

The politics of honey, bees and pollination

MAX WHITTEN explains why Australia's small commercial beekeeping industry risks collapse, spelling disaster for many primary producers and food security.

THE EUROPEAN honeybee, *Apis mellifera*, is probably the most important insect ever introduced to Australia. Imported for honey by European settlers, the honeybee has become our primary agricultural pollinator. Our crops and pastures, like the honeybee, come from elsewhere. They are exotic. Crops depending on, or benefiting from, pollination by the exotic honeybee, have a combined value exceeding \$4 billion per annum.

Australia has around 9,600 registered beekeepers but only 340 businesses produce over 60 per cent of the honey crop. Lose these 340 producers and paid pollination services will largely collapse. The annual almond harvest, alone worth over \$500m, will cease. Yet, the viability of the small but strategically important beekeeping industry is threatened by rural decline, bad politics and bureaucratic bungling. Identifying the challenges and recommending timely action has been recognised by two Inquiries conducted by the bipartisan Parliamentary Standing Committee on Primary Industries and Resources.

The first examined factors causing rural downturn in skills, training and research. Ageing workers, drift to the cities, declining income, closure of training facilities and shrinking research and extension, all contributed to the acute problems facing the rural sector. The Committee recognised that these problems were more acute in the beekeeping industry.

In recognition of the often overlooked strategic importance of beekeeping, the Committee obtained approval from then Minister Peter McGauran to conduct a follow-up inquiry focused on the special needs of commercial beekeeping. It reconvened after the last election with permission from incoming Minister Tony Burke. Its Report *More Than Honey: the future of the Australian honeybee and pollination industries*, released in May 2008, outlined a rescue package for the ailing industry, including a cash injection of \$50m p.a. for R&D.

The Government's response, framed by a middle-ranking bureaucrat, and signed off by Tony Burke, has been, in the words of

the Committee's Deputy Chair, Alby Schultz MP, pathetic. No support was forthcoming. Nil. Kiss my backside. This article begins to explain why.

Nature's premier pollinator goes global

A honeybee visiting a flower to collect nectar is a familiar sight. To the more observant, other foraging bees are collecting pollen instead of nectar, and packaging their harvest as neat orange, green or yellow balls on especially adapted hind legs.

What exactly happens back at the hive with the pollen and nectar is a mystery many folk accept. The queen, the workers and drones, the nurse and guard bees, how they cooperate and communicate to regulate hive activities, and the coded dance telling other foragers where to find the latest nectar flow, are secrets better left to beekeepers and curious naturalists.

But we are all back on familiar terrain when it comes to honey and bee's wax, the two visible outputs of the busy bee's endeavours. This 'liquid gold' has served as a food sweetener and component of a



...THE FARMER'S SHED...

healthy diet since time immemorial. Wax provided candle light in churches and homes for millennia. Today it is a common ingredient in many cosmetics. What matters to us today is how important are honeybees to society, especially in Australia. And is there offsetting damage to our rich and unique biodiversity?

The European honeybee, *Apis mellifera*, hails from the old world—Africa, Europe and The Near East. It was imported to the Americas in 1638 and, two centuries later, to Australia and New Zealand. Thus, the flora of the New World evolved without honeybees. Pollination outside the Old World was done by many other insects that co-evolved with flowering plants. This large pollinating fauna in the New World included a fair sample of the 25,000 other species in the huge bee family, Apidae. Australia is home to over 1600 species of bee, including the sting-less bee familiar to aboriginals. The honeybee genus itself, *Apis*, boasts only four species with three occurring in Asia. One of these, the Asian honeybee, *Apis cerana*, breached

quarantine at Cairns in 2007. It will feature later in this article.

A. mellifera was first introduced into the colony of NSW by the 'flogging' parson, Samuel Marsden, around 1812. These hives, located at Parramatta, probably perished, but not before some swarms had become established in surrounding bushland. The more successful introduction occurred when Captain Wallis (Wallace) safely transported a number of hives on the 'Isobella' from Ireland to Sydney in 1852. Some of these hives finished up with D'Arcy Wentworth (father of William Charles) and John Blaxland at Homebush.

There were further importations, but subsequent propagation and spread of honeybees within Australia occurred in two ways. Beekeepers continually split hives to increase numbers and they transported hives to suitable food sources. In nature, honeybee colonies propagate and spread by swarms leaving the parent hive and setting up home largely in suitable tree hollows.

We can safely assume that wild colonies of honeybee had colonised

every available bush site across mainland Australia and Tasmania by 1900. A similar process occurred in North America 200 years earlier; and is better documented, especially its impact on native Indians. James Denny, a reviewer of Tammy Horn's 2005 'Bees in America' states *Perhaps her strongest chapter is the one in which she describes the effect upon American Indians in observing the 'white man's fly'. Here is insight into the trigger event for Indians to remove themselves from their historic grounds, for as the bees came in, so too would settlement and occupation of the land. The Indians realized that that once this happened, their historic way of life was gone. The 'white man's fly' was the canary in the coal mine—a sign of danger, time to go.* The spread in Australia would have been just as comprehensive, and possibly more rapid. The density of feral hives is much higher because of our abundant nectar resources and nesting sites, especially our Eucalypt forests.

The purpose for importing honeybees to the New World >

was honey and wax, pure and simple, not pollination. Indeed, it was only in 1750 that Irishman, Arthur Dobbs, established pollen as the 'male seed' which fertilises the ovum. The role that bees played in pollen transfer (pollination) was established by Christian Sprengel of Germany in 1793. However, the sordid field of plant sexuality was largely ignored until Darwin's work on fertilisation in orchids in 1862 gave it respectability. Linnaeus (1707-1778) had already labelled the honeybee, *mellifera* which means 'maker of honey'. Had Linnaeus known what we know now, he likely would have used the name '*polleniphora*', carrier of pollen, to reflect the true biological significance of the honeybee.

This history allows us to tackle the first major threat to pollination services in Australia—loss of access to floral resources; the exclusion of commercially managed hives from public lands and national parks which is essential for beekeepers to generate their primary income source, honey production.

However, access is equally essential for beekeepers to build up hive strength for pollination services. Managed hives will soon become a limiting factor in meeting this growing need. For instance, the almond industry alone already requires over 100,000 hives for a brief three week period in August each year. By 2015, according to Trevor Monson, Australia's leading pollination broker, the almond crop will require 350,000 hives to service a crop with an annual value around \$700m. Managed bee hives right now amount to around 500,000 across eastern Australia; so, in the best of worlds, we're heading for a shortfall with almonds. That's just one crop! Other important crops—including avocado, blueberry, cucumber, rockmelon, sunflower, watermelon and zucchini—are fully dependent on honeybee pollination. Some very high value crops like canola, cotton and pasture clovers can increase yields 10–20 per cent with honeybee pollination. When all the sums are done, the gross value of crops that involve honeybee pollination exceeds \$4 billion p.a.

Access to floral resources, a man-made crisis

It is obvious that our flora does not require the services of honeybee pollination to protect its evolutionary past and secure its evolutionary future. The question then arises, does the introduced honeybee have an adverse impact by inappropriate or 'unnatural' pollination or our native plants? And the related question, do honeybees compete for pollen and nectar which serve as sources of protein and carbohydrate for native fauna? Do we apply the precautionary principle and exclude managed hives from public lands including national parks—where feral colonies probably reached saturation point over 100 years ago?

Pollination of native plants by commercial honeybees during short visits (3-5 weeks) to exploit nectar flows cannot be an issue because the bush is already saturated with feral hives all year. Since commercial beekeepers only access floral resources on public lands during nectar flows, it is reasonably argued that nectar and pollen resources are naturally abundant for other fauna.

In contention is not just a honey crop whose annual value is a modest \$80m. Were that the case, be damned with honey production. Let's import honey from China or Argentina where the same environmental concerns are less acute. However, without this base income from honey, and the opportunity to build up hives whose well-being are often punished by the environmental conditions imposed by pollinating a monoculture, the pollination service industry would collapse.

In Queensland, the Beattie/Bligh Government has a policy of excluding all managed hives from national parks and forest reserves by 2024. It is rapidly converting State Forests to conservation status or into national parks so 1-2 million additional hectares of floral resources will be lost to commercial beekeepers. The bureaucrats wrongly argue that honeybees cause unnatural

pollination, they compete with native fauna and they are exotic. By 2024 Queensland's commercial beekeepers face oblivion if the policy is not abandoned.

There is no credible evidence that commercial beekeeping which only occurs for some weeks when there is a nectar flow has any significant ecological impact. More so, when we consider the fact that wild colonies of honeybee reached saturation levels in these habitats over 100 years ago.

Stripped to its essentials, the argument to exclude commercial hives from these public lands is an ideological one. Honeybees are alien creatures and beekeeping is a commercial activity. Neither have a place in native habitats. This ignores the fact that Australian agriculture is based on introduced plants and animals. Macadamia is the only native plant under cultivation for food. There is cogent evidence that the lead environmentalist who bent Beattie's ear on this issue detests big trucks, and not bees, entering national parks. Removing occasional trucks with nightly loads of bees, and therefore losing fire trails, actually poses a genuine threat to the parks.

In mid 2009, Queensland's Minister of Primary Production acknowledged that the value of Queensland crops dependent on honeybee pollination is around \$1 billion p.a. By 2024 these crops will lack honeybee pollination and \$1 billion worth of crops will crash. To attract the 'green' vote, Beattie was prepared to sacrifice a handful of beekeepers and a honey crop worth around \$14 million p.a. for a fetish over trucks. A further problem facing Queensland's beekeepers is the recent decision by the Bligh Government to privatise its state forests where the majority of commercial apiary sites are located. No one knows where the privatisation path is leading.

Victorian beekeepers face similar resource problems. Tasmania and West Australia have well balanced advisory committees in place; and beekeepers and environment bureaucrats appear to share common values. Without continued but responsible access to

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THREATS TO POLLINATION SERVICES

#1

"the exclusion of commercially managed hives from public lands and national parks"

#2

"the small hive beetle... reducing crop yields and fruit quality"

#3

"when, not if, the mite *Varroa destructor* invades Australia... experience from USA and NZ indicates that all our feral colonies will be eliminated, at least in the short term."

#4

"without any advice from bee experts and State Departments, the Eastern Creek Quarantine Station was closed by Ministerial fiat in 2009."

native floral resources across Australia, commercial beekeeping will not be able to provide essential pollination services.

The role of wild (or feral) European honeybees in pollination.

Feral colonies have played a key role in providing a free pollination service since settlement. Foraging bees fly over 5km to collect pollen and nectar. Flowers in small scattered orchards and crops were likely to receive sufficient visitors to ensure adequate pollination without grower intervention. With consolidation of holdings, fewer but larger orchards, habitat destruction and pesticide prevalence, the free ride from ferals is faltering.

A new pest, the small hive beetle (SHB), breached quarantine around 2000. Its entry and rapid spread along the eastern seaboard since 2002 appears to have

decimated feral colonies, as well as destroying many managed hives. It possibly gained entry through the Richmond RAAF base, either with returning military gear from South Africa, or with athletics equipment for the 2000 Sydney Olympics.

SHB is here to stay, and it's another nail in the beekeeper's coffin. Already, substantial anecdotal evidence suggests SHB is reducing crop yields and fruit quality by eliminating feral hives and free pollination. This is nothing compared to what will happen if another pest, the mite *Varroa destructor* invades Australia. Many experts say it is a matter of when not if.

The mite co-evolved with the Asian honeybee, *A. cerana* and the two live in comparative harmony. But varroa jumped host to *A. mellifera* when the European species was introduced to Asia. From there varroa has spread to all beekeeping countries, except Australia. Experience from USA

and NZ indicates that all our feral colonies will be eliminated, at least in the short term. Crops dependent on honeybee pollination will then be totally dependent on the European honeybee.

To add to our woes, CSIRO's Denis Anderson, the world expert on varroa, has found another mite, *Varroa jacobsoni*, has recently jumped from Asian to European honeybees in PNG. A cerana occasionally tests our quarantine barriers with the most recent entry at the port in Cairns in 2007. Thankfully, it came without varroa. Swarms of *A. mellifera* are regularly detected on boats or sea cargo. Such swarms pose a greater risk of introducing varroa.

V. destructor was first detected in the North Island of NZ in 2000. Despite every effort, it crossed to the south island in 2007, so the notion of containment or eradication of either varroa species once established here is fanciful. In the short term, at least, the >

ecological landscape for agriculture and food security will change profoundly.

A solution may eventually be found. In the interim, we are in for a rough ride. R&D may produce a honeybee tolerant to varroa but funding is very limited. Money for research to date has been mainly driven by a statutory levy on the value of the honey crop. Pollination services, where the big money is, do not qualify for matching dollars under the Primary Industries R&D Act. *More than Honey* recommended broadening the funding base to include pollination services. This would require legislative change but the Government's response to the Report's recommendation was 'make your own arrangements'. Not interested, said the Government. The pollination dependent industries are getting their house in order with the establishment of 'Pollination Australia'. The Government is running in the other direction.

In the same vein, the Government ducked for cover over the parlous status of honeybee quarantine. This is dealt with in the final section.

Honeybee quarantine and the future

At industry urging, the Federal Government built Australia's only honeybee quarantine facility at the Eastern Creek Quarantine Station in the early 1980s. Since then it has been used sporadically to import genetic material to support bee improvement programs.

In 2001 the Howard Government foolishly sold the facility for a pittance with lease-back arrangements until 2010; and with a further extension until 2015. Neither party wanted to extend the lease beyond 2010 but AQIS did precious little about providing alternative facilities. It was presumed that all quarantine services could be privatised. This may well happen eventually for some imports (cats, dogs, horses?) but is improbable for honeybees. As things stand, action to counter the impact of a short-sighted 2001 decision is yet to commence; and

time is running out.

Importing queen bees or semen is spasmodic but essential. For example, there is potential to source genetic stock which provides tolerance to varroa. Wise virgin thinking would support this pre-emptive action. But that's now not possible because of action by Minister Burke to close the facility to prevent entry of a disease which doesn't exist. Without any advice from bee experts and State Departments, the facility was closed by Ministerial fiat in 2009. Re-opening the facility is not a simple reversal. Normally, the decision requires Federal and State jurisdictions to act conjointly.

Minister Burke's rationale was to prevent Colony Collapse Disorder (CCD) entering Australia. Experts now believe CCD is not caused by a new pathogen but by any one or a combination of known and widespread pathogens which already exist in Australia. Action of these pathogens is exacerbated by varroa, which does not exist in Australia, and the quarantine facility was established to keep such a pest out. The experts figure management stress on modern hives triggers the pathogens to get out of hand. Had timely advice been sought from the right experts, the facility would have remained open.

Turning to our surveillance capability and incursion responses, the 2007 quarantine breach by *A cerana* in Cairns is illuminating. It revealed poor coordination between state and Commonwealth agencies, turf wars within state agencies, and a failure to keep the then Federal Minister for Primary Industries properly informed. Some of these issues were canvassed in *More than Honey*.

Shortly after its detection I discussed the Cairns incursion with Minister McGauran. Till then he had been kept in the dark about events, some of which reflected poorly on AQIS. He instructed his quarantine advisor to collect information from one industry leader in Queensland and a key CSIRO scientist, both of whom I identified. This never happened, it seems for fear of retribution on the advisor's

eventual return to AQIS. 'Plausible deniability' also came into play.

Opportunity for further airing was forgone in the Beale Quarantine and Biosecurity Inquiry in 2008. This Inquiry, triggered by the equine influenza outbreak at Eastern Creek, was established by Labor Minister Burke who replaced Minister McGauran following election of the Rudd Government. Sensitive issues such as need for Federal-level whistle-blower legislation to ensure the Minister for AQIS received timely and effective advice was raised with the Beale Enquiry, but ignored.

It seems that little has been learned from the Allan Kessing story where a public servant was judged criminally guilty for raising issues of genuine public concern about security at Sydney airport. After a \$200m security upgrade, triggered by Kessing who still denies responsibility for the leak, Kessing was found criminally guilty. In an SBS debate, Roger Beale supported the conviction.

The unnecessary closure of the Eastern Creek honeybee quarantine facility, and its uncertain future is further evidence that it's business as usual with bureaucrats and ministers. The ongoing uncertainty about floral resources with public misconceptions about the role of feral versus commercially managed bees on public lands, and the failure to appreciate the strategic importance of commercial beekeepers and the general decline in rural communities, collectively bode poorly for other primary producers and food security.

Max Whitten was Professor of Genetics at the University of Melbourne (1976-1981), Chief of CSIRO Entomology (1981-1995) and Chairman of Honeybee R&D Council (1985-1992). He worked with the FAO of the UN in Asia (1996-2000) advising governments on sustainable agriculture and biodiversity conservation. An amateur beekeeper since 1957 and advisor to the beekeeping industry since 1978 he is a Fellow of Australian Academy of Science and Member of The Order of Australia.