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NORTHLAND BEEKEEPING

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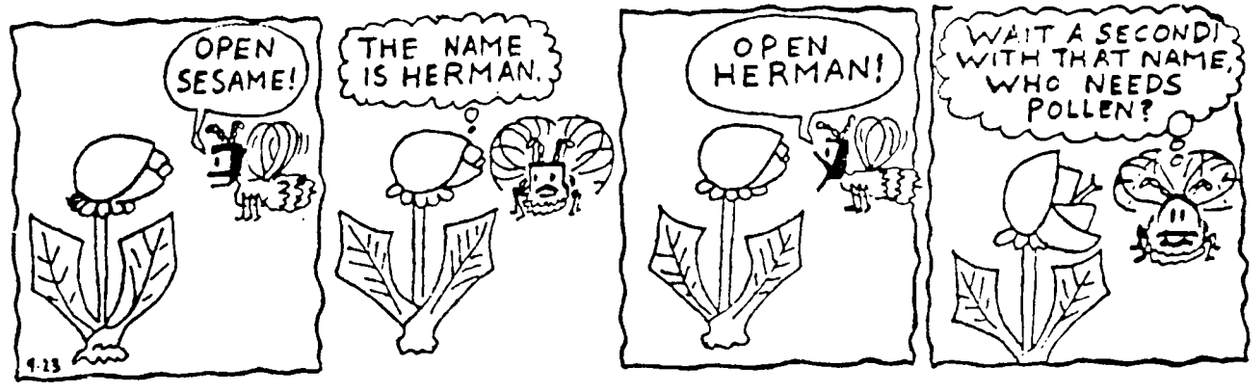
KIWIFRUIT POLLINATION '85

With the fruit now well-developed on the vines, indications are that this season's pollination was very effective. While the bad weather half-way through kept the bees motivated for pollen collection, the standard of hives and other aspects of pollination service played a major role.

As many beekeepers know, I carried out a Pollination Survey this year as part of my work programme. With the help of Field Officers Andrew Bolton and Barry Greaney, 153 hives were inspected. This figure represented 5% of total hives used for kiwifruit pollination this year. Five colonies in each of two orchards were surveyed for each pollinator who registered sites with MAF. Each beekeeper was presented with a personal report of our findings for use in improving pollination service next year.

The results were very encouraging, but as in all things there is still room for improvement. Only 17% of hives failed to meet the NPA standard for both



brood and bees, with the average situation looking like this -

	Bees*	Brood (cm^2)	Brood*	Honey*	Pollen*	Empties
N.P.A. Standard	9	7000	4	3	<1	9
'85 Average	11.8	8055	4.6	3.4	0.9	9.1
% of Standard	1.31	1.15	1.15	1.13	1.10	1.01

I was also pleased with the response to improved service methods on the part of both beekeepers and growers. Split deliveries were used in over 1/3 of contracts surveyed while almost half of all orchards provided bins for hive placement. Just as important, at least 3/4's of orchards now use end-of-row or along-shelter-belt placement. It looks as though Cam Jay's message on bee dispersal really has gotten through.

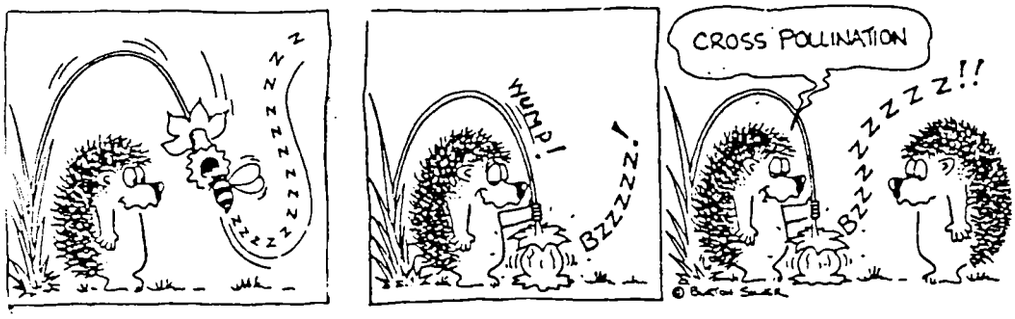
Obviously the survey was very worthwhile. We now have a base level of information we can work with, both as individual beekeepers and as a group. It's also given me the opportunity to learn more about kiwifruit culture and the behaviour of hives in orchards. I've now seen my fair share of kiwifruit blooms!

I'll be reporting more fully on this year's Pollination Survey and my advisory plans for next season at the joint NBA - NPA field day in May.

BROOD AREA AND POLLINATION STANDARDS

Probably the most important factor in assessing a kiwifruit pollination hive is the brood-to-bee ratio. Hives at the steepest slope of the growth curve have a high ratio, with a corresponding strong demand for pollen. Larger colonies are actually less efficient pollinators of kiwifruit. With a lower brood-to-bee ratio there's a greater stimulus to forage for nectar, something the kiwifruit flower doesn't produce.

That's why we went to such efforts actually measuring brood area and population in this year's survey. And when you measure brood it's obvious that we shouldn't talk about "full frames of brood." While that's a theoretical concept, you very rarely find such frames in reality. A really full frame is no more than 85% full, since the corners and top and bottom strips are usually missed.



"Good" frames, in beekeeper language, are usually about 60% full. So, if we talk about 4 full frames of brood we actually mean 7 "good" (60% full) frames.

You will also recall that we discussed a change in pollination standard just prior to the season to take into account better understandings of brood production rates. The old standard of 8,700 cm² is actually 8.2 "good" (60% full) frames, leaving not enough room for honey (standard = 3 frames) in one brood box. 8,700 cm² is also a real struggle for any queen. The following table shows why :

	Below Standard	Minimum	
Daily egg-laying rate	1070	1430	1791
Cells with Brood/Cycle	22500	30030	37620
Area of Brood (cm²)/cycle	5250	7000	8770
Equivalent FD Frames (full)	3	4	5
"Good" (60% full) FD Frames	5	7	8

It takes a young, well-reared queen to lay close to 1,500 eggs per day, one of the most important reasons why pollination hives must be requeened annually.

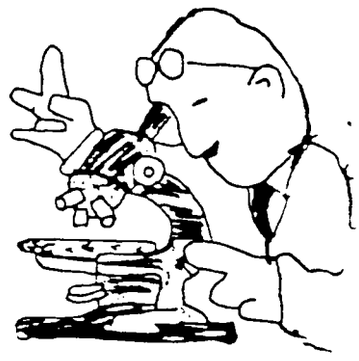
We'll have a Hive Strength field day prior to next season so that everyone can "get their eye in."

KIWIFRUIT GETS A NEW IMAGE

Scientists used to refer to kiwifruit as *Actinidia chinensis*, because of the plant's Chinese origins. Now the taxonomists have done some reshuffling and

the plant is officially "delicious" - it's now known as *Actinidia deliciosa*.

NEW BEE VIRUS DISCOVERED



Some of you may have seen a recent wire service report announcing the discovery of a new bee virus, which the reporter suggested was "akin to herpes in humans." Well, the virus is Kashmir bee virus and as normal the reporter got it wrong.

The virus was found by Dr Dennis Anderson, our bee pathologist at DSIR Mt Albert. It appears to be widespread in New Zealand, but as Dennis says, there's no need to worry. The virus has no recognisable field symptoms and doesn't even affect bees unless another disease is present as well. In larvae the virus is being found in association with American foulbrood (*Bacillus larvae*).

Still the discovery did cause a worry. The virus had only been found previously in Australia and India (hence the name Kashmir) and there was concern the finding might affect queen bee exports. But after the collection of dead bee samples from around the world (under strict quarantine!) the virus has already been detected in Canada as well. This one's a different strain which would tend to indicate it didn't originate from our queens.

Dennis feels he will find the virus in other countries before he's through (a case of "you don't know you have it unless you look for it") and is even suggesting a change in name to "K" virus since it's becoming obvious that it didn't just originate in exotic Kashmir.

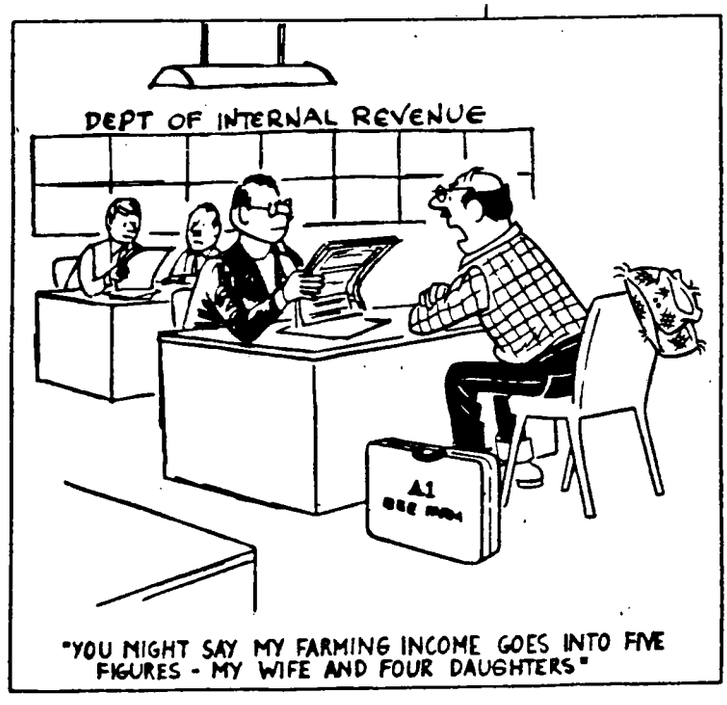
GST

A Great Service to Taxpayers or a Gigantic Swindle Tax? Opinions might differ but like it or not, the countdown to GST-day has begun. In the next few months you'll have to start putting your house in order to be ready for 1 October next. Forewarned is forewarned, so here's an explanation of what the tax is about.

<u>What is GST?</u>

It's a comprehensive tax on goods and services. Comprehensive because it includes virtually everything. And on goods and services because it covers both tangible products (goods) and intangible ones (services).

It is not a retail sales tax, like in the USA, where a set percentage is added on the bill at the final point of sale. Rather it is imposed at each sale or transaction. Effectively, though, the tax is levied only on the <u>added value</u>. The example I've given below will illustrate what I mean.



<u>Why a GST?</u>

- New Zealand currently gets a huge proportion of tax (63%) from personal

income tax. We've been promised that the introduction of GST will allow a reduction in average and marginal personal tax rates.
- An invoice-based GST system should stamp out a lot of tax evasion that occurs through the "underground economy."
- GST will replace most of the existing wholesale sales tax system - a hidden component of prices which has come about largely through historical accident and with no real logic.

How does GST work?

Let's look at a hypothetical example, to see how the 10% GST is calculated and paid at various steps in the life of a product :

Step	Cost of product	GST calculation	GST paid to IRD
1. Wholesaler imports a product which costs $100.	$100	$10	$10
2. Wholesaler adds $40 mark-up (to cover costs and profit margin) to the $110 total cost of the product	$150		
3. Distributor buys product from wholesaler at $150 plus 10% GST.	$165		
4. Wholesaler collects $15 GST from the distributor, but has already paid $10 GST. Therefore pays the balance to the IRD.		$15-$10	$5
5. Distributor sells the product to a retailer for $200 (to cover overheads) plus 10% GST.	$220		
6. Distributor pays IRD the $20 GST collected from the retailer, less the $15 already paid to the wholesaler.		$20-$15	$5
7. Retailer adds mark-up to the cost, and sells the product for $500 plus 10% GST.	$550		
8. Retailer has collected $50 GST from the consumer, but has paid $20 already to the distributor. Therefore owes the IRD $30.		$50-$20	$30
		Total GST paid to IRD	$50

What's happened? At each step, the article increases in price by the markup plus 10% GST. But on examination no-one in the middle of the system has actually been put out of pocket for the GST. They just pass it down the chain to the end-user (compare the "Total GST paid" in the example to the GST collected from the consumer). The only added costs to producers, distributors, retailers is the administrative cost of handling the paperwork.

So why not just charge the tax once at the retail price and avoid all the hassle? The answer is to protect the little guy. Overseas where they do this, consumers by-pass the retailer (and the tax) and purchase directly from the warehouse. That system penalises small producers who can't buy bulk-order wholesale.

How do you claim GST back?

In the previous example, the distributor paid $15 GST to the wholesaler, yet received $20 GST from the retailer. How does the distributor prove payment of the $15 GST, so only a payment of $5 (not $20) is made to the IRD? There are two requirements : 1. the business must be registered
2. proof of payment of the GST is needed.

1. Registration

All businesses involved in taxable activities with turnovers exceeding $24,000 must be registered with the IRD. Registration begins on 1 August 1986 and businesses will have a month to register. The IRD will use a business's IRD tax number as the registration number.

If turnover is less than $24,000, registration is voluntary but could be beneficial if the business is in competition with other, registered businesses. A registered buyer will prefer to buy from a registered seller if the GST paid is to be claimed. Purchases from unregistered sellers prevent the refund of the GST paid.

2. Proof of payment - the invoice

If GST is to be claimed all transactions must be traceable, which generally means that an invoice is required. Invoice numbers scribbled on envelopes or inadequate invoicing will not be accepted. Very clear rules have been drafted on what the invoice must contain :-

a) Invoice number
b) Supplier's name and address
c) Supplier's registration number
d) Purchaser's name and address
e) Date the invoice was issued
f) Date of supply if different to e)
g) Description of goods or services sold
h) Quantity of goods or services sold
i) Price
j) GST paid
k) Total price

For sales exceeding $100, all of a) - k) are necessary, whereas only b), c), g) and k) are required for purchases of under $100. By placing the onus on the buyer to provide the information, the IRD has transferred the responsibility of providing accurate claims back to the business.

For purchases of less than $10, no invoice is required, just the price (plus GST). The IRD will be watching for excessive claims in this category.

A minor change on those yellow credit card receipt slips will bring them up to the acceptable invoice standard - the main point is that the transaction must be verifiable.

When must returns be submitted?

For turnovers of less than $250,000, the IRD offers you the choice of submitting returns once every six months or once every two months. Note : If an application

is not lodged, returns will be expected bi-monthly, so make sure you apply. The two-monthly cycle is mandatory for businesses with turnovers exceeding $250,000.

Payment of GST is due on the first day of the second month following the end of the period. Although this sounds complicated, it's not. For example, if the period ends on 30 April, the GST should be paid by the first day of June (i.e. the second month after the period ends). Severe penalties, not the attractive 10% penalty of the past, exist for late payment of GST (e.g. on 2nd June).

"I DON'T NORMALLY DO THIS SORT OF THING, BUT I'VE JUST RECEIVED MY GST DEMAND."

What tax categories are there?

The government has made this as straightforward as possible. Goods and services are either :-

a) taxable b) exempt

Almost all goods and services will be taxable, but the notable exceptions are land sales, private dwelling rentals and financial services (i.e. those dealing in money, such as banks, stocks and shares). Because banks won't charge GST, but will still incur the extra costs for the goods and services they buy, they will probably increase bank charges. This rise should be lower than the GST percentage (if they play fair).

Any registered person buying a capital item which is used in a "taxable activity" (business) can claim from the IRD the GST content of the price paid when making his/her return.

For example, if a business bought a $27,500 truck (cost = $25,000 + $2,500 GST), the GST portion is recoverable because the truck is used in the business. However, if the truck was later sold, whether by auction, through the newspaper or at a clearing sale, it would be subject to GST on the sale price.

Zero rating

Zero rating is applied to all goods and services which are not subject to the tax because no GST is paid by the end-user. A good example is exports. Although exporters pay GST on their purchases, they will not recover it when selling their exports. Instead they have the pleasure of receiving cheques from the IRD for GST paid on their purchases.

When is GST due?

During submissions to the GST white paper, it became clear that the time of payment and the time of supply could be different. Market gardeners are unaware of their returns until their produce is auctioned. Dairy farmers on daily supply receive advances during the year and a settling payment once a year. So a change was made and at present GST is due at the earlier of either :
- the time an invoice is issued, or
- the time any payment is received by the supplier

What other effects will GST have?

The impact on cash flows depends on the length of your

return period, and the amount of cash versus credit sales.

- when selling packed honey, you hold the extra 10% of the sale price for up to six months before paying it to the IRD.
- however, GST worsens your cash flow if you make significant credit sales on extended payment terms or have a lot of bad debts (poor payers).

One of the biggest advantages that I can see is that GST will force businesses to keep better records. Every transaction will have to be recorded in detail on a standard invoice form, and beekeepers who aren't using some sort of cashbook and invoice/receipt folder, will have to start.

Further information

No doubt there will be plenty of seminars run on GST by accountants, small business agencies, polytechnics and the like. Use them - even though they won't have a beekeeping bias, they will be helpful. If there's enough interest we could even have IRD give the local branch a presentation.

The IRD has some information available. One piece is the Public Information Bulletin No. 139 (September 1985), a free, 51-page booklet on the tax. It's not very well written, but if you can wade through the woolly verbiage you'll find out the latest on GST.

Remember :-

- learn about GST.
- don't leave it to your accountant; you can't afford not to be able to manage it yourself.
- if you are going to register, do it by 31 August 1986.

- Buzz Words No. 2, Mark Schrader

THINKING AHEAD POSITIVELY

Interesting observations from a well-known farm accountant. I've adapted the article to fit the beekeeping scene.

My clients who keep bees profitably all have the following characteristics :

a) Wife is invariably close to the action although not necessarily physically involved.
b) Doing simple things well.
c) Has very good grip of own financial affairs.
d) Tends to look forward, at least as much as looks back.
e) Has a high production per hive, whether from honey or pollination or both.
f) Attends field days, seminars and the like and is often prepared to listen to a new idea or approach. Often is only having his or her own actions confirmed from attending these types of events but keeps an open mind.
g) Is the sort of individual to whom hard work and planning are much more important than luck.
h) Tends to have a positive point of view on decision-making and in general attitude.
i) Is usually a good communicator with advisers and would not move on any major capital decision without first discussing same.
j) Appreciates good advice even though not always moving in the advice direction.
k) Invariably has as few vehicles as possible but what vehicles he does have are in very good order.
l) Takes a very active interest in his annual financial statements regardless of whether the figures are good or bad.
m) Doesn't like overdrafts and debts even though he can cope with it much better than his neighbour.
n) Is usually not content to remain in status quo situation; is always trying to

improve on some area of his beekeeping operation.
o) Usually doesn't realise, appreciate or acknowledge that he is in the top 10% of farmers for profitability.

- Small Farmer
December 1984

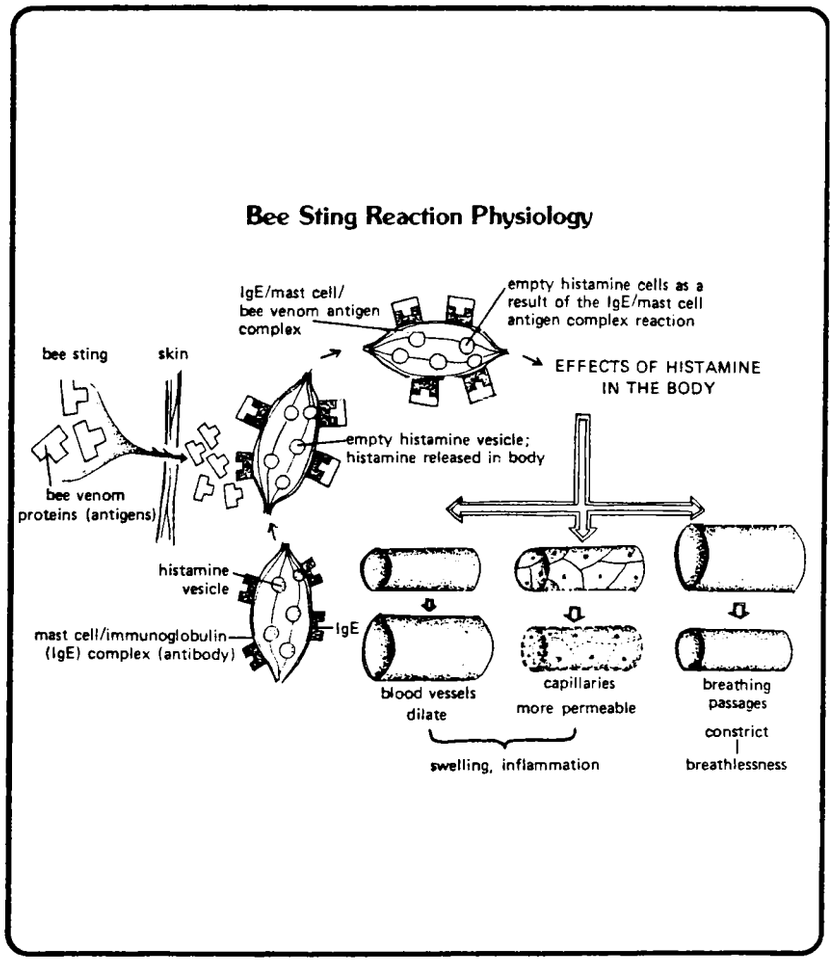
UNDERSTANDING BEE STING ALLERGIES

For those of us in beekeeping, periodic bee stings are just a fact of life. While they will always hurt (particularly in a few tender spots I could name!), most of us are lucky enough not to suffer the redness, swelling and sometimes even anaphylactic reaction that can accompany such stings.

As it turns out, however, those most near and dear to us can sometimes be the most at risk. In a three year bee sting allergy research study just completed, Dr J. Day, of Manitoba, Canada, has found that beekeepers' families are 50 times more likely than the overall population to show a general or anaphylactic reation to stings. In such families the figure is as low as one out of every five.

What could cause such susceptability? At first thought some strange process of heredity comes to mind. But while we've all been accused of having bees on the brain, it really hasn't altered our genes. Instead, the work clothes that we bring unknowingly into the house seem to be the culprit. To see why, we have to learn something of how bee venom actually works in our body.

Our bodies contain a number of natural defences against the many foreign invaders they have to content with. Bee venom is basically a foreign protein (called an antigen) which calls up in our bodies the production of other, defensive proteins (the well-known antibodies). Antibodies are in the larger family of body proteins called gamma globulins or immunoglobulins. Bee sting antigens stimulate specific immunoglobulins known as Immunoglobulin E (IgE in the diagram).



Now these IgE proteins are carried around on tissue cells called mast cells which contain sacs (vesicles) filled with histamine and other substances which cause inflammation.

When the venom antigen comes into contact with the IgE proteins and their mast cells, the reaction causes the vesicles to release the histamine into the blood stream. Once the histamine is released it has several affects including blood vessel expansion, take-up of fluids in cells, and even the constriction of breathing passages.

Many people have observed that swelling does not occur until after they have had their first sting. That's because the IgE antibody is specific to the bee venom antigen. Once the first sting has occurred, the body seems to "remember" the particular venom antigen. The next reaction is faster, with further antibody production taking place.

In people like beekeepers who receive repeated stings, the body is induced to produce another, "blocking" antibody called IgG. IgG proteins are not fixed to histamine producing mast cells, but float freely in the body and compete with the IgE in combining with the venom antigens. Because they are free-floating, IgG proteins are better able to attack these antigens before they reach the IgE/mast cells. Less histamine is produced and there is therefore no discomfort or allergic response.

But here's where our clothes come in. Coveralls and other personal bee gear routinely receive bee stings, even though the stinger may not make it through to our skin. As a result the clothing is continually being deposited with venom, which crystalizes in cooler temperatures, but begins to vaporize through the air once in the warmth of indoors. Another means of spreading venom may be in washing such coveralls with other family clothing in the washing machine.

In either case family members receive minute doses of this venom, breathing it and coming into contact with it on their skin. The venom antigens set up the "memory" process of IgE/mast cell production, but without sufficiently strong doses to bring on the manufacture in the body of the "good guy" IgG. When such a person finally does receive a full bee sting, the large number of IgE/mast cells reacts swiftly with a systemic histamine reaction.

Thankfully there is a desensitization process which can be used with individuals who show such a reaction. A preliminary test (called a RAST test) is carried out to determine the likelihood of a future reaction and then a course of injections with purified bee venom is given, usually at weekly intervals. Such injections no doubt stimulate the production of IgG proteins to compete with the allergy-causing IgE's. Once the course is completed a booster dose at regular intervals is required to keep up the level of IgG's. Contact your doctor if anyone in your family seems to be at risk!

BEE STING FIRST AID

Here's an interesting development for people with bee venom hypersensitivity - asthma treatment inhalers. People at risk from stings normally carry Ana-kits, an antihistamine tablet together with adrenaline in a hypodermic syringe. But a shot in the arm can be difficult to administer, particularly if you're by yourself. As well, an injection doesn't get the adrenaline directly to the throat tissues, the most life-threatening area in sting reactions.

Inhalers, on the other hand, administer adrenaline-like compounds directly to the tissues concerned. They're easier to administer (aim the nozzle and press the cap) and cheaper, too.

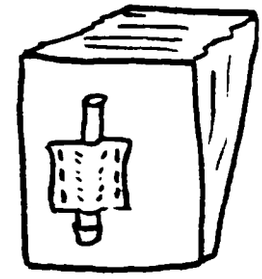
Sounds great. The hitch, though, is that inhalers are only available on prescription, so see your doctor first. The brand to use is called Medi-haler EPI by Riker.

FEELING THE PINCH

Beekeepers are feeling the economic squeeze right now; high interest rates, slow

honey sales, increases costs, and so on. It reminds me of the story of the 'coon hunters who accidently treed a mountain lion. One good ol' boy climbed up the tree to shake at the 'coon and got more than he bargained for. Finally he pleaded with his buddies on the ground to "shoot up here amongst us; one of us is gotta have some relief."

- Waikato Bee Notes
August 1985



GADGETS AND GISMOS

Hive Marker Extraordinary

Tired of not being able to see the "Qless" mark the next time you go back to a hive? Try Alflex ear tag marker pen. This is a felt pen with a spring loaded tip. You push it up and down and release the amount of ink you want. Marks will stay on hives (or ear tags) for at least two years (!) without fading.

Pen Holder

How about stapling a piece of leather or vinyl to the back of your smoker (as in diagram). Then you have the pen with you whenever you need. Beats having the pen cap come off in your pocket. Alflex pen ink doesn't wash out of clothes or overalls!

Inexpensive Hive Brand

Graham Cammell, 133 Walmsley Road, Mangere, AUCKLAND (ph. 09-667938) is producing a brand head to order (your initials or registration number) for only $52.00. They're 25 mm in size, so they can be used for top bars as well as boxes, etc.

Re-cycled Drums

Auckland Drum Co. Ltd, 591 Rosebank Road, Avondale, AUCKLAND (ph. 09-643777), have recycled drums for sale at about $25.50. The drums are lined with a Taubmans two-pot epoxy laquer which is approved for food use. They're slightly smaller than new 200 l drums and so hold less honey. They're also lighter - 20.75 kg versus 21.5 kg. The drums are available as open mouth or with bungs.

Trade Table

* 20 Hives for Sale - 5 storey, some with 3/4 depth honey supers, sold with crop. Phone Dave Nicklin (0846) 22318.

HONEY MISCELLANY

Even though this year's Northland honey crop will be lower than normal, I thought I would include a number of items of interest concerning our major crop.

* Chemical Investigations of New Zealand Honeys

Prior to my arrival, beekeepers throughout the district were asked to submit honey samples for a study of antibiotics in honey. Some of you out there no doubt thought we were trying to catch people using drugs for AFB! Actually that wasn't the case at all.

The samples were for a university thesis investigating the natural occurrance of antibiotics in honey. We all know honey has been used to treat burns for centuries and that honey kills bacteria both because it contains hydrogen

peroxide and is hydroscopic (absorbs water). But as it turns out honey has other antibiotics as well.

The researcher, Seng To Tan, found a series of phenols and acids in honey which, while not highly antibacterial individually, have a high combined activity. The presence and levels of these substances are not the same in all honey sources and as it turns out manuka and kanuka from this district have the highest antibacterial activity of any honeys tested.

Substances which were found only in the manuka and kanuka are :

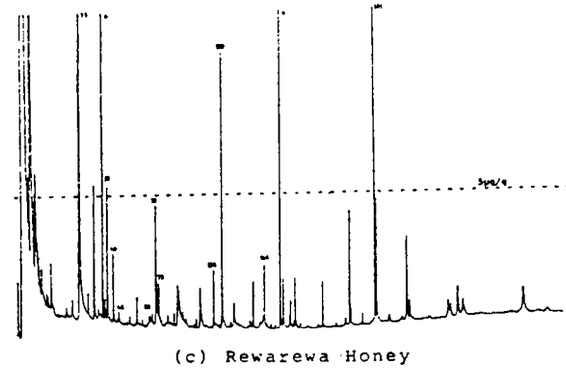
*syringic acid methyl ester
*2-methoxyacetophenone
*2-methoxybenzoic acid
*2-hydroxy-3-phenylpropionic acid

I have a copy of the discussion sections of Mr Seng's results, if you're interested, but they're quite hard going. Anyone who supplied samples might be interested in the table on Antibacterial Activity. Here the samples are listed individually together with their affect against a test bacteria. Contact me if you would like a copy.

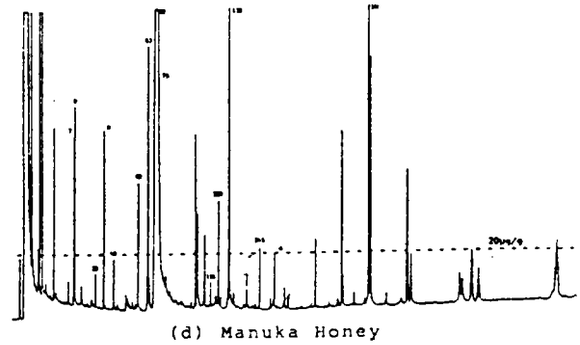
*Finger-Printing Honey

Another part of Mr Seng's work involved a potentially pioneering new method of honey source identification. Currently, producers and exporters must rely on pollen content analysis of a new honey to determine its floral source (see last issue). That procedure is fraught with error, however, since some species are represented by more or less pollen than the actual nectar produced.

Seng's method is to look at the different chemical constituents of honey using gas chromatography/mass spectrometry. Every floral source has its own unique levels of these chemicals (like a fingerprint!), so the analysis method should be quite reliable. Two such fingerprints are shown in the illustration.



(c) Rewarewa Honey



(d) Manuka Honey

To help in this work, we are once again requesting samples of specific floral source honeys, but time is of the essence. The sample should be 50-100 ml in an unbreakable jar. Don't forget to mark the sample with the area and floral source. Post the samples to me C/o MAF, Private Bag, WHANGAREI.

*Honey Markets

Just when we were wondering where New Zealand's 1985 bumper crop (10,000 t) was going to go, the Northern Hemisphere produced a short crop. Europe, the U.S. and Mexico had below average crops and the continued U.S. support programme created a vacuum that New Zealand has slotted into very nicely.

Demand continues to be strong for this year's crop as well with good prices being reported by exporters. And it looks like the U.S. Congress has stepped back from the brink on plans to cancel their support programme. The programme will continue,

albeit in a revised form. The support price is to reduce up to 5% per year to a minimum of U.S. 54¢/lb (N.Z. $2.18/kg). Honey will also be encouraged onto the domestic market at the world price with the government paying the producer the difference. Not bad going (if you were a U.S. producer) but it may actually reduce future U.S. import demand.

N.Z. Honey Exports

Honey exports for year to end of June 1985 :

Category	Amount (kg)	Value ($NZ f.o.b.)	Largest Customer
Bulk honey	829 767	1 646 012	West Germany
Retail packs	175 091	552 493	Australia
Comb honey	258 450	1 621 987	Saudi Arabia
Honeydew	661 264	1 336 385	West Germany
Total for 1985	1 924 572	5 156 877	
(1984)	(824 861)	(2 368 094)	

Source : Department of Statistics and Trade & Industry

*Honey Buyers

Two new buyers are active on the North Island market. Wilson-Neil - Hororata Honey Exports Ltd, (ph. (024) 766 921) and Acton International (ph. (03) 62 598). Both these firms are well established export companies with plenty of experience in handling honey.

Wilson Neill - Hororata Exports sent out a circular recently to most beekeepers. If you didn't get one ring their "local" agent, Peter Jones in Rotorua (ph.(073) 476 622).

Acton International has made a good reputation in recent years and now are employing Kevin Whiteside, formally Wilson Neill's horticultural export manager.

I've heard some good prices quoted from both companies, particularly for light honey (lotus/clover blend).

And finally :

Dissolution of the New Zealand Honey Marketing Authority
(Notice No. 3555, Ag. 4/54/19)

PURSUANT to subclause 3(8) of the Honey Marketing Authority (Dissolution) Regulations 1983, I give notice that the New Zealand Honey Marketing Authority is hereby dissolved as from the 31st day of August 1985.

Dated at Wellington this 20th day of August 1985.

M L Cameron
Director-General of Agriculture and Fisheries

NZ Gazette, 29 August 1985

SUGAR NEWS

The world price of sugar has been hovering around NZ$150 per tonne. New Zealanders pay about four times that - but not for too much longer. The sugar industry is to be de-regulated. Long term contracts with Fiji and Australia will not be re-negotiated and the refinery will start buying sugar on the spot market.

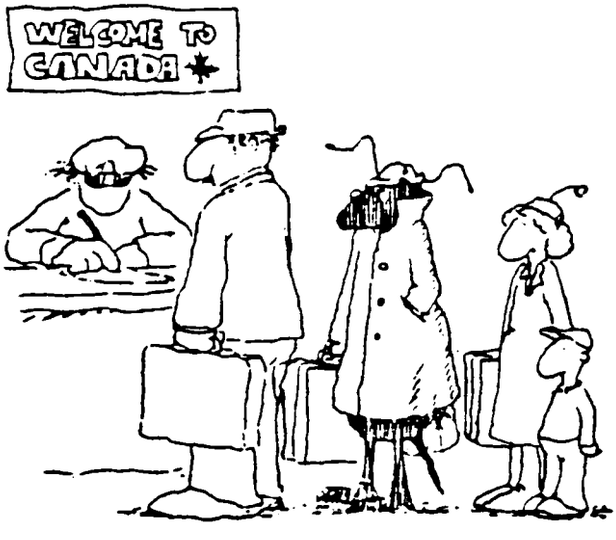
According to sources, we can expect price reductions prior to de-regulation, but at this point the price is -

Raw - $22.80/35 kg bag $651.43/tonne
Al (white) - $26.30/35 kg bag $751.42/t

minimum order - ½ t.

THE NOSE KNOWS

Dr Mark Winston
Source : British Columbia Honey Producer's Newsletter

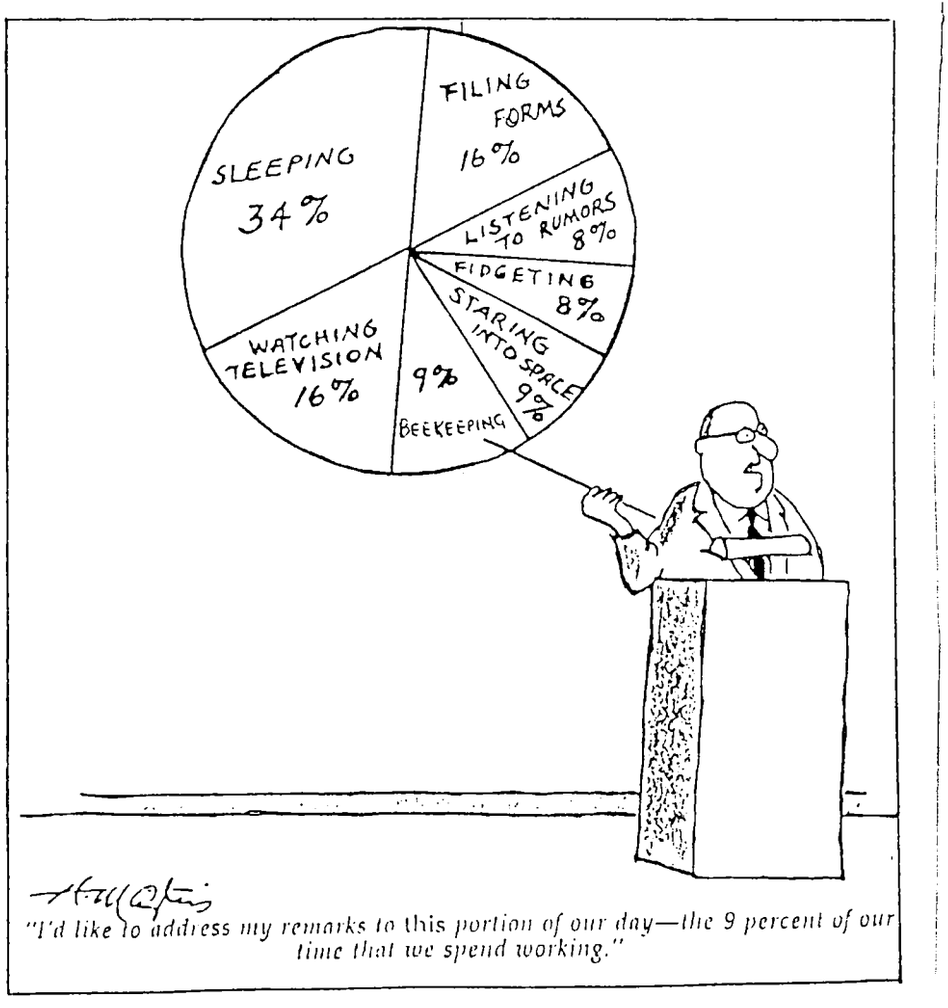


Sometimes some of the old research turns out to be the most interesting. I recently came across some work by Forel, von Frisch, and their students which answered a seemingly simple question : How do bees smell? The antennae were thought to be the noses of bees, but this was not confirmed until the early 1900's, when von Frisch showed that workers could be trained to visit dishes which contained odors of natural flowers. When the last eight segments of the antennae were surgically removed, this sense of smell was eliminated. Subsequent experiments showed that the olfactory activity of bees is approximately equal to man, although workers are 1/10 - 1/100 more sensitive to odors of wax, flowers and other biologically significant smells.

However, bees have one aspect of their sense of smell which is even more sensitive, the ability to localize where an odor came from. Bees can use their paired antennae to accurately detect the location of an odor by comparing the intensity of odors perceived by each antennae. This sense was demonstrated by experiments in which food rewards were used to train worker bees to odors in a Y-shaped tube. When the antennae of trained bees were glued in a crossed position, the workers would choose the wrong direction at the fork, indication that the antennae were providing information concerning odorant location.

The antennae are also involved in numerous other functions, such as temperature, carbon dioxide, and humidity perception. The sense organs on the antennae which are involved in these functions are still not known, but differences of 1% in carbon dioxide concentration and 1° C temperature can easily be detected by worker antennae. Such acute sensitivity is important for maintaining the brood nest

within the precise and narrow range optimal for brood rearing. Without their antennal "noses", bees would have little idea about what goes on around them!



"I'd like to address my remarks to this portion of our day—the 9 percent of our time that we spend working."