AUSTRALIA'S

HONEYBEE NEWS

"The voice of the Beekeeper"

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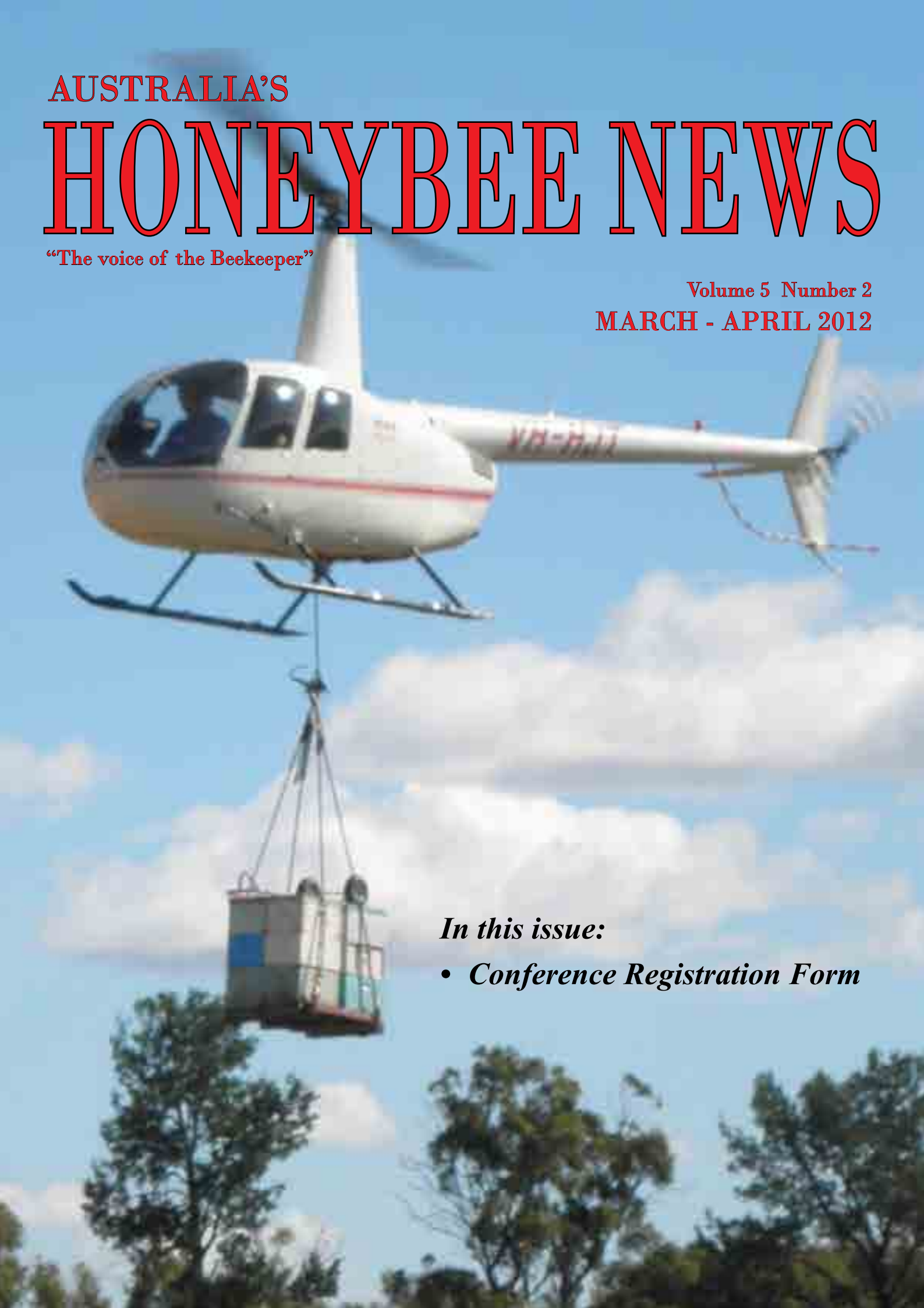

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AUSTRALIA'S HONEYBEE NEWS

The Journal of the NSW Apiarists' Association Inc. (NSWAA)

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COVER: Hives caught in the floods in March at Narrandera NSW Photo : David Mumford

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Editor & Production: Margaret Blunden PO Box 352 Leichhardt NSW 2040 - Phone: 02 9798 6240
Mobile: 0411 662 014 Fax: 02 9797 8061 Email: honeybee@accsoft.com.au

Printer: Farrell Printers PO Box 253 Croydon NSW 2132
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NSW Apiarists' Association Inc. Executive Council

PRESIDENT
Bill Weiss
206 Lambeth Street
Glen Innes NSW 2370
Ph/Fax: 02 6732 1263
beeweiss@gmail.com

VICE-PRESIDENT
Craig Klingner
PO Box 564
Glen Innes NSW 2370
Ph/Fax: 02 6734 4125
klingnershoneyco@bigpond.com

SECRETARY/TREASURER
Kate McGilvray
PO Box 833, Mudgee NSW 2850
Ph: 02 6373 1435 Fax: 02 6373 1436
nswapiaristsassociation@gmail.com

COUNCILLOR
Mal Porter
135 Eusdale Road
Yetholme NSW 2795
Ph: 02 6337 5383
malP380@optusnet.com.au

COUNCILLOR
Harold Saxvik
25 Kings Street
Darlington Point NSW 2706
Ph: 02 6968 4217
jsaxvik@gmail.com

COUNCILLOR
Laurie Kershaw
151 Shingle Hill Way
Bungendore NSW 2621
Ph: 02 6236 9137
ltkershaw@bigpond.com

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FEDERAL COUNCIL OF AUSTRALIAN APIARISTS' ASSOCIATIONS (FCAAA)
Federal President: Bill Weiss
206 Lambeth Street, Glen Innes NSW 2370
Phone/Fax: 02 6732 1263
Email: beeweiss@gmail.com

Interim Secretary: Marlene Weiss
PO Box 649, Glen Innes NSW 2370
Phone/Fax: 02 6732 1263
Email: beeweiss@gmail.com

AUSTRALIAN HONEY BEE INDUSTRY COUNCIL (AHBIC)
National Chairman: Lindsay Bourke
11/11 High Street, Launceston TAS 7250
Mobile: 0418 131 256
Email: queenvic@cradlemountain.com.au

Executive Director: Stephen Ware
PO Box R838, Royal Exchange NSW 1225
Phone: 02 9221 0911 Fax: 02 9221 0922
Email: ahbic@honeybee.org.au Website: www.honeybee@org.au

HONEY BEE RESEARCH & DEVELOPMENT COMMITTEE (HBRDC)
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PO Box 4776, Kingston ACT 2604 Ph: 02 6271 4132 Email: helen.moffett@rirdc.gov.au Website: www.rirdc.gov.au

AUSTRALIAN QUEEN BEE BREEDERS ASSOCIATION (AQBBA)
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Secretary: Kevin Webb
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PRESIDENT'S REPORT

Season
Production over New South Wales has reached close to normal; however future prospects are looking thin on the ground. Most inland prospects flowered last season and few of these would double up to flower this year. White Box was thought to be budding for a big flowering, however recent observations show only patchy budding in the North.

Honey Prices
While prices have slipped a little, honey production will be in shorter supply over winter and spring and could well see some packers short of supply by spring.

Supermarket pressure is being felt by packers and will determine prices more as time progresses until we see a shortage of supply.

State Secretary
Kate McGilvray has begun work and is settling in as our Secretary/Treasurer. **Please note Kate's correct contact details on page 4 - apologies for the error in the last edition.**

Asian Bees
The T2M (Transition to Management) Program is functioning now, with bait station trials being carried out over the past few weeks. These trials are reported to have been quite successful and if they can be honed into a control program then the Industry and Biosecurity have a tool which could ensure the Biosecurity of the Honeybee Industry of Australia against future incursions of exotic pests.

An effective tool such as the bait stations could even lead to eradication of the Asian Bee in the Cairns region.

Volunteers are again going up to Cairns with one Tasmanian going next week and a group of Northern Tablelands beekeepers planning to go over the next 2 months.

If anyone would like to volunteer for working in Cairns for one or two 2 weeks please contact me and I can arrange accommodation. Contact Bill Weiss on 02 6732 1263 or email: beeweiss@gmail.com

Sydney Show
As I write *Honeyland* is in full swing. I returned from Sydney only last night 13 April and can report that sales have been reasonable, with good enquiry and many questions following the live bee demonstrations.

Congratulation to our new Show Coordinator Bruce White who is working very diligently along with a large crew of volunteers. A huge thank you to those volunteers:

Anthony Andrist, Jenna Barker, Jean Bejian, Neil Bingley, Brett Bingley, Margaret Blunden, Cate Burton, Jess Chapman, Beatrice Chew, David Cowling, Lianne Colwell, Carl Cooper, Casey Cooper, Paul Drew, Rosemary Doherty, Irwyn Doherty, Heidi Dokulil, Doyle Egelhoff, Jenny Farrell, Kevin Haswell, Wayne Hammond, Joy Hood, Ken Jackson, Adrian Jones, Laurie Kershaw, Therese Kershaw, Matt Kershaw, James Kershaw, Craig Klingner, Tilak Lamichhane, Geoff Manning, Reg Marsh, Ellen McIntyre, Raelene Mitchie, Rob Mitchie, Su An Ng, John Patterson, Neil Peadon, Debbie Porter, Malcolm Porter, Chris Porter, Geoff Porter, Cathy Porter, Steph Robertson,Harold Saxvik, Judy Saxvik, Shannon Schmidt, Rhonda Smith, Warwick Smith, John Sunderland, Kieran Sunderland, Lurline Tanner, Rob Toet, Bill Trimmer, Sheila Trimmer, Norm Webb, Bill Weiss, Eric Whitby, Enid Whitby, Lynn White, Bruce White, Damian White, Brian Woolfe.

Many thanks to Australian Rain Forest Honey, Capilano Honey, Beechworth Honey, R Stephens and Superbee for their generous donation of stock for the promotional bags which once again proved very popular.

Show Highlights
The *Honeyland* Stand was awarded the 2012 Sydney Royal Easter Show Commercial Exhibitors Gold Award in the Woolworths Fresh Food Dome (a framed Gold Ribbon). The judges were very impressed with the honey tastings.

Congratulations also to Noel & Barbara Bingley on receiving the John Ross Award presented to unique characters of the Sydney Royal who have contributed to the Show for many years and significantly enhanced the Show patron's experience.

2012 Conference
Organisation is well under way for Conference, which is to be held at Coffs Harbour Ex Services Club on 24 & 25 May. A number of speakers have been arranged with some focus on pollination and Food Security needs Bee Security.

Also the Executive has been working on an alternative program for AFB and intends to present this program on Thursday of Conference to seek Industry's view. The Executive has also appointed a small committee to investigate the effects that Coal Seam Gas may have on the Apiary Industry.

The Trade Show is shaping up with large number of participants this year. Entry is included in the Conference Registration fee.

The North Coast Branch will hold a Field Day following Conference on Saturday 26 May at the Coffs harbour Race Course.

A Conference Agenda and Registration Form are included in this edition. Please consider pre registering as it cuts down on the waiting time on the first day of Conference as well as helping with administration beforehand.

2013 Congress
Unfortunately a decision has been made to postpone the planned 2013 International Congress. This is due to timing and difficulties involved in organising such a large event. The Executive intend to look at holding such an event sometime in the future.

Bill Weiss
State President

NEW MEMBERS

A warm welcome to the following new members:

Sam Malfroy	Bruce ACT
Charles Rice	Clothiers Creek

MARCUS OLDHAM

Each year the Association sponsors a member to attend the Marcus Oldham Rural Leadership Program. The leadership program is an intensive five-day workshop conducted on the college campus at Geelong, Victoria commencing on the last Sunday in June each year, with an average of approximately 30 participants per course. The next leadership course is scheduled from 24 to the 29 June 2012.

There are no maximum age or experience criteria, but it is preferable for participants to be a minimum of 21 years of age. If there is a member who would like to apply to attend this year's program please contact NSWAA Secretary Kate McGilvray on 02 6373 1435 or email the NSWAA Executive on nswapiaristsassociation@gmail.com

If you would like further information from the College please contact Jennifer Jones on 03 5247 2901 or email jones@marcusoldham.vic.edu.au

IN MEMORIAM

KLINGNER, Monte Albert 1945 - 2012

Monte was of the generation of beekeepers that changed the structure of the honey industry in Australia. He entered the industry as it was beginning to move from being a low-cost, labour-intensive, small-scale rural pursuit to a highly mechanised, capital-intensive small business, and Monte was just the man for the job.

By the time Monte had established his beekeeping business changes were afoot in almost every aspect of the industry and he was not only quick to adopt them but he also proved to be innovative and imaginative in adapting new techniques to suit his business.

Monte was born at Jamestown in South Australia into a beekeeping family and at an early age showed enthusiasm for the pasttimes that would occupy him all of this life: beekeeping, hunting, clay target shooting, fishing and travelling. In his youth Monte was a champion club swimmer and on three occasions swam against Dawn Fraser – without ever catching her.

After leaving school Monte worked with his father in the family beekeeping business and during this time took a serious interest in the Rural Youth movement. Then at age 20 he was called up to do his two years National Service and was posted to the 3rd Battalion, the Royal Australian Regiment.

Later Monte became more serious about beekeeping and travelled widely within Australia on what amounted to a study tour. Whilst at the QBA Conference in Caloundra he met Bob and Vivienne Weir's eldest daughter Kae. He soon found it imperative to visit the Weir Brothers extracting plant at Glen Innes and thus began a four-year courtship – a very successful one at that. They were married in 1973.

Monte expanded his bee business by packing and retailing in Adelaide but eventually sold out and bought his father's beekeeping business. The business grew and he became a well established beekeeper, ranging far and wide in search of honey. In 1984 however, the family moved to Glen Innes and began a new chapter in their lives.

After some initial setbacks the Glen Innes business expanded and prospered. Monte was involved in industry organisations and was a member of the Capilano Board for six years. He maintained his innovative approach to beekeeping technology and to searching out new areas of honey producing flora.

Kae and Monte had three children; Craig, Scott and James. The whole family was part and parcel of the local community. It is not too much to say that they were in everything. In particular Monte became even keener on clay pigeons and with his trusty Perazzi double barrel was a regular at gun club meetings throughout northern NSW and southern Queensland. He and Kae loved caravanning and travelled widely. I remember when he rang Macca an the ABC one Sunday morning on his satellite phone from the Simpson Desert.

Disaster struck about a year ago when he was diagnosed with a rare and aggressive blood cancer. The year-long battle was a trial that few people could imagine.

Farewell dear friend.
Fred Benecke

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DOUG'S COLUMN

Doug Somerville
Technical Specialist, Honeybees - NSW Department of Primary Industries - Goulburn
doug.somerville@industry.nsw.gov.au

AFB – ITS DAY OF RECKONING HAS ARRIVED

Is AFB the most significant disease of honey bees in Australia? True or False

The answer, according to the feedback and responses from the Pest and Disease courses Nick Annand and I have conducted over the past 18 months overwhelmingly rate AFB as the most serious disease or pest you as a beekeeper deal with.

Some facts on AFB:

- AFB = American Foul Brood disease
- It is a spore-forming bacteria.
- 6 to 10 spores need to be fed to a day-old larvae to cause the larvae to become infected.
- A dead, infected larvae will produce 2.6 billion spores.
- The spores can survive for decades.
- The spores are particularly tough and are resistant to extremes of heat, cold and dryness.
- It is not a particularly infectious disease; however bees robbing an infected hive or combs and beekeepers transferring combs between hives are the most likely means of colonies becoming infected.
- The disease is fatal to a colony, while the presence of other pests/diseases is not necessarily fatal to the colony.
- AFB does not affect the environment, human health or trade.

The last point is not so much about AFB, but more to the point what governments of all persuasions are concerned about, and this is the reason for writing this article.

In the past, government apiary inspectors roamed the countryside, searching for bee hives to check their AFB status. In many cases beekeepers provided these inspectors with intelligence on where to look or reported cases of AFB, which guided inspectors to check out various locations. A lot of local knowledge was built up by the apiary inspector, who in most cases had a passion for honey bees and an interest in beekeeping.

Various Acts of Parliament relevant to AFB have been passed, the last one in NSW was in 1985 (Apiaries Act). Similar Acts exist in all Australian States, primarily focused on the management and control of AFB. The NSW Act also covers abandoned and neglected hives, plus nuisance bees. The need to register as a beekeeper and brand your hives is to facilitate the business of the Act.

Nuisance bees can create a lot of work for the Department of Primary Industries (DPI). An enquiry in 2000 established there are other means of dealing with nuisance bees, including passing it to local government. The collective wisdom of the review identified that the DPI had a better knowledge of the issue and on a state-wide basis provided consistency in the way the issue was dealt with by government. Even so, the review also analysed past cases investigated by DPI inspectors and identified that about half the beekeepers involved were not registered under the Apiaries Act as legally required. The vast majority of nuisance bee complaints arise from backyard beekeeping and thus, the amateur section of the beekeeping industry.

Abandoned and neglected hives are primarily investigated to ascertain their risk as far as diseases are concerned. That is, the risk the unmanaged hives pose managed hives in the same region. If on investigation the inspector does not have any evidence that AFB is present, it is debatable that they are the equivalent to any feral colony in the region as far as further actions by the DPI. Thus it could be argued that the NSW Apiaries Act 1985 is primarily concerned about the management and control of AFB with "add ons" to deal with related issues or functions best managed by the DPI (i.e. nuisance bees).

In 1994 NSW had 6 dedicated full-time Apiary Officers. Their role covered regulatory activity, inspecting for AFB and all things relating to the Apiaries Act 1985; extension, which included field days, beekeeping meetings, writing information sheets and visiting beekeepers individually; conducting formal education courses and research.

During 1994 the job descriptions of the Apiary Officers changed, with the regulatory component being removed. No longer did Apiary Officers administer the Apiaries Act (1985). This was now the function of the Regulatory/Compliance section of the department.

This eventually comprised a Regulatory Specialist Honey Bees and a series of multiskilled inspectors across the state. These inspectors had no advisory, education or research function and were responsible for the administration of a variety of Acts including the Apiaries Act.

During the next 10+ years, the AFB issue continued to be seen by most involved as a government problem.

But things started to change!

Let us fast forward to 2012 where we now have two Apiary Officers and continue to have a Regulatory Specialist Honey Bees, plus a network of multiskilled inspectors. Services offered 20-30 years ago are no longer in place. Politically, NSW is a very different state in so many ways, especially with the way it deals with agricultural issues. The Department of Agriculture is no more; we are Department of Primary Industries and a shadow of our former selves. This is a phenomenon across all states in Australia. The New Zealand government divested themselves completely of the responsibility of managing AFB and handed it to the beekeeping industry. The ACT government deleted their Apiary Officer position; the Tasmanian government made beekeeping registration voluntary and handed the role of education and extension to the beekeeping industry. Every other state DPI has reduced the number of staff responsible for bee work.

The Present:

The Apiary Inspectors in NSW continue to be involved in inspections for AFB, usually conducted as part of a 'task force' or exercise where a group of inspectors are assembled for a 'blitz' (my words) on a specific region. These are designed to identify sources of problem AFB infections and apply the purpose of the Act. This is similar to the police operations held during long weekends and busy periods.

The role of these blitz exercises is enforcing the Act and determining if beekeepers are adhering to the Act, issuing warning letters, issuing penalty notices or recommending prosecution of offenders. They are not designed to hold the beekeeper's hand, they are enforcement activities.

The effectiveness of these task forces in finding cases of unreported AFB and problem apiaries has been very good. Unfortunately, the beekeeping industry collectively has not played the game. The regulatory team can only act on intelligence received from beekeepers. Anecdotally, we are aware of an increased number of beekeepers experiencing cases of AFB, but these are not being reported. Thus, on paper, when industry or even the DPI staff involved with the issue state to DPI management and policy makers that this is a major issue to the beekeeping industry, the evidence is not on record, i.e. reports of AFB are not on file, there is limited evidence on paper that there is an issue to be concerned with. Why? Because beekeepers are not officially reporting cases of AFB. Thus the question we occasionally have to defend is, if beekeepers are not reporting AFB, then how serious is the AFB issue? How can the DPI deploy its resources if beekeepers do not report AFB even when they are legally, under the Apiaries Act, required to do so.

There is no guarantee that numbers of staff in the DPI with a responsibility for honey bees will remain the same. Every year there is a motion from one of the state beekeeping conferences held across Australia asking for more apiary inspectors or resources. The secretary of that state beekeeping organisation will write a polite letter to the relevant Minister. A response will be received highlighting past achievements and stating the current commitments by government in the support of the beekeeping industry. I haven't yet heard of a response along the lines of "Yep, how many more staff would you like?" It is bad press for government to reduce services, thus they are unlikely to advertise this trend. Peter Warhurst, Apiary Officer in Queensland, retired in January this year. Peter has made a major contribution to the beekeeping industry as a government employee. Will he be replaced? Watch this space!

The beekeeping industry has been able to highlight how important it is to agriculture via its role as the primary pollinator of a very large range of crops. Even so, compare the gross value of beekeeping produce to other rural commodities. Then reflect on the decline in services and size of the DPI over the past 20 years. This scenario applies to all states.

On a positive note, extension activities have gotten smarter in the way things are done. This includes the production of a series of DVDs on AFB, an extensive number of Primefacts on the DPI web site, plus the evolution of a very comprehensive Pest and Disease course with a major focus on AFB.

The following are a collection of stories from the past six months that I want to share with you the readers as they demonstrate why I am concerned about industry knowledge and attitudes to AFB. Some commercial beekeepers of long standing have phoned me wanting me to 'inspect' hives in their region and referring to me as the Apiary Inspector, even though this has not been a function of our position for 18 years.

One beekeeper confessed to buying bee hives some six months previous but not inspecting at the time. He now believes that they may have had AFB. He does not practise any barrier system and integrated all the bought gear into his operation. He has made a number of fundamental errors, decisions that I would not regard as best practice. The first, he should have inspected all hives at the time of purchase. The second was he should have kept these hives separate for at least 12 months, and thirdly, the practice of having a barrier system provides obvious advantages.

Another story was relayed by a third person where a beekeeper confessed to a group of beekeepers that he had AFB but didn't report it, as he didn't want DPI inspectors in his hives. Even if he did report AFB, it is unlikely he would receive a visit from a DPI staff member unless he requested it. Also the region in which he operates has had major issues with AFB but very few AFB cases have been reported. How can the Regulatory Specialist Honey Bees recommend to his management that a 'task force' exercise would be beneficial if the industry players are not being seen to be cooperative?

The construction and delivery of the Pest and Disease courses was a mammoth task conducted by Nick Annand and myself. The courses were aimed at commercial/professional beekeepers. I was pleasantly surprised with some of our participants, but I heard back through the grapevine that other beekeepers believed that the DPI couldn't teach them much. This was despite the extremely positive feedback we received from all participants, both experienced third generation beekeepers and those who had been keeping bees for over 50 years.

One beekeeper, who was too busy to attend a course and believed the course would be too basic, rang me a few months after a course was held in his area and spent an hour on the phone asking questions about AFB. The exact same information was covered by the course.

Thus, at present, we have a sizeable component of the beekeeping industry that have the impression that AFB is a government problem. We have governments across the country with the view that AFB is an industry problem with DPI in the midst of changing political priorities.

Many years of attending conferences, industry meetings and frequent one-on-one conversations about AFB clearly highlight to me that this is a major issue and subject. Unfortunately, there is a lot of misunderstanding about the disease, there is a lot of emotion around the disease and there are many opinions about where to go in the future. As most dialogue is a re-run of previous discussions and conversations, I took a proposal to my immediate supervisor, Tim Burfitt, to employ a consultant to produce a document reviewing the effectiveness of the AFB program in NSW.

Michael Clarke from AgEcon Plus has conducted other consultancy projects for the Honey Bee Industry through the honey bee research committee (RIRDC).

Michael held a number of meetings with key beekeeping industry representatives and NSW DPI staff. The report produced included chapters on:

- Features of the NSW Apiary Industry
- Why AFB is a serious threat to beekeeping
- The AFB policy picture
- Industry consultation results
- AFB policy options
- Proposed AFB strategy
- Review conclusions and recommendations

Although the document primarily collated the history of the AFB issue, workshops, meetings, discussion papers etc, it also gathered some opinions of the beekeeping industry. A very strong message within the report was that the beekeeping industry does not want a deregulated environment and continued government support for activities to suppress AFB was highly desirable.

<u>The future</u>. Where to go from here?

From now on AFB will struggle to get attention from Governments which have other priorities. It is an endemic disease that is not a biosecurity threat or likely to need an emergency response from DPI. It doesn't have an impact on the environment, affect trade or human health. The honey-packing sector do not reject or price discount honey with AFB spores. This fact sends a clear message to Government that it isn't a food safety or quality issue and they don't consider it a problem.

The beekeeping industry therefore clearly needs to take the lead role in a way forward for AFB. It is a matter of taking action and considering:

1. the degree of support from fellow beekeepers for continuing controls and regulations around AFB.

2. does a general consensus exists across the beekeeping industry for its control?
3. whether the industry leaders have a plan to deal with the issue.
4. would a national program through the Australian Honey Bee Industry Council (AHBIC) be a more powerful and effective pathway? If so, how should this be implemented and who will be responsible to make it happen?
5. is there a need for industry representatives to lobby the Minister to retain DPI support?
6. what the senior managers of the DPI are likely to support? Talks between industry leaders and DPI managers may provide a picture of what will or won't be supported within the DPI.
7. whether the beekeeping industry would be prepared to pay for a New Zealand style system? This is a user pays system but one where the industry has a lot more involvement in an AFB program.

The Victorian Minister for Agriculture and Food Security late last year stated that their AFB Smart program was "*clearly unsustainable*" [too expensive], and as a result they "*have decided ……. to suspend the AFB Smart testing program for 2011-12*". Instead the minister states that "*clearly, consideration also needs to be given to focusing available DPI and industry resources on varroa mite preparedness rather than AFB in future years*".

The South Australian Government at the same time commissioned a report "*Review of the Biosecurity South Australian Apiaries Program."* Biosecurity SA is very focused on cost recovery within its Animal Health program. The report goes onto say that "*There is an over-emphasis on controlling an endemic disease, AFB, rather than prevention, surveillance and preparedness for serious exotic pests and diseases."* (i.e. varroa mites mentioned later in the report).

For the NSW beekeeping industry, doing nothing is a choice, but is that the best option? The beekeeping industry needs a plan. There is still considerable support within NSW DPI for the beekeeping industry and a willingness to cooperate with the industry but at the very least, it requires a collaborative approach. The day has arrived where AFB is clearly no longer a problem for government alone.

SWARM ON BEER CARTON

This swarm landed on a pallet of Crown Larger at the RAS Showground at Homebush, they must have been thirsty as the swarm went into a cool room when the door was open.

They were on the bottom of two pallets making their way into the centre one at a time as it was a very small opening between two cartons - quite spectacular.

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24 & 25 May 2012

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Steritech Pty Ltd
Valley Industries

ECROYD WINE & CHEESE EVENING

Thursday 24th May
6pm

Preliminary Conference Program Thursday 24 May 2012 Coffs Harbour

8.00am	Registration
9.00am	Call to Order - Bill Weiss Welcome, Apologies and Remembrance Pause Confirmation of 2011 Conference Minutes Business Arising from Minutes Financial Report & Show Report Branch Reports – as published President's Report – as published Resource Report – as published Australia's honeybee News - Margaret Blunden
9.30am	RIRDC Report - Dr Michael Hornitzky
10.00am	AHBIC Report - Lindsay Bourke
10.30am	**Official Opening** **Mr Colin Grant** **Head of Biosecurity - DAFF**
10.45am	**Morning Tea**
11.00am	Asian Bee Program - Russell Gilmore
11.30am	NSW Dept Primary Industry Report - Research & Advisory Dr Doug Somerville - Regulation Mick Rankmore
12.15pm	**NOMINATIONS FOR EXECUTIVE COUNCIL**
12.25pm	**Lunch**
2.00pm	Varroa - Sam Malfroy Plant Health Australia
2.30pm	AFB Review Paper - Michael Clarke
3.00pm	AFB – Department Policy Bruce Christie - Head of Biosecurity - NSW
4.30pm	General Business
5.00pm	Close

Preliminary Conference Program Friday 25 May 2012 Coffs Harbour

8.30am	Registration
9.00am	Use of Cold Room in Pest Control Ben Hooper - SA Nuffield Scholarship
9.30am	Log Books
10.00am	Where GMO is at in Australia Sasha Nimmo - PR- CSIRO
10.30am	**Morning Tea**
11.00am	Macadamia - Pollination Andrew Starkey Macadamia Association Chairman
11.30am	Blueberry – Industry Markets etc Phillip Wilk - Industry Development Officer
12.00noon	OHS
12.30pm	**Lunch**
	CLOSE OF POLL FOR EXECUTIVE
2.00pm	National Parks - CSG Craig Arms
2.30pm	Forests NSW – CSG Warwick Bratby
3.00pm	Coal Seam Gas Regulation Greg Somerhaze Dept Trade & Investment (Minerals)
3.30pm	Coal Seam Gas – EPA Regulation
4.00pm	General Business
4.30pm	Close

ANNUAL CONFERENCE DINNER

Friday 25 May 2012

Pre-dinner drinks will be served from 7.00pm

Dinner begins promptly at 7.30pm

2012 STATE CONFERENCE

The NSWAA Conference
will be held at the
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May 2012

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Included in this edition is a Conference Pre-registration Form

Early Bird Special:
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Sat 26 May2012
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NICK'S NEWS
from DPI NSW

Nick Annand
Livestock Officer (Bees), NSW Department of Primary Industries, Bathurst
Ph: 02 6330 1210 Email: nicholas.annand@dpi.nsw.gov.au

Note Sugar Shake Tests
Firstly a reminder that I will be mailing out a letter at the beginning of May to gather all results from Sugar shake tests for external mites. So please try and get a few sugar shake examinations done prior. It well may be the way we first detect varroa in Australia. Early detection enhances any chance to eradicate an incursion of varroa mites when it occurs.

Adult Beetle Movements
Continuing with the reporting of the findings from my SHB research. In this article we examine the movement of SHB in and out of bee hives.

Trial 3
The following is an abbreviated version of the full report available at https://rirdc.infoservices.com.au/items/11-044, title: 'Small Hive Beetle Biology – Producing control options'

Aim
Identify any patterns in movement of SHB in and out of hives over a year and observed the seasonal SHB population fluctuations over a year.

Methodology
Surveillance recording
Four, two-deck hives where used located at Richmond, NSW at the University of Western Sydney's, Hawkesbury campus beginning in February 2008.

Figure 4.1. The four hives used with surveillance cameras attached and recording. The top right hive was Hive 1 and, proceeding anti-clockwise Hive 2 etc.

To monitor adult SHB movements in and out of the hives a 4 Channel DVR/Camera Surveillance Kit was used which recorded back to a 250 Gigabyte hard drive. The cameras had infra-red night viewing capability. Cameras were setup and adjusted to ensure good visual coverage around the hive entrances (See Figure 4.1). Camera images could be viewed on a monitor with the time and date displayed allowing an accurate assigning of time to each SHB movement whilst reviewing.

The cameras were set up monthly, recording the hive entrances over a 24 h period. Fourteen observation periods were recorded monthly between 25 February 2008 and 4 May 2009 except for May 2008. After each recording the SHB were collected from each hive, counted and returned, to their respective hives.

Hive management
The hives remained on site for the duration of the study. Additional honey supers were added on 5/11/08 to Hives 1, 2 and 3. Hive 4 was found queenless on 5/11/08 and re-queened the same day. Honey was extracted on three occasions (4/4/08, 10/11/08 and 2/1/09). Clinical symptoms of American foul brood (AFB) disease were identified in Hive 2 on 8/4/09. It was assessed as having sufficient strength to maintain its integrity until the following month, so it was kept in the trial. On 5/5/09, Hive 2 was in the early stages of breakdown, with SHB larvae present. The remaining three hives were also found with AFB so the trial was terminated one month earlier than planned.

SHB collection from hives
After each recording the adult beetle movements from each of the 4 hives were collected using a pooter (as per trial 2) chilled, counted. The SHBs were returned to the hives of origin on all but three occasions, 10/2/09, 8/3/09 and 5/5/09. On these dates they were not returned because of concerns of possible SHB damage due to large numbers of adult beetle.

Surveillance footage examination
The recorded surveillance footage was examined making notes on the time, date and movement (in or out) of adult beetles. Movement times were then correlated to temperature and relative humidity data.

Data presentation and analysis
To examine the time of day of SHB movements, the 24 h day was broken into 12 x 2 h increments, with nightfall taken as 0 h. Nightfall was deemed to be 15 min after sunset. The 2 h intervals after nightfall were designated as 0-2 followed by 2-4, 4-6,….., 10-12. The periods before nightfall were designated 2-0, 4-2, ….., 12-10.

Results
Beetles usually tried to land within a 30 cm radius of the hive entrance and then walked fairly directly towards the entrance. Very few SHBs flew directly into the hive entrances or onto the hive landing boards. SHBs did not always immediately enter the hive entrance often going under the hive for varying lengths of time. Guard bees attempting to prevent beetles entering, often caused the SHBs to retreat under the hive,. It was noticed that very few SHBs entering the hives after nightfall had flown in after dark but had been in the vicinity of the hive (mainly under the hive) and then entered when dark.

SHBs leaving the hive would walk out of the hive entrance onto the landing board and, almost immediately, fly off.

Variation in monthly recordings of SHB movements.

From the 14 sets of 24 h surveillance recordings, a total of 453 SHBs were seen entering the four hives and 34 leaving (Figure 4.2).

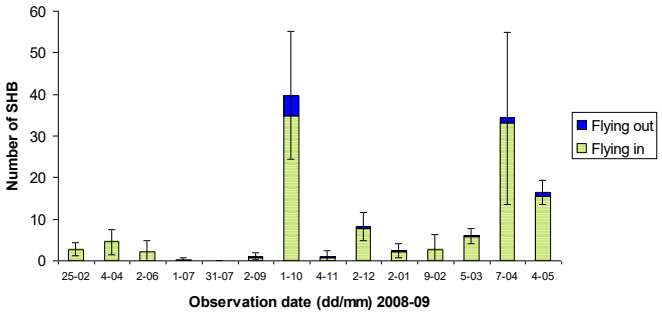

Figure 4.2. Mean number of SHBs entering/leaving hive entrances over a 24 h period of monitoring for 14 observation periods between 25 February 2008 and 4 May 2009.

Bars represent the standard errors of SHB entering/leaving the 4 hives. Time of day SHBs entered and left the hives.

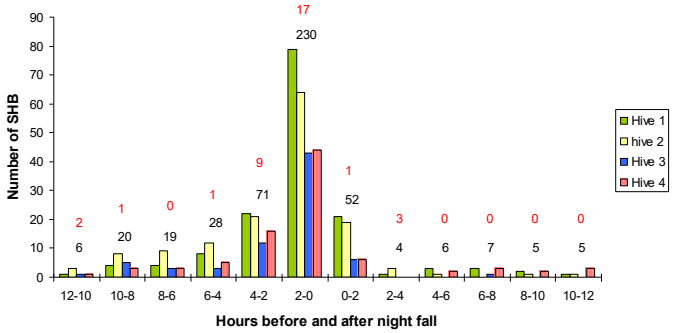

Figure 4.3. Total number of SHBs entering each of the four hives throughout the 24 h observation period over the 14 observations between 25 February 2008 and 4 May 2009, with nightfall being 0 h.

For each period, the bottom numbers (in black) above each group of columns are the total SHBs entering the four hives. The top number (in red) is the total number of SHB leaving the four hives.

The influence of temperature on SHB movements

Most SHB movements where recorded at temperatures over 17ºC.
SHB numbers within the hives

A clear seasonal cycle was observed. Hive position also affected SHB numbers with hives 1 and 2 (against the wall) infested with higher numbers of SHBs than hives 3 and 4 at each monthly recording for the majority of the experiment (Figure 4.6).

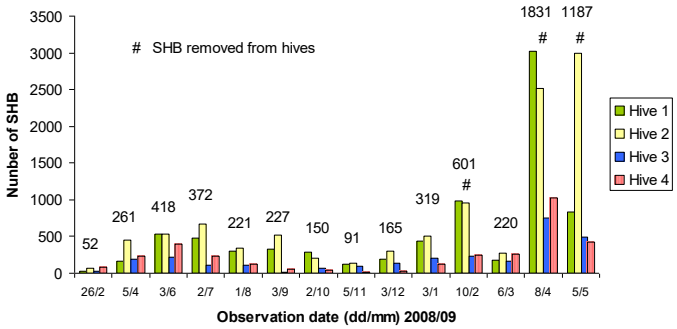

Figure 4.6. Number of SHBs collected, counted and returned to each hive after 24 h surveillance between 25 February 2008 and 4 May 2009. Numbers above each set of columns are the mean number of SHBs per hive. # indicates the occasions when the SHBs were not returned to the hives, to prevent SHB-induced hive collapse.

Discussion

At all recording times during the trial far more SHBs were observed entering the hives than leaving. This translated to big increases of SHBs in-hives from November 2008 through to May 2009. Therefore, their ability to enter and survive within the hive during these months outnumbered losses due to emigration or death. From June 2008 through to November 2008 the opposite was observed, with a large decrease (78%) of SHB numbers within the hives. This was despite more SHBs observed entering than exiting. The decrease in number was most likely due to death or unobserved movements. Under favourable lab conditions SHBs have been observed to live for up to six months (Lundie, 1940; Ellis, 2003). Perhaps, the population decline from June through to November might be explained by cooler temperatures limiting SHB breeding preventing replenishment while natural attrition from ageing continued.

The lowest ratio of SHB movements was eight in, to one out, recorded during the October spike. If the same pattern was happening in all the other hives in the area it suggests there is some, albeit limited, movement of SHBs between hives, leaving a shortfall in the number of SHBs observed entering. This then implies the majority of the SHBs entering the colonies were coming from alternative sources other than hives in the area. However, as there is limited evidence that SHB adults survive on alternate food sources or hosts in the environment if bee colonies are nearby (Buchholz *et al.*, 2008). In Australia, no known cases of SHBs have been identified from non bee-related sources (Davidson (NSW I&I), pers. comm., 2010, Lamb (DEEDI, Qld), pers. comm., 2010 and Joe Riordon (DPI, Vic), pers. comm., 2010). It is suspected the bulk of SHBs entering were recently emerging adults. This conclusion differs from Spiewok et al. (2008) and Neumann et al. (2010),who suggested that re-infestation of hives was mainly through SHBs dispersing between nearby hives.

In this trial (and the next) SHB population numbers in-hives over the year formed a sinusoidal curve, ie. numbers increased from November through to June then decreased June to November. The increase in beetle numbers coincides with favourable breeding conditions between November and June plus some lag time for their development. If SHB movements and population levels are mainly influenced by emergence levels, then what

was expected, relating to observations of SHB breeding and surviving for up to six months, was seen with in-hive numbers peaking late Autumn prior to low soil temperatures inhibiting SHB development. To a large extent, SHB movements recorded in this trial were consistent with this pattern. The only exception was a large spike in movements recorded in October (Figure 4.2). This spike was larger than at any other time of the year and where all these beetles came from remains unknown.

Due to low temperatures prior to October, it is considered there was insufficient time for the SHBs to complete a full reproduction cycle coming out of winter. However, a large number of SHB movements were recorded on 1 October 2008. The previous paragraph suggests the majority of SHB movements into hives were recently emerged adults. These two points appear to be at odds but perhaps the explanation could be dormancy/diapause of the SHBs while in the soil. Diapause in developing insects can result in the synchronising of adult emergence (Chapman, 1969). With a six month life span (Ellis, 2003; Lundie, 1940) overwintering in the ground and emerging post-winter would ensure a larger SHB adult survival into the optimal reproduction period of summer. Interestingly, Pettis and Shimanuki (2000) found both larval and pupal stages of SHBs in the soil during February (winter) in Florida, possibly in a state of dormancy or delayed development. However, despite the large number of SHB observed entering the hives in October it appears to have been restricted to a short period, as beetle numbers in the hives declined from September to November 2008.
October is approximately six months after the peak in-hive SHB population, so it is possible that the aged beetles were dying faster than they were being replenished by the next generation.

A very large peak in the in-hive SHB populations occurred in the autumn of 2009. During March 2009 the average increase in adult SHBs was about 50 per hive per day. It could be expected that fluctuations in SHB populations within the yearly cycle are greatly influenced by local factors such as soil type, rainfall and temperature patterns, the number of bee colonies (managed and feral) in the area, hive management and care, proximity and hygiene of the honey shed, SHB control strategies, natural predators, hive health, hive nutrition etc. In 2009, conditions at the trial site were clearly favourable for SHB reproduction.

The majority of SHB movements occurred in the temperature range 17 - 28ºC, but with movements observed down to as low as 8ºC and high as 32ºC. The temperatures at which most of the movements occurred strongly correlate with the months of October through to May, when mean maximum temperatures ranged from 25ºC to 20.3ºC. As the ambient temperature during the hive surveillance never exceeded 32ºC, it provided no opportunity to observe SHB movements at temperatures > 32ºC. Temperatures rarely rose above 28ºC during this study, skewing data towards the more commonly experienced temperatures (17 - 28ºC).

Being unable to track individual beetles that did not enter the hives, it is suspected that the majority of movements at < 17ºC were SHBs that had flown in earlier then moved under the hive, only to reappear and enter the hive later when temperatures had fallen.
When the temperature was within the range of 17 - 28ºC the time of day was the major factor influencing SHB movements. The majority of SHB movements occurred in the four hours prior to, and the two hours after nightfall. As discussed in the previous paragraph, most of the SHBs entering the hive after nightfall had flown into the hive vicinity while it was still light, often going under the hive only to reappear later and enter the hive after dark. Thus, very few flights occurred after nightfall and those that did were soon after nightfall.

The level of relative humidity appeared to have little or no influence on SHB movements.

The two hives positioned against the wall had more SHB movements and contained the largest SHB populations. Some factors that may have contributed to the variation include: being elevated, being against a wall, being located behind the other two colonies and being shaded for longer during the day. The wall provided a barrier which limited the SHBs from moving beyond these hives. It is suggested that hives and SHB traps in shade attract more SHBs (Arbogast *et al.*, 2007; de Guzman *et al.*, 2010), with recommendations that hives be place in full sun to reduce SHB infestation levels (Cannon, 2006).

Hive strengths were fairly similar between hives, except for a period just prior to and after November 2008, when Hive 4 was found to be queenless. While this hive was immediately requeened, it was still weaker than the others for a few months. Interestingly, this coincided with it having the lowest number of SHBs of all the hives during those months. Similarly, the weaker hives from trial 2 had fewer beetles (see prior Honeybee News). Near the end of the trial (April 2009) clinical symptoms of AFB developed in Hive 2. At the last recording (May 2009) it had over three times as many SHBs as the other hives and was starting to break down with SHB larval damage. Such a large difference implies that factor(s) associated with this hive were attracting the SHBs. What caused the high infestation level of SHBs and the SHB larval establishment is unclear but is likely to be related to the AFB infection as bee numbers had remained high in the colony. The high SHB population pressure in the colony probably resulted in the development of SHB larvae which resulted in fermentation products that then attracted more SHB adults.

Conclusion
This research helps us understand the daily and yearly movement patterns of SHBs into and out of bee hives.

- The peak time for SHB movements into and out of the hives was the two hours prior to nightfall with the majority (93%) of movements being into the hives.
- The bulk of the SHB movements into and out of the hives occurred when the temperature was between 17 and 28ºC. However, with temperatures not exceeding 32ºC on the days of surveillance and only infrequently exceeding 28ºC, there were no opportunities to observe movements under hotter conditions.
- Relative humidity did not influence SHB movement into or out from hives.
- The peak number of SHB movements within a 24 hour interval occurred in October 2008 with an average of 40 movements per hive. Most (84%) movements were beetles entering a hive. This peak in activity coincided with a decline in the beetle populations within the hives, suggesting that the ingress of SHBs may not have been a common event around that period, otherwise the SHB numbers in the hives would have increased between months. Other months with high levels of movement were April and May 2009. These coincided with large increases in SHB populations in the bee hives suggesting the movement activity observed for these months was a regular daily occurrence throughout this period.
- There were significant differences in the number of SHB movements and population levels between the hives in different localised positions, with elevated hives against a wall having more SHB entries and containing larger beetle populations.
- SHB adult populations within hives showed a definite seasonal cycle, with a peak in numbers around late autumn and a minimum around late spring.

Implications
Understanding the fluctuations and cycles of the SHB hive population over the year is important when considering the timing and type of control practises used. The implications are that beekeepers can target their control practises more effectively with regards to hive health and stability and SHB population size and vulnerability.

The possibility of SHB in stages of development surviving through winter by entering a dormancy period, emerging the following spring and allowing replenishment to the declining/aging SHB population, could explain why SHB are a much greater problem in areas with milder climates as compared to cooler areas.

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CROP POLLINATION ASSOCIATION REPORT

Be part of your future in the industry, put back into it

I recently attended the Crop Pollination Association executive meeting held at Narrandera on the 21 March 2012. This was a meeting that had been changed due to an extraordinary rainfall event in early March as members could not attend due to flooding and road closures.

That afternoon I also had the opportunity to see some of the water damage in and around Narrandera. There was some damage from flood waters from the river but most of the damage to the roads, properties and dams seemed to be from the rainwater running down from the hills and plains.

There were bees flooded in many locations Rutherglen, Leeton, Wagga Wagga etc. Bees near Leeton were lost due to raging flood waters and the banks the bees were sitting on simply eroded away beneath them whilst they were doing pollination work.

We were lucky that our bees doing pollination in that area had been taken out 3 weeks prior to the rain and flooding. Our bees at Condobolin got a lot of rain and were isolated. The rain did a lot of damage to the sunflower and melon crops. The cool wet conditions are not ideal for pollinating and growing melons or lucerne seed production. Condolences to those who lost bees.

At our previous executive meeting a full day was set aside for a Strategic Plan Workshop which was led by Doug Somerville. The executive talked about the future of the Crop Pollination Association and its original reason for existence and a way forward. Doug broke it down blow by blow and extracted some important goals from our class, and gave us something to refer back to for the future.

Hive beetles are also running rampant. I have noticed the bees coming out of cage work losing up to 35% more than usual. Extreme humidity the main reason. 4, 6 and 8 frame hives were used in cage work (Glasshouse). The hives were prepared with bees from the Paroo on gum and cape weed at Dubbo, with new queens in any hive not showing strong brood patterns. The ventilated hives were delivered weekly as required pollinating onions. On delivery they are placed in a cool room until placed in cages. (Maximum of 4hours for large deliveries due to logistics of opening and placing bees and water in cages).

The bees spend a maximum of 21 days in the cage and then come out and are allowed to fly free. I have noticed this is where the trouble starts. The hive bee numbers are down. There is nearly no brood in the hives and a big gap in the age of the bees. And there are well fed beetles in and amongst the brood cells.

The hives are checked initially 2 days after their removal from the cage and are usually starting to lay and gather good nectar and pollen. Also noticed is the queen has sent most of the bees that were left to fly and forage for food and water.

Due to the low numbers of bees it seems the beetles lay large amounts of eggs and with the extreme humidity, I suspect, all hatch nearly within the same day (day 7) and overwhelm the hive causing it to slime out. A large number just abscond or swarm into a tree; others hang out on the front of the nucleus hive and look like they are fanning honey, but when you open the hive it's a different story.

A lot of work was done to try and save the hives but nearly all due to the extreme humidity had ongoing infections I believe due to the demoralisation of queens. In previous years there have been fewer losses. This year 44 out of 144 x 8 frame singles, were lost to beetles. A lot of extra time and work went into avoiding this, making our job harder and doubling the amount of work needed.

The Apithor traps are working extremely well according to reports after talking to several beekeepers about how effective they are. I am considering their use.

But after reading about Fiprinol and its revision by APURA nearly all problems arising from its use were from misuse and not following the label exactly. If the traps come in contact with water in the bottom of the hive, the hive will most certainly demise. Unfortunately due to the design of our hive bottoms, I can't guarantee that no water will get in the hive even with the bottoms that have full ventilation. Placement anywhere but the bottom board encourages contamination.

Another consideration is removing traps after 3months so that beetles don't become resistant to the chemical and also removing them before chemical levels drop. Currently I am unable to use the traps legally by the label.

Other methods being used in the meantime are:

- Placing bees on dry bare ground up on pallets (reducing humidity)
- Cleaning excluders and lids
- Replacing frames in order
- Cracking lids on big hives. (Heat and humidity)
- Not working in extra high humidity
- Re-queening
- Using packaged bees

I am against using chemicals in bee hives especially those like Fiprinol that can be put on a dog's nose and 25minutes later there are dead fleas dropping off their tail. The same mode of action that helps it move systemically through the plant when applied. (It causes toxic nectar and pollen for 28days).

However in the future of managing hives under stress during pollination and high humidity, (pollination between September to February) some sort of trap may need to be utilised along with higher prices.

Chux wipes and oil traps are a little help but don't cut it when beetles are serious. Oil traps can spill and contaminate the hive when lifted by hand and the Chux wipes pull as many legs off bees as they do to beetles.

The best story I've heard from the Apithor traps from someone who used over 1000 traps (As per the label), there were no beetles present in the hive and the bees were working happier But there were a couple of hives where there was a young queen (under 12 months) and a handful of bees (1000) but the queen wouldn't lay and there were also more beetles than bees in the hive crawling through empty cells. (Queen demoralised by beetles and beetles possibly eating eggs, nectar, pollen and being fed by bees).

After placement of the traps in the bottom of their hives, (by pulling 4 frames out of the brood box and placing the harbourage flat on a sloping bottom board) within 1 week the queen was happy and laid a full frame of brood, and expanded with very few beetles in the hive. All bees were working comb and brood peacefully without having to fend off heaps of beetles.

I don't know what price we put on a good queen being able to do her job without being harassed by beetles. More than the $5.00 price of the trap.

My only comments on homemade traps is if there is a contamination problem, saving $4.00 on a trap will be rabbit food when contamination of our premium Australian honey renders it in the $1.00 per kilo. (Bye bye honey sales for trap users). Consideration for permit use of traps also should be watched along with declaring use on a stat dec for honey sales.

Looking forward to meeting the challenges from the government, bees, climate, family and life.

Bryn Jones, **President**

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SICK BEES

by Randy Oliver - ScientificBeekeeping.com
First published in American Bee Journal March 2011

PART 7

INFECTIONS BY MULTIPLE VIRUSES

How does immunity to a virus spread throughout the hive? And can we use this mechanism to our advantage?

Trans Generational Immune Priming

The honey bee does not take the insults thrown at them by all these weird recombinant and chimerical viruses lying down, or we simply wouldn't have any bees left! As I explained in the last installment, bees can "fix" immunity to a certain virus in their genome. This process has been confirmed with respect to Israeli Acute Paralysis Virus. Since only a percentage of the bee population studied carries the viral genes that confer immunity, we may be watching genetic evolution in action as a new host-parasite relationship is becoming established.

Within the bee population, there exist various forms of each gene (each form is called an *allele)*, just as there are various alleles of the pigmentation genes for different body colors. Natural selection will favor certain alleles if they are adaptive against a parasite threat. We have watched this process happen after the recent introductions of some now common parasites-- tracheal mite and chalkbrood (those processes have essentially reached "equilibrium"), varroa (still in progress), and *Nosema ceranae* (I'm not sure how far along that relationship is). No telling about the Army's iridovirus!

But genetic evolution proceeds at a relatively sedate pace unless most of the host population is dying from the parasite (as occurred after the introduction of tracheal mite and varroa). However, it is clear that bees are able to gain some degree of immunity much more quickly, as evidenced by the operations that have recovered from CCD and/or epidemics of any of the aforementioned parasites. (Beekeepers still intervene with treatments for varroa and nosema, but neither of those measures has any lasting effect against the parasites).

As opposed to the tedious ***genetic*** process by which bees slowly evolve resistance to a parasite, a much quicker process is via ***epigenetics***--that is by tweaking the way in which they ***express their already existing genes***. Epigenetic modifications allow for very rapid evolution of not only immune response and resistance to specific pathogens, but for all sorts of other adaptations (I will cover bee epigenetics more fully in the future).

Bee colonies have two sorts of "generations," one being at the colony level (in which the daughter colony is left behind when a colony swarms), and the other being the successive rounds of brood (generations of workers, which are replacement sisters). In either case, the offspring will likely inherit the same pathogens as their parents or siblings. So it makes sense for bees to be able to pass on, or upregulate, their gained immunities to the next generation.

The queen of epigenetic science is Dr. Eva Jablonka (2009), and there are a few bee researchers who stand out in field of bee immune function (anything that they publish is worth a read!). Sadd and the Schmid-Hempels (2005) found that by injecting a queen bumblebee with bacteria, that the induced antibacterial proteins (normally only produced in response to an infection) of her ***offspring*** would be upregulated! Moret (2006) then demonstrated the same thing occurring in mealworms. The antibacterial peptides are fairly generic, although there is evidence that the transgenerational immune priming may actually be specific for the type of bacterium (Little 2003).

Little's and Moret's experiments were with nonsocial invertebrates, so that the epigenetic priming must have been via the egg. Bees, however, by virtue of their maternal feeding of their larvae, have another avenue by which they could transfer immune priming—via the jelly. Such priming could also be passed from bee to bee by the same mechanism. This "social transfer" of infection resistance was demonstrated by Traniello (2002) in termites.

As you might have guessed, this discussion is leading back to immunity to viruses. I have watched colonies that appeared to be on their deathbeds with Sacbrood or Deformed Wing Virus recover spontaneously and fully. Note that I said that the ***colony***, rather than the individual bee recovered (although there is evidence that individual bees can purge an active virus infection). It is striking to me that an entire bee operation that is suffering from virus-induced collapse can recover spontaneously, given good conditions (like a plentiful nectar and pollen flow).

Dr. Joe DeRisi (2011) has been monitoring virus levels in colonies over the past year. He found that virus epidemics in colonies occur in "sporadic waves" and then largely disappear. Dave Wick (pers comm) has observed the same, using different technology. DeRisi's collaborator, Dr. Michelle Flenniken (2010), marvels at the delicate "equilibrium" that is generally maintained in colonies between the bees and their viruses: "These cases of persistent infection illustrate an exquisite equilibrium between the host RNAi machinery and the viral RNAi suppressor, a balance that determines the pathogenic outcome of infection, virus survival, and virus spread. The virus and host mechanisms responsible for maintaining the delicate balance achieved in persistent infections in which both parties thrive is a fascinating avenue of research."

I came across a relevant study from India (Verma 1990), where the indigenous bee, *Apis cerana,* had been devastated by a new strain of virus, Thai Sacbrood Virus (TSBV; also called Chinese Sacbrood in China), first reported from Thailand in 1976. TSBV spread to the entire region of the Hindu Kush Himalayas: Burma, Nepal and India. ***More than 95% of the colonies were killed***, particularly in the temperate regions where this disease is most widespread!

The researchers fed 25 healthy survivor colonies suspensions of the virus; 3 developed severe symptoms of the disease and were

destroyed. The remaining 22 colonies showed typical symptoms of the disease, and were then reared through 5 generations (each colony's queen was replaced by a daughter of the queen) to test resistance against the disease, each generation being again fed with a freshly purified virus suspension in sugar syrup. Now here's where it gets interesting! I'll quote directly:

"When the symptoms of the disease appeared, they appeared within 4-10 days after feeding the virus suspension. Such symptoms appeared earlier in parent (mother) colonies than in subsequent generations… [T]he percentage of affected brood (sealed-perforated) was greater in parent than in daughter colonies, and a continuous decrease in infection was observed in subsequent generations.

"In the present investigation, recovery from infection was observed within 30 days after the appearance of disease in the colonies [compared to the initial 95% mortality]. Parent colonies took longer to recover from infection than daughter colonies. Similarly, [the] percentage [of diseased brood] decreased…from parent to 5th generation.

"In parent colonies, abnormal behavior such as failure to cover brood by nurse bees, tendency to abscond, increased aggressiveness and reduced ability to clean out dead brood was observed, but in subsequent generations, there was gradual improvement and colonies showed normal behaviour.

"These results suggest that some mechanism of resistance to Thai Sacbrood Virus disease exists in *A. cerana*. In nature, this disease had a 4-year cycle and, after this period, surviving colonies began to multiply in a normal way. "

The astute reader may notice the similarity to the many historical bee epidemics (Underwood & vanEngelsdorp (2007). An epidemic blasts through an area, and then simply "disappears" of its own accord. Looks to me like host/parasite evolution in action!

So let's look at what happened. The only significant possible genetic selection that could have occurred in the experiment, after the initial weeding of three colonies, would have been via the drones, which came from the experimental apiary (so I suspect that little genetic evolution took place). It appears to me that the natural immunity gained over the course of five generations was likely more due to epigenetics (although there may have also been evolution of the virus during the experimental period). Can we capitalize on this?

The benefit of breeding from survivors should be obvious, as well as intentionally challenging breeder colonies with pathogens (a la bee breeder Dan Purvis). So here's a question: Could you help a failing colony by adding a frame of nurse bees from a nearby thriving colony? Would the nurses carry immune factors from the healthy colony to the sick one? I don't know the answer. However, we may soon have another option…

Practical Applications

In 2007, a patent was filed for the use of dsRNA in prevention and treatment of viral infections in honeybees (Paldi 2008) (refer to my recent articles for an explanation of RNAi). I've previously written about the field trial that I ran of the product (Sick Bees Part 2), in which we created the collapse of a yard of bees via an inoculation with a virus (largely IAPV/KBV) cocktail. The results of the previous year's trials were recently published (Hunter, et al 2010).

The authors conclude: "IAPV specific dsRNA (Remebee-I) was used successfully to prevent bees from succumbing to infection from IAPV. The results further demonstrate the possibility to produce targeted treatments for bee pathogenic diseases. These field results demonstrate the successful application of dsRNA as a viable treatment to solve a real world problem, which may further lead to concerted efforts to utilize this ubiquitous natural mechanism, RNAi, for the benefit of the bees, beekeepers, and hopefully to other applications in agriculture and veterinary health."

What is Remebee™ and How Does it Work?

Remebee is simply double-stranded copies of relatively long (~800 "base pairs") portions of the Israeli Acute Paralysis virus RNA strand, from two different regions (covering, in total, about a tenth of the virus genome). When fed in sugar syrup, it kick starts the natural antivirus response in bees, similar to the way in which vaccines work in humans—the vaccine doesn't actually kill anything, it only tells the immune system what to attack.
When the bees ingest Remebee, it is absorbed into their gut cells, and within those, the Dicer enzyme chops up the 800 bp strand into many different short (~25 bp) dsRNA's, (please refer to Sick Bees Part 4). It is these secondary short sections that then produce the actual bee antiviral response in a completely natural process. In fact, it appears that the preexisting presence of a low-level virus infection improves the efficacy of the treatment!

Natural Amplification and Spread

At this point, the gut cells may gain immunity to the virus, but how about the rest of the cells in the bee's body? It has been recently demonstrated (Saleh 2009: Lipardi 2009) that insects have mechanisms to ***amplify*** the initial RNA interference response, and then spread it systemically throughout their bodies. Even an exposure to a small amount of a dsRNA product like Remebee can elicit a full systemic immune response! No one is quite sure how the immunity spreads from there, but my guess would be that it is via the jelly passed throughout the colony.

Is Remebee Safe?

Remebee is nothing more than natural virus sequences that would be produced in a natural virus infection. It's been tested on over 10,000 colonies, and does not seem to have any negative side effects. However, keep in mind that a monthly treatment appears to be more effective than a weekly treatment, as weekly treatment may "saturate" the antiviral mechanism. There is still much to learn!

Does it work?

Beeologics has tested the product in thousands of hives in a number of countries (although generally without the intentional inoculation of viruses). It appears to be safe, and to a measureable extent, effective. Remebee is currently available for use by any beekeeper in the U.S. who wants to test it under an Investigational Use Permit. It appears that treatment may suppress virus reproduction enough to allow bees to live longer as adults. By simply adding a few days to the average life of a forager, the colony population and honey production may increase substantially.

Results from my California Trial (continued)

I never finished sharing the results of my California trial (run concurrently with another trial in Florida). To their credit, Beeologics approached me and the monitor for the trial, Dr. Eric Mussen, as two totally objective parties that are in general skeptical of new products (the Florida trial was run by USDA virologist Dr. Wayne Hunter). Beeologics also gave me permission to publish all results—good, bad, or indifferent.

Disclaimer: I am not a pitchman for the product, and have

no financial interest in the company. I feel that it is fortuitous that I was offered the chance to run the trial, as it gave me great insight into the processes leading to colony collapses. I'm as curious as anyone to see how the product works in "real life" situations.

At the start of the trial (prior to feeding any Remebee) about 3/4ths of the colonies tested positive for IAPV, although usually at very low levels. Nearly all tested positive after inoculation. Unfortunately, the protocol required only this confirmation of virus titers, so I was not able to track the actual prevalence of viruses in the collapsing colonies. However, tests were run to determine the levels of siRNA in a sampling of hives at, and shortly after, virus inoculation.

Of interest is that in the untreated colonies in the Florida trial, those that already had naturally high levels of siRNA (indicating that their antiviral immune response was already in action) survived to the end of the trial, whereas those that did not crashed. In both trials, siRNAs levels increased dramatically in the Remebee-treated colonies two weeks after virus inoculation, but remained at much lower levels in the control (non Remebee) group. This indicates that the feeding of Remebee indeed worked to ramp up the antiviral immune response.
After the midwinter virus inoculation, the colonies began to crash within two weeks, and most continued to dwindle and/or suddenly collapse for the duration of the trial (until July). Of note is that I observed an above average number of hives going queenless during the trial, indicating that such failure to supersede may be related to virus infection. By comparison, similar collapses were not observed in the rest of my operation in the same county (the test yard was isolated from them).

I was completely blinded as to treatment throughout the trial, but it was not hard to guess which of the three treatments was the control, as the six groups of "green coded" colonies were obviously hit harder than the rest (this is a beauty of being blinded, since as an investigator you can then look impartially for any treatment effects).

As far as survivability, colony strength, and honey production, there appeared to be a significant difference between the control and monthly treatment groups (Figures 1, 2, and 3).

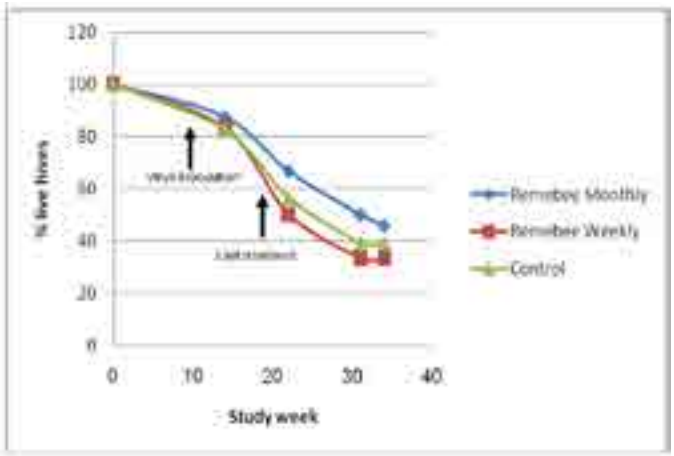

Figure 1. Colony survivability. Treatments began at Week 0, all three groups were inoculated with virus at Week 9. There was little difference in colony survivability between the groups. However, the colonies were relatively small, and got hit by snow shortly after virus inoculation, which appeared to knock the snot out of them (that is the proper scientific term). There was no colony mortality until after the virus inoculation. The test yard then suffered snowstorms every week through the end of May, which was unusually stressful to the bees. Initial graphs courtesy Nitzan Paldi.

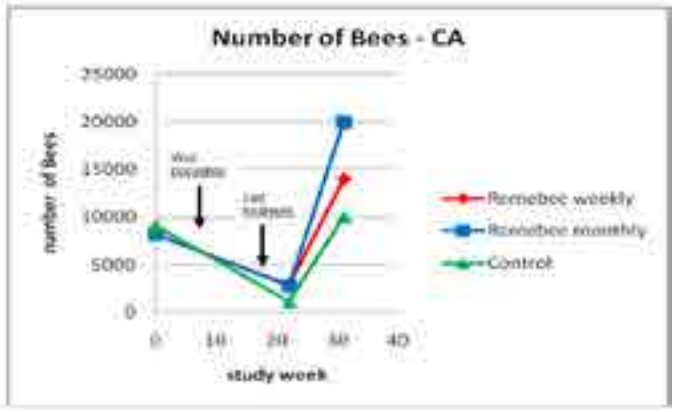

Figure 2. Results for strength of the surviving colonies. The hives treated with Remebee appeared to recover better. Note that the lines merely connect the points, and are not necessarily representative of the actual populations between the points.

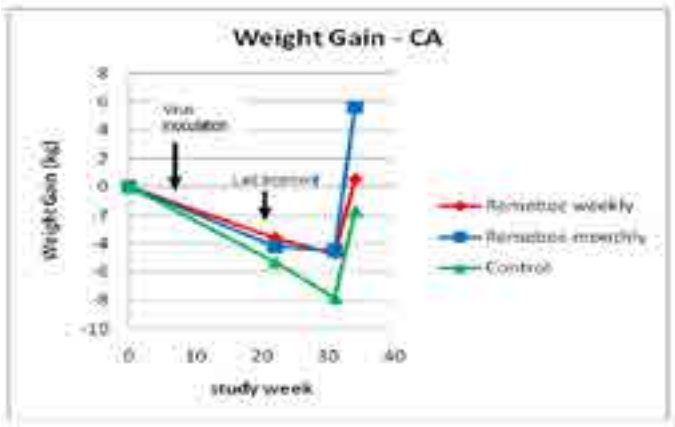

Figure 3. Weight gain or loss. The trial ran from Sept 30 until July 2, but we had some snow every week in spring until week 31 (May 20), after which the few surviving colonies put on weight (I needed to take weights on July 2 before the strong colonies swarmed). Note that the final weights are only for the approximately 40% of colonies that survived to that point.

The above graphs suggest that feeding of Remebee was of benefit, but did not save this apiary from decimation, likely due to the strong virus inoculation and miserable weather conditions (cold, wet, snowy). I would guardedly say that Remebee appears to be of benefit, especially when the results of the other trials are also included in the analysis.

How About *Nosema ceranae*?
The trial was run with colonies that were infected with *N. ceranae* to some degree. At the end of the trial, I took samples of house bees from the remaining collapsing colonies as well as the few thriving ones, and squashed the bees one at a time do look for nosema spores. ***In general, the thriving colonies had little or no nosema, but in some (but not all) of the collapsing colonies, about half of the nurse bees were badly infected*** (Figure 4). This is something that I had not previously observed, as normally *N. ceranae* spores don't show up in house bees until they've aged past the nurse bee stage. This observation is similar to that reported by Higes (2008) in the collapse of colonies in Spain. ***However, I cannot tell you whether nosema was the <u>cause</u> of the problem, or whether it was simply an opportunistic parasite in collapsing colonies*** (I still have some spore counts of samples to run, which may shed more light on any possible nosema/virus synergy).

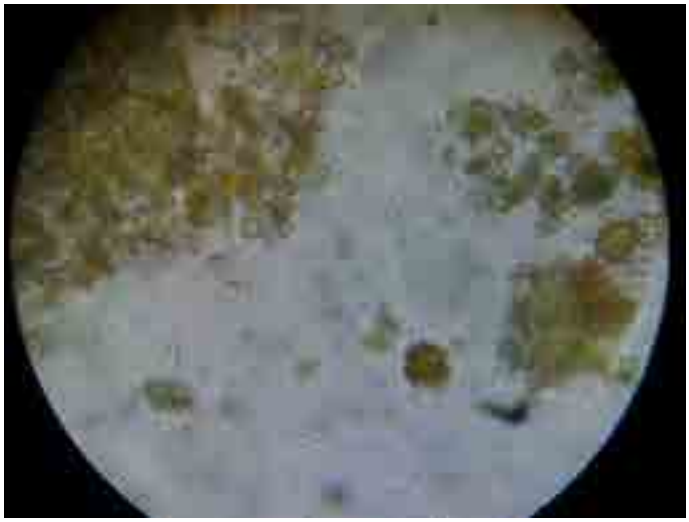

Figure 3. A "gut squash" of a house bee from a collapsing colony. I am assuming that this was a nurse bee due to the gut full of pollen grains. Note the hundreds of nosema spores in this field of view. *Nosema ceranae* spores are not normally found in nurse bees, but in some of the collapsing colonies in my trial a substantial proportion had severe infections, as observed by Dr. Mariano Higes in Spain.

The Future of RNAi

Beeologics is currently developing "Remebee Pro," which is designed to be effective against several viruses simultaneously. In collaboration with Dr. Jay Evans and the team from USDA-ARS in Beltsville, Beeologics also successfully used RNAi to suppress *Nosema ceranae* (Paldi 2010). Recently, Dr. Alan Bowman in Scotland used RNAi against varroa (Campbell 2010). Don't hold your breath on this one, since there are still major hurdles ahead (we owe a note of thanks to Dr Jay Evans of the Beltsville Lab for his foresight in sequencing the varroa genome, which allowed for this sort of application).

Transgenic Bees?

A limitation of RNAi for parasite control is that it is relatively transient. However, scientists have figured out how to use a virus vector to insert siRNA sequences into the host genome (Kang 2008). Such insertions are stable and can be passed to future generations (Kennerdell 2000). There is great interested in inserting RNAi into mosquito populations in order to control the malaria parasite (Brown 2003, Perrimon 2010), and no particular hurdle against doing the same with honey bees!

What? Genetically-modified insects! you may ask. Remember from last month's article that this is a totally natural process that has been done by viruses since life began, and as a result, every human being is also a GMO! I don't want to get into the GMO debate, but there is nothing to stop someone from "helping along" bee evolution to produce bees resistant to current virus strains, nosema, or even specific pesticides (Pesticide-Ready Bees from Monsanto). Yes, this makes me as uncomfortable as it does you…

Dang, I'm out of space, so I will have to continue next month with bee/virus evolution, and the role of varroa.

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"These articles were originally published in the American Bee Journal. All of Randy's bee articles may be found at: www.Scientificbeekeeping.com

If you find these articles of use, Randy appreciates donations to fund his efforts."

A day in the life of a beekeeper .... never a dull moment!

Beehives being burnt at Griffith - December 2011 ***Photos: David Mumford***

Moving bees cut off by flooded creek near Narrandera - March 2012 ***Photos David Mumford***

Neil Peadon, Irwyn Doherty & Bill Weiss working at Honeyland - April 2012 ***Photos: Rosemary Doherty***

AUSTRALIAN HONEY BEE INDUSTRY COUNCIL

Mailing Address: PO Box R838, Royal Exchange NSW 1225
Telephone: 02 9221 0911 Facsimile: 02 9221 0922
Email: ahbic@honeybee.org.au Website: www.honeybee.org.au
Executive Director: Mr Stephen Ware

The following is an update of recent activities of AHBIC
If you should seek further clarification please do not hesitate to contact the AHBIC office.

Asian Honey Bees

The containment program for Asian Honeybee continues to be a major priority for industry and in this regard industry meets on a monthly basis with State and Federal Departments to discuss ongoing developments.

The industry is also represented on the Scientific Advisory Committee whose role is to provide specific technical, scientific information to enable decision to be made. Industry has also agreed to fund a number of projects related to the containment program and these are being managed via RIRDC and HBRDC.

All of these projects are, of course important, however, two in particular will be of interest to industry. These include:

the research proposal for remote poisoning and in particular the re-designing and testing to measure variables such as concentration of Fipronil, how many foragers are present on the bait station and distance to the hive, etc. Also, experiments are going to be conducted on minimising the impact of Fipronil remote poison on non-target organisms with direct scientific input.

Industry is funding a project on the risk assessment of Asian Bees and bee viruses with the view of reassuring international trading partners that Australian bees should be allowed to be imported. This is particularly important to the Queen Bee industry and the continuation of live bee exports.

Registration of Apithor for Small Hive Beetle (SHB)

Industry will recall an application was made on behalf of the AHBIC in 2010 to use the fipronil SHB trap product Apithor Hive Beetle Harbourage. As a result the permit PER12007 was issued.

Ensystex have applied to register Apithor but it is not likely to be completed till at least August 2012. The permit expires on 30 June 2012 and accordingly AHBIC has requested from the APVMA to renew the permit.

NRS Survey

The National Residue Survey Results were recently released and of concern to industry was the fact that there are a number, albeit small PDP detections. The samples concerned originated from Queensland, South Australia and Tasmania (2 samples). The concentrations detected were low: 0.001, 0.003, 0.009 mg/Kg and were well below the ERL of 0.1 mg/kg. The detections are, however, a timely warning to producers that it is not in their own interested to use PDB for any purpose. The producers concerned will be contacted, however, industry is again reminded that the use of PDB in food stuffs is not acceptable and they should not use PDB in any form.

AHBIC Annual General Meeting

Members are advised that the AHBIC AGM this year is to be held in Tasmania on Friday, 6 July in Launceston. This is to be preceded by the Tasmanian Beekeepers' Association Conference and in this edition we provide the AHBIC draft program and agenda. Anyone seeking further information should not hesitate to contact the AHBIC office or the Tasmanian Beekeepers' Association.

AHBIC Business Plan

Following input from industry a re-drafted Business Plan has been considered by the AHBIC Executive and will be distributed to AHBIC delegates and all member bodies in the next week for further comment and input. It is then hoped to have the Plan approved by AHBIC delegates at the AGM in Tasmania.

Plant and Animal Health Meetings

During the last month, both Plant and Animal Health Australia held a series of meetings. AHBIC represented the industry at these meetings and we note that there have been a number of new initiatives announced by the Government in respect of biosecurity arrangements. Perhaps the most important being an inter-governmental agreement between the States and Federal Government regarding biosecurity responses. It is also noted that industry continues to work with the Varroa Preparedness Committee. Industry's representative is Mr Peter McDonald. Part of Peter's report to industry is reproduced below:

There is a good representative coverage of all groups that need to be involved in preparation for Varroa with some that were missing being invited to join before the next meeting.

There are many things being done and completed in many different areas that not everyone is aware of. So there is a lot of stocktaking to be undertaken to get that information together, which should be done by the next meeting.

It is hard to find the right person to talk to in the different Government departments to get a definitive answer. The latest news on the shelf registration of the three (3) main chemicals for treatment of Varroa was that it still wasn't done at that time of the meeting.

Having the many Government departments and pollination industry groups represented in the committee (PHA, DAFF, CSIRO, HAL, Almond Board of Aust) with beekeepers, makes getting information to the committee easier than it would be for us mainly beekeepers on the AHBIC Varroa Preparedness Committee.

It is extremely important that work on Varroa Preparedness Committee continues as it is the feeling amongst most professionals that it's not a matter of if, but when Varroa reaches our shores.

APIS CERANA (ASIAN HONEYBEE)

Since my last Advice 111, the checking in Townsville has been completed and no other Asian bees were found. Local beekeepers have been asked to keep a lookout and report any suspicious bees. This should be the case for all beekeepers anywhere.

With the Transition to Management Plan for the Asian bees (T2M) details of the plan, the minutes of the Scientific Advisory Group (SAG) and the Transition Management Group (TMG) can be found at http://asianhoneybee.net.au/ So you can keep up to date at this site.

Within Queensland, the Department here has set up a group called "AHB T2M Bee Industry Liaison Committee". Members are:

- Mark Cozens, Acting Director, Animal Biosecurity and Welfare, Biosecurity Queensland who is also the Chair
- Russell Gilmour, Program Manager, Asian Honey Bee Transition to Management Program, Cairns
- Max Whitten and myself. Others can be admitted, as required, with the prior approval of the Chair.

The Terms of reference are:

a. To discuss/develop operational policy and procedure for Queensland that may also have a national application.
b. To identify priorities for further work
c. To share information regarding the current AHB situation

We had our first phone hook-up today, 22 March. Neil O'Brien, who is the Director, Biosecurity Queensland Control Centre, was also on the hook-up

We discussed putting in place a permit system so that beekeepers can move out of the RA. There would be a restriction that the movement could be no more than 200 kilometres from the boundary of the Restricted Area (RA). This provision would allow beekeepers to continue to make a living from beekeeping in the area (so far there has been great financial hardships on some) but the 200 kilometres would hopefully satisfy overseas countries, to which we have live bee exports to and those who have currently stopped imports, that there are still movement restrictions. The chances of moving Asian bees with the European bee hives are remote.

The Chair is to check with DAFF Biosecurity to see what their reaction would be and what those importing country's reactions might be. We also discussed if there is still a need for permits to be issued for movements within the RA. Again this could not be necessary but checks with DAFF Biosecurity will also be made.

This also raises the question of what will happen post 30 June, 2013 when the T2M is scheduled to cease. It is assumed that the RA would be rescinded then. Do we need to look at some sort of protocol to keep export markets open? It comes down to shared responsibility but the beekeeping industry will need to be very proactive on this aspect.

The current situation is that the trap runs still continue and so far we are up to IP576. So far, no detections have been made outside the RA. In March so far there has been 789mm of rain in Cairns with rain on 19 days.

The remote poisoning trials have commenced with six (6) initial nests and the results of the initial work are to be reported to the SAG. A seventh nest that was due to be worked on was lost due to the nest being taken out by green ants. Results of these trials will, I am sure, appear on the website after consideration by SAG and TMG.

Checks are still to be made on any nests and swarms destroyed for mites. So far no mites have been detected. Currently it is only passive destruction. If anyone wants any other information, feel free to contact me at any time.

Trevor Weatherhead
22 March 2012

NOTICE OF ANNUAL GENERAL MEETING

Notice is hereby given that the Annual General Meeting of the Australian Honey Bee Industry Council (AHBIC) will be held on Friday 6 July at the Grand Chancellor Hotel, 29 Cameron Street, Launceston, Tasmania 7250.

The attached preliminary agenda provides details of the meeting times and content. Confirmation of speakers and presenters may vary according to their availability. Member organisations and delegates should consider the resolutions together with tabled motions so that they are in a position to vote on them at the meeting.

- AHBIC AGM & General Meeting 6 July
- AHBIC/TBA Dinner 5 July
- National Crop Pollination Association TBA
- Tasmanian Beekeepers' Association 5 July
- Federal Council of Australian Apiarists' Association AGM (8.00am - 9.30am) 6 July

Stephen Ware
Executive Director

TASMANIAN BEEKEEPERS' ASSOCIATION 2012 CONFERENCE

Please note the change of venue for the Tasmanian Conference and AHBIC conference 5 & 6 July, 2012. The venue will be at the Hotel Grand Chancellor in Launceston. Accommodation costs are $125 per room for Deluxe King Room or Deluxe Twin room or $155 per room for Superior Refurbished king room or Superior Refurbished twin room. Please contact the hotel directly to book rooms phone (03) 63111055 or email reservations@hgclaunceston.com.au

Further details will follow shortly but any queries please do not hesitate to contact me.

Maxine Ewington, Secretary
Tasmanian Beekeepers' Association Inc.
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RURAL RESEARCH AND DEVELOPMENT (R&D) UPDATE

The March 2012 edition of the *Rural Research and Development (R&D) Update* has been released.

The update presents recent policy and program developments in rural R&D and innovation. To view the update, please visit the DAFF website:
www.daff.gov.au/agriculture-food/innovation/council/rural-policy-update

Please feel free to circulate the website link to colleagues who may be interested in receiving updates on rural R&D matters.

Previous editions of the Update have been circulated by the Rural R&D Council. As the Council completed its three year term in December 2011, the Update is now being circulated by the Department of Agriculture, Fisheries and Forestry (DAFF).

Please do not hesitate to contact us IF you require further information: ruralresearch@daff.gov.au

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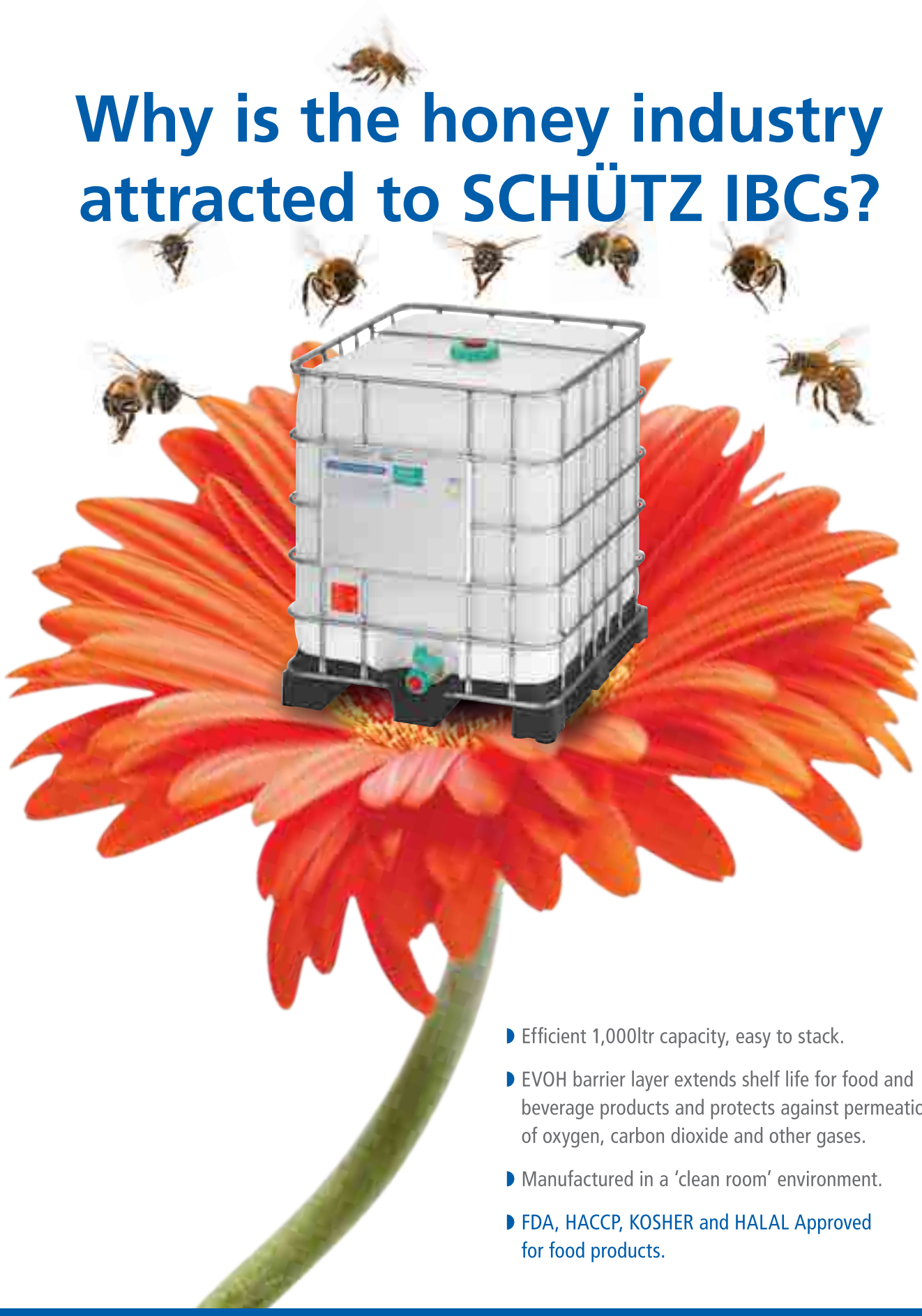

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