copy, autographed, to a friend with whom he had kept in contact? We will never know. So back to the main story.

Charles Shearer died in 1908. His holdings were bought by a Mr S Mitchel, whose daughter, Edith, managed a beekeeping operation in the same area for a number of years, although on a small scale.

After the death of Peter Lucas, Mrs Lucas gave Shearer's copy of the ABC in Bee Culture to Keith Detlaff, a member of the West Coast Branch of NBA, appropriately from Ross. Eventually the gold and silver medals came into his possession also, and Keith presently holds these in trust on behalf of the West Coast Branch.

The Branch looks upon these treasures with pride, and as a symbol of part of the colourful history of beekeeping on the West Coast.

BAKED APPLE WITH HONEY FILLING

• Wash and core the apples. Leave part of the core in the bottom of the apples to act as a plug. Fill the cavity with honey, using as much as the tartness of the apples requires. For variety, add a bit of lemon juice, or a few cinnamon candies. One may stuff the cavity with raisins and dates or other fruit combinations.

The phenomenon of swarming

From John Heineman

By the time you have had one or two seasons with your colonies you will surely have seen a swarm, either from your own hives or hanging somewhere on a bush or tree in the neighbourhood. Perhaps you have been asked to come and deal with it.

Many a beekeeper started his or her hobby or later career in beekeeping with the first picked up swarm. I got my first one given to me, housed in a very old straw skep, when I was 15 and it started a life-long interest. Shortly after another swarm arrived, this one in a very old type wicker hive. It was a type of basket made from willow cane, plastered with a mix of cow dung and clay and thatched with rushes. That type of hive was common and can still be found in Holland and some other continental countries. Both of them promptly produced swarms the next year. However we had been making some preparations during the winter and I had enough gear for four hives, so not only the swarms were housed in moveable frame hives but the ones in the skeps were also transferred into more modern accommodation. Those bees were black like the ace of spades and nasty. That meant that their proud owner was the laughing stock at school when he arrived showing a cauliflower ear, a closed eye and enormous swollen nose. This madness has persisted to this day but life did become easier when a kind beekeeper friend helped with requeening those tigers. Those black queens were ever so hard to find!

But WHY do bees swarm? The answer (or answers) are not as simple as some people believe.

One obvious answer is to reproduce. A colony of bees is a unit, the individual bee only a very small part of that unit. A worker, drone or queen bee cannot on its own establish or maintain a colony (some other insects can). So if the unit needs to procreate it must split. If this instinct of procreation were absent the species would inevitably die out.

Another reason is overcrowding. At a certain point a hive becomes so congested that many young bees cannot do the jobs they are meant to do at their stage of life (brood caring). To put it simply: at that time there will be just not enough queen substance or pheromones to go around. These pheromones are a substance produced in the mandibular glands of the queen bee and are a vital factor in attracting drones during mating, inhibiting works from building queen cells and from laying eggs. So when a hive is running short of these pheromones queen-cell building will take place, and swarming preparations are under way.

It could also be possible that a queen after having functioned at full capacity becomes tired, especially an older queen, and that factor would affect pheromone production.

Then there is nature's timing. Mostly swarms will appear shortly before or at the beginning of a main honey flow thus giving the new unit a chance to become established and stock up its larder with essentials while the going is good.

Genetic factors play a big part too. Some strains of bees are much more prone to swarming than others. Here in New Zealand where we are working predominantly with Italians, albeit with some left overs of early importations mixed in and with our borders having been closed for many decades to bee-imports, we still find a vast difference between colonies as to swarming tendency.

It is a fact that the incidence of swarming also varies considerably not only from year to year but between the different parts of the country. Weather plays a role and I think that an early build-up (good willow flow) followed by a long period with scarce nectar before the main flow starts will aggravate swarming.

Broken weather is often blamed for increased swarming. If in Oct./Nov. we get those cold snaps followed by a few nice warm days there will often be swarms galore on those few nice days. They might have appeared anyway but more spread out instead of a large number on the same few days. On the cold days the conditions for swarming are absent and a colony can delay for a certain length of time. Sometimes the plans are aborted altogether. In that case queen cells are torn down.

A colony headed by an older queen is in general more likely to swarm than one in which a young vigorous queen is doing the job. This stands to reason if we accept that the latter has a greater amount of pheromones available for distribution. However this is not a hard and fast rule for the unexpected does happen.

A colony with a young queen, introduced last autumn or this spring may occasionally still issue a swarm. But who is to say that that particular young queen was one from the top shelf. She might be inferior in some way. After all we do get newly-introduced queens which are superseded after a very short time.

Research into all the aspects of swarming is far from finished. I advocate that you do some reading on the subject to widen your understanding, it is so very fascinating.

A colony which prepares for swarming changes its behaviour from the normal. In the first place a number of queen cells will have been built, eggs will be deposited and the resulting grubs will receive their special food. Most of these swarm cells can be found near the bottom bars of the combs, but some will be in other places. It is normal practice when checking for swarm cells to split top and bottom supers with the hive tool. Tilt the top back and have a quick look for cells. If any queen cells are visible it will be high time for a thorough scrutiny.

A very strong and congested colony may be "hanging out". It can be very apparent that the hive has become more or less inactive, lethargic, and is just biding its time. Also the queen will have reduced egg laying. A number of scout bees will be looking around for a suitable new home and when returning to the hive they perform, what is termed, the "wagtail" dance which apparently communicates their findings.

These same bees will change their dance pattern into the "whir" dance and this really sets the whole show going. The bees will fill themselves up with honey and in great excitement start to boil from the entrance.

This first or prime swarm will take the old mated queen with it. She is not leading the swarm and is certainly not the first one to leave the hive. Sometimes it happens that she did not come along and the swarm will "fall back". The whole performance will probably be repeated the next day with more success. The time of the day is often late morning. At first the swarm will not go very far but will settle nearby on a post, shrub, tree and sometimes even in the grass. Here they will stay for a shorter or longer period, till the next day, sometimes longer. And here of course is your best opportunity to catch that swarm without complications. They will leave

this temporary stop for their new permanent home which is likely to be a fair distance away from where the swarm settled first. Under the guidance of the scout bees the swarm will take off and fly as a cloud in a straight line up and over obstacles like hedges, trees, or buildings towards their destination. Once arrived, one can see the whole lot gradually landing and then the march into the entrance commences. Again the queen will not be the first one to enter. Half or more of the bees will be inside before she takes her turn.

These new living quarters can be inside anything that offers a colony shelter and security to set up household. At best it will be an empty hive placed on purpose by a beekeeper to attract a swarm but chances are that it will be a hollow tree, a cavity in rocks, or in the wall of a building.

We don't like to have wild hives around for several reasons and we don't need them in buildings for that always means inconveniencing the owner, extra unprofitable work for the beekeeper who gets to remove them, plus the possible cost of repairs.

Swarms can be a big nuisance in towns and cities when they settle in gardens, parks, picnic grounds, church entrances, and any other places frequented by the public. If you are known to be a beekeeper you will get the telephone call to please come and do something about it. As likely as not it will happen during the weekend when mum and the kids are waiting for you to go somewhere.

About 99% of the public is very wary of bees and it helps little if you tell them that swarming bees in general are gentle and unlikely to sting. Your neighbours will be in a real panic if their little Jenny is playing on the lawn and all of a sudden becomes surrounded by a cloud of bees. Fair enough for the little thing could receive a sting which does hurt and is upsetting and in some cases could be dangerous. Swarms are, especially in build up areas, not good for our P.R.

Also if you want to harvest some surplus honey, which no doubt is the aim of most beekeepers, commercial or hobbyist, a hive which has lost somewhere near 50% of its population won't produce it. It will take considerable time before it can make up for the loss. The new queen has to be mated first and by the time the population has increased to somewhere near average strength the honey flow will be at an end. As for the swarm, it may gather a considerable amount for a start but it is starting from scratch and must first get its winter stores. Not much hope for a surplus.

However interesting a phenomenon swarming is, we must do our best through wise management to stop colonies from swarming as there are many disadvantages. With the moveable frame hive in use in NZ we can manipulate brood combs, add extra supers, make good use of queen excluders and division boards, thus t least minimizing the swarming problems.

Before summing up some routine measurements we can take, I should like to point out that in my opinion it is imperative to good management to work with nature, to ask ourselves always before making a move if it tunes in with what is bound to happen at that particular time or with that which we anticipate to occur in the foreseeable future. If things are done contrary to this rule one will very often have to face failure and frustration.

1. Colonies should be supplied with young vigorous queens (pheremone supply). Regular requeening, every year would be ideal but two seasons from a queen is often possible without trouble. Girls older than that will create difficulties. There are several ways to do this:

a. catch and kill the old queen and introduce a new one;
b. if the hive is in two supers divide brood and food and bees over the two boxes and place a division board between. Introduce the new queen or mature cell into the queenless half. Unite with a double sheet newspaper after some time when new queen is well under way. The old queen can be caught and perhaps set aside in a nuc, but this is not necessary as the young queen will prevail in 99% of cases;
c. beat the colony to the gun and make an artificial swarm. Implying that you make a nuc so giving the parent colony more room and introducing a young queen at the same time

Introduce the new queen either to the parent colony or the nuc depending which one holds the old queen. In lieu of a queen, a cell may be used but that means delay for it has to hatch and a virgin queen will have to mate before she can start doing her job. You must also count on a rate of failure which on an average won't be less than 20 to 25%. The same of course goes for a parent colony or nuc left to raise its own queen. The delay will still be greater. Also more than one cell may be raised and consequently if the extra ones are not removed a swarm may issue.

2. Reversing, that is inter-changing the brood boxes and at the same time cull out the poor combs which can be replaced with foundation. Don't put foundation in the centre of a brood nest but keep it to the sides (first a comb, then foundation, brood etc.) Two or three sheets of foundation every year into your brood boxes will keep up the quality of the brood combs.

3. More room when hives become crowded, that means an extra super. I often combine steps two and three and put culled combs, if they hold honey and/or brood, into the extra super. They come out when extracting. Dry combs can of course be kept out immediately. I like the extra super above a queen excluder so as to keep the queen out of the extracting supers. Some beekeepers maintain that queen excluders are honey excluders. We have not found that to be so.

4. Interchanging places between weak and very strong colonies.

5. Removal of entrance blocs, adequate ventilation. Such as using combination crown-division board with the entrance down ward and loose fitting roof, an extra entrance in supers, small sticks between bottom board rim and bottom super or between supers during very hot weather. Some shade during the hottest part of the day is not a bad thing.

6. The last measure I will mention is the breaking out of swarm cells. It may have to be done from time to time but it is really against nature. The hive is getting ready to swarm and in fact we have missed the boat. It usually results in a temporarily delay for new cells will be put on. At that stage some drastic steps need to be taken, such as: swapping places, removal of old queen, uniting a nuc. It sometimes works if a good honey flow follows very shortly.

All this however is no guarantee that you will be free of swarming. As said before in beekeeping the unexpected is always bound to happen.

If you have to deal with a swarm, be wise. Put on your hat and veil for swarming bees, however docile can still sting. A smoker may be needed, also a secateur, saw, super, bottom board and roof or screen and crown board, depending on the situation of the swarm. Swarms have been shaken into all sort of things, such as buckets, bags, or cardboard boxes and taken home. It is interesting to dump a swarm in front of the hive you want it to enter, and on a sack or sheet of paper and watch the bees marching in.

Literature: Aglink 392; Snelgrove: Swarming, it's control and prevention; Gleanings in Bee Culture Vol. 115, No 5 articles by Imirie, Jaycox, Taber and Koover.

Economic titles sting Canada's beekeepers

If there were an Olympics for silly government programs, Alberta's latest farm subsidy might seem like a sure medal-winner.

The province announced it would give its beekeepers up to $C600,000 this winter so they can feed sugar to their bees.

On the surface, it sounds about as reasonable as paying farmers to take their cows and chickens to McDonald's for lunch.

But the subsidy is just another indication of how troubled the beekeeping business has become for the 16,000 registered producers in Canada.

"Everything was going along quite nicely through the '70s and early '80s," recalls Merv Malyon, president of the Manitoba Beekeepers' Association.

"Then all of a sudden, we got these parasites and these poor prices that we, as Canadians, can't control."

Both problems are examples of how quickly the economic rules can change in agriculture.

Christmas turkey

Until 1987, millions of Canadian bees had no more reason to look forward to winter than Christmas turkeys. Many beekeepers simply let their bees die and then bought packages of California bees in the spring.

But in late 1987, federal officials banned importation of U.S. bees in order to prevent the spread of a damaging mite which had infested American stocks.

That forced beekeepers to either import New Zealand bees, at double the cost, or start protecting their bees from the ravages of Canadian winters.

Beekeepers invested in heated shelters or insulated coverings for hives. They also had to make sure their bees had something to snack on in the long winter months — which is where the Alberta sugar subsidy comes in.

Sugar makes better bee food because it's cheaper and doesn't freeze into little granite-like blocks like honey.

One colony or ive can consume upwards of 40 kilograms of sugar, worth about $C27, during the winter, and a large honey producer may have 2,500 colonies. That works out to $C67,500 worth of sugar.

The other bad bee news was the U.S. government's 1986 decision to buy honey from producers at a guaranteed price and then sell it back to them for a much lower price. Producers could then dump the honey on the market at cheap prices.

The programme immediately resulted in a drastic plunge in world honey prices. Canadian producers saw prices drop by one-third and found themselves losing money on every drop of the 30 million kilograms of honey they produce annually.

"For the past four years, you had to eat up your equity to survive," says Malyon, who has 700 hives on his farm near Brandon, Man.

Producers have also relied on government subsidies, especially in the Prairies where most of the country's beekeepers are located. The federal government handed out a special national payout two years ago. Saskatchewan had a low-interest loan program and Manitoba producers received a $C10-a-colony payout from their provincial government.

But the twist to this subsidy war is that the Americans are not out to dominate the honey market. The U.S. subsidy is designed to benefit farmers who grow citrus fruits, almonds and cotton and depend on bees kept by others to pollinate their crops.

"The Americans make no bones about it. They're subsidizing honey to keep bugs for pollination," says Malyon.

Canadian bees do their share of pollinating too, but only in fruit orchards is the presence of bees considered crucial. Many Canadian orchardists will pay beekeepers for their services, while growers of other crops just trust to nature.

Honey prices are now starting to rise — although they're still lower than the cost of production — but for many beekeepers it's too late.

Malyon says that both the number of registered beekeepers and the number of hives in Canada have dropped by about 20 per cent in the last three years.

OBITUARY

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In 1949 Harry took up beekeeping from his father who had established a small business at Fairview just out of Timaru. From here he and his wife worked hard to build up hive numbers, later aided by their sons Russell and Mervyn, to become the second largest beekeeping business in New Zealand.

Harry made a huge contribution to the beekeeping industry not only in New Zealand but also overseas, with his innovative ideas. Some of these include systems for the production of queen bees, he helped develop a wax recovery press. Harry also tried many beekeeping techniques and ideas which he never adopted in the commercial operation because he found after testing they were not suitable.

Cloake is a name synonomous with beekeeping not only in N.Z. but also in Australia where Harry presented a paper at the Apimondia Congress in Adelaide. In recennt years he spent much time in Australia and developed friendships with many Australian beekeepers.

A number of today's beekeepers had their grounding at Cloakes Honey where Harry not only taught them good hive management skills but also taught good work habits through his example.

He was always ready to help young beekeepers getting started and encouraged his staff to have hives of their own. If you needed to borrow a truck or equipment Harry would always oblige or if you had a problem he would be there if needed with advice and encouragement.

Harry was called on often for advice by young beekeepers contemplating buying an outfit of their own, and always gave it freely.

In retirement, Harry still took an active interest in the business and was always ready to do a day's work if required.

After spending his working life looking to the future, he began to look to the past when he developed an interest in old single banger oil engines. He spent many happy hours in his workshop restoring old engines to the same high standard which he maintained in everything he did.

Harry was a member of Rotary and was made a Paul Harris Fellow, an award given for service to the club and community. He also devoted much time during his retirement to the Probus Club and the Senior Citizens Association where he was on the Management Committee.

concluded on page 31

Nelson

The longest day has been and gone and the quality of weather needed for honey gathering with it. While temperatures are good, dry winds on dry conditions land-wise will soon parch the countryside.

Any hives that have not got their quota of honey will be lucky to get more than the normal autumn picking.

There seems to be a marked change in the floral behaviour: ie, the barberry flowered this last two years while the weather was reasonably favourable but the bees did not show the interest they had done previously and gathered very little nectar. Neither did the manuka near some of my bees this season appear to hold interest for them. So far I have not detected any honey from that plant.

One thing different this year: the weather put on everything for the benefit of the kiwifruit pollination, so we'll hear the singing when we come rejoicing bringing in the trays.

Ron Stratford

South Canterbury

After a reasonable spring, a bit of willow, a bit of dandelion, and in places subclover, sycamore and the like, some good and some bad weather, and some good and some bad queen mating we were again heading for a drought.

Then in mid-December we got a lot of rain and since then, intermittently, reasonable showers.

Even the Mackenzie Basin which was extraordinarily dry got a good dose of moisture.

Now (January 10) most hives have got some honey on and the country is looking very good indeed. It is better than we have seen for many a year and we are just waiting for the weather to get warmer as we are suffering a pretty cold spell of weather with very cold nights.

Unusual for the time of year. All in all if the weather is kind we could have a bumper year and I hope you all have the same.

Jan van Hoof

Auckland

This season is a great improvement on the last. The barberry produced well for a build up to kiwifruit pollination. Since then the manuka has really produced a flow, but pahutakawa has been rather poor. Clover has flowered extra well and the fields are just white, although unless we get more sun and heat into the ground it will not produce as it should. However, indicators are that our season should be good.

At the end of November the Auckland Branch had an end-of-the-year dinner at the Parnell Rose Gardens restaurant. It was very well attended. Some of the older members were unable to come for health reasons, but we were very pleased to have along such older beekeepers as Mr Bob Walsh and Mr Rex Hilary. Both spoke of their experiences of past beekeeping.

I wish all beekeepers the best for the New Year and may your honey tank runeth over.

Dave Young

Westland

Summer to date has been very unsettled and changeable. We have heavy rain, flooding, two snow falls on the Alps during December, and strong northerly gales. The few fine periods have been of short duration making the task of harvesting the smaller-than-hoped-for honey crop difficult indeed.

In retrospect, after such a fine winter and warm spring, the present weather is not surprising. However, like all beekeepers, those in Westland were optimistically hoping for fine settled weather during December. Unfortunately that did not eventuate. A report from one place in central Westland, indicated that 585mm of rain fell during the last 21 days of December.

The one bright spot is that most members report an increase in hive numbers over the past few years. So, although hive averages are down, the increase in numbers will help in obtaining what we will have to call our 1990 honey crop.

Sandy Richardson

Southern North Island

(Southwestern Districts)

Clover in profusion is the report from Wairarapa, the southernmost corner of our far flung region. All the way up the west coast from Wellington to New Plymouth it's the same story. Even hillsides that are normally dry and frizzled in mid-January are tempting scenes of clover and wild flower.

But we can't boast a bonanza crop yet. The strong, warm westerlies and regular rains are cutting short the number of flying days.

Hives that weren't shifted into kiwifruit have so far yielded the best. They took advantage of an early honey crop in December. However, kiwifruit hives not supered up until mid-December have struggled to fill their first box of honey.

The whole region is poised to do better if warm settled weather returns for the second half of January. Soil moisture is good, clover is abundant, and we just need the same sort of summery weather that holiday campers enjoy.

The Wairarapa experienced a difficult, wet and windy spring, but the rest of the region enjoyed excellent weather. Hives were in good order for kiwifruit pollination. Spring feeding of these hives by the orchardists was almost general practice in the New Plymouth and Wanganui areas.

John Brandon

Waikato

It would be nice to write positive and confident notes from the Waikato but again the weather has spoilt a honey flow in our region and probablay the rest of New Zealand as well.

Up to the beginning of November the weather was cold and showery with westerly winds making queen rearing and hive work difficult. At one stage I wondered if the young queens would ever get out and mate; some of them must have been close to geriatric.

From the beginning of November to about the 20th was the only spell of fine hot weather we have had. Since then we have had changeable overcast days with heavy showers and gusty southerly to westerly winds and cold nights. Dairy production is down in the Waikato and one of our biggest problems is the heavy stocking rate on dairy farms. Many farmers are farming numbers instead of culling an appropriate number of cows to reduce to a sensible stocking level for the weather we are experiencing; that is, to a level which would allow the pastures to recover for the farmers benefit as well as ours. Many have not been able to make silage or hay and at present, hay is being sold for $6 a bale, plus GST!

Five finger produced well in some areas but the kamahi did not. Buttercup would have been great but for the weather. The tawari failed, clover flowered in early November but stopped with the cold weather and started again about Christmas. At the time of writing, January 14, clover is flowering well over a wide area, but the weather is cloudy and dull with a gusty westerly wind, and honey is only dribbling in.

Some members think we can still get a crop and that it is a later season, but in my experience if the crop is not on the hives by the middle of January in the Waikato, then it is not likely that we'll get it after then.

Many members say they would like to sell out and start in something more stable and profitable, but who can they sell to and at what price? Nobody would want to buy after looking at the balance sheet of a beekeeper. Most beekeepers these days take their books to their accountant and he and they cry! As one member said to me the other day: 'beekeepers do little more than provide a free clover pollination service for farmers.'

What really surprises me is the number of members in kiwifruit pollination who charge orchardists about $80 per hive and they complain that they are struggling financially!

How many years can we keep going like this? Makes you think doesn't it?

Ray Robinson

Bay of Plenty

After such a costly past season things have certainly improved around the BOP. Spending a lot of time and money on sugar feeding was essential to prime hives for pollination.

The weather was mainly very good to most of us, making shifting hives a pleasure. Pollination money seems to be coming in at a reasonable rate, probably due to a somewhat bouyant attitude to the $6.50 growers are expecting per tray.

Some local beekeepers are concerned about the amount of uncovered beekeeping gear left in open sheds and lean-tos around the area, especially boxes of drawn combs, etc, which possess an obvious risk of spreading bee diseases. If those sheds cannot be made bee-proof how about making such equipment inexcessible to roaming bees!

Since pollination, the weather has been a mixed affair with warm sunny days and a little rain in between to keep things growing.

With the large amount of clover around at the moment all that is required is a good hot burst and we could see the extractors in motion.

Karl Christophersen

Otago

A good spring followed by what looked to us a very early summer. However that was not to be. That marvelous warm weather in late October and early November was followed by a prolonged dull and chilly period. Not much rain and overall a drought seemed to be in the making. But most of the province got a greater or lesser share of the wet weather welcomed east of the main ranges. The last few days are very nice again, hives are working clover and getting a drop or two. May it continue.

Sugar feeding in general has been on a modest scale. Surplus was gathered by colonies near sources s.a. kamahi and heath.

The last branch meeting of the year was held at Techpac in Dunedin, well known to those who attended this year's conference. Mr Steve Auld gave us a very interesting report and entertaining talk about his recent travel with a trade mission to Europe. We capped the evening with a sumptious supper.

We are looking forward to combined forces with the Southlanders for a field day in early February at Telford Farm Training Institute.

As it is only a few short weeks before 1989 runs out of steam may I wish, on behalf of the Otago Branch, all our beekeeping friends in Kiwiland, a good and prosperous new decade. We are certain that as usual difficulties in plenty will be encountered but alongside new opportunities and challenges.

John Heineman

Hawkes Bay

Perhaps to the comfort of all our members, both commercial and hobbyist, the 1989-90 season appears to be one of the best the area has experienced for quite some time.

However, we all know that it would not have to be exceptional to be that because the last seven or eight years have been poor. Anyway, let us hope that the total crop is a great deal better than average.

Branch-wise the only main event over the last few months was our annual hive inspection day on November 4. Once again there was an excellent turnout of members and with our ever faithful Ted Roberts at the helm we could not help but have a successful day. Statistics proved interesting: 54 apiaries visited, 374 hives inspected, 107 found dead and regrettably 14 diseased. However, it still proves the value of the whole event.

The last few branch meetings have had only a good average attendance, but they were still very interesting and educational. At the last meeting members expressed the desire to have an autumn field day with something on honey extraction for the hobbyist beekeepers. The committee have that in hand. Particulars hopefully will be in the buzz sheet. **Gordon Sutton**

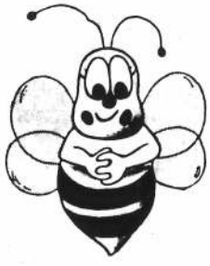
Poverty Bay

This season has been almost the complete opposite of the previous season. Instead of being brown with drought the countryside around Gisborne in January is looking green, something it has not done for some years. Usually the norwester's brown things right off by this time, so consequently the weather has kept the bees busy, the beekeepers happy, and we are back to an average years production.

Some early summer crops such as tawari will be down because of the several cold southerlies we had before Christmas, but other crops, such as from pasture, will be better than those in the drought years. Another thing in our favour has been lower stock numbers which means that apart from areas of over growth there is a better sward generally which gives the clover and wild flowers time to flower and seed before being eaten off.

Here's fingers crossed to hope that this weather pattern will continue.

Barry Foster



Comb honey in the halfcomb
The modular halfcomb cassette & super

By John A. Hogg

The Halfcomb cassette is a radically new MODULAR comb honey section. By virtue of its modular design, the Halfcomb cassette offers the beekeeper for comb honey unprecedented labour saving and marketing advantages. The much reduced wax content of "Honey in the Halfcomb" is an entirely new dimension in comb honey quality. The overall advantages described herein, combined with the prospects for premium pricing, considerably enhance the potential for profitability in comb honey production.

I. GENESIS OF THE MODULAR HALFCOMB CASSETTE

Interim reports[2] describing Halfcomb prototypes were published in 1980 and 1984. This report brings the development up to date in an overall summary.

The purpose of this project from the beginning has been to devise a *one-piece* comb honey section that is *modular.* In addition to the elimination of parts by one-piece construction, such a *modular* section was envisioned a) to interlock in the super in repeating units, b) to self-serve both support and comb regulation functions, yet allowing access by the bees, and c) to constitute (with cover) a pre-package section for marketing, as well as a convenient server of comb honey.

That a *modular* section would be possible became a reality when the idea of box-like structures arranged piggyback, bottoms-to-tops, came to mind. The outside bottom of each box would then serve to regulate the extent of comb in the next box.

Subsequent to the filing of patent applications[3] on the Halfcomb cassette, it was learned that the idea of a simple box (individual serving size) with foundation at the bottom had been disclosed in a now-expired U.S. Patent in 1935[4]. A more recent patent[5] discloses a means of interlocking pairs of such boxes bottom-to-bottom in frames in a super, as well as top-to-top as a package when filled with honey. That both were designed for paired bottom-to-bottom arrangement was presumably in the belief one must simulate natural comb. Also, both require the usual surrounding support frames and intervening separators.

Three *modular* Halfcomb cassette prototypes of one-piece molded plastic were designed and tested sequentially, leading to the present U.S. design (figures 1 & 2). A nearly identical version has been introduced in New Zealand by Robin Teding van Berkhout[6].

Polystyrene has been the plastic of choice because it fulfills the requirements for FDA approval, bee acceptance, cost, rigidity and the desirability of clearness.

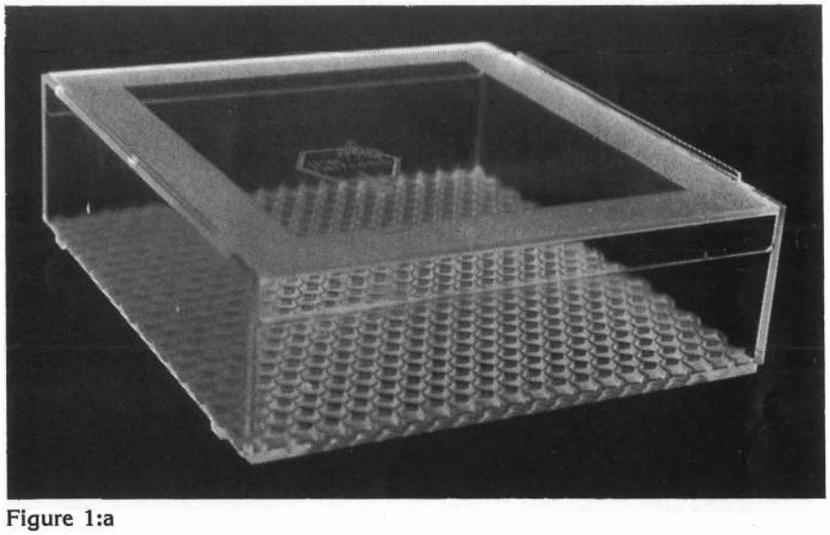


Figure 1:a

Figure 1: a) The U.S. commercial halfcomb cassette
b) A set of three covered cassettes showing interlock
Figure 2: Honey in the halfcomb

II. REFINEMENT OF THE CASSETTE AND EXTENSION OF THE MODULAR CONCEPT

Some of the changes and additions made along the way are:

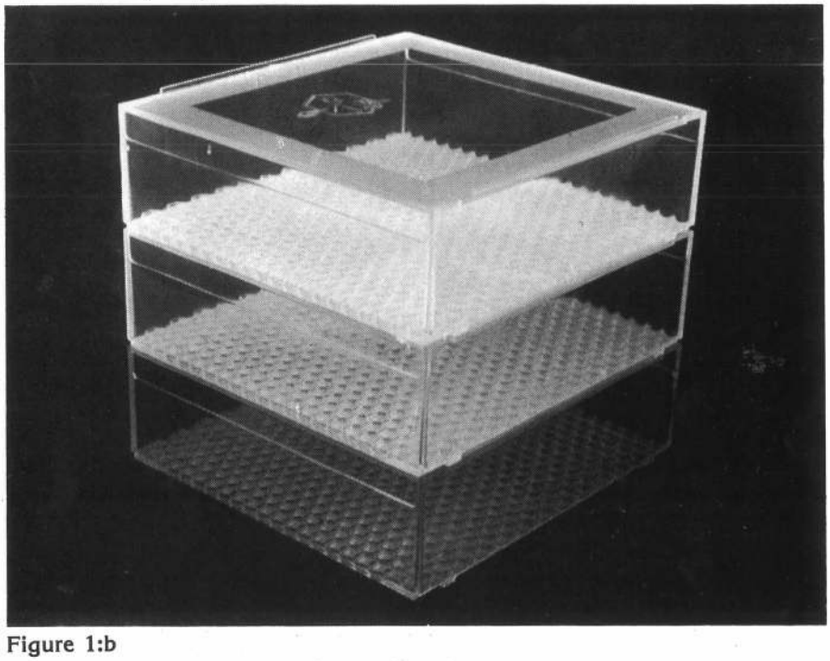


Figure 1:b

(1) **Deletion of the rotating cover concept:** Originally the cassette was designed to be useable with cover in place while on the hive, then rotated to close the filled cassettes. Although novel, this later was seen as a liability since rotation was actually just another step, the covers became soiled, and a proper fit of cassettes in the standard super was pre-empted by the requirement for squareness. The US cassettes have now been adjusted to 4 1/2" x 4 5/16" x 1 3/8". In New Zealand cassettes are 4 1/2" (114.3mm) x 4 9/32" (108.7mm) x 1 3/8" (35mm).

(2) **Improved structural strength:** Stress points were reinforced, redesigned for strength, or eliminated wherever possible to minimize impact breakage — a characteristic of rigid FDA approved polystyrene.

(3) **Top corner posts:** Especially notable in the foregoing category is the sturdy new top-corner post. These posts interlock with corresponding receptacles in the cassette bottom corners for support when installed in the super. The cover corners also lock into them, later, when the cassette is filled with honey. (figure 2)

(4) **The larger and sturdy new top cover posts** provide a location for a small "snap-on" cover button.

(5) **The cover for the U.S. cassette is now so designed** that a strip of tape on one cover flap becomes a *hinge* for convenient opening and closing of the cassette when used as a server (figure 3). Labels can be designed in such a way as to serve also as a hinge.

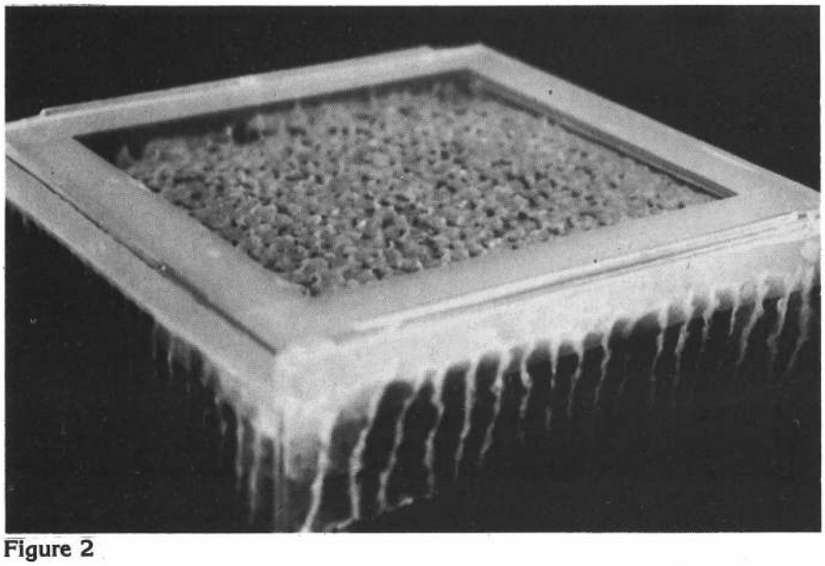


Figure 2

Figure 3: U.S. cassette with tape-hinged cover

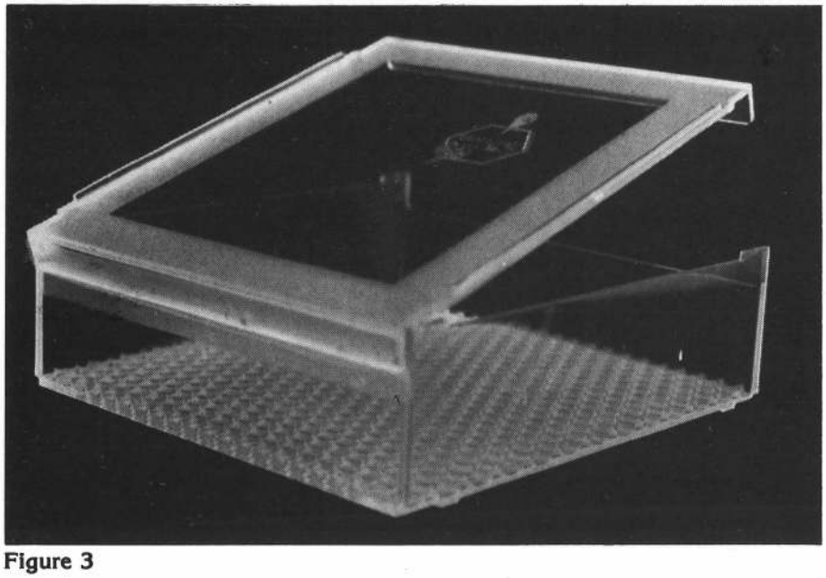


Figure 3

(6) **Coverless cassettes are now stacked in columns of ten** (figure 4) in the manufacturing process, following spray waxing, and then they are taped securely with a strong tape that is not offensive to the bees. The handling of individual cassettes is eliminated. Only four units (figure 5), each a stack of 10 cassettes, are to be handled by the beekeeper to load a super. This, in a sense, is an extension of the modular concept. These columns, peripherally pressured by springs (or wedges) in the super, withstand considerable weight and are thus self-supporting.

Figure 4: Taped stack of 10 cassettes without covers

Figure 5: A complete set of 4 stacks to fill one super of 40 cassettes

III. CONVERSION OF THE STANDARD LANGSTROTH COMB HONEY SUPER FOR HALFCOMB USE

Proper super construction is equal in importance to the cassette design. Together they are the invention (figure 6). Precise control of space in the super, sturdiness, and ease and speed of cassette installation are essential complements to realising the full potential of the modular halfcomb cassette. Special attention has been given to simplicity in the design of a *Super Conversion Unit* for use in the standard 4 3/4" Langstroth comb honey super. Conversion units were designed for convenient installation by the beekeeper. Specifications and directions are provided in this section as follows:

Figure 6: A completely assembled Halcomb super.

A. **Specifictions for Super "Bee Space":** Langstroth's important concept of bee space is much too loosely defined and all too often ignored. C.C. Miller[7] points out that a space of 3/8" (9.5mm) between comb supers and frames invariably results in "burr combs in abundance" and states that in such circumstances 1/4" (6.35mm), or a bit less, is optimal. With the halfcomb, strict adherence to this fact is especially important since such space control is the principle means of protection of the two sides of each cassette that are exposed. Accurate spacing thus becomes a matter of cosmetics. The requirements for bee space in a comb honey super differ with location.

1. **Top and bottom bee space.** The bee space between cassettes and the brood frames of a hive, or between cassettes of adjacent supers, should be 1/4". Since frames in the U.S. brood chamber are 3/16" top spaced, the su-

per shoud be bottom spaced 1/16" so that there is 1/4" between super and brood frames. With super shells precisely 4 3/4" deep and cassettes 4 1/2", the space between adjacent supers also becomes 1/4". It appears that in New Zealand where brood chambers are bottom spaced that super space should be equally divided between top and bottom, 1/8" or slightly over 3mm at each location.

2. **Bee space inside the super rim.** This space, surrounding the entire block of comb honey sections may range from 1/4" to 1/2" (figure 7). This enables bee travel and circulation favorable *to maintaining warmth* around the outer sections. The sections should thus be better filled. Cool temperatures discourage comb building, especially likely at night. This type of bee space has greater dimensional tolerance than elsewhere in the super. Very little if any burr comb is likely between such opposing wood surfaces at the super periphery.

Figure 7: Sketch of super showing super conversion construction (U.S. dimensions).

B. **The Super Conversion Unit:** The conversion unit is made up of 4 followers (two fixed and two movable) with spacers; two metal corner supports; and several super springs to be installed inside the standard 4 3/4" comb honey super. A top-down view of a converted super is shown schematically in figure 7. Designed to achieve accurate space control, the conversion unit also supports the block of 40 cassettes which it surrounds.

The details of the two long followers, the "guts" of the unit because they support the cassettes, are shown in figure 8. They are cut from 1/2" (no less than 7/16") high density fiber board. Plywood or chipboard are generally inadequate because of splitting (by nails), chipping, warping and other defects. There are two triangular metal supports to be nailed onto the bottom corners of the super as support for the long movable follower. The fixed long follower, with a metal strip support, is nailed in place. As will be seen shortly in the directions for installations, no special measuring or assembly skill is needed for accurate spacing in the super because of the 1/16" (1/8" or 3mm in N.Z.) feet on the two long followers.

The two shorter end followers are identical pieces of 1/8" masonite, or the like. Each is 4 1/2" x 12 7/8". The five wooden spacers are 4 1/2" long, cut from 3/4" x 3/8" strips. In New Zealand the spacers should be thinner because the inside standard super width is about

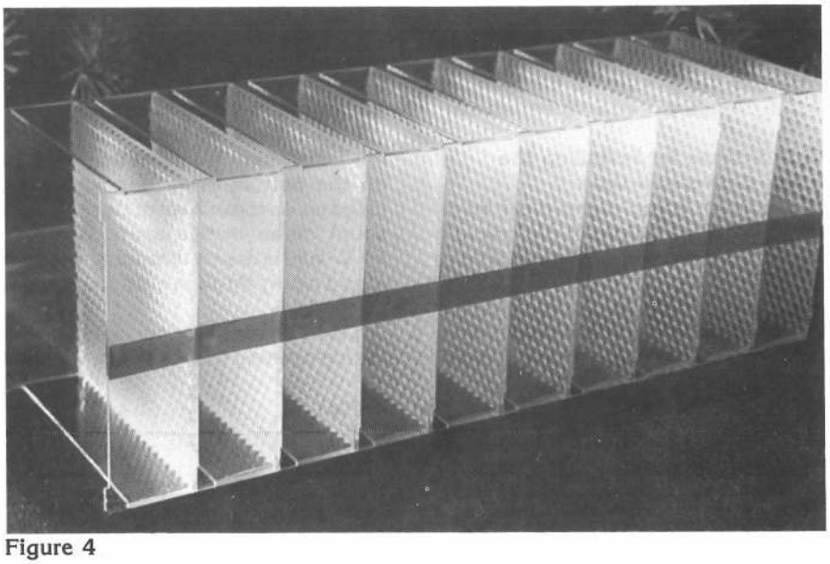


Figure 4

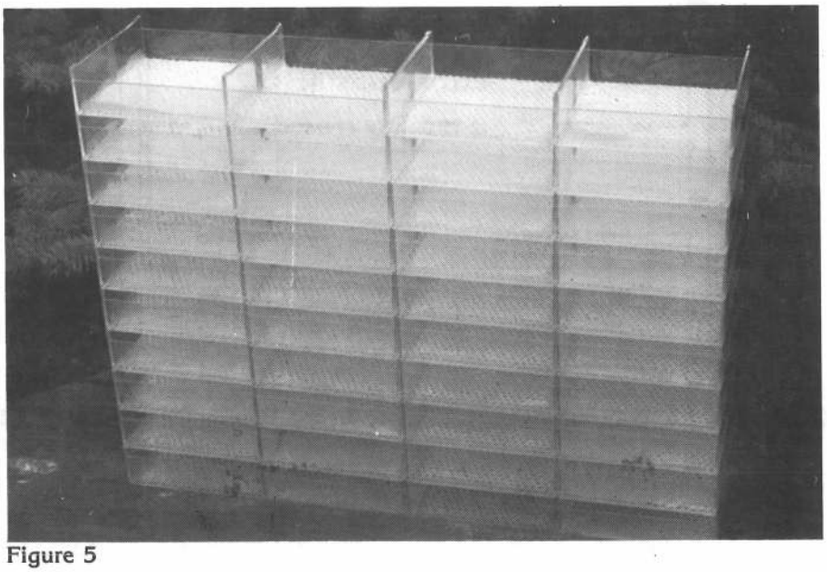


Figure 5

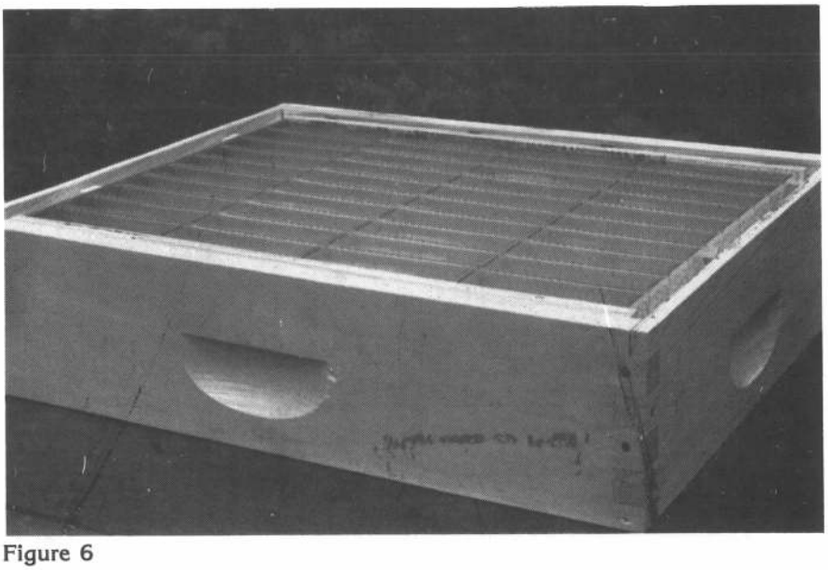


Figure 6

3/8" (9.5mm) less than in the U.S. The followers could be slightly thinner also.

Figure 8: Long support followers of figure 7 (U.S. dimensions).

C. **Directions for Installing the Super Conversion Unit:**

The comb honey super must meet standard specifications (4 3/4" plus or minus 1/32"). Reject or correct, if possible, any super that is not; the cassettes are exactly 4 1/2" deep, which leaves the required 1/4" for space distribution between top space (3/16" U.S. and 3mm in New Zealand) and bottom space (1/16" and 3mm N.Z.). Refer to figure 9 for the following steps:

Step 1: Nail the two performated triangular metal supports on to the bottom of the super at adjacent corners, as in figure 8, which are separated by the long dimension of the super.

Step 2: The long follower which has the factory-installed metal support strip on the bottom edge is now placed, ledge up, on top of a set of three spacers about seven inches apart. A single 1 1/2" nail is driven through the follower and nearly through each spacer near the end.

Step 3: Place the super on edge with the top opening facing the operator and the metal support corners behind and to the top. Transfer the partially nailed fixed long follower unit on to the inside bottom edge of the thus positioned super with the spacers down, and metal support edge upward and to the rear.

Step 4: The follower is now pressed against a straight 3" x two foot board hand-held firmly behind the super as a backstop while the three nails are further driven to secure the position. The correct bottom space of 1/16" from the bottom edge of the super is thus automatically obtained due to the 1/16" follower feet being in contact with the backstop which represents the actual resting position of the bottom edge of the super.

NOTE: If a number of conversions are to be made it is desirable to construct a fixed backstop, e.g. by securing a 2" x 2" x 20" strip on the edge of a perfectly flat piece of 3/4" plywood (8" x 20"). Such a fixed backstop unit is shown in figure 9. A line drawn 4 3/4" from the backstop also allows the devise to be used for a quick check of super depth. With lines to indicate spacer location, it serves additionally in Step 3 as a template with backstop for partial nailing of the fixed long follower on to the spacers (Step 3).

Step 5: Drive two more 1 1/2" nails into each of the two outside spacers, but only one more at the far end of the center spacer since a center nail here would exit the other side through the hand hold.

Step 6: After rotating the super on the bench to the left short end, one of the short 1/8" (3mm) hardboard followers is nailed into the short end of the super over two spacers about ten inches apart. This follower does not bear weight or affect spacing so that precision here is not critical. Just shove it next to and in line with the fixed long follower and drive two nails through each of the two spacers.

Step 7: After installing a set of halfcomb cassettes, check for accuracy of space distribution (3mm bottom and 3mm top in N.Z.) in the converted super. Using a plastic ruler, graduated on the ends, rest the long edge of the ruler on the cassettes and read the graduated end when shoved against the super rim. Measure each side.

D. **Directions for Installing Halfcomb Cassettes in the Super:**

40 Halfcomb cassettes, pre-waxed and pre-stacked in four taped columns of 10 each, may be installed in a converted 4 3/4" comb honey super in less than two minutes.

First, place the empty super vertically on the long edge which directs the top opening of the super toward the operator. The fixed followers are now to the left and below. (figure 10)

The four taped stacks of cassettes are then set onto the long fixed follower with the bee entry slots exposed. Shove the stacks firmly to the left against the short fixed follower and back against the 3/16" metal ledge.

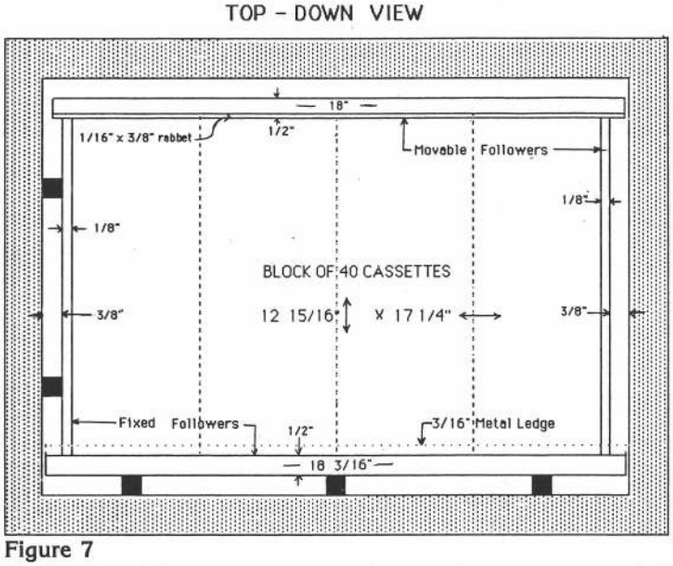


Figure 7

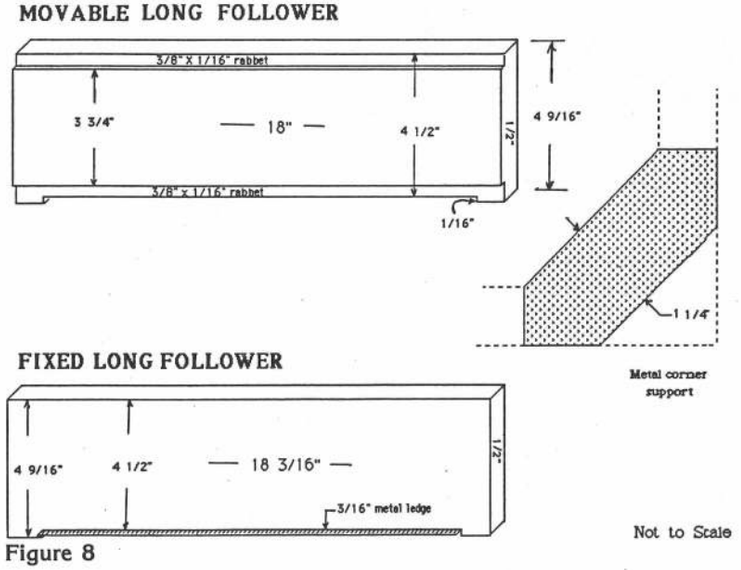


Figure 8

Then insert the long movable follower along the top four cassettes with the rabbets down and the corner posts of the top cassettes fitted into them. Extend the follower to the right into bee space so that the follower may be tapped loose at harvest.

Next, secure this rabbeted fofllower firmly by inserting four super springs between it and the upper super rim — one at each column with the curled ends against the follower.

Check to be certain that all of the cassette corner posts are fitted into the rabbets. Install the short movable follower

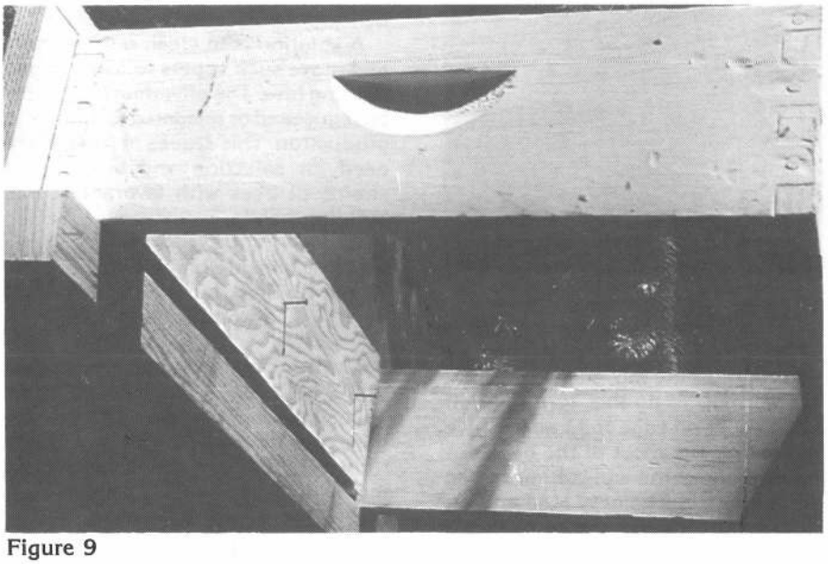


Figure 9

securely with two super springs. In this same position, make certain that the four columns of cassettes are pressed together so there are no cracks between them. Turn the super bottom down on the table as it would be on the hive (figure 6). Press the cassettes downward against the metal supports so that they are flush at the top. Top space should now be 3/16" in the U.S. (1/8" or 3mm in N.Z.)

To remove honey-filled cassettes from the super, follow this procedure in reverse. The movable long follower, extending into bee space may be tapped loose at the end with a hive tool after removal of springs.

Figure 10: Position for loading a super

IV. ON-HIVE TESTING OF THE HALFCOMB CASSETTE AND SUPER

Throughout this project, on-hive testing was conducted by the author and many others. The objectives were to identify structural and design deficiencies, and to evaluate cassette acceptance by the bees and comb building performance in the Halfcomb super.

The most difficult task was to determine whether to fault the cassette or the beekeeper when a poor result was observed. Hence complaints not accompanied by information on hive status quo, nectar flow conditions, manner of use, or compliance with super specifications were considered for their anecdotal value only.

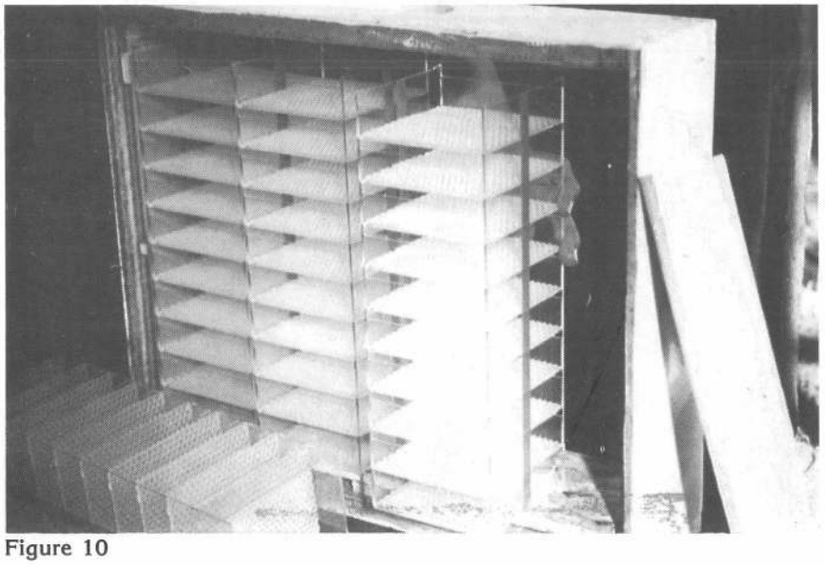


Figure 10

A. **Acceptance by the Bees:** From a large number of documented case histories and carefully controlled experiments, it was not uncommon to find that the bees had occupied the Halfcomb super and started comb building within hours. Such results speak for themselves as to the vargaries of the honey flow and the readiness of the hive for comb building. Failed acceptance was usually attributable to:

1) **Violations of super or cassette specifications:**

a) The *beeswax foundation coating* was too skimpy.

b) The super had been *freshly painted* especially bad when painted on the hive — A SPECIAL WARNING.

c) *Adhesion tapes* with strong adhesive odor had been used.

d) The super had been exposed to a smoke-filled or otherwise *tainted environment.*

e) *Cool air inflow via* an open inner cover, super tim to hive contact cracks (inherent with brand new supers never sealed by bees), or other nearby holes or hive defects.

f) Even human scent from excessive handling cassettes as demonstrators has been suspect.

2) **Hive mismanagement**

a) The brood chamber was honey bound[8]

b) Foraging and comb building momentum had been pre-empted by swarm preparation.

c) Foraging bee population was inadequate[8]

3) **Comb honey super misuses:**

a) Putting a super on the hive with no knowledge of the hive's condition or consideration of timing with flows.

b) Placing both a comb super and an extracting super on a hive together. The extracting super is at once usable space. The extracting super will always pre-empt the comb super in a contest.

c) The mistaken assumption that a comb honey super added belatedly will immediately increase space, as would an extracting super. A comb honey super with foundation becomes *usable* space for the bees *only later after comb is constructed.*

B. **Comb Building Characteristics in the Halfcomb Cassette:** There are two outstanding characteristics of "comb honey in the Halfcomb" which are inherent to the Halfcomb concept. One is the *total visibility* of the comb in every detail because of the crystal clear

plastic. Even cut comb in plastic boxes is much less observable, especially when wrapped. The other is the deep-celled comb which has no midrib.

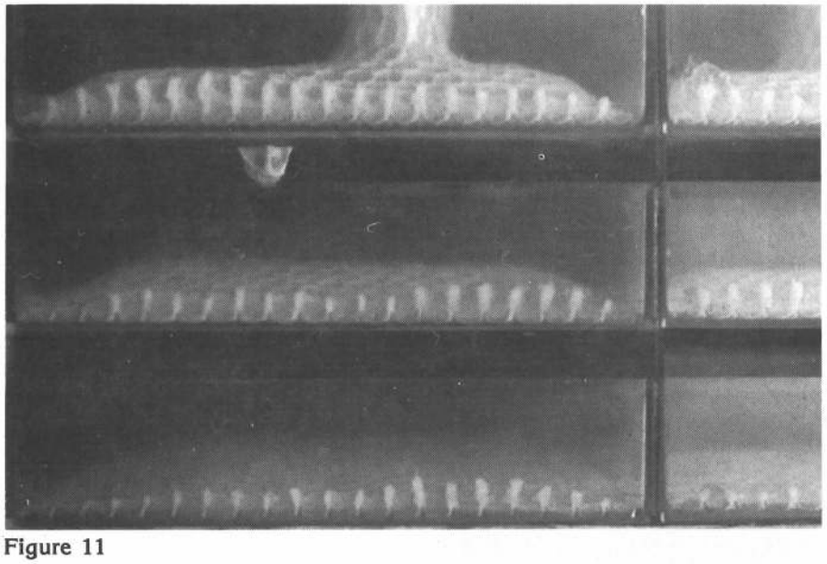


Figure 11

Hence, the *wax content* is *significantly reduced* over that of all conventional comb forms.

It was found that bees fill cassettes all the way to the walls and corners full depth from side to side when comb building temperature is maintained. This important discovery was unexpected, since traditional square wooden sections are notorious for the tendency of the bees to resist completion of those cells next to the walls and corners. It is reasonable to view this as evidence of the possibility that bees actually perceive the developing comb in the neighbour cassettes through the clear pastic and/or the reflection of the comb they rest on, and attempt to build continuous comb.

The tendency of bees to avoid completion of those sections to the outside and corners of a super, noted in III-A2, is seen in all types of comb honey supers, including the Halfcomb. This avoidance is clearly explainable by reduced temperature there. It is much more pronounced in cool weather with cold nights and almost unnoticeable in hot weather with warm nights. The solution is to construct and manage supers in ways that favour continous warmth in so far as is possible. One standard way to improve this situation is to provide the aforementioned continuous bee space around the block of sections for insulation and warmth by bee occupancy (figure 7). Another is the systematic rotation of supers close to the always warm brood nest (see VI on supering).

In the case of the Halfcomb cassette super, temperature effects are mainly observable on those cassette walls next to the front and rear ends of the super. Unlike in any other section super, when nights are cool and end filling is slow, it is possible to rearrange columns in the Halfcomb super so that the two outside columns are moved inward where it is warmer. To do this, turn the Halfcomb super on edge right on the hive, blow or smoke most of the bees out. Remove one of the end columns to accommodate it. The easy load and unload feature of the Halfcomb super makes this a reasonable option which could help to increase the percentage of completed cassettes.

Occasionally, certain strains of bees were encountered with the innate habit of constructing brace comb inside the cassettes. These were started as small burrs on the bottoms of the next box when the new comb is about 5/8" away (figure 11), and then become attached to the comb. Such burrs have been reported[9] in Round comb supers. To further show that the construction of these brace burrs is not unique to the Halfcomb and is largely due to innate comb building characteristics in some strains of bees, two experiments were conducted. **First,** when such burrs were removed, the bees would at once rebuild them, but moved to another hive such brace burrs were not rebuilt. **Secondly,** the offending hive was supered with the classical basswood section comb honey super. These same bees proceeded at once to attach burr to the wooden separators also (figure 12).

A solution is to clean out the burrs and move such supers to a better performing hive. The offending hive might be requeened or relegated to non-comb production. This argues in favor of the need for selection and breeding of strains of bees with favorable comb building habits.

Figure 11: Inside brace burr
Figure 12: Brace burrs on separators of a wood section super

The more conventional type of burr comb, however — that seen between opposing non-wax surfaces such as between two supers — can be largely controlled by accurate space control.

V. ADVANTAGES ACCRUING TO THE BEEKEEPER

All of the advantages introduced by the Halfcomb cassette accrue directly or indirectly to the beekeeper. They are itemized under four categories as follows:

IN COMB HONEY PRODUCTION:

— No section parts to assemble, including wax foundation
— No section holders to buy or clean

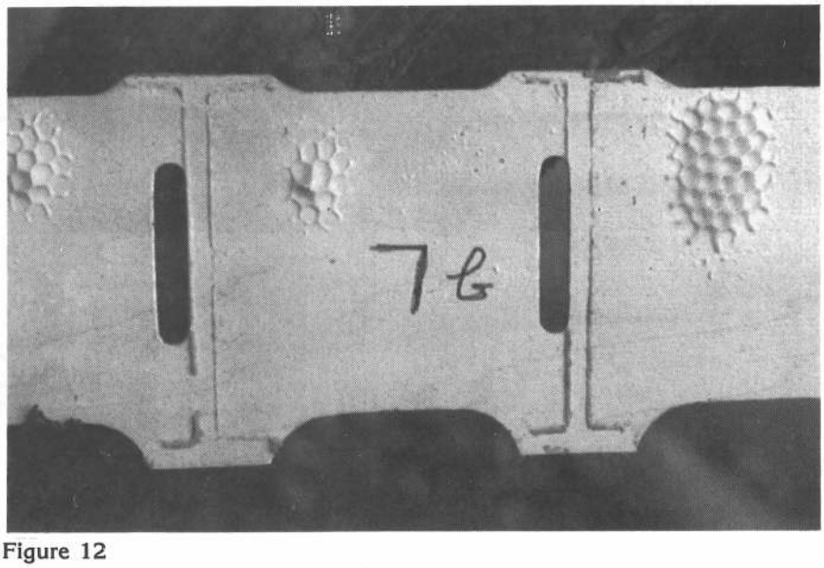


Figure 12

— No section separators to buy or clean
— Durable foundation that lasts indefinitely
— Supers can be assembled in less than two minutes
— No additional packaging, except for cover and label
— Favorable finished-cassette yield potential by rearrangement in the super, and by convenient sorting and return of incompletes
— Very likely less prone to wax moth

IN MARKETING:

— WAX REDUCTION stands out as an IMPORTANT NEW AND EXCLUSIVE SALES PROMOTION PITCH which could extend the use of comb honey
— Visibility: unusual potential for hilighted display (figure 13)
— Cassettes rest firmly on 5 of 6 sides with no leaking from open cells
— Covered cassettes interlock for stacking
— Multi PAK option (figure 1b)

CONSUMER APPEAL:

— A new dimension in comb honey quality (low wax content)
— 12 oz. net vs. 8 oz. for Round
— Visibly certified to be NATURAL
— Absolute minimum of human handling (Bee-prepared)
— Convenient server: requires no transfer of honey
— Cover-protected for storage between uses
— Novelty

ECONOMIC:

— Significant reduction in labor (cost)
— Equipment cost savings (holders, separators, foundation)
— An exclusive diversification not subject to import competition (Patent protected)
— Honey in the Halfcomb merits a premium price. The greater net weight of honey over Round (12 oz. vs 8 oz.) **alone** supports a substantial premium over Round. (The package cost per ounce of honey is about the same.)

VI. CONSIDERATIONS FOR NEW RECRUITS TO COMB HONEY PRODUCTION

A full discussion of comb honey methodology is far beyond the possible scope of this article. Yet there are a few important considerations to be highlighted for first-time comb honey recruits. This includes those experienced extracted honey producers who may not have had cause to contemplate the nature of the radically different task involved in comb honey production. This, of course, has to do with the obvious difference that *new clean comb must be built for every pound of honey produced, and that this comb is part of the product.*

A. **Hive Management:** Comb honey production can be managed quite compatibly with extract production and its equipment, so that diversification makes a perfect combination.

A successful procedure that can be recommended as a starter for new recruits to comb honey is that described by Sechrist[10] for diversification into comb honey by extracted honey producers. Its success rests with the precaution to assure that *the bees are ready to construct new comb and then enabled to do so.*

Basically, with variations, the plan is to shift a *strong colony* from extracted honey to comb honey production temporarily, *during the heart of a main flow,* and then back full circle to extracted honey before the end of the flow.

Starting with a single brood chamber hive with extracting super(s) after the full flow has begun and the *bees are actively storing nectar above the brood nest,* Sechrist simply removes the extracting supers and replaces them with the intended comb supers after removing the excluder. The comb supers are thus next to brood. The extracting supers are placed back on top over an escape board, then moved elsewhere when empty of bees. For the Halfcomb, two full supers of cassettes are advised (see VI on super rotation). When the supers are completed, remove them over an escape board. No further supers are added. The extracting supers are returned, while incomplete supers are placed on those hives doing the best work.

With the double brood chamber hive, most commonly used for extracted honey, the same plan can be followed, provided that the two brood chambers are reversed in position at the start. This assures sealed brood next to the comb supers, at once, to stimulate comb start. The double deep hive is generally not satisfactory for dedicated comb honey production because of the tendency to develop a honey barrier at the very top.

B. **Supering:** The rotation strategy for supering described by C.C. Miller[7b] in 1915, and modified by the Killions[11] in recent years remains sound today.

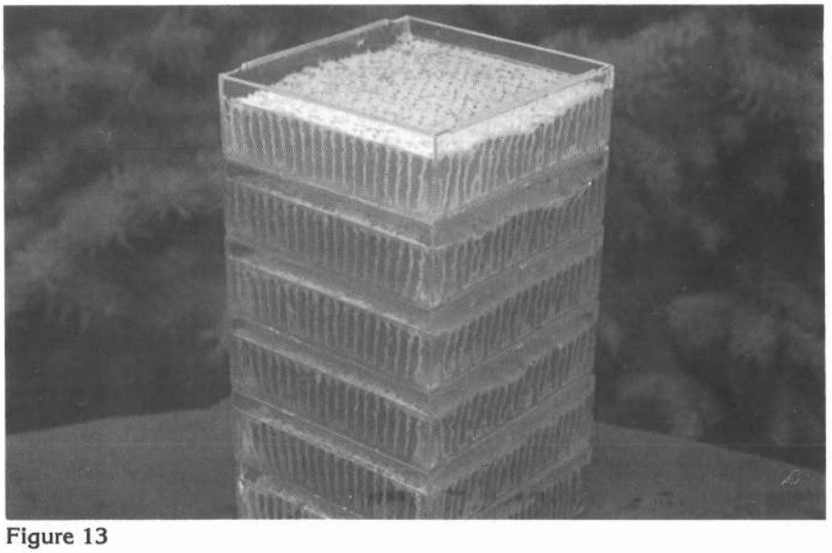


Figure 13

The rationale is convincing, as are the results.

New comb supers are first placed on top of other super(s) (if any). One can conveniently monitor progress of the bees in starting new work in this super at the top, especially in the Halfcomb. **Next,** each new super is moved down directly over the brood, for the major filling when about half drawn; bees *work best next to brood where it is warm.* Previous supers, are moved upward without change of order for capping; comb honey capped away from the brood is whiter and less likely to be travel stained. Supers will thus be finished at or near the top to be cleared of bees over an escape board.

Note the added possibility when using the Halfcomb super for rotating the end columns of cassettes inward for better filling, if nights are cool (see Part IV,B).

Partially drawn supers, even up to just short of capping, may be carried over to another flow, or another season if well protected.

The strategy of super rotation for improving the quality of comb honey in the Halfcomb (or the continuing rotation of open comb next to the brood.

It is here, in the management of supers during the flow, that one earns the right to a premium for the product.

C. **Harvest:** Timely harvest to avoid

travel stains is just as important as timely supering to maintain momentum. At the time a super to be harvested is placed over an escape board, for clearing of bees, **rough scrape** any burr comb present; the bees will clean up the resulting honey drip for you. A thin bladed tool works well, such as a putty knife finely polished on the cutting edge to avoid scratching. Use short, quick strokes without much pressure.

After removal from the hive, further clean-up is most efficiently completed while the cassette sections are still in the super. Cloudiness from travel stain etc. may be removed easily with paper toweling, wetted with rubbing alcohol (or vegetable oil). Dry paper towelling gives a nice polish.

To remove cassettes from the super, turn it on edge just as in loading the super. Remove the springs and knock the movable long follower loose by tapping the end protruding into bee space.

There is usually some wax at the ends of the bee entry slots which can be largely ignored as the covers are installed — at which time unfinished cassettes can be set aside in stacks for return to a hive the same season, or the next.

Figure 13: Display of Honey in the Halfcomb

VII. **DISCUSSION**

For perspective, some comparisons of the Halfcomb with the popular Round comb are useful.

The net weight of finished Halfcombs per cassette average 12 oz. (40 per super) vs. 8 oz. per section of Round (32 per super). Two supers of Round are required to equal one super of Halfcomb in net weight of honey.

Per super, there are 152 units and 32 wrappers as labels to handle for Round vs. 4 units (figure 5) and 40 covers with labels per super of Halfcomb. Thus for an equivalent net weight of Round there are over 300 parts vs. four for Halfcomb to assemble. However, there are 64 sections of Round vs 40 cassettes of Halfcomb in this comparison.

With a window into every detail of Halfcomb honey to verify naturalness and the substantial reduction in wax content, clean white honey in the Halfcomb is truly distinctive. Visibility, stackability and versatile displayability (figure 14) are strong marketing advantages.

The time freed up from super assembly by Halfcomb use, especially during the critical period of the honey flow when additional supers are needed at once, attention can be shifted to super monitoring. *This attention, essential to the production of quality comb honey, will be well rewarded.*

A commitment to succeed with Honey in the Halfcomb, or any comb honey production, is probably one of the best ways to learn about beekeeping. Comb honey production is *different,* but it need not be *difficult.* Save the comb super for a better opportunity if historical honey flows fall to materialise.

The savings in labour and the prospects for premium pricing, supportable by the many advantages herein enumerated, considerably enhance the potential for profitability in comb honey production.

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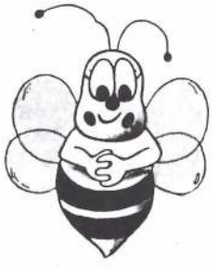

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Harry is survived by his wife Doreen and three sons Mervyn (Fairview), Russell (Southland), Jeffrey (Timaru) and daughter Marilyn (Tamworth, Australia), to whom we extend our most sincere sympathy.

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