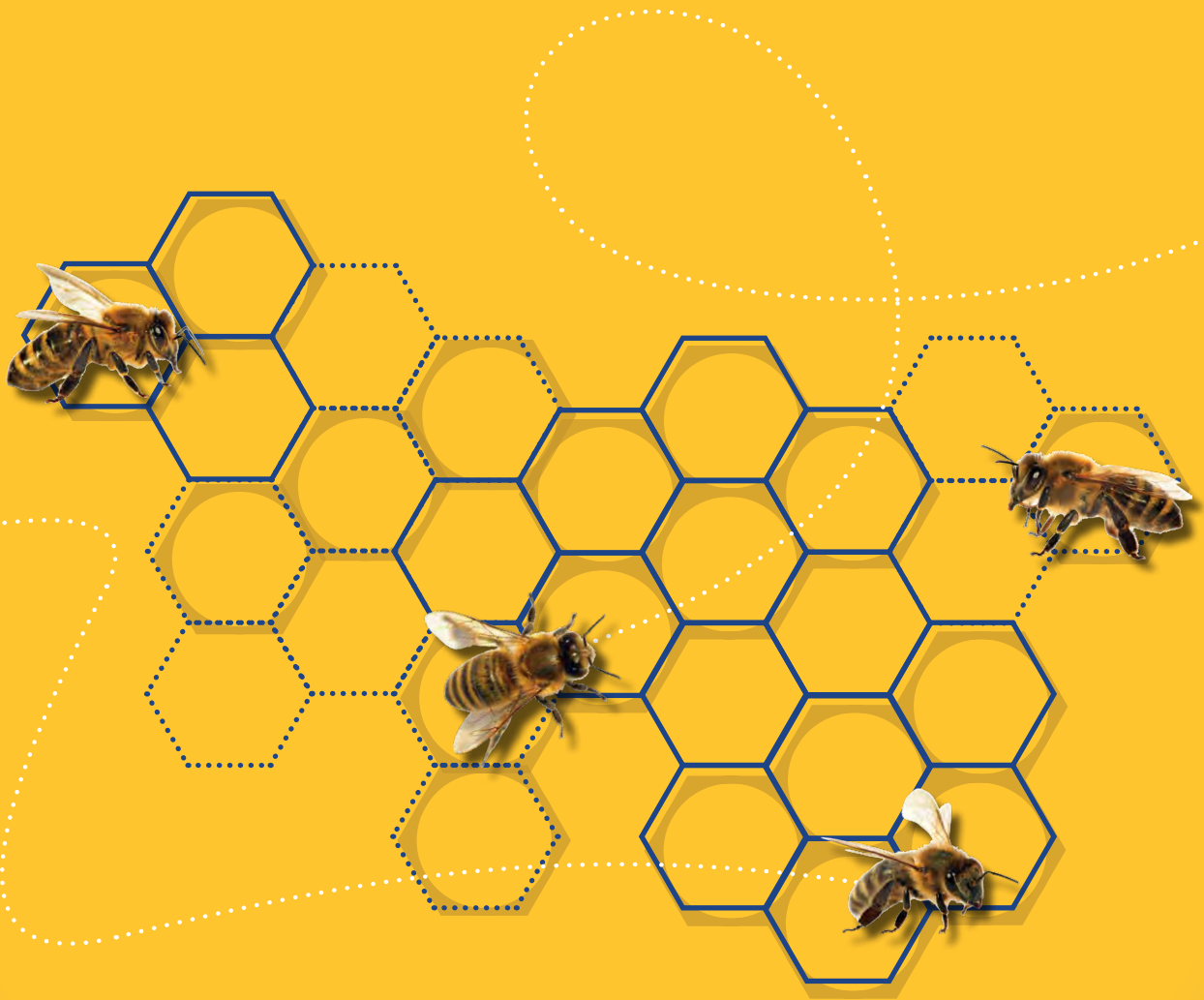


WA HONEY BEE AND POLLINATION INDUSTRY **SITUATION ANALYSIS 2021**



Prepared for the
APC BEEKEEPERS PRODUCERS' COMMITTEE
To support the industry strategic plan

JULY 2021



Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABA	Amateur Beekeepers Association
ABS	Australian Bureau of Statistics
AHB	Australian Honey Board
AHBIC	Australian Honey Bee Industry Council
APC	Agricultural Produce Commission
BAE	Australian Bureau of Agricultural Economics (now ABARES)
BICWA	Bee Industry Council Western Australia
CIE	Centre for International Economics (consultants)
CRC	Co-operative Research Centre
DAWE	(Australian Government) Department of Agriculture, Water, and the Environment
DFAT	(Australian Government) Department of Foreign Affairs and Trade
DPIRD	Department of Primary Industries and Regional Development (Western Australia)
FAO	Food and Agriculture Organisation of the United Nations
FOB	free on board (value of exported goods when they leave Australia)
GVP	gross value of production
PHA	Plant Health Australia
PIRSA	Primary Industries and Regions South Australia
RD&E	Research, Development and Extension
RIRDC	Rural Industries Research and Development Corporation (AgriFutures Australia)
SHB	small hive beetle
USDA	United States Department of Agriculture
WAAS	Western Australian Apiarists' Society
WABA	WA Beekeeping Association

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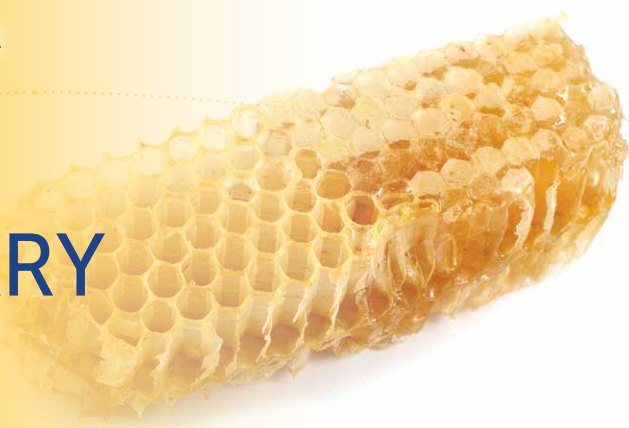
Note:

The information provided throughout this report is the latest information available and may be out of date given the circumstances and changes globally since COVID19. Reports and data used range from 2016-2021. The author has endeavoured to provide the most recent figures, which has been difficult. The validity of information taken from the web is questionable at times in terms of trusting the source as the figures can vary.



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EXECUTIVE SUMMARY

This report was commissioned by the APC Beekeepers Producers' Committee to assist in the review and design of the next Strategic Plan for 2021-2025 to guide direction for the WA bee and honey industry.

The first stage of the project was to conduct this Desktop Review and Analysis of the current global, Australian and Western Australian industry and market situation for the honey bee and pollination industries. The report draws on a wide range of industry reports and web-based information, some of which were conflicting.

Globally the honey bee industry is mainly dominated by China, the United States which is the largest valued importer, and New Zealand with their highly valued Manuka honey are the largest valued exporter of honey. The forecast is for increased global production and consumption in the future.

Currently Australia is only a small player in the world market, however its reputation for producing premium honey associated with strict food safety requirements and quarantine controls, and the country's freedom from the destructive Varroa mite make it attractive to international customers. Western Australia lags behind the other states in production of honey and other hive products and the pollination industry.

While there are many threats that may hinder the development of the Western Australian honey bee and pollination industry, there are also many opportunities for the local industry to capitalise on in order to become a more collaborative industry that can further increase the productivity and profitability of the Western Australian industry.

In Australia the honey bee industry is a significant contributor to the economy not only in terms of honey production but as a provider of pollination services for agriculture and horticulture including the almond industry. In 2019 it was estimated the total annual contribution of the honey bee to the Australian economy was \$14.2 billion. The economic value of recreational beekeeping is estimated at \$173.5 million and the commercial beekeeping sector, honey bee and pollination values combined is estimated at \$264 million. In 2019 the commercial beekeeper honey bee and pollination industry values of honey and beeswax production in Australia was \$147 million, honey production was estimated to be worth \$65 million and other hive products was \$12 million. The pollination industry was estimated to be about \$40 million. The Western Australian honey bee industry and associated products are valued at \$30-50 million and the WA pollination industry at \$1.2 billion.

Global honey production has declined marginally in recent years to be 1.85 million metric tonnes in 2019 and valued at US\$7.19 billion. The market is forecast to grow to US\$11.16 billion in 2027. China clearly dominates with 25% of the production with 444,000 tonnes, New Zealand ranked 17th (1.3%) and Australia was 28th producing 0.6% of global production. While New Zealand's honey production is increasing, Australia's appears to be decreasing. Reports indicate that Australia produces anywhere between 10,000 – 30,000 tonnes of honey annually which was valued at A\$65 million in 2019. Australian production is dominated by New South Wales, Victoria, South Australia and Queensland. Western Australia is fifth ahead of Tasmania. In terms of Western Australia, estimates range from 1,600 tonnes up to 4,500 tonnes of honey produced annually. Honey production figures in Western Australia are based on guestimates as there is no formal process that requires beekeepers to annually report honey production.



The value of global exports in 2020 increased by 8% to US\$2.17 billion. New Zealand had a significant increase to overtake China as the highest valued exporter of honey in 2020 with 15% of the global share valued at US\$328.8 million. China had a marginal increase to have a 12% share ahead of Argentina. While New Zealand exported 12,000 tonnes, China exported 133,000 metric tonnes which is sold at a lower price in the world market. Despite China exporting more, New Zealand has a clear price advantage over its competitors with significantly higher export prices for their Manuka honey which sells at top dollar following increased demand for natural products.

Currently Australia only exports 4,000 tonnes each year. Australia has the potential to export more honey, but the supply is simply not available. Key markets for Australian honey include China, USA, Singapore, Canada and Malaysia. Tridge data shows that honey exports from Australia in 2020 were worth US\$40.7 million, up on 2019. Australia was ranked 20th in the world in terms of export value and 27th on volume. Total honey exports from Western Australia of raw honey in 2020 were about \$7.5 million which was sent mainly to Singapore, Hong Kong, Malaysia, UAE and Japan.

The value of global imports in 2020 increased by 5.5% to US\$2.11 billion. The United States was the largest importer value wise in 2020 and has been for a number of years, with 21% of the global share and a value of US\$441.8 million. The US imported 196,000 tonnes while Germany who was second in terms of value with 13% imported 92,000 tonnes. Data shows that China's import price is at a lot higher than that of other importing countries.

Australia routinely imports twice what it exports. Sources of imported honey include China, Argentina and New Zealand. In 2019 Australia imported about 5,000 tonnes. It was ranked 13th in terms of import value which was about US\$54 million and 13th for volume imported. Import prices in 2019 ranged from \$2.89 from Asia up to \$36.70 for Manuka honey from New Zealand. There is no official data for honey imports into Western Australia.

Domestic supply of honey in 2019 was the highest in China, which grew 6.5% year on year to 432,000 tonnes. United States was second with 212,000 tonnes ahead of Turkey 108,000 tonnes. Australia was ranked 22nd with 17,000 tonnes of honey supplied domestically and New Zealand had 6,000 tonnes and came in 42nd. Nationally about \$40 million of honey is sold within Australia. Due to the diversity of the market, the volume is hard to determine, it was mentioned that 10,000 tonnes of honey is sold domestically in Australia a year through major retail outlets, however that also includes imported honey.

The global honey market size was US\$7.19 billion in 2019. The global impact of COVID-19 has been unprecedented and staggering, with sweet liquid witnessing a positive demand shock across all regions amid the pandemic. It was impossible to locate an average global price for honey, however according to Tridge honey prices for June range from US\$5.58-10.55/kg for Acacia honey; US\$12.79/kg for meadow honey; wildflower honey US\$3.64-3.95/kg and other honey ranges from US\$2.95/kg-\$9.68/kg. Honey produced by Australian commercial and recreational beekeepers is valued at around \$6.00/kg at farm gate in 2020. Western Australian producers generally receive a higher price per kilogram for honey. Bulk honey (mainly canola honey) generates around \$7/kg at the farm gate in Western Australia. It has been reported that WA beekeepers are regularly receiving \$30/kg for jarrah and blackbutt honey, which has markedly increased beekeeper profitability in Western Australia.

The Statista website states there were about 90.11 million beehives worldwide in 2019, increasing from around 89.56 million beehives in the previous year. Over the last decade some countries have seen a significant disappearance of bee populations either due to diseases, pests, climate change or the loss of habitat because of farming and urbanisation.

As of 2019, according to Nation Master, India is the country with the highest number of beehives, at around 13 million, followed by mainland China (9 million) and Turkey. New Zealand was ranked 21st and increasing with 898,827 hives while Australia's hives appear to have levelled out to see it ranked 39th globally, with a reported 375,997 hives. Western Australia has a reported total of 48,600 hives.

Australia-wide there are approximately 530,000 commercially managed hives available to deliver paid pollination services with the majority located in NSW and Victoria. In 2019 the almond industry, Australia's largest user of paid pollination services, hired 180,000 hives for crop pollination.

NSW has the largest concentration of total beekeepers and hives, followed by Victoria, Queensland, South Australia, Western Australia and finally Tasmania. The 2019-20 bushfires destroyed a significant proportion of hives in NSW, Queensland, Victoria and South Australia. Western Australia has a reported 48,000 bee hives.

Within Australia in recent years there has been a 10-fold increase in recreational beekeeping with 28,000 estimated in 2019 and a 36% decline in the number of commercial beekeepers (owns more than 50 hives) to 1800. Despite this, the average number of hives managed by a commercial beekeeper increased to 299 hives in 2018 whereas recreational keepers average 6 hives. Current numbers in Western Australia, as of June 2021, bring the total year to date registrations to 3994 beekeepers. There has been an influx in new registrations which is directly linked to the advent of the Flow Hive and interest in beekeeping as a hobby, particularly since COVID-19. It is estimated that 100 are commercial beekeepers and the rest are hobbyists.

Globally figures for honey production per hive were not available however in 2018, it was reported that United States production was 22.4kg/hive and New Zealand was 20.6kg. Honey production per hive in Australia in 2019 was calculated to be 29.9kg/hive for commercial producers and half that for amateurs/hobbyists. Another Australia report outlines that commercial hive honey production oscillated between 50kg and 70kg/hive/year whereas recreational beekeepers produce an annual output of 50kg per hive. Honey production for commercial producers has averaged 18 tonnes/year since 2003.

Production per hive in Western Australia for commercial producers is 150kg per hive per year, semi-commercial producers about 90kg/hive and then the amateurs is unknown. The general rule of thumb for the industry is 20 kilograms of honey per hive.

While honey is the major commercial output of the honey bee industry, there are a number of other products that add to the income of honey bee businesses including beeswax production, honeycomb in sections, propolis, royal jelly, bee venom, pollen, queen bee and packaged bee sales.

The global beeswax market was valued at US\$505 million in 2020 and is expected to reach US\$653.1 million by the end of 2026. Global beeswax production in 2019 was recorded as 66,100 tonnes. Asia and Africa are the major producers of beeswax with a production share of 52% and 22% respectively. India and Ethiopia are the top beeswax producing countries. China and Germany are the leading exporters (33% share) and importers (23%) of the beeswax respectively.

In terms of exports Australia ranked 14th with 1.46% valued at US\$1.9 million in 2020 and New Zealand came in 36th with 0.22% of global beeswax exports. Imports of beeswax into Australia were 2.37% and ranked 9th, whereas New Zealand was 55th with 0.14% of global imports.

Australia's annual beeswax production was estimated to be about 276 tonnes in 2018, equivalent to New Zealand. It is estimated that about 80% of Australia's beeswax is exported. The price received by beekeepers has increased from \$3/kg to \$20/kg in the last 10 years. Australian beeswax has always sold at a premium on world markets because it is free of adulteration and chemical residues.

Australia imports small volumes of refined beeswax. Raw beeswax imports are prohibited on biosecurity grounds. There are no production figures for Western Australia.

Honeycomb tends to be marketed as a niche product through farmers markets, specialist retailers and to the food service sector. There is no data available to determine global production and value of honeycomb sections and chunk honey. Within Australia, there are a few specialist producers of which the overall value is insignificant. Western Australia has no reported data.

The global propolis market was valued at US\$607.10 million in 2020 and the total annual commercial production of raw propolis is estimated between 1,800 and 2,400 tonnes per annum. Major producers are understood to include China (300 tonnes) and Brazil. The largest exporter of propolis is Indonesia (61%), Malaysia (51%) and China (10%). The largest importer is China (62%).



Propolis production in New Zealand is on the rise with demand from Asia. They currently produce approximately 30 tonnes/year of raw propolis, the equivalent of 12 tonnes of pure propolis. New Zealand imports many times this volume of processed propolis. Imports are required for lower cost consumer products.

It is reported that Australia imports up to 80 tonnes of pure propolis every year. The estimated retail value of imported propolis products was \$32 million pa in 2019 and that product is mostly sourced from China. Beekeepers, especially on Kangaroo Island SA, are producing small volumes commercially, perhaps as much as \$0.1 million pa. Prices reported for raw Australian propolis are encouraging with prices between \$100 and \$120/kg up to \$300/kg in 2018. These prices are consistent with prices received for raw propolis in New Zealand. Western Australian beekeepers retail propolis products but it is not known whether these are manufactured from locally sourced propolis. There are no production-based figures available.

World production of royal jelly in 2012 was estimated at 4,000 tonnes per annum with a wholesale value of US\$135 million. China produces an estimated 3,500 tonnes of royal jelly and other large producers include Vietnam, Taiwan, Japan and Korea. Royal jelly consumption and export is dominated by China. Tridge shows that Indonesia was the biggest exporter in 2020 with a value of US\$550 million and China was the largest importer, with the value of royal jelly at US\$547 million.

Royal jelly is a high-value apiary product that is not currently produced in Australia however Bee Healthy Australia in South Australia is currently in the process of establishing a network co-op to significantly expand on the limited raw materials available. Reports have identified there is a lot of opportunity for future production of royal jelly in Australia. It is estimated that Australia imports a retail value of \$6 million pa of royal jelly and that product is mostly sourced from China. The market is somewhere around 17 tonnes per annum for freeze dried product and 3 tonnes per annum for fresh royal jelly. Both products are on-sold to the health supplement and cosmetic preparation sectors. The average retail value of these products is close to \$300/kg. Royal jelly is not currently produced in Western Australia.

Limited data was available for the value and production of bee venom globally, Europe is the dominant market for bee venom and is expected to remain in a steady position. The factor that restrains the market is that there is not much availability of the beehives in the US, due to the absence of availability of honey bees, there is a lack of availability of venoms, thus no appropriate clinical testing or analysis can be done. Countries such as Russia, New Zealand and Japan with some of the Eastern countries have wide-ranging applications of bee venom. Currently no beekeepers in Australia or Western Australia produce bee venom commercially, however there is potential in the future. Bee venom is imported, mainly from Romania.

The global Bee Pollen Market is currently valued at US\$644 million and is expected to grow and reach US\$1003.36 million by 2027. Production figures are scarce however North America ranks second in terms of production volume of bee pollen worldwide and expected to rise having a large number of producers and increasing consuming population. Europe is third in terms of production of bee pollen worldwide. The bee pollen market is similar to propolis and royal jelly in that Indonesia is the largest exporter (61%) with a value of US\$896 million and China was the largest importer in 2020, with a value of US\$886 million. Australia is the 8th largest exporter globally with 0.96% market share and 10th largest importer of bee pollen value wise behind China and Hong Kong.

Within Australia there are limited cash sales of pollen by beekeepers on the east coast. However WA production has increased. Some WA beekeepers collect 3-4 tonnes of pollen for sale each year. Most of the pollen is sold either overseas or interstate. SaxonBee Enterprises in WA is currently servicing the Australian markets and exporting to the USA and Asia. Prices on their webpage show 1 kg of dry bee pollen is \$65 and 5 kg is worth \$220.

There was no global information for the production and sales of queen and packaged bees. Australia sells queen and packaged bees on the export market and domestically. Packaged bee exports to Canada are a small but important industry for Tasmania and Western Australia. The industry value peaked at \$7.5 million in 2010. In 2019 total queen and packaged bee exports were valued at \$2 million pa. Destinations of Australian Honeybee exports include Canada, Malaysia, Lebanon, Japan, UAE and the Solomon Islands. Western Australia exported about \$400,000 in queen bees and packaged bees in 2020.

Domestic package sales within Australia have increased as the recreational sector has grown. Industry estimates for domestic packaged bee sales vary between \$1.5 million up to \$5.5 million in 2018-19. Packages retail for \$150 each, a beekeeper price of \$75 is assumed. In 1997 it was reported Queens were worth \$9 each and in 2018-19 it was estimated to be about \$30 per queen. Imports of live honey bees are limited to a small number of queen bees for the purposes of genetic improvement. Strict biosecurity provisions also pertain to the importation of drone semen for genetic improvement.

The pollination industry has a global economic value of more than US\$60 billion dollars and the industry is forecast to continue to grow: between US\$235 and \$577 billion worth of annual global food production relies on their contribution annually. In Germany and France alone pollination services provided by insects, mainly bees, are worth EUR 153 billion a year and in the United States the economic value of insect pollinators was US\$34 billion in 2012. The average economic value of honey bee insect pollinators created for horticulture and the Australian economy from paid pollination services was A\$14.2 billion in the 2015 financial year. Victoria had the highest average economic value of \$2.4 billion, followed by NSW, Queensland, SA, WA, NT, Tasmania and finally the ACT. Western Australia's pollination services are valued at around \$1.1 billion.

Global honey consumption has increased over the past decades. The main reasons for this are the increase in the world population and the preference towards more natural food sources by a growing number of consumers. One report shows Greece with the higher per capita honey consumption at 1.53 kilograms of honey per person a year, followed by Switzerland and Ukraine. New Zealand came in 5th with 1.15kg and Australia was 8th with honey consumption per capita in Australia in 2017 at 0.67kg of honey per person a year.

Consumer research shows that honey is the most preferred sweetener over and above sugar. Consumers are paying more attention than ever before to the foods they are eating. This is part of a larger evolution that started many years ago when consumer preferences started shifting and natural ingredients became heavily sought after.

The IBISWorld report outlines that health consciousness is a key driver in demand for honey, as it is often used as a healthier substitute to sugar. In addition, as consumers move away from overly processed foods demand for locally produced, raw honey is growing, boosting demand. As a result, per capita honey consumption has risen over the past five years, as consumers look for healthier alternatives to sugar. And it's a trend the Cooperative Research Centre (CRC) for Honeybee Products suspect is behind a spike in honey sales across Australia in mid-2020 during the coronavirus pandemic.

Based on this research and information gathered in the desktop review, a number of opportunities and threats have been identified for the WA honey bee and pollination industry to consider in the design of the industry's next Strategic Plan.



Opportunities

INDUSTRY

- The industry is growing at a faster pace than the overall economy.
- There is increasing interest from beekeepers to be involved in the industry.
- An attractive industry to newcomers and small-scale producers following development of the Flow Hive.
- Ongoing increases in the number of hives managed per commercial beekeeper.
- Industry participation is rising.
- Industry collaboration.
- Collection of data, including honey production, to determine the industry situation.
- More regulation around the activities of the amateur/hobbyist beekeepers.
- Raise awareness of the importance of bees and the beekeeping industry.

POLLINATION

- Demand for pollination services is forecast to continue due to rising exports of Australian horticultural products. Strong growth in demand and income earned from pollination of almond, apple, avocado, blueberry, macadamia, pumpkin and watermelon.
- Growth in pollination opportunities is likely to result in the emergence of specialised pollination businesses, with honey production being the secondary income source.
- Increases in the area of protected cropping is increasing honey bee hive requirements, e.g. an increase in the area of apples grown under a net is increasing the number of growers willing to pay for pollination services.
- Australian almond production is entirely reliant on bee pollination and for macadamias, cherries and mangoes the figure is 90 per cent.

HONEY

- Further differentiation of honey to recognise the medicinal and other qualities of Australian honey.
- A strong opportunity to further improve and capitalise on the prices and recognition of medicinal honeys and other qualities of mainstream honey.
- Honey is one of the 20 high growth, high potential primary industry sector opportunities for WA.
- Honey free from antibiotics and miticides.
- More rigorous checking of imported honey and faster action to remove fraudulent product from the Australian market.
- Better labelling of honey and products containing honey.
- Consideration of honey in any Free Trade Agreements.

TRADE

- WA honey achieves a higher price than the rest of Australian produced honey.
- Improve collection of data on honey sales – intrastate, interstate, export, import etc.
- Strong domestic and growing export demand for premium honey.
- Surging demand throughout Asian markets (and globally) for clean green food.
- Substantial cultural history of medicinal uses of honey in many Asian countries.
- Widespread food fraud elsewhere means consumers are looking at Australian produce.
- Australian made products are highly sought after by Chinese consumers due to Australia's strict food safety requirements and quarantine controls, as they are sceptical about products manufactured in their homeland.
- Demand from Asian markets is likely to rise as the growing middle class increasingly demands Australian produce, which has a high-quality reputation in Asia.
- WA and Australia's freedom from destructive bee diseases and pests like the Varroa mite made it attractive to overseas honey export markets.
- Increasing consumer use of ecommerce platforms, which has increased due to COVID-19.

OTHER HIVE PRODUCTS

- Re-establish US market for export of packaged bees for their pollination season and live bee export trade adds value to industry. Packaged bee exports from east coast prohibited by most countries.
- Diversification into the harvest and marketing of propolis, targeting the Asian market.
- Production of royal jelly in Australia to target a readymade market in Asia.
- Increase beeswax production as Australian beeswax has always sold at a premium on world markets because it is free of adulteration and chemical residues.

Opportunities (Cont.)

CONSUMERS	OTHER
<ul style="list-style-type: none"> • Rising health consciousness is driving domestic demand, with consumers looking for healthier alternatives to sugar and honey often used as a substitute due to its perceived health benefits. • A forecast rise in per capita honey consumption in Australia due to more health-conscious consumers. • Increase in consumer demand for Manuka honey and premium, raw honey as it's seen as a highly valuable product due to its purported medicinal properties. • The impacts of the COVID-19 virus on consumer habits is seeing a recent increase in honey sales as consumers seek long-life natural products and bake at home more. • Authenticity and provenance branding of honey bee products: build the story to support the premium prices. 	<ul style="list-style-type: none"> • WA's pristine environment produces healthy bees and pure clean honey. • Limited endemic honeybee diseases. • Southern WA free of small hive beetle (SHB) unlike eastern Australia. Tasmania is free but not Kimberley area - reduces hive productivity and can destroy colonies. • One of the oldest bee breeding programs in Australia. Queens are highly sought after. • Significant opportunities to partner with indigenous groups and traditional owners to: <ul style="list-style-type: none"> • Develop WA's native vegetation resource. • Management of floral resource by indigenous rangers. • Market in partnership with cultural products such as traditional 'bush tucker'. • Ensure beekeepers have access to unburned sites (the current mapping system is not linked to the Department responsible for prescribed burns nor is it linked to a system that would normally sit with the Department of Agriculture and Food to allow site access trading). • Enforcement of labelling requirements of pesticides. • Quick and accurate recognition of bee diseases is needed with inexperienced beekeepers entering the industry and new diseases arriving in Australia. A rapid diagnosis and response to these diseases is needed to keep Australia as a haven for healthy bees for the rest of the world.

Threats

INDUSTRY	HONEY
<ul style="list-style-type: none"> • The beekeeping industry is highly fragmented. • Lack of collaboration amongst industry groups. • Lack of information and consistent data on the overall industry. • Lack of industry data globally, nationally and state wide. The industry situation in WA is a lot harder to determine as there is not a lot of data available. • There is no formal process requiring beekeepers to annually report their honey, beeswax and other beekeeping production. • Beekeepers primarily compete with each other on price and quality. • Over calculation of the number of beehives/beekeepers in Australia as the rules for registering beehives differ from state to state. • Under reporting of hives, in order to avoid paying levies. • Ineffective engagement with state and federal departments supporting export market development. • Lack of awareness of policy makers on the importance of bees. • The hobbyist beekeepers are the fastest growing sector, but hardest to track in terms of production and sales. • Decline in commercial beekeeping: commercial beekeeper numbers are decreasing in Australia and across the world for a number of reasons including reduced access to resources, low honey prices with increasing production costs, an under-appreciation of the value of pollination services, and the impact of serious bee disease. 	<ul style="list-style-type: none"> • Australian and Western Australian honey production figures are unknown and vary greatly across industry sources, therefore it is hard to determine honey yields. • Increasing the supply of honey – domestic and export demand is robust, but the supply of honey is fixed. Solutions such as the development of honey bee pastures may be needed. • Keeping honey bees safe from pests, diseases and the impacts of widely-used pesticides. An ongoing challenge exists with exotic and endemic pests, and safe management of pesticides, especially agricultural chemicals.
	OTHER HIVE PRODUCTS
	<ul style="list-style-type: none"> • Biosecurity issues could lead to the loss of Western Australian packaged bee exports to Canada due to their strict biosecurity requirements which only Tasmania and WA can meet. • Low prices of honey bee products originating from Australia do not reflect their true value as unique and pure. Endemic flora, together with regulated isolation, has created the opportunity to produce rare honey bee products and develop niche markets.

Threats (Cont.)

POLLINATION

- Keeping the beekeeping industry viable so it can carry out the pollination requirements of the agricultural and horticultural industries.
- Loss of horticultural industries (and reliance on them) requiring pollination services due to low prices, loss of market, climatic conditions, restricted water access etc.
- Decline in Australia's bee population attributed to climatic conditions could lead to some horticulture companies seeking alternative methods of pollination. If Australia begins to suffer the honey bee decline seen elsewhere in the world, our agriculture industry will be paying for pollination services. The problem is that Australia would not have enough managed hives to meet demand, and the bees would need a healthy environment to hold over for the next flowering event.

TRADE

- Market is so diverse therefore it is hard to track information.
- Lack of data for honey sales in the domestic market – i.e. what is sold locally and interstate.
- Lack of differentiation of data for domestic honey sales in locally produced honey as opposed to imported honey.
- Disruption and impact as a result of the COVID-19 pandemic impact – high freight costs and reduced availability constrain exports.
- Value of the Australian dollar.
- High imports and external competition - Australian beekeepers face significant external competition from honey imports, particularly from New Zealand which accounts for over 70% of total industry imports.
- The efforts of the New Zealand honey industry present a threat to the marketability and value of Australian premium honey exports.
- New Zealand has applied to claim certification trademarks for the term 'Manuka' honey in China and other markets like the European Union.
- Exports are forecast to fall slightly in the future.
- Ongoing trade tensions with China, the industry's largest export market.
- Failure to capture export opportunities, poor marketing.

CONSUMERS

- Competition from alternative sweeteners such as sugar and stevia.

OTHER

- Habitat destruction and access - fewer resources due to wildfires, prescribed burns, land clearing, logging of old growth timber such as Jarrah, Marri and Karri, lower rainfall and urban encroachment.
- Restricted accessibility of public land for beekeeping and significant associated lease and license costs. Beekeeper access to public lands is also impacted by government policies and varies widely from state to state.
- Competition for best locations for apiary sites.
- Decline in Australia's bee population due to climatic events – i.e. bushfires, droughts, floods etc.
- Access to sufficient floral resources for hive build-up for crop pollination and honey production. The industry's key limiting factor even before the 2019-20 bushfire crisis.
- Biosecurity: exotic pest and disease incursions.
- Varroa mite is a major threat to the honey bee and crop pollination plant industries.
- The use of agricultural chemicals can be highly toxic to bees.
- Beekeeper migration, chasing the next flowering event to keep their bee hives alive and healthy, and maintaining a honey bee product output is an art at present. Predicting a flowering event bees can feed from would not only save travelling time but ensure the best Australian flora is captured.
- Biosecurity is a big issue for industry - with lots of amateurs as they are not experienced at seeing disease and tracking it and some hives are not well attended.
- Intensification of agriculture. Pesticides.
- Honey adulteration.
- Climate change and its global impact on beekeeping.
- Aging of beekeepers.
- Lack of a public understanding of the benefits of bees.
- Increase in the domestic price of sugar (as key feed input for bees) limits rise in profitability.

Global Honey Bee and Pollination Industry Situation

There was no indication of the overall value of the global honey bee and pollination industry on the world wide web, therefore the values and production of the individual industries has been the focus of this report.

Fortune Business Insight says the global honey market was valued at USD 7.19 billion in 2019, and the value is forecast to grow from USD 7.84 billion in 2020 to USD 11.16 billion in 2027 at a CAGR of 5.2% in the 2020-2027 period.²⁶ The Statista webpage shows global production in 2019 was 1.85 million metric tonnes.²³ China clearly dominates production with 25%, New Zealand is ranked 17th and produces 1.3% of the world's honey with 23,000 tonnes and Australia produces half of that again (10,700 tonnes) which is 0.6% of global production and 28th in the rankings for 2019.²⁴

Global exports in 2020 were valued at USD 2.17 billion, of which New Zealand had the highest export value of natural honey at about USD 328.8 million, consisting of 15% of the overall value.²⁴ China was the second biggest exporter and despite its higher volume of exported honey, New Zealand honey exports have a significant price advantage over competitors.

The value of global imports in 2020 was USD 2.11 billion. The United States was the largest importer value wise, with 21% of the global share and a value of USD 441.8 million. Germany was second, followed by Japan and then the United Kingdom.²⁴

In terms of other bee hive products:

- The global beeswax market was valued at US\$505 million in 2020 and is expected to reach US\$653.1 million by the end of 2026, growing at a CAGR of 3.7% during 2021-2026.²⁸ Global beeswax production in 2019 was recorded as 66,100 tonnes.²⁴
- The global propolis market was valued at US\$607.10 million in 2020 and it is expected to register a CAGR of 5.48% during the forecast period 2021-2026.²⁹ The total annual commercial production of raw propolis is estimated at between 1,800 and 2,400t per annum.³⁰
- World production of royal jelly in 2012 was estimated at 4,000t per annum with a wholesale value of \$US135 million.³¹
- The global bee pollen market is estimated to reach US\$1003.36 million by 2027, growing at a CAGR of 5.7% between 2019 and 2027.³⁴
- There was no global information on the production and sales of bee venom, honeycomb sections, chunk honey, queen and packaged bee sales.

The pollination industry has a global economic value of more than US\$60 billion dollars and the industry is projected to grow at a CAGR of 2.1% between the forecast period 2018 to 2023. Between US\$235 and \$577 billion worth of annual global food production relies on their pollination contribution annually.³⁸

Over the past two decades, global production of honey has increased nearly 50 per cent. During the same period, the number of farmed beehives has increased too but by less than 30% to about 90 million, according to the United Nations Food and Agriculture Organisation.⁸¹

Vice President of the Scientific Commission on Beekeeping Economy at Apimondia, the international Federation of Beekeepers' Association, Ron Phipps said it is impossible to account for the increase in global production of honey by the modest increase in the number of beehives. 'We believe consumers are being cheated – honey is being adulterated with rice syrup and other sweeteners.'⁸¹

Beekeepers warn that cheap imports threaten to put them out of business, meaning fewer bees to pollinate crops, wildflowers and trees and risking ecological disaster.⁸¹

Police intelligence confirms fraudsters are targeting cheaper honeys. And beekeepers from Europe to South America allege the adulteration originates largely in China, the world's biggest honey-producing nation. Such practices are known to the Chinese authorities, who say they are working hard to detect them.⁸¹

Number of Beekeepers and Hives

The Statista website states there were about 90.11 million beehives worldwide in 2019, increasing from around 89.56 million beehives in the previous year. In 2016 there were about 90.5 million beehives in the world, up from about 80 million beehives in 2010.²³

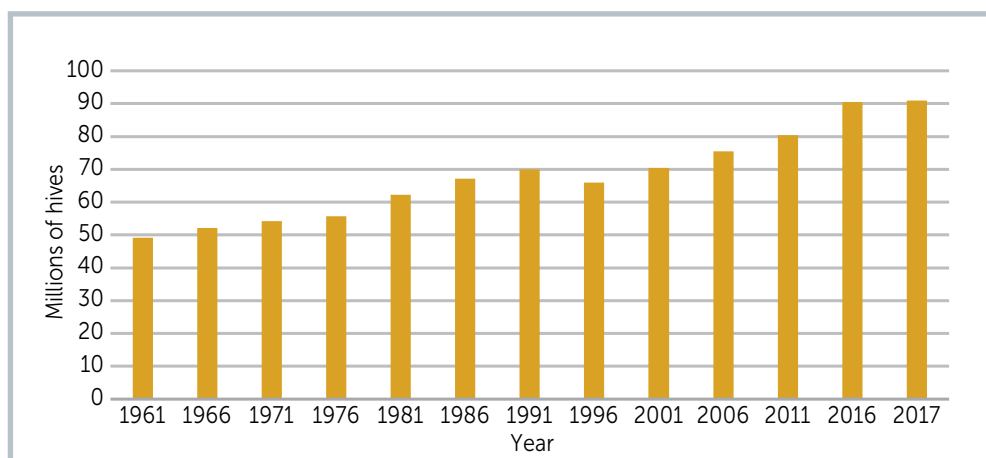
The global bee population is currently between 80 million and 100 million managed beehives. Although this seems impressive with each of the hives having between 10,000 and 60,000 bees in them, the numbers can drop dramatically.⁴⁸ Over the past decade some countries have seen a significant disappearance of bee populations either due to diseases, pests, climate change or the loss of habitat to farming and urbanisation. The fertilisers and pesticides used on crops can also kill bees.

Colony collapse disorder and varroa mites have created huge problems in the past. The USDA bee population chart shows this was the case throughout 2018, with April through June seeing the most significant portion of colonies affected by varroa mites (56.4%). Varroa mites affected 45.6% of these colonies from January through March 2019. These mites still pose the greatest risk for bee colonies, causing significant damage and high death rates throughout the year.⁴⁹

In 2019 economist John Karasinski⁷³ prepared a paper 'Estimates of the Population of Managed Honey Bees (*Apis mellifera*): A Global Study' that attempts to quantify the size of the global population of managed honey bees on a country by country basis.

This study is based on the United Nations Food and Agriculture FAO (2019) database¹⁰ which is the only global time series database which publishes the annual number of managed honey bee hives by country for over a half of a century, from 1961 to 2017.^{11, 12} According to the UN database the geographical spread of the honey bee industry is not universal, with only 124 countries (64% of the global number of countries) submitting their honey bee hive statistics to the UN. It could be construed that many smaller nations may have micro artisanal sized industries whose activities do not warrant reporting to the UN.⁷³

According to the UN there were 49.2m managed bee hives in 1961 rising to 91m managed bee hives in 2017, representing an 85% increase in the global number of managed bee hives. As the current de facto measure of honey bee population it can be concluded the global honey bee population increased between 1961 and 2017. Based on this evidence claims of a global decline in honey bees can be refuted. Between 1991 and 1996 there was a global decline of 4m bee hives most likely associated with the changing geo-political boundaries that occurred with the collapse of the USSR in 1991. By 2017 bee hive numbers had "recovered" resulting in 25m more managed bee hives than there were in 1996.⁷³ Further calculations done by John Karasinski show the global number of bee hives in 2019 to be 90,116,413. The growth rate was 83.84% with a CAGR of 1.0499%.⁷⁹

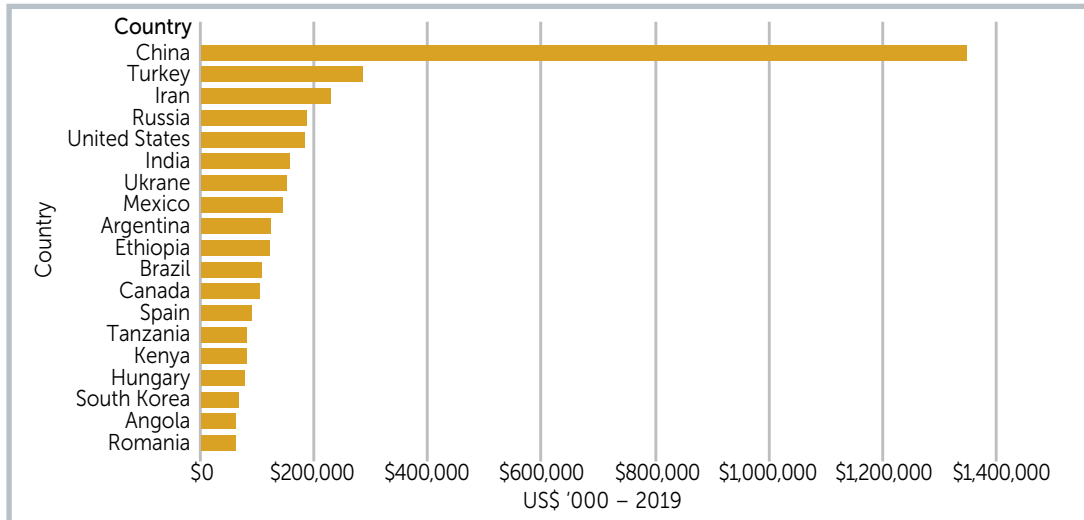


Global number of Bee Hives 1961-2017

Source: Karasinski, John – Curtin University Economist, 'Estimates of the Population of Managed Honey Bees (*Apis mellifera*): A Global Study', October 2019⁷³

Country breakdown of Beekeepers and Hives

As of 2019 according to Nation Master, India is the country with the highest number of beehives, at around 13 million, followed by mainland China (9m) and Turkey. In comparison the United States only has about 2.7m beehives. Despite the huge number of hives in India, China outstrips India in terms of production volume producing about 497,000t of honey in that same year, about 27% of the global market volume.^{46,23} New Zealand was ranked 21st with 898,827 hives while Australia was 39th with a reported 375,997 hives.⁴⁶

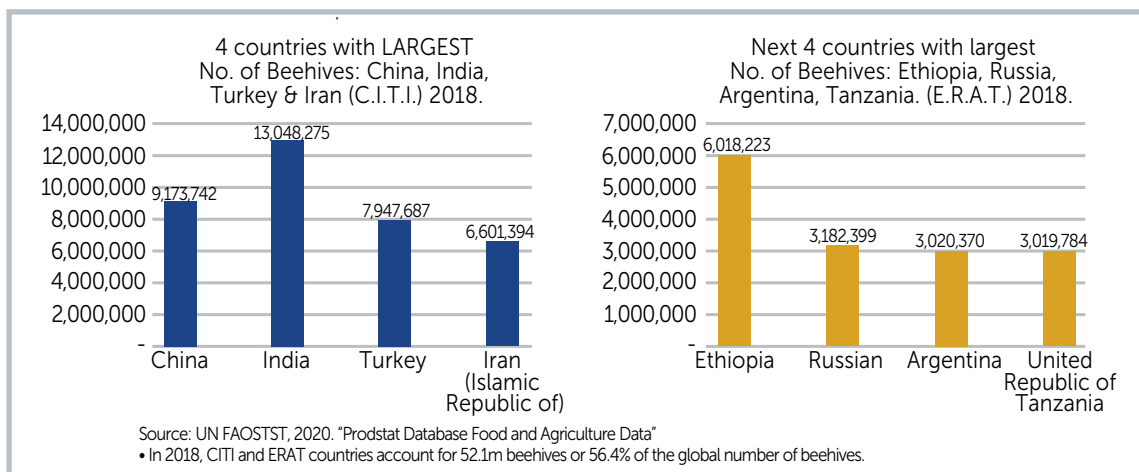


Top Countries in Natural Honey Net Production

Source: Honey Industry: Key statistics and indicators - NationMaster⁴⁶

John Karasinski's 2019 paper⁷³ outlined there were 124 countries for which the UN collects data that have been arbitrarily grouped into countries with less than 1 million honey bee hives and countries with more than 1 million bee hives. Sixty-eight percent of the countries have less than 200,000 bee hives and 80% of those countries have less than 100,000 bee hives, implying their honey industry is a relatively small-scale cottage-type industry where honey is produced largely for personal consumption and some form of trade. Ninety percent of the countries listed have less than 500,000 hives. Based on the UN data, the Australian honey industry is one of the six countries included in the 300,001 to 400,000 range of bee hives.⁷³

Globally there are nineteen countries with more than 1 million bee hives and their industry by comparison comprises large scale commercial enterprises. According to the UN, India had 12.8m bee hives in 2017 making India the world's largest honey bee country. The next largest country was China with 9m bee hives in 2017. Nine countries (or 47% of this category) report owning 1-2m bee hives. Brazil has the smallest number of bee hives in this group (1m) while Mexico is the largest with 1.8m bee hives. The next group comprises the USA (2.7m hives), Spain (2.9m hives) and Tanzania (3m hives).⁷³



Eight Countries with largest number of beehives in 2018: (a) C.I.T.I. and (b) E.R.A.T. countries

Source: Karasinski, John – Curtin University Economist, 'The Flip side of the Australian Beekeeping Industry: A Global Perspective. Presentation at WA Apiarist's Society, March 2020⁷⁴

New Zealand is included in this review because it is an important global industry player and a competitor to the Australian industry. According to the UN data New Zealand had 820,000 bee hives in 2017. It is one of four countries with between 800,001 and 900,000 managed bee hives.⁷³

According to Wikipedia currently Adee Honey Farm in South Dakota, USA, (80,000 colonies) and Comvita in New Zealand (30,000+ colonies) are among the world’s largest beekeeping enterprises. Worldwide commercial beekeepers number about 5% of the individuals with bees but produce about 60% of the world’s honey crop. Commercial beekeeping is on the rise, especially in high-value markets such as pollination in North America and honey production (especially Manuka honey) in New Zealand.²⁵

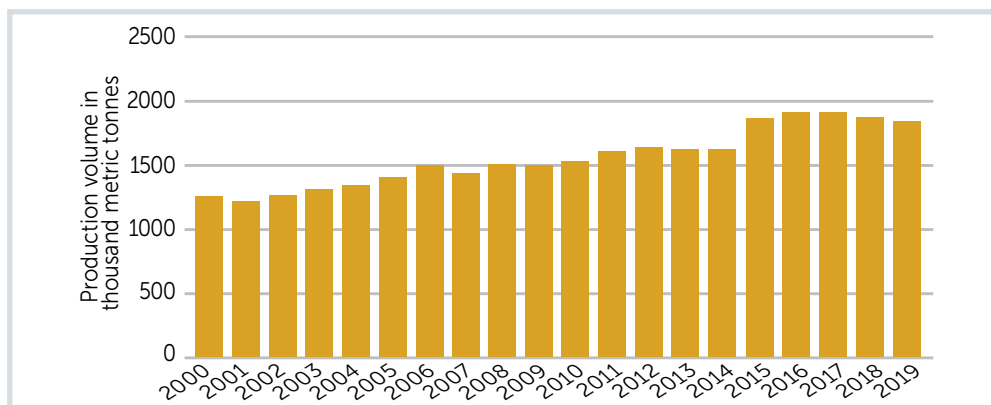
With regard to the number of beekeepers per country, they are not readily available however here are some statistics from various websites:

- United States – there are more than 200,000 beekeepers in the United States. *Buzzing Across America: State Beekeeping Facts*
- European Union – according to data provided in the 2017–2019 programmes there were around 600,000 beekeepers in the European Union. The number of EU beekeepers has been decreasing. Many beekeepers who leave the sector for reasons of age are not replaced by newcomers. *The number of beekeepers in the EU is falling down – MyBeeLine*
- Canada – there are approximately 7,000 beekeepers in Canada operating a total of 600,000 colonies of honeybees. The ratio of commercially operated bee colonies to those owned by hobbyists is 80:20 and the reverse is true for the number of operators i.e. 20% of the beekeepers maintain 80% of the colonies. *Industry Overview – Canadian Honey Council*
- New Zealand – the number of registered bee keeper enterprises is 6,735. *Top 10 Largest Honey Producing Countries in The World 2020 | Trendrr*
- United Kingdom – there are approximately 35,000 bee keepers. *All About Honey and The International Packers Association | HIPA.ORG.UK*

Global Honey Production

Fortune Business Insight reports the global honey market size was US\$7.19 billion in 2019 and predicted to reach US\$11.16 billion by 2027. Growing at a CAGR of 5.2% the market will project a modest growth from 2020-2027. The intensifying demand for natural sweeteners due to their potential health benefits is predicted to be the key factor driving the global market growth. Asia Pacific is anticipated to hold the highest share in the global market.²⁶

Statista reports that the average annual production of honey worldwide was about 1.85 million metric tonnes in 2019. The graph below shows the production volume of natural honey worldwide from 2000 to 2019, measured in thousand metric tons. The global production volume of honey peaked in 2016 at about 1.9 million metric tons and has since decreased to about 1.78 million metric tons. Increasing production costs, declining honey yield per hive due to the growth of industrial agriculture and decreasing prices have led to a reduction in honey production since 2017. The global honey market was valued at about US\$7 billion in 2016 and is projected to reach over US\$11 billion by 2027.²³



Production volume of natural honey from 2000 to 2019 (in 1,000 metric tons)

Source: Statista webpage Natural honey: average annual production volume worldwide 2019 | Statista²³

The Tridge webpage also reinforces Statista information and shows global production in 2019 was 1.72 million metric tonnes. China clearly dominates production with 25% or 444,000 tonnes, New Zealand is ranked 17th and produces 1.3% of the world’s honey with 23,000 tonnes and Australia produces half of that again (10,700 tonnes) which is 0.6% of global production and 28th in the rankings for 2019.²⁴

Rank	Country	Production %	Production Volume (MT)										
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	Global		1.51M	1.59M	1.66M	1.70M	1.74M	1.81M	1.88M	1.93M	1.93M	1.86M	1.72M
2	China	25.81%	401.00K	431.00K	448.00K	450.30K	462.03K	473.00K	555.00K	542.50K	446.90K	444.10K	
3	Turkey	6.35%	82.00K	81.12K	89.16K	94.69K	103.53K	108.13K	105.73K	114.47K	107.92K	109.33K	
4	Canada	4.67%	33.51K	81.67K	79.82K	90.76K	76.47K	85.64K	92.01K	94.58K	96.01K	80.35K	
5	Argentina	4.59%	62.00K	59.00K	72.00K	76.00K	67.50K	76.00K	52.60K	68.12K	76.38K	78.93K	
6	Iran	4.39%	46.40K	45.00K	50.70K	71.10K	74.60K	77.80K	72.87K	67.78K	70.53K	75.46K	
7	United States	4.14%	66.41K	80.04K	67.29K	64.54K	67.81K	80.86K	71.01K	73.43K	67.60K	71.18K	
8	Ukraine	4.06%	74.10K	70.87K	70.30K	70.13K	73.71K	66.52K	63.62K	59.29K	66.23K	69.94K	
9	India	3.9%	55.00K	60.00K	60.00K	60.00K	61.00K	61.96K	62.60K	65.09K	66.64K	67.14K	
10	Russia	3.69%	53.60K	51.54K	60.01K	64.90K	68.45K	74.87K	67.74K	69.76K	65.17K	63.53K	

New Zealand

Total Production Volume

in 2019

+23.00K
MTs

Ranked 17th, % share in global production

1Y +15% 3Y +15.67%
5Y +30.62%

Australia

Total Production Volume

in 2019

+10.70K
MTs

Ranked 28th, % share in global production

1Y -3.49% 3Y -9.69%
5Y -18.32%

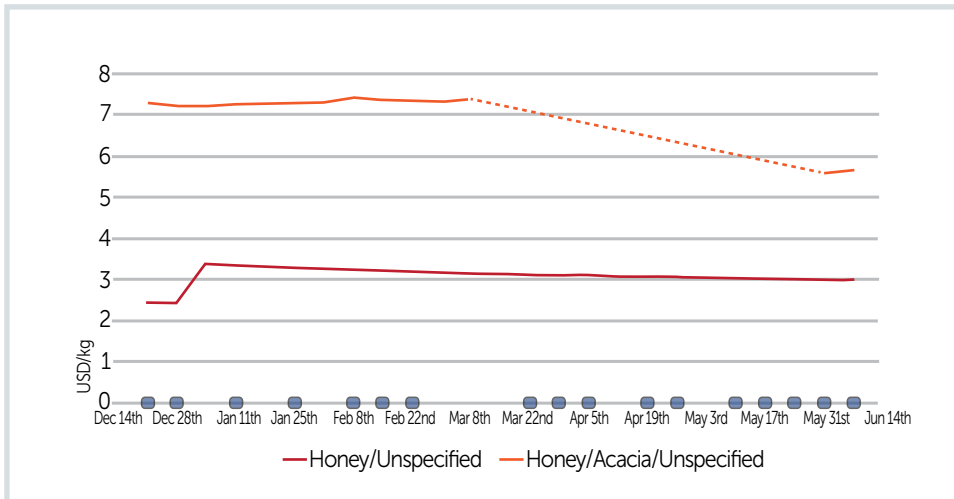
Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Rank	Country	Country 2019	Production Quantity 2019	1-Year Growth in Qty 2018-2019	3-Year Growth in Qty 2016-2019	5-Year Growth in Qty 2014-2019
1	China	25.81%	444.10K	-0.63%	-19.98%	-3.88%
2	Turkey	6.35%	109.33K	+1.31%	+3.41%	+5.61%
3	Canada	4.67%	80.35K	-15.42%	-15.05%	-6.19%
4	Argentina	4.59%	78.93K	-0.68%	+15.86%	+3.85%
5	Iran	4.39%	75.46K	-0.49%	+11.33%	-3%
6	United States	4.14%	71.18K	+1.89%	-3.06%	-11.97%
7	Ukraine	4.06%	69.94K	-1.88%	+17.95%	+5.14%
8	India	3.9%	67.14K	-0.7%	+3.15%	+8.36%
9	Russia	3.69%	63.53K	-2.28%	-8.94%	-15.15%
10	Mexico	3.6%	61.99K	-3.53%	+11.97%	+2.25%

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Honey price received

While the global honey market size was US\$7.19 billion in 2019 it was impossible to locate an average global price for honey, however according to Tridge²⁴ honey prices for June range from US\$5.58-10.55/kg for Acacia honey; US\$12.79/kg for meadow honey; wildflower honey US\$3.64-3.95/kg and other honey ranges from US\$2.95/kg-\$9.68/kg. Prices for export and imports are outlined in the 'Honey exports' and 'Honey imports' section.²⁴



Source: Tridge webpage *Honey global production and top producing countries* - Tridge²⁴

Market outlook

The demand for immunity-boosting products even after the COVID-19 pandemic is expected to remain strong, which adds to the forecast for the market. Due to its antibacterial, antiviral and anti-fungal properties honey is receiving appreciation and wider acceptance as an effective medicine to treat acute cough and throat infections observed in corona-infected patients. The Public Health England (PHE) and the National Institute for Health and Care Excellence (NICE) guidelines have recommended honey as a prominent first line of treatment in treating acute cough due to respiratory tract infection.²⁶

The demand for organic sweet liquid has increased at a notable pace in the last few years, especially in the developed markets of Europe, the US and Japan. The high profits associated with organic products and their high demand among environment and health-conscious consumers is driving the natural sweet liquid industry growth. The application of honey in innovative health drinks and supplements is emerging as one of the popular market trends across several economies. For instance in July 2019 Manuka, a prominent New Zealand-based health and beauty products company under its brand Manuka Doctor, launched Manuka Plus, a vitamin supplement range. Rising support for organic agriculture from associations such as the National Beekeepers Association and the National Organic Value Chain Association is further anticipated to support organic product sales.²⁶

Honey is being progressively advocated as an ideal substitute for conventional sugar due to its various health-benefit properties. Rising health consciousness amongst consumers has motivated them to include natural sweeteners in their diets and reduce their white sugar intake. The antioxidant and antibacterial properties of natural sweeteners and the presence of several crucial minerals and vitamins within them have made them an ideal sweetener choice. The longer shelf life of the product and its high affordability are the other prominent factors that are positively impacting the market's growth rate.²⁶

Potential therapeutic effects of the product due to the presence of various amino acids, enzymes, minerals and other nutritional substances has fuelled its roaring popularity across the pharmaceutical sector. Honey has risen as a prominent ingredient in cough syrups due to its antibacterial properties and its ability to act as a demulcent. This is one of the major factors driving the growth of the global market.²⁶

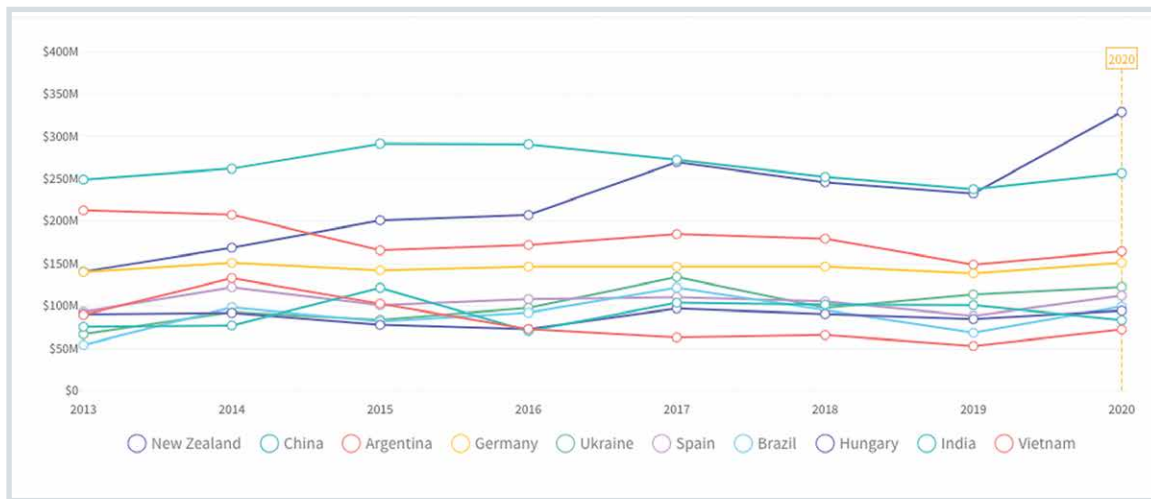
In recent years honey adulteration and fraud incidents have emerged as one of the industry’s major problems which has had severe impacts on the product’s price and negatively impacted market growth. According to the US Pharmacopeia’s Food Fraud database, honey has emerged as the third most targeted food for adulteration after milk and olive oil. The extensive supply of adulterated natural sweeteners in local and global markets has resulted in a loss of profits for high-quality and pure product producers. The presence of alternatives such as stevia, maple syrup and others in the market and their rapid adoption by consumers is predicted to hamper the honey market’s growth.²⁶

Buckwheat honey, a monofloral variety, is widely popular in Russia, China and several European economies. The demand for this product type is high due to its intense nutritional value, less sweet taste and strong presence of antioxidants. The buckwheat product type also has various medicinal properties and its demand for cough syrup production is rising rapidly. Alfalfa is another prominent honey type that has high demand across North American countries as it is used in cooking and also for direct consumption due to its mild taste and aroma. The recognition of clover honey types is predicted to rise rapidly in future due to its antiviral, antioxidant properties and crucial minerals and vitamins.²⁶

Honey has wide application in the food and beverage industry as a sweetener and additive. Different types of honey are used in confectionary products, beverages and baked goods in place of sugar or in combination with sugar to give the product a desirable taste and texture. The demand for the product in the pharmaceutical industry, especially for the formulation of cough syrups and liquid dietary supplements is rising due to its anti-inflammatory, antibacterial, and other health enhancing properties. In the personal care and cosmetics industry, honey utilisation in soap, face wash, moisturisers and other products is growing at a fast rate. The reason behind this is the potential in retaining skin moisture, inducing soothing effects on the skin and acting as an anti-aging agent.²⁶

Global Honey Exports

The value of global exports in 2020 increased by 8% to US\$2.17 billion. New Zealand had a significant increase to overtake China as the highest valued exporter of honey in 2020 with 15% of the global share valued at US\$328.8 million. China had a marginal increase to have a 12% share ahead of Argentina. While New Zealand exported 12,000 tonnes, China exported 133,000 metric tonnes.²⁴



Export trends of the top 10 exporters of Honey from 2013 to 2020

Source: Tridge webpage Honey global production and top producing countries - Tridge²⁴

Country	Share in Export Value 2020	Export Value 2020, USD	1-Year Growth in Export Value 2019-2020	3-Year Growth in Export Value 2017-2020	5-Year Growth in Export Value 2015-2020	Export Quantity 2020, MTs	1-Year Growth in Quantity 2019-2020	Unit Price of Export 2020, USD / MT	Revealed Comparative Advantage 2020	Concentration of Export Destinations 2020
New Zealand	15.16%	\$328.84M	+41.36%	+21.93%	+63.46%	12.79K	+50.16%	\$25.69K	Very Strong	
China	11.83%	\$256.60M	+7.9%	-5.82%	-11.95%	133.11K			Medium	
Argentina	7.59%	\$164.65M	+10.42%	-10.99%	-0.69%	≈ 0			Very Strong	
Germany	6.97%	\$151.22M	+9.15%	+3.15%	+6.23%	29.71K	+12.91%	\$5.09K	Medium	
Ukraine	5.66%	\$122.69M	+7.7%	-8.73%	+45.91%	≈ 0			Very Strong	
Spain	5.18%	\$112.47M	+27.09%	+1.51%	+11.08%	≈ 0	-100%		Strong	
Brazil	4.59%	\$99.52M	+45.04%	-18.38%	+21.52%	≈ 0	-100%		Very Strong	
Hungary	4.37%	\$94.84M	+11.67%	-2.7%	+21.57%	≈ 0	-100%		Very Strong	
India	3.85%	\$83.59M	-17.39%	-19.72%	-31.32%	≈ 0	-100%	\$1.52K	Very Strong	
Vietnam	3.34%	\$72.54M	+36.21%	+14.61%	-29.58%	≈ 0	-100%		Very Strong	

Source: Tridge webpage *Honey global production and top producing countries* - Tridge²⁴

A news report outlined that New Zealand’s honey export volumes surged from February 2020 reaching 5,700 tonnes in the six months from January to June, up 49 per cent on the same period in 2019. In the year to June 30, honey export revenue increased by 20 per cent to \$425 million. The figures are from the Ministry for Primary Industries’ latest Apiculture Monitoring Report which states that monofloral Manuka has been selling at top dollar following the introduction of a standard for the honey in 2018 and increased demand for natural products in the face of the COVID-19 pandemic. More than 10,280 tonnes of monofloral Manuka honey known for its antioxidant, anti-inflammatory and antibacterial properties was exported at an average price of \$55.36 per kilogram.³⁵

By comparison multifloral Manuka and non-Manuka honeys attracted an average export price of \$32.44 and \$22.50 per kilo respectively. New Zealand usually produces between 15,000 and 20,000 tonnes of honey each year depending on the weather, with export earnings of more than \$340m.

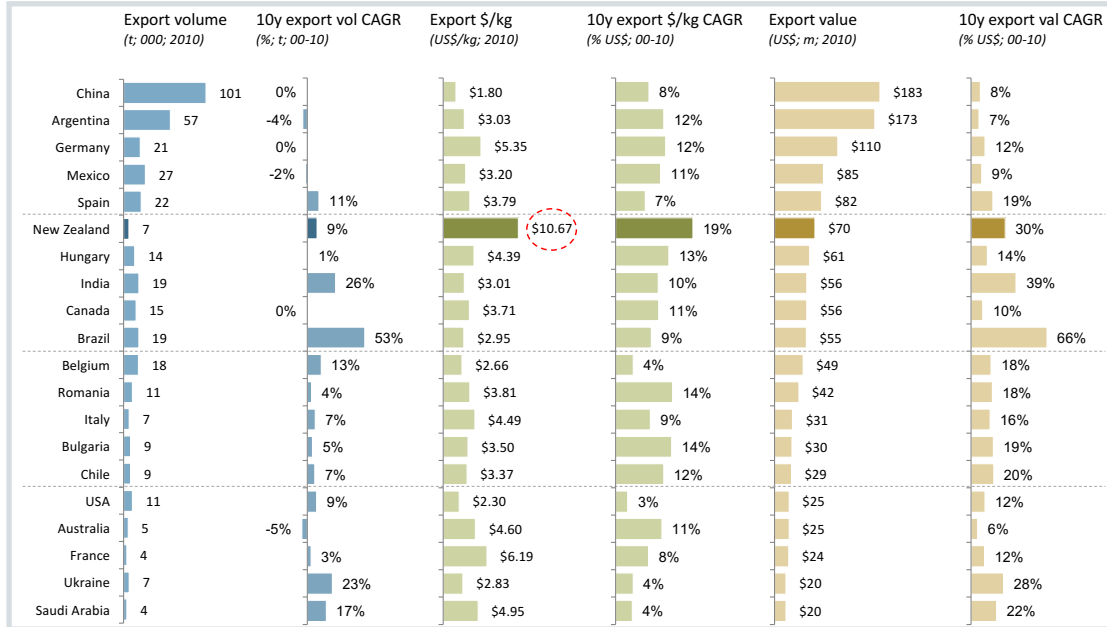
Manuka honey is exported to more than 40 markets and accounted for 76 per cent of export volume and 88 per cent of export revenue in 2019/20. While demand for monofloral Manuka honey has remained strong, demand for multifloral Manuka and non-Manuka varieties has fallen. Higher costs of production relative to producers in some other countries mean New Zealand has struggled to compete in export markets, apart from in the niche monofloral Manuka category.³⁵

Below are some of the export prices in US dollars from Tridge which show that New Zealand has a clear price advantage over its competitors. Despite China exporting approximately 120,850 tonnes of natural honey, it achieves a lower price in the world market hence it has less value globally and is the second largest exporter (in terms of value) behind New Zealand.²⁴

Country	Export %	Export Price (USD)												
		19/12	20/01	20/02	20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 New Zealand	15.16%	\$29.89	\$27.61	\$27.63	\$30.44	\$22.82	\$27.97	\$22.69	\$22.29	\$25.14	\$32.14	\$26.02	\$24.57	\$25.92
2 China	11.83%	\$1.58	\$1.65	\$1.50	\$1.62	\$1.86	\$1.62	\$1.60	\$1.65	\$1.47	\$1.62	\$1.65	\$1.59	\$1.90
3 Argentina	7.59%	\$2.11	\$2.24	\$2.27	\$2.32	\$2.36	\$2.46	\$2.51	\$2.49	\$2.56	\$2.52	\$2.59	\$2.66	\$2.82
4 Germany	6.97%	\$5.19	\$4.74	\$5.21	\$4.96	\$5.66	\$4.49	\$5.54	\$6.23	\$5.57	\$5.21	\$4.60	\$4.73	\$5.10
5 Ukraine	5.66%	\$1.87	\$1.75	\$1.62	\$1.62	\$1.56	\$1.57	\$1.63	\$1.71	\$1.71	\$1.71	\$1.74	\$1.85	\$1.96
6 Spain	5.18%	\$4.21	\$4.04	\$3.67	\$3.58	\$3.71	\$3.88	\$3.94	\$3.92	\$4.59	\$4.00	\$3.96	\$4.24	\$4.41
7 Brazil	4.59%	\$2.02	\$1.95	\$1.93	\$1.91	\$1.93	\$2.07	\$2.09	\$2.14	\$2.21	\$2.19	\$2.35	\$2.59	\$2.76
8 Hungary	4.37%	\$4.04	\$3.85	\$4.38	\$3.84	\$3.73	\$4.21	\$3.07	\$3.55	\$4.90	\$4.31	\$4.04	\$4.69	\$6.20
9 India	3.85%	\$1.46	\$1.46	\$1.57	\$1.49	\$1.41	\$1.59	\$1.50	\$1.38	\$1.51	\$1.57	\$1.47	\$1.60	\$1.71
10 Vietnam	3.34%	\$1.32	\$1.28	\$1.27	\$1.35	\$1.32	\$1.37	\$1.34	\$1.34	\$1.37	\$1.36	\$1.37	\$1.39	\$1.37

Source: Tridge webpage *Honey global production and top producing countries* - Tridge²⁴

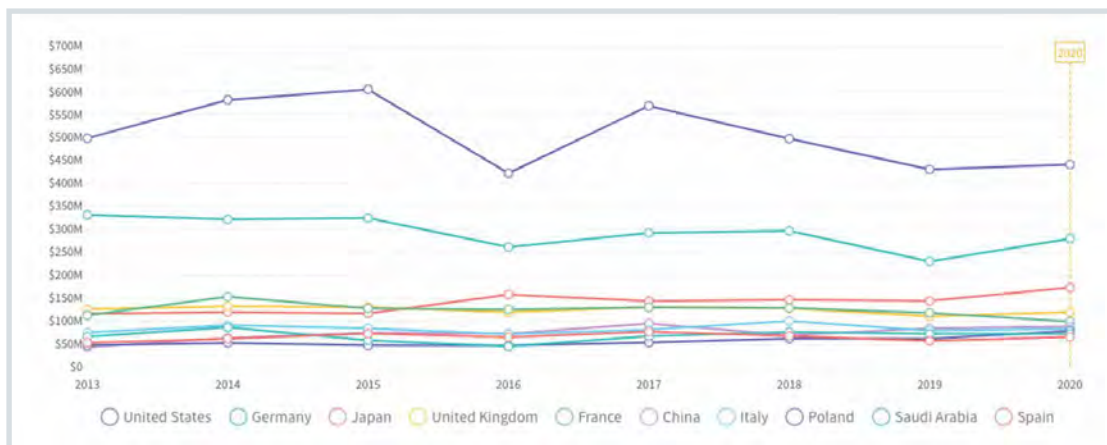
The Coriolis report 'Investment Opportunities in the New Zealand Honey Industry'⁹ completed in 2012 outlines data from 2010 which shows export volume in comparison to value and clearly shows that while New Zealand exports low quantities of honey, the high export prices significantly contribute to its place in the global market.



Coriolis – part of the New Zealand Food & Beverage Information Project, 'Investment Opportunities in the New Zealand Honey Industry', August 2012⁹

Global Honey imports

The value of global imports in 2020 increased by 5.5% to US\$2.11 billion. The United States was the largest importer value wise in 2020 and has been for a number of years, with 21% of the global share and a value of US\$441.8 million. The US imported 196,000 tonnes while Germany who was second in terms of value with 13% imported 92,000 tonnes, followed by Japan at 8% and United Kingdom with 6% of the value of the global import market.²⁴



Import trends of top 10 importers of honey

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

The high consumption western/European countries are the major importers of honey; Europe accounts for US\$941.27 million of global import value and North America was US\$473.5 million.

Country	Share in Import Value 2020	Import Value 2020, USD	1-Year Growth in Import Value 2019-2020	3-Year Growth in Import Value 2017-2020	5-Year Growth in Import Value 2015-2020	Import Quantity 2020, MTs	1-Year Growth in Quantity 2019-2020	Unit Price of Import 2020, USD /MT	Revealed Comparative Advantage 2020	Concentration of Import Destination 2020
United States	20.9%	\$441.82M	+2.54%	-22.38%	-27%	196.68K		\$2.25K	Strong III	
Germany	13.26%	\$280.26M	+21.53%	-4.28%	-13.78%	92.23K		\$3.04K	Strong III	
Japan	8.21%	\$173.60M	+19.95%	+20.38%	+47.49%	49.35K	+10.15%	\$3.52K	Strong III	
United Kingdom	5.69%	\$120.18M	+8.04%	-8.17%	-8.49%	≈ 0	-100%		Strong III	
France	4.72%	\$99.81M	-15.97%	-23.55%	-22.33%	24.79K	-24.47%	\$4.28K	Strong III	
China	4.22%	\$89.23M	+5.29%	-6.52%	+18.44%	≈ 0		\$15.67K	Medium II	
Italy	3.96%	\$83.60M	+4.64%	+1.77%	-1.6%	≈ 0	-100%		Medium II	
Poland	3.74%	\$79.04M	+27.32%	+46.31%	+65.57%	37.34K		\$3.27K	Medium II	
Saudi Arabia	3.44%	\$72.81M	-0.3%	+6.98%	+23.3%	≈ 0	-100%		Very Strong IIII	
Spain	3.13%	\$66.26M	+15.12%	-14.34%	-9.83%	≈ 0	-100%		Strong III	

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Below are some of the import prices of honey in US dollars, taken from Tridge, that clearly show China’s import price is a lot higher than that of other importing countries.²⁴

Country	Import %	Import Price (\$/MT)												
		19/12	20/01	20/02	20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 United States	20.9%	\$2.28	\$2.03	\$2.22	\$2.50	\$2.17	\$2.32	\$2.13	\$2.33	\$2.17	\$2.12	\$2.29	\$2.35	\$2.39
2 Germany	13.26%	\$3.45	\$3.16	\$2.91	\$3.09	\$2.74	\$2.61	\$2.74	\$2.93	\$3.07	\$3.32	\$3.07	\$3.44	\$3.58
3 Japan	8.21%	\$3.48	\$3.14	\$3.40	\$2.91	\$3.58	\$3.08	\$3.91	\$3.81	\$3.92	\$3.58	\$3.65	\$3.64	\$3.61
4 United Kingdom	5.69%	\$2.03	\$2.34	\$1.81	\$2.09	\$2.72	-	\$1.93	\$2.27	\$2.10	\$2.47	\$2.42	\$2.49	\$2.45
5 France	4.72%	\$4.23	\$4.47	\$4.18	\$3.55	\$3.21	\$3.52	\$4.34	\$4.19	\$4.30	\$3.65	\$4.06	\$4.48	\$5.42
6 China	4.22%	\$14.14	\$19.21	\$20.12	\$17.10	\$13.87	\$18.81	\$20.86	\$18.29	\$21.01	\$21.72	\$21.34	\$26.03	\$28.20
7 Italy	3.96%	\$3.28	\$3.35	\$3.45	\$3.89	\$3.50	\$3.69	\$3.41	\$3.89	\$4.32	\$3.85	\$3.63	\$3.82	\$4.28
8 Poland	3.74%	\$1.68	\$2.18	\$2.44	\$2.17	\$2.14	\$1.76	\$2.06	\$1.96	\$2.13	\$1.95	\$2.15	\$2.22	\$2.20
9 Saudi Arabia	3.44%	\$6.79	\$4.78	\$5.93	\$5.62	\$6.13	\$5.02	\$5.85	\$6.09	\$5.47	\$6.88	\$3.94	\$3.14	\$4.17
10 Spain	3.13%	\$2.66	\$2.02	\$1.99	\$2.06	\$2.08	\$1.92	\$1.97	\$2.24	\$1.68	\$2.14	\$2.29	\$2.36	\$2.32

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Domestic Supply of Honey

Nation Master show that the domestic supply of honey in 2019 was the highest in China, which grew 6.5% year on year to 432,000 tonnes. United States was second with 212,000 tonnes ahead of Turkey 108,000 tonnes. Australia was ranked 22nd with 17,000 tonnes of honey supplied domestically and New Zealand had 6,000 tonnes and came in 42nd.⁴⁶

#	112 Countries	Thousand Metric Tons	Last	YoY	5-years CAGR	View data
1	China	432.00	2017	-3.4%	+6.5%	View data
2	United States	212.00	2017	+0.5%	+0.5%	View data
3	Turkey	108.00	2017	+5.9%	+0.8%	View data
4	Germany	86.00	2017	+0.0%	+0.4%	View data
5	Iran	79.00	2017	+8.2%	+3.8%	View data
6	Russia	70.00	2017	-1.4%	-0.9%	View data
7	United Kingdom	52.00	2017	+10.8%	+4.9%	View data
8	Ethiopia	50.00	2017	+6.4%	+0.7%	View data
9	Japan	41.00	2017	+0.0%	+0.0%	View data
10	France	37.00	2017	+2.8%	+0.9%	View data

Top Countries in Honey Domestic supply quantity. Thousand Metric Tons - 2014 to 2017

Source: Honey Industry: Key statistics and indicators – NationMaster⁴⁶

Other hive products

Beeswax

The global beeswax market was valued at US\$505 million in 2020 and is expected to reach US\$653.1 million by the end of 2026, growing at a CAGR of 3.7% during 2021-2026.²⁸ Global beeswax production in 2019 was recorded as 66,100 tonnes. Asia and Africa are the major producers of beeswax with a production share of 52% and 22% respectively. India and Ethiopia are the top beeswax producing countries.^{24/27} China and Germany are the leading exporters and importers of the beeswax. Beeswax is primarily used in candle making, the food and pharma industries and cosmetics.^{24/27}

Country	Production %	Production Volume											
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1 Global		63.72K	63.57K	64.99K	64.89K	64.36K	64.89K	66.32K	67.39K	69.35K	68.75K	65.42K	66.10K
2 India	38.87%	21.20K	21.20K	23.00K	23.00K	23.10K	23.20K	23.60K	23.96K	24.92K	25.53K	25.77K	25.69K
3 Ethiopia	8.76%	5.15K	4.60K	5.15K	5.00K	5.00K	5.00K	5.28K	5.48K	5.50K	5.60K	5.69K	5.79K
4 Argentina	7.46%	4.70K	4.70K	4.70K	4.70K	4.70K	4.81K	4.87K	4.91K	4.88K	4.89K	4.91K	4.93K
5 Turkey	7.17%	4.54K	4.39K	4.15K	4.24K	4.22K	4.24K	4.05K	4.69K	4.86K	4.75K	4.67K	4.74K
6 South Korea	5.74%	3.72K	3.98K	3.40K	3.06K	3.06K	3.06K	3.91K	3.93K	4.31K	3.45K	3.29K	3.80K
7 Kenya	3.82%	2.50K	2.51K	2.50K	2.50K	2.50K	2.50K	2.50K	2.52K	2.52K	2.52K	2.52K	2.53K
8 Angola	3.5%	2.30K	2.30K	2.30K	2.30K	2.30K	2.30K	2.30K	2.31K	2.31K	2.31K	2.31K	2.31K
9 Tanzania	2.86%	1.83K	1.83K	1.83K	1.83K	1.85K	1.87K	1.88K	1.87K	1.87K	1.88K	1.88K	1.89K
10 Brazil	2.65%	1.70K	1.75K	1.70K	1.85K	1.65K	1.65K	1.70K	1.73K	1.74K	1.74K	1.75K	1.75K

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

The main reasons for high beeswax production in India and Africa are its pharmaceutical uses. The demand for beeswax is expected to increase for the next few years due to the explosion of diseases in the Afro-Asian region and beeswax is essential to cure some of those diseases. Organic beeswax is also being produced due to high demand in Europe and the USA. The key importing countries like Germany, the USA and France have a high demand for both Organic and conventional Beeswax.²⁷



Global Beeswax Market – Market size, by region, global 2019

Source: Beeswax Market | 2020-2027 | Industry Report | Covid Insights (mordorintelligence.com)²⁷

China was the top exporter in 2020 with an export value of US\$42.2 million with total global exports valued at US\$127.33 million (33% share). In terms of exports Australia ranked 14th with 1.46% valued at US\$1.9 million in 2020 and New Zealand came in 36th with 0.22% of global beeswax exports.²⁴

Rank	Country	Share in Export Value 2020	Export Value 2020, USD	1-Year Growth in Export Value 2019-2020	3-Year Growth in Export Value 2017-2020	Weekly Domestic Price Change 2021-07-19	Monthly Domestic Price Change 2021-07	Harvesting Seasonality
1	China	33.17%	\$42.23M	-10.61%	-25.39%			-
2	Germany	15.51%	\$19.75M	+8.03%	+11.81%			-
3	United States	7.04%	\$8.97M	-5.54%	-44.97%			-
4	Vietnam	5.76%	\$7.33M	+24.14%	-1.81%			-
5	Tanzania	4.24%	\$5.40M	+34.11%	+55.06%			-
6	France	3.27%	\$4.17M	-34.49%	-33.83%			-
7	Spain	2.39%	\$3.04M	+57.97%	+26.17%			-
8	Argentina	2.24%	\$2.85M	-36.76%	-40.81%			-
9	Netherlands	2.1%	\$2.67M	+67.45%	+86.07%			-
10	Ukraine	1.89%	\$2.41M	+72.62%	-1.87%			-

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Export prices for the top ten producers of beeswax globally are outlined below which range from US\$4.66 up to \$33.64.²³

Country	Export %	19/12	20/01	20/02	20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 China	33.17%	\$5.31	\$5.44	\$5.18	\$4.96	\$5.06	\$5.40	\$5.33	\$5.52	\$5.25	\$5.47	\$5.02	\$5.57	\$5.12
2 Germany	15.51%	\$9.33	\$9.94	\$12.31	\$9.31	\$8.41	\$8.89	\$9.68	\$9.01	\$10.20	\$10.73	\$9.38	\$8.21	\$9.91
3 United States	7.04%	\$4.94	-	-	\$4.51	\$5.48	\$4.00	\$4.08	\$4.47	\$3.17	\$6.01	\$4.35	\$6.22	\$4.66
4 Vietnam	5.76%	\$7.00	\$7.28	\$6.80	\$6.74	\$6.90	\$6.91	\$7.10	\$6.84	\$6.74	\$7.06	\$7.04	\$7.31	\$7.34
5 Tanzania	4.24%	\$7.32	\$8.34	\$8.81	\$16.01	\$7.85	\$7.02	\$7.85	\$7.35	\$9.38	\$6.47	-	\$7.34	\$9.78
6 France	3.27%	\$14.33	\$10.63	\$7.26	\$8.26	\$7.65	\$9.03	\$13.57	\$12.70	\$6.84	\$10.61	\$10.51	\$6.52	\$20.03
7 Spain	2.39%	\$15.99	\$6.99	\$6.66	\$7.81	\$6.76	\$6.51	\$7.05	\$7.83	\$8.88	\$6.06	\$10.08	\$8.13	\$8.34
8 Argentina	2.24%	-	\$7.63	\$8.17	-	-	-	\$7.14	\$6.16	\$7.33	\$8.47	\$7.18	-	\$7.12
9 Netherlands	2.1%	\$6.19	\$13.96	\$10.73	\$14.92	\$18.23	\$13.33	\$12.77	\$9.67	\$11.95	\$12.59	\$13.82	\$19.82	\$33.64
10 Ukraine	1.89%	\$6.73	\$7.66	\$6.87	\$6.35	\$5.02	\$7.18	\$6.48	\$6.55	\$6.33	\$7.38	\$7.06	\$7.59	\$7.84

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

The top importer was Germany with an import value of US\$29.5 million (23% of the global share). Total global import value was US\$125.79 million. Imports of beeswax into Australia were 2.37% and ranked 9th, whereas New Zealand was 55th with 0.14% of global imports.²⁴ Import prices for the top ten importers of beeswax globally are outlined below. They range from US\$5.70 up to \$20.62.

Country	Import %	19/12	20/01	20/02	20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 Germany	23.48%	\$6.80	\$6.22	\$6.14	\$7.57	\$5.32	\$6.10	\$5.95	\$6.10	\$5.23	\$6.43	\$5.65	\$5.34	\$7.75
2 United States	16.84%	\$5.62	\$7.25	\$7.70	\$6.75	\$6.44	\$7.41	\$6.08	\$6.19	\$7.01	\$6.91	\$7.03	\$7.76	\$8.22
3 France	7.65%	\$1.15	\$6.94	\$6.98	\$8.79	\$7.30	\$6.06	\$7.95	\$9.10	\$10.32	\$8.26	\$5.52	\$9.10	\$8.74
4 Poland	4.24%	\$8.28	\$10.91	\$6.79	\$6.83	\$7.42	\$6.67	\$9.35	\$7.19	\$9.07	\$9.66	\$10.73	\$7.60	\$11.72
5 Japan	4.11%	\$11.92	\$7.33	\$8.19	-	\$7.45	\$7.96	-	\$7.89	\$6.99	\$8.60	\$9.49	\$9.45	-
6 Italy	3.65%	\$6.09	\$10.76	\$8.11	\$8.35	\$7.01	\$7.33	\$15.59	\$7.80	\$6.45	\$7.23	\$6.57	\$5.81	\$16.05
7 Spain	3.4%	\$11.32	-	\$5.65	\$9.83	\$3.80	\$2.67	\$3.65	\$2.31	\$5.94	\$6.91	\$9.72	\$7.76	\$5.70
8 United Kingdom	2.98%	\$8.33	\$7.11	\$7.61	\$11.20	\$6.38	\$7.79	\$6.27	\$6.28	\$5.05	\$11.04	\$6.39	\$9.70	\$11.43
9 Australia	2.37%	\$7.23	\$7.90	\$5.92	\$7.14	\$7.82	\$6.84	\$10.74	\$7.43	\$6.63	\$7.28	\$7.00	\$7.58	\$20.62
10 Netherlands	2.33%	\$7.89	\$11.54	\$9.40	\$11.02	\$11.48	\$7.40	\$10.46	\$10.05	\$10.63	\$9.35	\$10.13	\$11.36	\$12.72

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Propolis

The major producers of propolis include China and Brazil. Annual production in China increased from 35 tonnes in 1984 to 300 tonnes in 2008 (Crane, 2009). Production in Brazil was 250 tonnes in 2004 and was thought to account for 10-15% of world output. Most of Brazil’s propolis production is exported to Japan and this market has grown constantly (Miguel and Antunes, 2011). Other major producers include Russia, the US, Spain, Romania, Argentina and Chile. This study estimated total annual commercial production of raw propolis at between 1,800 and 2,400 tonnes per annum.⁵³ The global propolis market was valued at US\$607.10 million in 2020 and it is expected to register a CAGR of 5.48% during the forecast period 2021-2026.²⁹

While Tridge doesn’t have production figures for propolis, according to Tridge the total export value in 2020 was US\$896 million and the top exporter of propolis was Indonesia. China was the top importer with the global import value at US\$886.44 million.²⁴

Country	Export %	Year									
		20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 Global		\$30.47M	\$4.29M	\$17.95M	\$22.23M	\$24.36M	\$21.86M	\$24.13M	\$26.97M	\$30.41M	\$24.57M
2 Indonesia	61.36%	\$19.60M	\$8.10M	\$8.24M	\$8.89M	\$10.78M	\$10.47M	\$10.02M	\$11.25M	\$13.89M	\$11.69M
3 Malaysia	15.81%	\$356.66K	\$41.71K	\$351.85K	\$1.11M	\$1.03M	\$1.01M	\$2.28M	\$3.26M	\$2.44M	\$1.71M
4 China	10.17%	\$1.82M	\$3.32M	\$2.33M	\$2.15M	\$2.35M	\$2.17M	\$1.06M	\$1.35M	\$1.34M	\$1.51M
5 Hong Kong	1.6%	\$1.48M	\$1.02M	\$790.39K	\$760.95K	\$769.09K	\$958.43K	\$1.61M	\$1.29M	\$2.24M	\$1.16M
6 Spain	1.38%	\$872.98K	\$636.08K	\$800.51K	\$699.97K	\$969.15K	\$811.19K	\$1.10M	\$1.33M	\$1.68M	\$1.49M
7 Singapore	1.01%	\$226.48K	\$31.90K	\$14.44K	\$1.36M	\$1.09M	\$1.04M	\$1.38M	\$1.17M	\$839.68K	\$766.19K
8 Thailand	0.99%	\$56.14K	\$40.06K	\$99.20K	\$530.11K	\$699.81K	\$1.25M	\$1.14M	\$957.70K	\$1.94M	\$1.43M
9 Australia	0.96%	\$408.41K	\$184.51K	\$859.06K	\$635.22K	\$1.32M	\$731.36K	\$548.92K	\$999.72K	\$444.55K	\$337.59K
10 United States	0.88%	\$1.04M	\$366.86K	\$999.88K	\$1.18M	\$640.22K	\$250.35K	\$297.37K	\$381.16K	\$285.09K	\$396.45K

Largest exporters of propolis

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Country	Import %	Year									
		20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 Global		\$31.40M	\$16.33M	\$19.43M	\$23.23M	\$25.26M	\$23.68M	\$25.32M	\$28.32M	\$31.66M	\$25.58M
2 China	61.7%	\$54.76K	\$78.38K	\$309.17K	\$60.80K	\$103.38K	\$142.14K	\$77.76K	\$56.65K	\$42.85K	\$170.06K
3 Hong Kong	16.51%	\$19.04M	\$7.34M	\$7.30M	\$9.71M	\$10.73M	\$11.36M	\$13.06M	\$15.43M	\$16.49M	\$12.89M
4 Netherlands	2.98%	\$2.08M	\$2.14M	\$2.16M	\$2.09M	\$2.13M	\$2.15M	\$2.50M	\$2.48M	\$2.32M	\$2.32M
5 United States	2.77%	\$1.33M	\$983.40K	\$1.18M	\$2.31M	\$2.85M	\$2.76M	\$2.72M	\$2.59M	\$2.35M	\$2.80M
6 South Korea	2.19%	\$77.00K	\$151.58K	\$270.39K	\$446.13K	\$448.39K	\$14.44K	\$68.96K	\$31.46K	\$88.09K	\$28.34K
7 Thailand	1.78%	-	\$3.20K	-	-	-	-	\$23.00	-	-	-
8 Macao	1.22%	\$873.43K	\$956.27K	\$454.79K	\$299.24K	\$695.78K	\$478.25K	\$810.84K	\$433.47K	\$2.70M	\$714.34K
9 Spain	1.09%	\$767.61K	\$1.17M	\$1.02M	\$672.92K	\$1.24M	\$763.64K	\$865.89K	\$875.05K	\$439.00K	\$1.46M
10 Australia	1.03%	\$1.44M	\$516.49K	\$995.32K	\$999.41K	\$789.50K	\$697.72K	\$385.88K	\$657.69K	\$65.39K	\$41.38K

Largest importers of propolis

Source: Tridge webpage Honey global production and top producing countries – Tridge²⁴

Maximize Market Research (2019) stated that the profile and consumption of propolis in New Zealand are on the increase. New Zealand also has a major domestic customer base in its in-bound tourism sector, particularly tourists arriving from Asia and purchasing propolis products in airport stores. The Asian export market for New Zealand propolis products is growing and is dominated by sales to China, Taiwan, Japan, and Korea. New Zealand propolis products are also exported to South East Asia (Thailand, Malaysia and Singapore), Europe (UK, Germany and Eastern Europe) and North America. Demand from markets in Asia for propolis is increasing and forthcoming growth is expected from markets in East Asia including China, Japan, and Korea. East Asian markets are investing in research to better understand the therapeutic benefits of propolis and their research frequently compares New Zealand propolis to propolis sourced from China and Brazil. New Zealand propolis has some distinctive characteristics in its flavonoids which stand out against propolis sourced from other countries.³⁰

An AgriFutures report (2019) outlined that New Zealand has two well-resourced and professional propolis processors with others looking to expand their industry footprint. There is competition between processors for raw propolis supply and a filled mat pickup and extraction service is offered to beekeepers. Beekeepers making use of this service do not incur labour costs associated with cracking and scraping propolis mats. Raw propolis supply can be profitable for New Zealand beekeepers including those with small apiaries. On average New Zealand hives produce 220 grams of raw propolis per annum and beekeepers receive between NZ\$54 and NZ\$197/kg for this product.⁵³

New Zealand produces approximately 30 tonnes/year of raw propolis, the equivalent of 12 tonnes of pure propolis. New Zealand imports many times this volume of processed propolis. Imports are required for lower cost consumer products but are also a recognition of New Zealand’s limited ability to increase domestic supply. In 2018 demand for raw New Zealand propolis exceeded supply and there were no discounts or premiums offered for propolis source, floral type, active flavonoids or chemical contamination test results.⁵³

Major businesses in the world propolis market

BUSINESS NAME	COUNTRY BASE
Apis Flora	Brazil
Wax Green	Brazil
Comvita	New Zealand
Apiario Polenectar	Brazil
King’s Gel Propolis	Brazil
MN Propolis	Brazil
Ponlee Propolis	Brazil
Manuka Health New Zealand	New Zealand
Zhifengtang	China
Beijing Baihua Apiculture Technology Development Corp.	China

Source: Market Research Future, 2018

NB: Arataki Bee Products Ltd is a New Zealand private company for which data would not be available

Source: Agrifutures Australia, ‘Propolis Production: A Potential Boon for the Australian Beekeeping Industry, 2019 Propolis Production: A Potential Boon for the Australian Beekeeping Industry | AgriFutures Australia⁵³

Key businesses active in the world propolis market are shown in above table.

This table shows the dominance of Brazilian companies along with the presence of two Chinese and New Zealand operations. New Zealand company Comvita had an annual sales turnover in 2017 of NZ\$156 million and profit of \$9.4 million. In the same year Manuka Health New Zealand had an annual sales turnover of NZ\$80 million and profit of NZ\$3.5 million. Both Comvita and Manuka Health New Zealand have significantly broader commercial footprints than propolis manufacturing and supply.⁵³

Propolis production per hive depends on many factors: bee breed, geography, climate, hive type, presence of a propolis source in nature and the strength of the bee colony. The literature points to an annual per hive production of between 50g and 400g with the potential to increase output to a maximum of 1kg with the use of specialised procedures in addition to a propolis mat.⁵³

Royal jelly

Current production information on royal jelly is difficult to locate however a report prepared by Rural Industries Research and Development Corporation in 2017 titled 'Australian Royal Jelly Market Opportunity Assessment based on production that uses new labour saving technology'³¹ outlined the global situation.

World production of royal jelly in 2012 was estimated at 4,000 tonnes per annum with a wholesale value of US\$135 million. China produces an estimated 3,500 tonnes of royal jelly and other large producers include Vietnam, Taiwan, Japan and Korea. Royal jelly consumption and export is dominated by China. Japan is the world's largest importer of royal jelly purchasing an estimated 1,000 tonnes per annum. After Japan the biggest consumers of royal jelly are Europe and North America where the product is used mostly as an input in the manufacture of cosmetic preparations. Price through the value chain is estimated in Australian dollars at \$17/kg farm gate China, \$59/kg factory price China, \$100/kg delivered Australia, \$138/kg wholesale Australia and \$296/kg retail.³¹

Royal jelly is an internationally traded commodity for which no official market data exists (Sabatini et al 2009). As a consequence market data has been assembled from a range of unofficial sources and reported where the metric is consistent across multiple publications. International market analysis addresses world production, exports, consumption, changes in wholesale price, price through the value chain and requirements for Australian beekeeper success.³¹

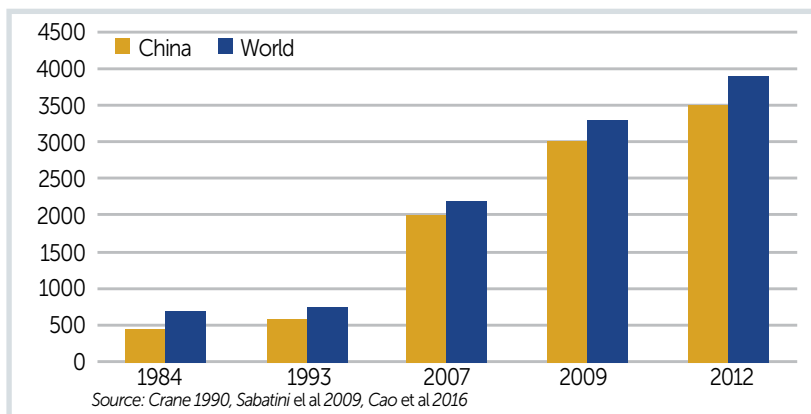
Royal Jelly World Production 1984 and 2012 (Tonne)

COUNTRY	1984	2012
China	450	3,500
Vietnam	20	100
Taiwan	140	80
Japan	46	75
Korea	20	50
Other (including Eastern Europe, France, Italy and Mexico)	24	80
World production	700	3,885

Source: Crane 1990 and various references including Cao et al 2016 and Sabatini et al 2009

Source: RIRDC report by Michael Clarke and Peter McDonald, 'Australian Royal Jelly Market Opportunity Assessment based on production that uses new labour saving technology', 2017³¹

Other important producers of royal jelly included Vietnam, Taiwan, Japan and Korea. Royal jelly production also occurred in Eastern Europe, Western Europe and North America (Sabatini et al 2009). China's production and hence world production of royal jelly has increased on the back of a concerted R&D effort and the creation of a high royal jelly yielding line of honey bees - *Apis mellifera ligustica* Spinola. High royal jelly yielding honey bees were developed and subsequently adopted by Chinese beekeepers in the 1980s (Cao et al 2016). Chinese beekeepers using this line of honey bees are able to make a reasonable living from their royal jelly sales (Somerville June 2013). The impact of high royal jelly yielding bees may be one factor behind the increase in China and world royal jelly production since the early 1990s.³¹



Royal jelly production China and the World 1984 to 2012 (tonnes)

Source: RIRDC report by Michael Clarke and Peter McDonald, 'Australian Royal Jelly Market Opportunity Assessment based on production that uses new labour saving technology', 2017³¹

An overview of the global royal jelly markets in 2020 from Tridge shows that Indonesia was the biggest exporter with a value of US\$550 million and China was the largest importer with the value of royal jelly at US\$547 million.²⁴

Rank	Country	Share in Export Value 2020	Export Value 2020, USD	1-Year Growth in Export Value 2019-2020	3-Year Growth in Export Value 2017-2020	Weekly Domestic Price Change 2021-07-18	Monthly Domestic Price Change 2021-07	Harvesting Seasonality
1	Indonesia	61.36%	\$549.80M	+50.96%	+95.95%			-
2	Malaysia	15.81%	\$141.66M	+4.73%	+122.44%			-
3	China	10.17%	\$91.10M	+10.72%	+8.83%			-
4	Hong Kong	1.6%	\$14.32M	-13.7%	-9.19%			-
5	Spain	1.38%	\$12.41M	+36.14%	+73.16%			-
6	Singapore	1.01%	\$9.06M	-84.2%	-88.44%			-
7	Thailand	0.99%	\$8.83M	+90.65%	+67.84%			-
8	Australia	0.96%	\$8.60M	+133.04%	+242.5%			-
9	United States	0.88%	\$7.91M	-66.98%	-82.21%			-
10	New Zealand	0.83%	\$7.44M	+203.22%	+176.47%			-

Largest exporters of royal jelly

Source: Tridge webpage *Honey global production and top producing countries – Tridge*²⁴

Most of the world’s royal jelly is consumed in China with much of the balance exported to Japan (Somerville September 2013). Previously Japan was the world’s largest royal jelly importer consuming an estimated 300 tonnes in 1996, 600 tonnes in 2003 and 1,000 tonnes in 2012 (AgEconPlus estimate). After Japan, the biggest market for royal jelly was the European and North American cosmetics sector. Consumption in the cosmetics sector is also increasing in Asia, especially in Thailand which has a substantial cosmetics manufacturing industry (Piana 1993).³¹

The world wholesale price for royal jelly has declined since the 1960s but has stabilised in recent year, see the Table below.

Changes in the Wholesale Price of Royal Jelly Over Time (\$US/kg)

YEAR	PRICE
1964	180 to 400
1993	30 to 80
2012	20 to 40
2016	30 to 60

Source: Bogdanov, 2012 and Alibaba 2016 <https://www.alibaba.com/showroom/wholesale-royal-jelly.html>

Source: RIRDC report by Michael Clarke and Peter McDonald, ‘Australian Royal Jelly Market Opportunity Assessment based on production that uses new labour saving technology’, 2017³¹

High prices in the 1960s were attributed to publicity linked to the successful treatment of Pope Pius XII for age and lethargy with royal jelly. Subsequent declines in price have been attributed to the growth of an efficient Chinese industry and a lack of substantiation for royal jelly’s health properties (Piana 1993). China supplies the world market with royal jelly at highly competitive prices that make it difficult for producers in other countries to compete (Sabatini et al 2009).³¹

Royal Jelly Price through the Value Chain (Australian \$/kg)

VALUE CHAIN LINK	SOURCE OF INFORMATION AND EXPLANATION OF DATA	ESTIMATE
Farm gate price in China	Farm gate value of royal jelly in China is 100RMB/kg, 6RMB = \$A1 (Somerville September 2013)	\$16.66
Factory price China – excluding insurance, customs clearance and freight	\$US30 to \$60/kg in Table 3.2 and an exchange rate of \$A1 = \$US0.77	\$58.72
Factory price delivered Australia	Personal communication Australian royal jelly importer November 2016	\$100.00
Wholesale price in Australia	Personal communication Australian royal jelly importer November 2016	\$138.49
Retail price equivalent based on products sold in Australia	Average of data provided in Table 4.1 for health sector products	\$296.16

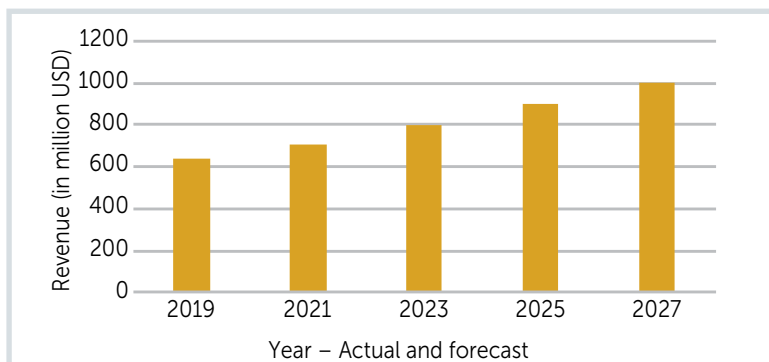
Source: RIRDC report by Michael Clarke and Peter McDonald, 'Australian Royal Jelly Market Opportunity Assessment based on production that uses new labour saving technology', 2017³¹

Bee venom

Europe is the dominant market for bee venom and is expected to remain in a steady position in the market in future. The demand is attributed to extensive use for the treatment of rheumatic diseases, and live honey bees and their venom extracts are both used for medical treatments in Europe. In the North American region market growth is expected to slow as the market is restrained by the availability of beehives and honey bees so there is a lack of availability of venoms, so no appropriate clinical testing or analysis can be done. Russia, New Zealand and Japan with some of the Eastern countries have wide-ranging applications of bee venom. It is in these countries where apitherapy is unique because of the availability of the varied products.³² The bee venom extract market is classified into powder and liquid. The bee venom is costly at around US\$80 per gram. With its antibiotic properties, bee venom has numerous therapeutic applications.³²

Bee Pollen

The global bee pollen market is estimated to reach US\$1003.36 million by 2027, growing at a CAGR of 5.7% between 2019 and 2027. ³⁴ Production figures are scarce however North America ranks second in terms of production volume of bee pollen worldwide and this is expected to rise with its large number of producers and increasing consuming population. Europe comes third in terms of production of bee pollen worldwide. Due to an increase in applications and rise in market demand for bee pollen the market is expected to stay positive with more interest from investors and increasing awareness amongst consumers as bee pollen supplements can be introduced in underdeveloped and developing countries, especially in Latin America and MEA regions.³⁴



Bee pollen market

Source: Bee Pollen Market- Analysis, Growth and Forecast 2019–2027 (profsharemarketresearch.com)³⁴

The bee pollen market is similar to propolis and royal jelly in that Indonesia is the largest exporter with a value of US\$896 million and China was the largest importer in 2020 with a value of US\$886 million.²⁴

Rank	Country	Share in Export Value 2020	Export Value 2020, USD	1-Year Growth in Export Value 2019-2020	3-Year Growth in Export Value 2017-2020	Weekly Domestic Price Change 2021-07-18	Monthly Domestic Price Change 2021-07	Harvesting Seasonality
1	Indonesia	61.36%	\$549.80M	+50.96%	+95.95%			-
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9	United States	0.88%	\$7.91M	-66.98%	-82.21%			-
10	New Zealand	0.83%	\$7.44M	+203.22%	+176.47%			-

Largest exporters of bee pollen

Source: Tridge webpage *Honey global production and top producing countries* – Tridge²⁴

Country	Import %	20/03	20/04	20/05	20/06	20/07	20/08	20/09	20/10	20/11	20/12
1 Global		\$31.40M	\$16.33M	\$19.43M	\$23.23M	\$25.26M	\$23.68M	\$25.32M	\$28.32M	\$31.66M	\$25.58M
2 China	61.7%	\$54.76K	\$78.38K	\$309.17K	\$60.80K	\$103.38K	\$142.14K	\$77.76K	\$56.65K	\$42.85K	\$170.06K
3 Hong Kong	16.51%	\$19.04M	\$7.34M	\$7.30M	\$9.71M	\$10.73M	\$11.36M	\$13.06M	\$15.43M	\$16.49M	\$12.89M
4 Netherlands	2.98%	\$2.08M	\$2.14M	\$2.16M	\$2.09M	\$2.13M	\$2.15M	\$2.50M	\$2.48M	\$2.32M	\$2.32M
5 United States	2.77%	\$1.33M	\$983.40K	\$1.18M	\$2.31M	\$2.85M	\$2.76M	\$2.72M	\$2.59M	\$2.35M	\$2.80M
6 South Korea	2.19%	\$77.00K	\$151.58K	\$270.39K	\$446.13K	\$448.39K	\$14.44K	\$68.96K	\$31.46K	\$88.09K	\$28.34K
7 Thailand	1.78%	-	\$3.20K	-	-	-	-	\$23.00	-	-	-
8 Macao	1.22%	\$873.43K	\$956.27K	\$454.79K	\$299.24K	\$695.78K	\$478.25K	\$810.84K	\$433.47K	\$2.70M	\$714.34K
9 Spain	1.09%	\$767.61K	\$1.17M	\$1.02M	\$672.92K	\$1.24M	\$763.64K	\$865.89K	\$875.05K	\$439.00K	\$1.46M
10 Australia	1.03%	\$1.44M	\$516.49K	\$995.32K	\$999.41K	\$789.50K	\$697.72K	\$385.88K	\$657.69K	\$65.39K	\$41.38K

Largest importers of bee pollen (value wise)

Source: Tridge webpage *Honey global production and top producing countries* – Tridge²⁴

Queen and packaged bee sales

Relevant global data on queen and packaged bee sales was not available.

Global Pollination services

The global economic value of pollination is more than US\$60 billion dollars and the industry is projected to grow at a CAGR of 2.1% between the forecast period 2018 to 2023.³⁷ Between US\$235 and \$577 billion worth of annual global food production relies on pollination services annually.³⁸ It is estimated that about one-third of global food production requires animal pollination and that 80–90 per cent of this role is carried out by honeybees.³⁶

In Germany and France pollination services provided by insects, mainly bees, are worth €153 billion a year according to EU-funded research which is now dated. This figure is equivalent to almost a tenth of the total value of world agricultural food production. Scientists warn that without these pollination services, the supply of fruits, vegetables, coffee and cocoa would no longer meet the current demand.³⁹

Pollinators, particularly bees, are in decline around the world; in some agricultural areas, farmers already have to import bees to ensure their crops are pollinated. Some 84% of crop species grown in Europe rely on insect pollination, as do 70% of the main crops used for human consumption worldwide.³⁹

In the United States the economic value of insect pollinators was \$34 billion in 2012, much higher than previously thought, according to researchers at the University of Pittsburgh and Penn State. The team also found that areas that are economically most reliant on insect pollinators are the same areas where pollinator habitat and forage quality are poor. The researchers found that 20% of US counties produce 80% of total economic value that can be attributed to wild and managed pollinators.⁴⁰

California is one state that relies on honey bees for pollination of crops: every February two out of every three commercial bee hives in the US are transported to California to service the almond bloom. For most commercial bees the pollinating season begins with almonds, California's largest crop. To provide a sense of scale, Scientific American estimates it takes some two million hives – more than 31 billion honeybees – to pollinate the Central Valley's 90 million almond trees during their two-week bloom.⁴¹

Between 60 to 75 percent of the bee population kept as livestock crisscross the United States foraging on the blooms of crops that will eventually make their way into grocery stores and into overseas markets.⁴¹ Once almonds bloom in January, hives are moved to other spring-blooming orchards such as cherries and plums in California or apples in the Pacific Northwest. Some head to Texas to pollinate squash, others to citrus fruit orchards in Florida, and others are dispatched to pollinate cranberries in Wisconsin and cherries in Michigan.⁴¹

Honey bee pollination alone adds more than \$15 billion value to over 90 different US agricultural crops each year. From cucumbers and citrus fruits to watermelon, kiwis, berries, cherries, apples, melons, peaches, figs, tomatoes, pumpkins and almonds, one-third of the US food supply relies on pollination by the hard-working honey bee.⁴¹



Global Bee Breeding Research Programs

Commercial enterprises run most bee-breeding programs. Their numbers are constantly changing because as some companies shut down, others are just becoming established. There are around 100 commercial enterprises breeding bees worldwide. A few of them have been around for over 20 years. They have focused on breeding honey bees that are tolerant to the virus transmitted by *Varroa destructor*. These enterprises are primarily in the United States and Europe.⁴⁸

Some of the research breeding programs around the world include:

University of Guelph, Ontario, Canada – The Honey Bee Research Centre breeding program focuses on Buckfast bees, a strain of honey bee that was developed through a breeding program by Brother Adam of Buckfast Abbey. They are highly resistant to the bee parasite *Acarapis woodi* or tracheal mite. This parasite blocks oxygen flow in the spiracles of the bees which can cause devastating colony loss. In addition the bees are bred for calmness, low tendency to swarm, non-aggressive behaviour and high honey production. They have two isolated queen mating stations for producing Buckfast queens on islands in Lake Simcoe. These islands are far enough away from the mainland that the queens only breed with the drone lines which express the traits selected for. Approximately 100 mini mating nucleus colonies are used to mate Buckfast queens on the islands each season. These queens are then used to re-queen Guelph apiaries or sold to beekeepers. *Honey Bee Research Centre – A Leader in Honey Bee Research and Education (uoguelph.ca)*

The Washington State University (WSU) honey bee selection and breeding program provides selected honey bee stocks to beekeepers. The WSU breeding program is focused towards developing honey bee stocks that exhibit a measure of resistance or tolerance to common honey bee pathogens and parasites. A related program coordinated by WSU is designed to enhance US honey bee diversity through importation of honey bee semen from Old World sources, evaluation of progeny and release of germplasm to the queen production industry. *Breeding Program | WSU HONEY BEES + POLLINATORS | Washington State University*

New World Carniolan brand, California, Strachan Apiaries Inc. was founded in 1954 by Don Strachan and is the world's largest producer of the New World Carniolan Queen Bee. The Carniolan honey bee's trinomial name is *Apis mellifera carnica*. The New World Carniolan was originally established in 1982 by Susan Cobey and Tim Lawrence in California. Carniolan stock from across the US and Canada was collected, back crossed, and evaluated to establish the foundation population. Instrumental insemination and a strict annual evaluation protocol are followed to maintain the NWC breeding program. In 1990 the NWC breeding program was moved to Ohio State University. A cooperative effort between OSU and Strachan Apiaries currently maintains and propagates the stock.

The New World Carniolan population is vigorously evaluated. Working with a diverse gene pool, the goal is to maintain careful selection protocols on the population of New World Carniolan Queens by using the Page-Laidlaw Closed Population Breeding Program. Annually, a new generation of breeders is instrumentally inseminated, established in full size colonies, and evaluated in the field. From these the top performing colonies are selected to establish the next generation. Selection is a continuous process and essential to maintaining and improving the desired traits of this population. All of the breeding stock is hygienically tested. The reliability of the New World Carniolan program is time tested and industry proven. Carniolan *Honey Bees* | Strachan Apiaries (strachanbees.com)

Apicentar, Serbia – is a specialised company for the selection and production of honey bee queens. It was founded as an independent organisation in 1995. The breeding program is based on an autochthonous subspecies of the honey bee *Apis mellifera carnica*.

In the selection procedure they apply open type line selection with free mating to increase honey productivity and *Varroa destructor* tolerance. Some of the lines are now in the 18th and 19th generation of selection. The selection program contains eight lines of honey bees. For each line there are approximately ten colonies with queens descending from a selected mother queen from the previous generation of selection. Each season four lines are in the first and four in the second year of performance testing. By this approach queen longevity is stimulated.

The new generation of each line is bred at different, mutually distant apiaries and from the same mother queens that are later used to produce queens commercially. Performance testing for honey productivity, tolerance to *Varroa* and other diseases, as well as other important qualities is exclusively conducted at the Apicentar's selection apiary. Control inspections performed in late summer and in spring are the base for data collection. Since 1991 the genetic material is used in the US by *Honey Bee Genetics* under the name *ARS Yugoslavians*.

Apicentar

Russian Honeybee Breeders Association Inc., United States – Members of the USDA Agricultural Research Service Baton Rouge bee lab and industry co-operators foresaw the value and need for such a group. The primary purpose of the corporation is to maintain and improve the genetic lines of Russian honey bees through propagation and selective breeding.

At present, they are maintaining and selecting to improve seventeen separate lines. These lines are divided into three separate blocks. Those blocks are designated as blocks A, B, and C. Beekeepers are also divided into those three blocks. Each member within a block is currently responsible for annually reproducing populations of two lines from his block, monitoring varroa and tracheal mite populations, monitoring honey production and then selecting the best queens from those colonies. Though other characteristics or traits exhibited in a colony may eliminate it from consideration, the focus remains on those traits, with varroa resistance given top priority. *Russian Honey Bee Breeders Association, Inc. - Home (russianbreeder.org)*

Purdue University, Indiana, US in 1997 launched a program to breed bees that were *Varroa mite* resistant. Their focus was largely on breeding for grooming behaviour to select for honey bees which clean themselves of phoretic *Varroa*. This behaviour was tested by placing a sticky sheet of paper underneath the colony to catch any fallen mites. In 2007 groomed mites were observed with their legs bitten off. This observation launched the on-going breeding efforts.

One of the first observations of mite biting behaviour in *Apis mellifer* (Ruttner and Hämel, 1992; Apidologie). In most colonies, honey bees will (at very low frequency) bite *Varroa*. Biting behaviour turned out to be heritable and an important means for honey bees to defend against *Varroa*. The Purdue honey bee lab has been selecting for mite biting since the initial observation in 2007. Then, an average of 3% of fallen mites had chewed legs. After artificially selecting for this behaviour for over a decade, nearly 50% of fallen mites have chewed legs today. Beekeepers who use the biting stock report higher yields and better survival. The lab is actively engaged in both maintaining this line and researching the genetics, ethology, and evolution of this fascinating trait.

It takes a community-driven effort to continue the biting line at Purdue. Each year beekeepers from across North America gather at the lab and make instrumentally inseminated breeder queens. These are distributed through the Indiana Queen Breeders Association and the Heartland Honey Bee Breeders Coop. *Our Breeding Program – The Purdue Bee Lab*

Betta Bees Research Limited, New Zealand – is New Zealand's leading Italian honeybee livestock improvement programme. The company was formed in 2004 by 13 members of the Southern Beekeepers Discussion group who were concerned about the quality of queens in the South Island. When the supply of queens were cut off to the South due to the arrival of the parasitic mite *Varroa destructor* in the North Island, Betta Bees was created. On establishment of the company each shareholder donated 10 hives with their best queens to the company to form the foundation stock. Semen was also sourced from a reputable North Island breeding programme which gave the bee stock a significant boost.

Since then, they have continued to improve the stock year on year to produce high quality breeder queens. Today the company has a core of 400 hives and distributes over 100 instrumentally inseminated breeder queens each year to shareholders and customers. It has established a *Varroa* sensitive hygiene programme and works closely with the University of Otago's Genetics Otago.

The company is beekeeper owned and run, with 28 dedicated shareholders. Betta Bees is a great example of what can be achieved when beekeepers come together for a common goal. *Breeding – Betta Bees*

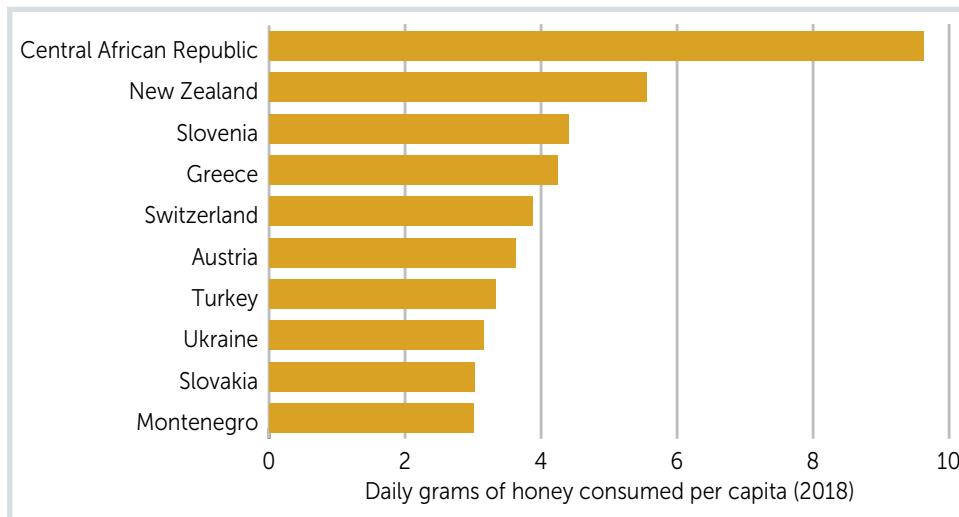
Global Consumption of Honey and Consumer Trends

Consumption of honey per capita data is difficult to locate without investing to access market research, however the following data was available on a web search.

Global honey consumption has increased over the past decade with the growth in the world population and the preference toward more natural food sources by a growing number of consumers. As demand for natural and healthy products increases many countries cannot meet their honey demand with domestic production and need to import increasing volumes from exporting countries.

The Central African Republic has a higher daily per capita consumption of honey than any other country in the world with 9.6 grams of honey consumed daily per capita. Honey is extremely well liked by the nation's citizens, especially as a natural sweetener to their meals. The Bayaka people, a pygmy community within the country, are well-versed in gathering honey.⁴²

New Zealand ranks second in the daily per capita consumption of honey. Slovenia ranks third in daily per capita consumption of honey, with an average of 4.4 grams. Slovenia boasts more than 10,000 beekeepers who produce more than half of the honey consumed in the country. Slovenian honey is revered for its unique taste and quality. Honey is an essential part of the traditional Slovenian breakfast, which contributes significantly to the amount of honey consumed in the country.⁴²

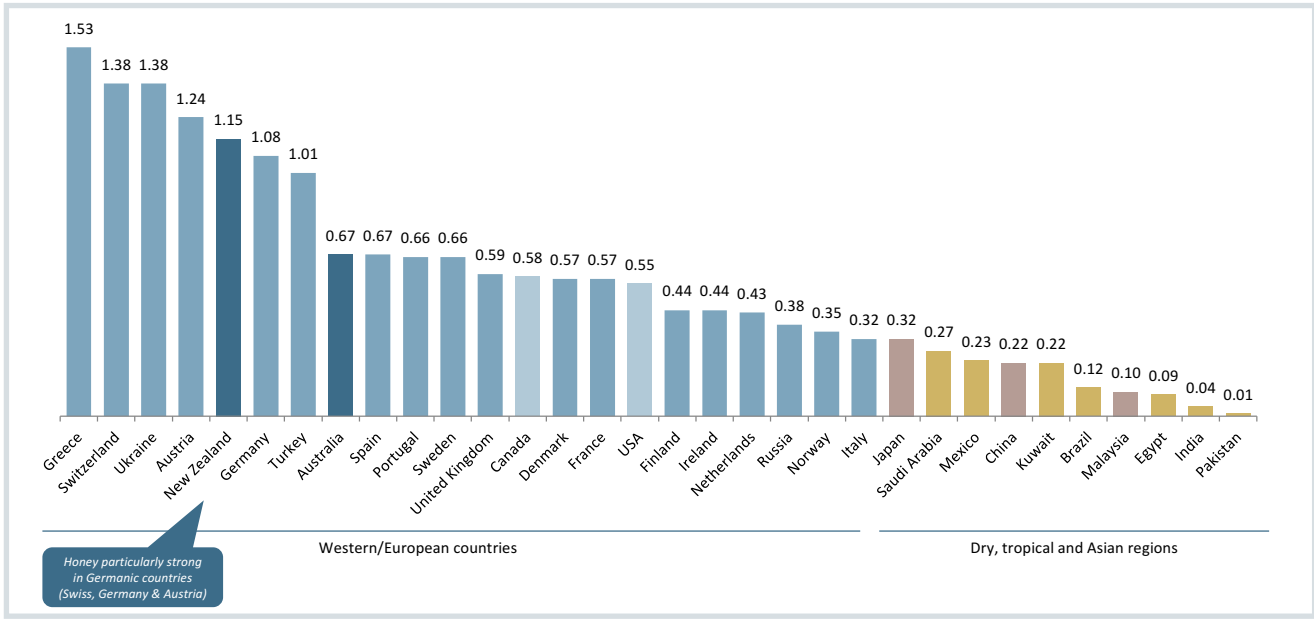


Countries that consume the most honey

Source: *Countries That Consume the Most Honey - WorldAtlas*⁴²

The US per capita consumption of pure honey per year amounted to approximately 635 grams in 2018.²³ While the per capita honey consumption is as low as 50 grams per year in India, globally it ranges from 250 to 300 grams, with Germany topping in per capita honey consumption with 1995 grams per year. In Asia Japan is the biggest consumer of honey, with per capita consumption of up to 907 grams per year.⁴⁴

The Coriolis report 'Investment Opportunities in the New Zealand Honey Industry'⁹ produced in 2012 shows high consumption per capita in European countries, particularly Germany and Switzerland with their high incomes and a strong interest in natural health products.



Apparent per capita honey consumption in all forms by select countries (kg/person; 2017)

Source: Coriolis – part of the New Zealand Food & Beverage Information Project, 'Investment Opportunities in the New Zealand Honey Industry', August 2012⁹

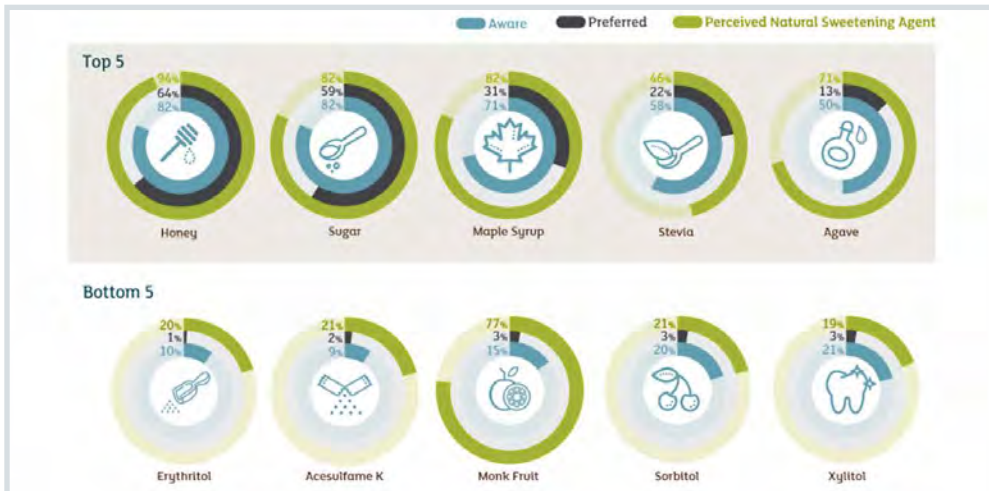
Over the past few decades sugar and artificial sweeteners have become undesirable ingredients in food products due to their health-damaging properties. Consumers’ inclination towards sugar substitutes, especially natural sweeteners, has increased with an escalation in the number of diabetic patients and patients suffering from obesity and high cholesterol, who are constantly searching for healthier alternatives to sugar. The easy availability of a wide range of products, coupled with its ability to impart a desirable taste in food and beverage products, is aiding market demand.²⁶

The sudden outbreak of COVID-19 affected various industries across the globe and resulted in the closure of processing plants/units which affected production. As honey is considered a health-enhancing product, its sales across several countries witnessed an incredible rise and resulted in a remarkable amplification of quarterly revenue of companies. For instance, in July 2020 Dabur India Limited disclosed that its immunity products witnessed a growth of 60% and 90% respectively in the first quarter.²⁶

Consumer research shows that honey is the most preferred sweetener over sugar. Consumers are paying more attention than ever to the foods they are eating. This is part of a larger evolution that started many years ago when consumer preferences started shifting and natural ingredients became heavily sought after. Consumers understand where honey comes from and its value as an all-natural sweetener.⁴⁹

A 2018 online survey of 760 American consumers that was commissioned by Kerry (a taste and nutrition company) rated honey as the #1 sweetener in terms of awareness, preference and perception as a natural sweetening agent. In the study 94% of respondents perceived honey as a natural sweetener and 64% preferred the ingredient.⁴⁹ Preference for sweetening agents depended on perceptions of how natural the ingredient is as well as consumers’ awareness of the ingredient. Kerry surveyed consumers about 17 sweetening agents. Honey was the most preferred sweetening agent, with the highest perception of naturalness. Sugar and maple syrup were tied for natural perception, though sugar was more preferred. Interestingly, respondents also had negative perceptions of some popular natural sweeteners due to perceived artificiality or poor awareness. For example, stevia was only perceived as natural by 46% of surveyed consumers, while 54% of respondents said it is artificial. However, stevia also had a high level of awareness (58%), thereby placing it in the top four preferred sweetening agents.⁴⁹

THE MOST-PREFERRED SWEETENERS:		THE LEAST-PREFERRED SWEETENERS:	
Honey	(64%)	Erythritol	(1%)
Sugar	(59%)	Acesulfame K	(2%)
Maple syrup	(31%)	Stevia	(22%)
Agave	(13%)	Monk fruit	(3%)
		Sorbitol	(3%)
		Xylitol	(3%)



Top 5 and bottom 5 sweetening agents by preference

Source: Bee Health Collective | Honey Industry Facts⁴⁵

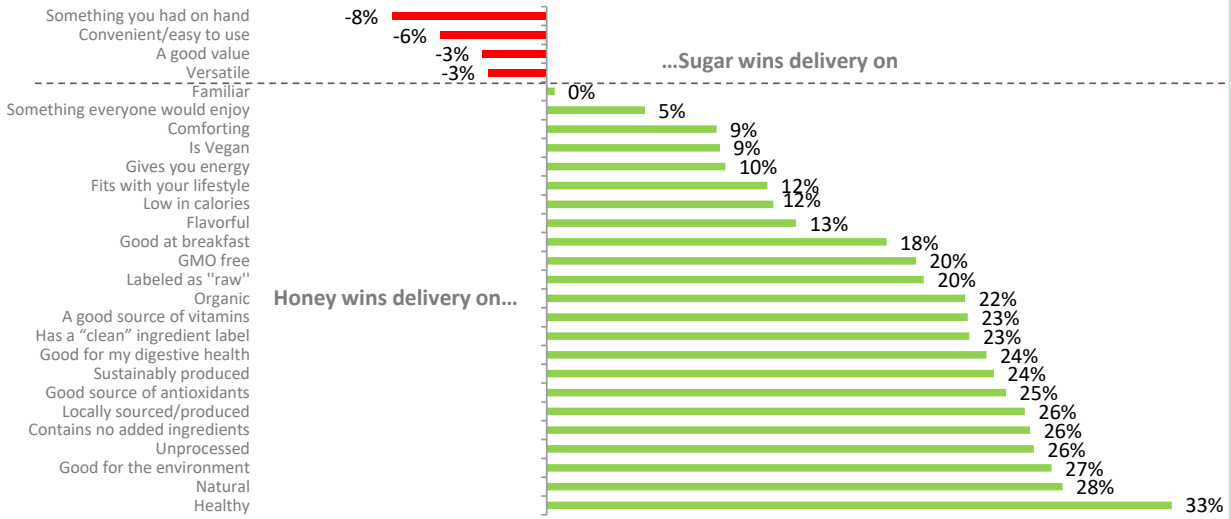
In the United States in 2020 the National Honey Board conducted a 'Honey Attitude and Usage study' which includes the general population plus the new 'goodness seeker' which is skewed to female Millennials, married/engaged, educated and employed. The study helps understand consumer dynamics by tracking awareness, self-reported usage, attitudes and perceptions of honey and other sweeteners. It included 2000 general population and 350 goodness seekers.⁴⁷

The results show the following:

- **Sweetener awareness** – honey (31%) was rated second to sugar (58%) by both groups. Unaided awareness for sweeteners is down from year ago, including honey, there was a slight word change from 2019 that likely influenced the decline.
- **Spreads awareness / morning topping** – honey awareness was low (5%) in comparison to other spreads which included peanut and nut butters, butter/margarine based spreads, jam/jelly/ preserves/ fruit spreads, cream cheese and hazelnut spread.
- **Honey usage frequency** – with less negative news, honey usage is increasing across heavy, medium and light users.
- **Sweetener usage** – usage is on the rise in terms of how often consumers eat sweeteners by themselves or in other foods or beverages. Honey was still second to sugar.
- **Spreads usage** – despite honey been behind other spreads, honey spread usage is up overall, trending with other spreads.
- **Typical usage** – breakfast remains the daypart with the most honey usage.
- **Sweetener preference** – honey is the most preferred sweetener. Honey has surpassed sugar as the most preferred sweetener with the general population, granulated sugar and non-calories sweeteners have dropped in preference.
- Honey is closing the gap versus granulated sugar and maple syrup.⁴⁷

Delivery Gap – Honey vs Sugar (Among Those Selecting as Favorites)

Gap on Top Box Rating "Excellent"
(Q28 n = 489; Q29 n = 595)



Delivery gap honey vs sugar: Honey closes the gap vs granulated sugar

Source: National Honey Board presentation, 'Honey Attitudes & Usage Study', Oct 2020⁴⁷

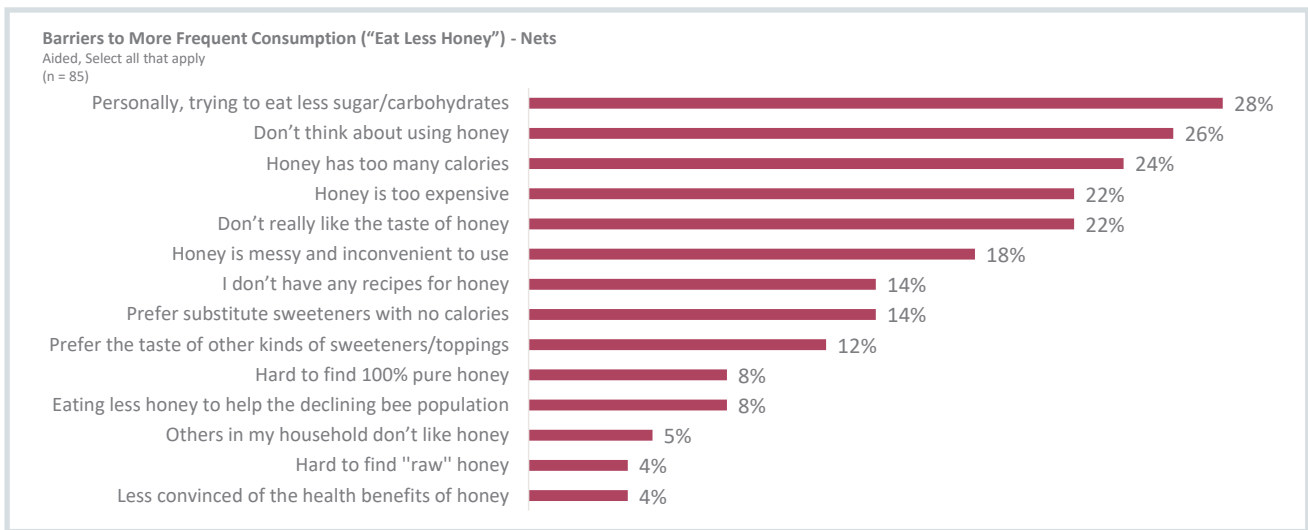
	2017 Gen Pop	2018 Gen Pop	2019 Gen Pop	2020 Gen Pop	2020 vs 2019
BROAD APPEAL/VERSATILITY					
Something everyone would enjoy	81%	78%	73%	73%	NC
Something you had on hand	79%	80%	73%	73%	NC
Versatile	81%	78%	71%	72%	1%
HEALTH/NATURAL					
Healthy	85%	80%	76%	79%	3%
Natural (previously Natural/Unprocessed)	90%	85%	85%	87%	2%
A good source of vitamins	76%	71%	60%	69%	9% ↑
Gives you energy	78%	71%	62%	70%	8% ↑
Organic	81%	72%	63%	67%	4% ↑
Locally sourced/produced	85%	74%	68%	75%	7% ↑
GMO free	75%	71%	60%	66%	6% ↑
Low in calories	53%	54%	46%	50%	4% ↑
Contains no added ingredients	-	84%	79%	81%	3%
Labeled as "raw"	-	-	60%	66%	6% ↑
Unprocessed	-	-	71%	74%	3%
Has a "clean" ingredient label	87%	81%	73%	76%	3%
Good source of antioxidants	-	-	-	70%	-
Good for my digestive health	-	-	-	72%	-
Is vegan	-	-	-	52%	-
FLAVOR & TASTE					
Flavorful	89%	88%	84%	84%	NC
CONVENIENT					
Convenient/easy to use	81%	78%	74%	78%	4% ↑
Something you had on hand	79%	80%	73%	73%	NC
A GOOD VALUE					
	71%	72%	68%	68%	NC
FITS MY LIFESTYLE					
	-	73%	66%	68%	2%
COMFORTING/FAMILIAR					
Familiar	90%	86%	80%	82%	2%
Comforting	83%	79%	72%	76%	4% ↑
GOOD AT BREAKFAST					
	-	83%	79%	77%	-2%
SUSTAINABILITY					
Sustainably produced	-	-	-	75%	12
Good for the environment	-	-	-	75%	-

Honey attribute delivery - tracking (Top 2 box, "Good" + "Excellent")

Source: National Honey Board presentation, 'Honey Attitudes & Usage Study', Oct 2020⁴⁷

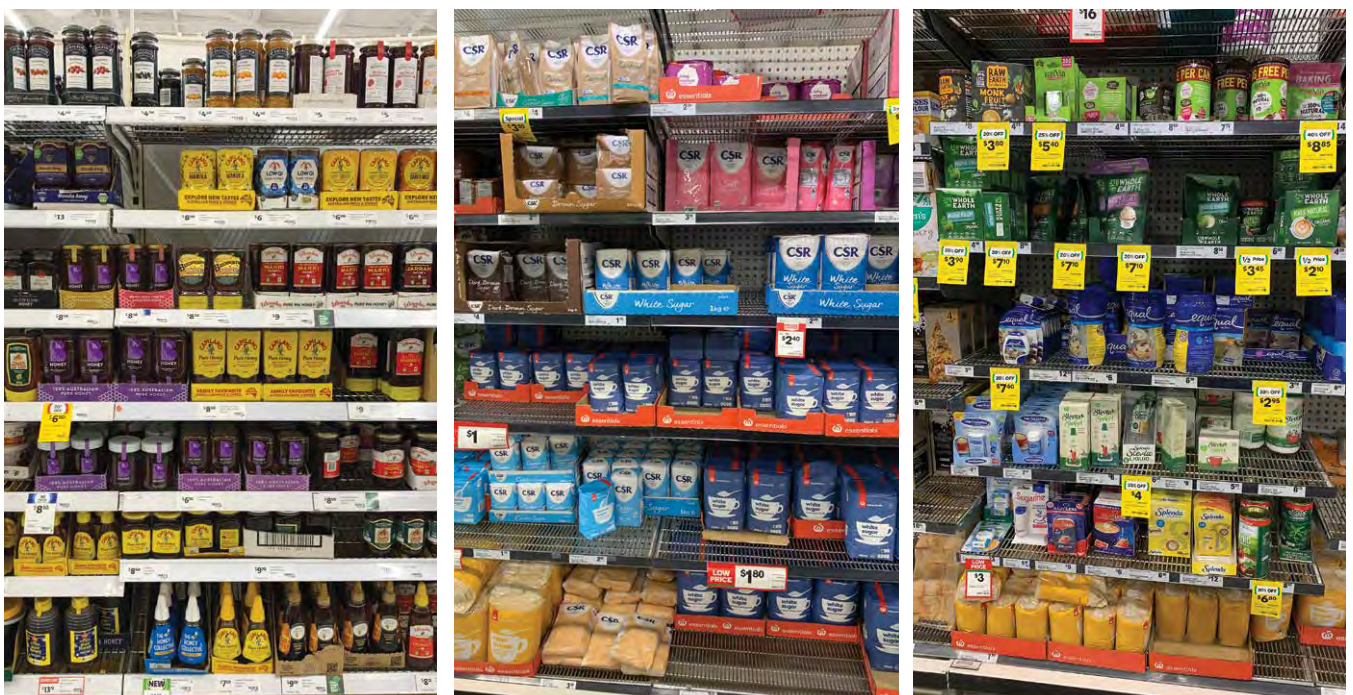
With regard to consumers' health perceptions based around honey, health perceptions have increased year on year. Honey has many benefits that consumers identify with, what's noticeable is how healthy perceptions have increased year over year.

While consumers identify with the many benefits of honey, there are also less barriers that are holding back increased consumption which are outlined below. Honey is a favourite sugar "alternative" as one consumer commented "Maple syrup comes from a tree, honey comes from the bees, so to me they're not as processed, they're natural." Honey is not associated with bad sugar. In fact, it is usually their favourite sugar alternative due to its natural nature, lack of processing, and perceived medicinal benefits. The study also found in regards to 'path to purchase' that most consumers say they plan their honey purchase and the traditional grocery stores still dominate retail shopping.⁴⁷



Barriers to more frequent consumption ("Eat Less Honey") – Nets

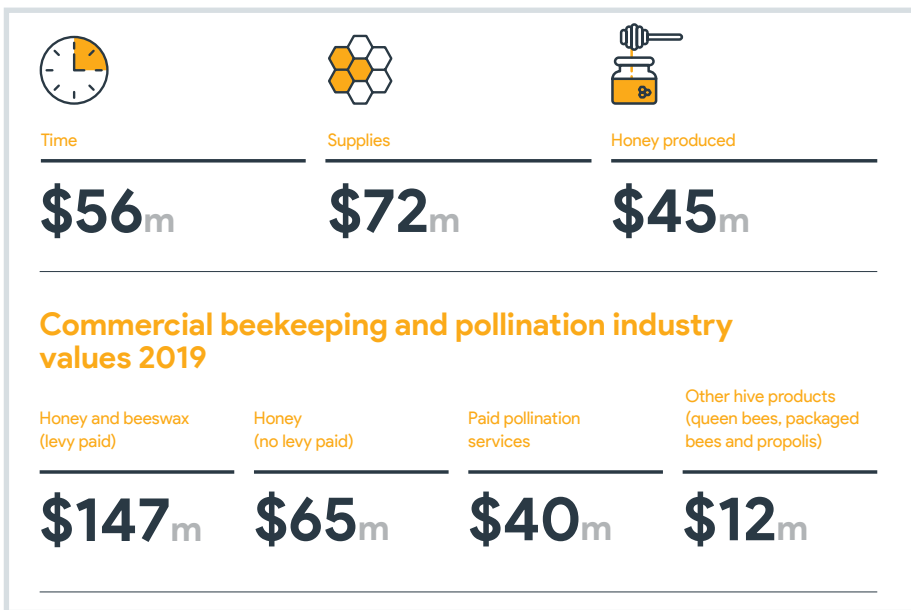
Source: National Honey Board presentation, 'Honey Attitudes & Usage Study', Oct 2020⁴⁷



Australian Honey Bee and Pollination Industry Situation

The Australian honey bee industry is a significant contributor to the economy not only in terms of honey production but as provider of pollination services for agriculture and horticulture including the almond industry.

In 2019 it was estimated the annual total contribution of the honey bee to the Australian economy was \$14.2 billion. The economic value of recreational beekeeping was estimated at \$173.5 million and the commercial beekeeping sector, honey bee and pollination values was estimated at \$264 million.¹



Recreational beekeeping economic values 2019

Source: AgriFutures Report 'The honey bee and pollination industry: A hive of activity', 2021¹

In 2019 the commercial beekeeper honey bee and pollination industry values of honey and beeswax production in Australia was \$147 million (ABARE Commodity Statistics). Honey production was estimated to be worth \$65 million and other hive products (i.e. queen bees, packaged bees, propolis) was \$12 million. The honey bee industry also provides pollination services to a variety of horticulture and broadacre industries which is estimated to be about \$40 million.²

Recreational beekeeping sector

In the same way that the recreational fishing industry generates value commensurate with the commercial fishing industry, the recreational beekeeping industry is comparable in size to the commercial beekeeping sector. The economic importance of recreational beekeeping is estimated as recreational values (beekeeper time invested) of \$55.9 million, plus the value of beekeeping equipment sold to the recreational sector of \$72 million, plus the value of honey produced \$45.6 million, making a total of \$173.5 million pa. This estimate is in addition to the total value of commercial beekeeper honey bee and pollination values estimated at \$264 million.²

Estimates of willingness to pay can be derived using different non-market valuation techniques. One such technique that puts a lower bound estimate on willingness to pay is the opportunity cost of time used in pursuit of a hobby. To estimate the recreational value of beekeeping to hobbyists, the following data was used:

- 23,272 recreational beekeepers
- 6 hives managed per recreational beekeeper
- 96 hours pa in hive record keeping, husbandry, maintenance, honey harvesting and bottling required for six hives (informal survey completed by the author)
- \$25/hour opportunity cost of the beekeeper’s time (underestimate at the lower end of the value of recreational time, which typically is higher than the average hourly wage rate).

Based on the above data, the recreational value of beekeeping can be estimated at \$55.9 million p.a.²

To estimate the economic value of beekeeping supplies bought by recreational beekeepers, an analysis of Australian beekeeping supply businesses was completed. The population of beekeeping businesses was identified and, where available, each business was reviewed online to determine whether its primary customer base was commercial or recreational. A small number of company records were also available online, and an indicative business turnover and employment was established using this information. The value of beekeeping supplies bought by recreational beekeepers is estimated at \$72 million, and is responsible for 108 full-time equivalent (FTE) jobs. Much of this spending is in regional areas.²

Commercial beekeeping sector current position

The IBISWorld report (April 2021) reports that beekeeping in Australia is worth \$134.2 million and revenue has declined over the past five years, largely attributed to the 2019/20 bushfire season which destroyed many hives and the COVID-19 pandemic which disrupted trade flows and consequently honey production has declined as well. Industry revenue is anticipated to decline by 15.5% in the current year. The industry is broken up into 79.4% honey production, 12.8% pollination services and 7.8% other products.⁶⁸

IBISWorld⁶⁸ looks at the historical performance data of the Australian beekeeping industry which shows that industry was at its peak 2017-19 in terms of revenue. For the current 2020-21 year, the industry has dropped off.

Historical Performance Data

YEAR	REVENUE (\$M)	IVA ESTAB. (\$M)	ENTERPRISES (UNITS)	EMPLOYMENT (UNITS)	EXPORTS (UNITS)	IMPORTS (\$M)	WAGES (\$M)	DOMESTIC (\$M)	DEMAND (\$M)
2012-13	114	50.5	933	928	1,519	27.2	19.7	11.2	107
2013-14	113	46.9	951	941	1,545	32.1	35.0	9.50	116
2014-15	130	64.6	934	925	1,515	40.9	60.3	15.0	149

Beekeeping in Australia A0193 April 2021

YEAR	REVENUE (\$M)	IVA ESTAB. (\$M)	ENTERPRISES (UNITS)	EMPLOYMENT (UNITS)	EXPORTS (UNITS)	IMPORTS (\$M)	WAGES (\$M)	DOMESTIC (\$M)	DEMAND (\$M)
2015-16	145	75.4	943	922	1,683	50.8	90.8	18.0	185
2016-17	148	76.9	989	983	1,814	41.9	56.3	15.7	162
2017-18	178	93.6	1,056	1,050	1,998	44.7	72.5	18.7	205
2018-19	182	96.8	1,103	1,097	2,104	49.0	61.0	19.0	194
2019-20	159	81.6	1,130	1,121	2,079	57.4	54.3	17.9	156
2020-21	134	67.6	1,096	1,083	2,026	41.1	56.7	17.6	150

Australia is one of the few countries in the world to remain free of varroa mite (*Varroa destructor*). An incursion of *Varroa destructor* is of high concern to the honey bee industry. A study by Hafi et al (2012) predicted that the economic costs associated with Varroa establishing in Australia would be significant, estimated at between \$0.63 billion and \$1.3 billion over 30 years (depending on the port of entry) if spread was unhindered, or between \$0.36 billion and \$0.93 billion over 30 years if the spread could be contained through measures such as movement controls. The National Bee Pest Surveillance Program has been developed as an early warning system to detect the incursion of exotic pests of significance to the honey bee industry (including *V. destructor*), with early detection greatly improving the capacity to contain and eradicate exotic pests, should they arrive in Australia. The Program operates at Australian sea and air ports that are considered to be the most likely entry points for honey bee pests from overseas (Plant Health Australia, 2021). Beekeepers also help lower the biosecurity risk posed by exotic species, with regular monitoring of hives for pests and diseases improving the chances of detecting these pests early.⁴

Number of Beekeepers and Hives

In 2019 the Australian honey bee industry consisted of approximately 30,000 registered beekeepers who owned a total of around 669,000 hives. There were 1,800 commercial beekeepers and 28,000 recreational beekeepers. Only 6 per cent of registered beekeepers have more than 50 hives, but it is estimated that they account for more than 80 per cent of Australia’s total honey production and production of honey bee-related products and services.^{5/1}

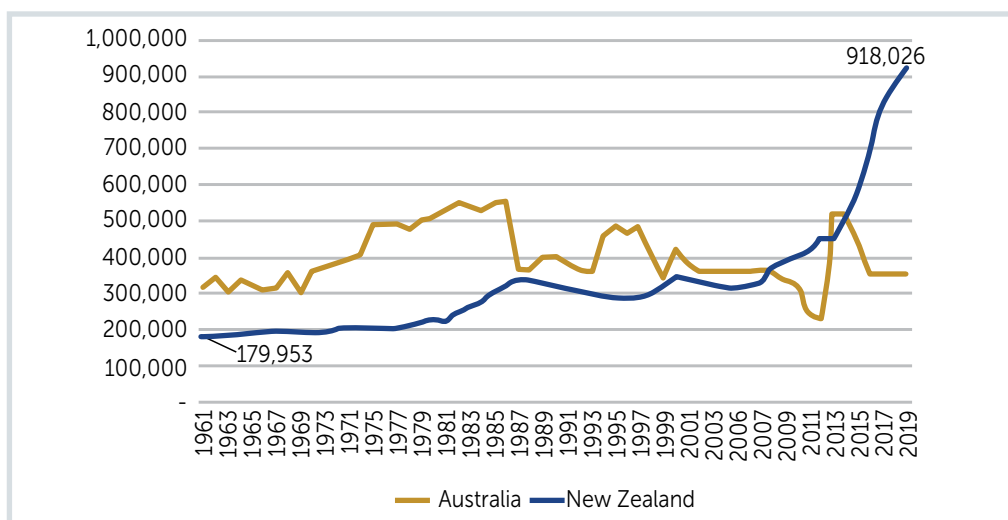
According to John Karasinski who is an Economist from Curtin University with a keen interest in the honey bee industry believes the number of hives within Australia is overestimated as a lot of hives on the east coast are double counted as beekeepers are required to have their hives registered in each state where their hives are located. Therefore, if they are operating across states, the hives are registered in each state. Until 2008 John said that Australia had more hives than its close competitor New Zealand, and since then New Zealand has continued to grow to more than 918,000 hives today whereas Australia has 357,811 hives as of 2019.^{67/79} This figure is a lot less than that estimated by AgriFutures above.

Australian hives

1961 = 323,447, 2019 = 357,811. Growth Rate = 10.5%.
Compound annual growth rate = 0.174% per annum.⁷⁹

Australia Vs New Zealand

NZ = 1961 = 179,953, 2019 = 918,026. Growth rate = 410.15%.
Annual compound growth rate – 2.85% pa⁷⁹



Australian and New Zealand number of beehives 1961-2019

Source: Karasinski J.M. 2021 Global Bee Hive Charts 1961 – 2019, Email Communication⁷⁹

The honey bee industry has changed significantly since 1962 when commercial beekeepers began contributing to an industry levy. There has been a 10-fold increase in recreational beekeeping and a 36% decline in the number of commercial beekeepers. Despite this, the average number of hives managed by a commercial beekeeper has increased from 156 in 1962 to 299 hives in 2018. More hives managed per commercial beekeeper is one measure of an increase in industry productivity. The average number of hives for recreational beekeepers is 6.¹



Commercial* beekeeping

Source: AgriFutures Report 'The honey bee and pollination industry: A hive of activity', 2021¹

Commercial and recreational beekeepers and hives owned – data 'snapshots' 1962 to 2019

	1962	1974	1985	1997	2002	2007	2015	2018	2019
BEEKEEPERS									
Commercial	2,929	2,415	2,222	2,350	1,585	1,701	1,337	1,781	1,868
Recreational	3,000	3,000	5,184	7,368	8,015	8,216	10,814	23,272	27,822
Total	5,929	5,415	7,406	9,718	9,600	9,917	12,151	25,053	29,690
HIVES OWNED									
Commercial	458,000	493,000	547,779	602,557	414,827	506,266		531,786	
Recreational			50,000	70,000	76,026	65,702		140,430	
Total			597,779	672,557	490,853	571,968	521,081	672,216	668,672
Hives/commercial beekeeper	156	204	247	256	262	298		299	

Source: Australian Honey Board (AHB) Annual Reports 1963 and 1974, Gibbs and Muirhead (1998), ABARES (2003, 2008 and 2016), AHBIC (2018) and PHA (2019). NB: Data for 1962, 1985 and 1997 include estimates by AgEconPlus.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Australia-wide there are approximately 530,000 commercially managed hives available to deliver paid pollination services; this number has been relatively static for some years. However, it is noted that the industry has the capacity to increase the supply of hives through splits and supplementary feeding if the economic signals (price received for pollination services) are appropriate. In 2019 the almond industry, Australia's largest user of paid pollination services, hired 180,000 hives for crop pollination.²

Commercial hives available for pollination in 2020 (beekeepers managing >50 hives)

STATE/TERRITORY	2016	2017	2018	2019	2020
NSW		236,561	240,411	252,317	295,841
VIC	182,035	196,460		196,000	196,000
QLD				88,301	88,301
SA	53,186	57,087	62,015	60,637	61,973
TAS	18,082	17,631	21,417	21,417	21,417
WA				50,000	50,000
Total				668,672	713,532

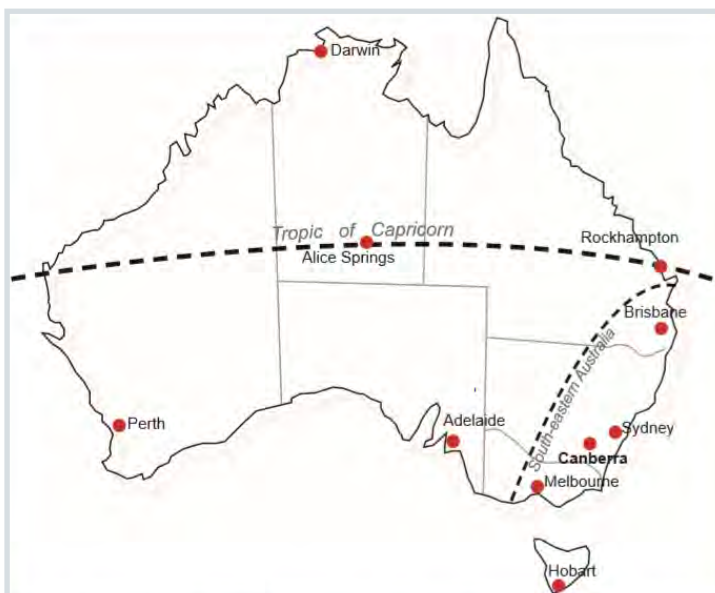
Source: Hive registration data from various state DPLs. Shaded data is AgEconPlus estimate.
 NB: Data to construct a longer timeseries is available on request from AgriFutures Australia. Data for TAS is collected only on an ad hoc basis, is not compulsory, and is required only for access to leatherwood forests.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

State by State breakdown of Beekeepers and Hives

The main honey-producing area of Australia is the huge swath of temperate land stretching from southern Queensland to central Victoria. Beekeepers migrate extensively within this area, regardless of state borders (RIRDC 2007).²

South-eastern Australia contains about 80% of the nation’s hives and 80% of its beekeepers. It produces about 70% of Australia’s honey (RIRDC 2007). While South Australia is a significant honey producer, it lacks the diversity and the area of melliferous flora in south-eastern Australia. Like SA, the relatively small proportion of Western Australia suitable for beekeeping restricts production in that state. A significant portion of the WA honey crop is exported. Tasmania is by far the smallest honey-producing state but has the advantage that its main crop is dependable and fetches a premium price. A small industry was established in the Northern Territory but has subsequently declined (RIRDC/Benecke 2007).²



The south-east – Australia’s beekeeping and honey production heartland

Australia’s beekeeping heartland is the huge swath of temperate land stretching from Southern Queensland to central Victoria
 Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

The 2019 breakdown of commercial and recreational beekeepers by state and territory is shown in the table below. About 44% of the nation’s honey bee hives are found in NSW.²

Commercial and recreational beekeepers, by state and territory July 2019

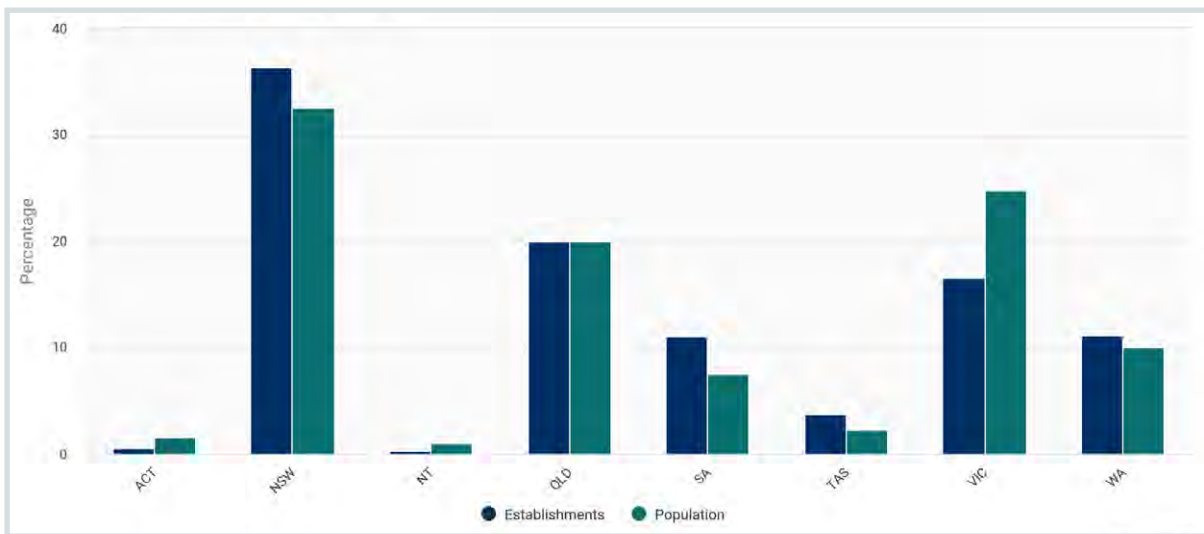
STATE/ TERRITORY	COMMERCIAL BEEKEEPERS (>50 HIVES)	RECREATIONAL BEEKEEPERS	TOTAL BEEKEEPERS	TOTAL NUMBER OF HIVES
NSW	848	8,499	9,347	297,362
VIC	337	8,899	9,236	123,277
QLD	309	4,760	5,069	105,495
SA	175	2,284	2,459	69,810
TAS	38	238	276	23,750
WA	161	3,142	3,303	48,978
Total	1,868	27,822	29,690	668,672

Source: PHA, using DPI hive registration data (Kath DeBoer, Project Officer, PHA, pers. comm, May 2020)

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

IBISWorld report (2021) shows that beekeepers are spread across Australia, but the majority are located along the eastern seaboard. This trend can be attributed to the temperate climate producing some of the most consistent levels of annual rainfall. Higher levels of rainfall produce healthier plants with more nutritious pollen. Conversely, the lack of rainfall in Western Australia and South Australia limits these states' suitability for beekeeping.⁶⁸

A significant portion of pollination services are located in South Australia and Victoria due to the prevalence of almond orchards, which require crosspollination to produce nuts. The majority of queen bee breeding businesses are located along the coast from southern Queensland to Sydney. In addition, enterprises that focus on packed bees for export are largely located in New South Wales.⁶⁸



Distribution of establishments vs population

Following the 2019-20 bushfires it is estimated that 15.6 million hectares of native forest was destroyed along with a significant proportion of hives. In New South Wales 9,800 hives were destroyed and 89,000 hives lost field bees and are in critical need of husbandry support. NSW previously had a supply of 275,000 hives. In Queensland 1,000 hives were destroyed by fire and an unknown number of hives lost field bees. In South Australia 1,100 of the 4,000 hives on Kangaroo Island were destroyed and in Victoria 650 hives were lost in the 2019-20 bushfires.⁵²

Commercial beekeeping businesses in Australia are mainly nomadic, with many hives being moved up to 20 times in a given year to a variety of different locations, either for pollination contracts or for honey production. These large numbers of movements are due to the high variability of budding, flowering, and pollen and nectar yields associated with most plants accessed by beekeepers.⁵

ABARES (2016) used beekeeper surveys to estimate the proportion of honey produced by land type in Australia:

- Private land other than agriculture (e.g., forest on private land) 39%
- State forests (25%), national parks (12%) and other public land (2%), public land total 39%
- Crops without providing paid pollination services 18%
- Paid pollination services 5%.²

AgEconPlus (2019) requested data from state-based beekeeping organisations on the number of public land apiary sites in each state and their contribution to total GVP which is outlined in the table below. The data shows a high reliance on public land apiary sites. The data was recorded before the largescale bushfires of the 2019–20 summer that significantly diminished public land apiary resources in NSW, Victoria, Queensland and SA.²

Importance of public land to commercial beekeeping

STATE/ TERRITORY	PUBLIC LAND APIARY SITES (NO.)	SHARE OF HONEY PRODUCTION AND POLLINATION SERVICES (%)
NSW	8,500	45
VIC	4,000	70
QLD	6,500	80
SA	400	'significant' #
TAS	2,000	90
WA	3,200	80

Source: AgEconPlus (2019) # ABARES (2016) reports SA's share of production is 7%.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Australian Honey Production

There is limited data available on the amount of actual honey supplied/produced domestically within Australia from Australian publications. According to Australia Honeybee Industry Council (AHBIC) there are 672,000 hives in Australia which produce an average of around 60kg to 100kg per hive.

As stated in the AgriFutures 'size and scope of the Australian honey bee and pollination industry' report the Australian honey bee industry produces between 20,000 and 30,000 tonnes of honey annually. Recorded long-term average honey production is 20,238 t/year with low points in 1968-69 (13,220 tonnes), 1976-77 (14,929 tonnes) and 2015-16 (15,957 tonnes). Peak production of 27,996 tonnes recorded in 1984-85 coincided with the last year ABS collected data on the complete industry. Subsequent to this year, estimates are drawn from levy receipt data, which is a subset of total honey production. The table below shows this study's estimate of total Australian honey production.²

Average Australian honey production – 2015 to 2019

HONEY PRODUCTION SECTOR	ESTIMATED VOLUME (TONNES)
Commercial honey production – on which levy is paid (>50 hives)	20,000
Commercial honey production – smaller producers and levy leakage	10,000
Recreational honey production – own consumption, small-scale sales	7,000
Total	37,000

Source: AgEconPlus analysis

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Previous estimates of honey production have ignored the contribution of recreational beekeepers. This study has estimated annual contribution of 7,000 tonnes of honey each year by the recreational beekeeping sector. In 2019 recreational beekeepers managed 140,430 hives with an average annual output calculated at 50kg per hive.² Honey production by state is relatively unchanged over time, with NSW, Victoria, SA and Queensland continuing to dominate national production.²

Honey production by state

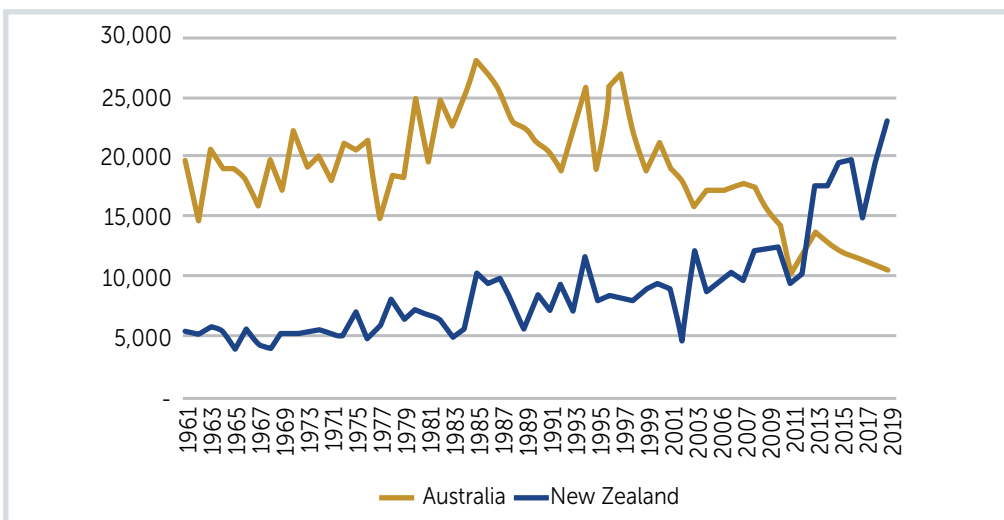
STATE	1962		2000	
	TONNES	%	TONNES	%
NSW	6,995	35%	8,775	41%
VIC	4,688	24%	4,971	23%
QLD	582	3%	2,069	10%
SA	3,820	19%	3,008	14%
TAS	127	1%	944	4%
WA	3,628	18%	1,596	7%
Total	19,840	100%	21,363	100%

Source: AHB Annual Report 1963 and RIRDC (2007) using ABS data.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

In John Karasinski's presentation to the WA Apiarist's Society in March 2020 he shared data on honey production in Australia as opposed to New Zealand from 1961-2019. It shows declining production in Australia whilst honey production is increasing in New Zealand. Honey production in Australia in 2018 was 11,300 tonnes which was 0.49% of global production which was 2,308,749 tonnes of honey.⁷³ In 2019, it was 10,695 tonnes while New Zealand's production was 23,000.⁷⁹

	1961	2019	GROWTH RATE	ANNUAL COMPOUND GROWTH
Aust	19,800	10,695	-45.98%	-1.0563 p.a.
NZ	5,533	23,000	+315.69%	+2.4869 p.a.



Honey production Australia and New Zealand 1961 - 2019 (tonnes)

Source: Karasinski, John – Curtin University Economist, Email Communication, June 2021⁷⁹

As in most other areas of the world, honey production in Australia is mainly driven by weather conditions and the impact of weather events such as droughts, floods and bushfires on the honey bee population. Other factors that can impact the level of production are honey bee pests and diseases, nutritional deficiencies as well as the health and access to the native vegetation from which the honey is produced.

Following the 2019-20 bushfires it is estimated that 15.6 million hectares of native forest was destroyed. Critical nectar and pollen sources for honey bee colonies were lost and the ability to meet the pollination needs of the Australian agriculture industry severely compromised along with the ability to meet demand for domestic and export honey. Industry experts suggest honey production across Australia is down 50% with a significant proportion of hives lost.⁵²

NSW apiarists say it will take up to 10 years for honey production to recover from the fires. They expect it could take between 5 and 20 years for some flowering gums to fully recover and produce enough nectar and pollen to feed the bees. Even in Tasmania many bees are now starving to death due to wilting leatherwood flowers and a lack of pollen.⁵⁷

In response to bushfires, a 6-point plan was developed through industry wide consultation to recover the beekeeping industry over the next five years which includes:

- Direct hive feeding and pollination support to underpin spring honey flows and future pollination services for agriculture.
- Fee waivers to reduce costs for apiarists such as site fees, beekeeper licences and vehicle registrations.
- Levy supplements to support the loss of levy income due to low honey production and to ensure critical bio-security measures and industry research continues.
- Industry sustainability research to optimise hive management, use of native flora resources, and to optimise agriculture pollination into the future.
- Communications initiatives to deliver best practice in bee keeping and advice on flora selection.
- Industry outreach and engagement to support beekeeper and industry representation with native vegetation and forest management agencies and groups, and to upskill beekeepers and encourage new entrants to the industry.⁴²

IBISWorld outlines that some Australian producers have invested in expanding their Manuka honey production capacity over the next five years, as a result of strong demand. Manuka honey is produced by bees that pollinate the Manuka flower, which is native to south-east Australia and New Zealand. Manuka honey’s popularity has soared over the past decade, and the honey is often sold at a high price point and generates strong margins for beekeepers.⁶⁸

In late 2019 New Zealand Manuka honey producers applied to claim certification trademarks for the term ‘Manuka honey’ in China and other markets like the European Union. This application has faced strong objection from domestic Manuka honey producers, which are represented by the Australian Manuka Honey Association. No decisions have been made regarding the trademark, but any changes to how producers in Australia and New Zealand can market Manuka honey in export markets would significantly affect the industry’s performance.⁶⁸

Honey production per beekeeper/ hive

Honey production per hive in Australia in 2019 was calculated to be 29.9 kg per hive according to John Karasinski.⁷⁹ In his presentation to WAAS, he shared data that shows the yield per hive in Australia in 2018 was 27.4kg/hive compared to 1961 when it was 55.5kg/hive. However, the 2018 data is on the back of the driest year in 119 years. Australian beehive yields are actually above that of New Zealand and the USA in 2018.⁷⁴

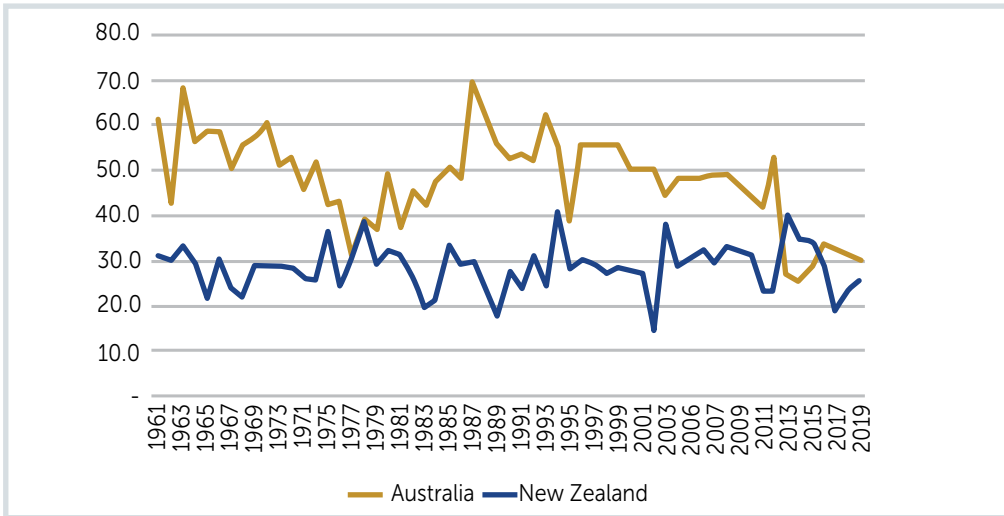
Honey productivity: 1961 – 2018

	HONEY PRODUCTION (KG)	NUMBER BEEHIVES	YIELD PER HIVE (KG)	PERCENT CHANGE		PRECIPITATION 2018
				YIELD	HIVES	
1961						
• Australia	17,962,258	323,447	55.5			
• New Zealand	5,019,453	179,953	27.9			
• USA	112,777,578	5,514,000	20.5			
2018						
• Australia	10,251,188	374,697	27.4	(50.6)	15.8	Driest in 119 years.
• New Zealand	18,143,695	879,758	20.6	(26.2)	388.9	120 - 149% above normal.
• USA	62,690,094	2,803,000	22.4	9.3	(49.2)	3rd wettest on record.

NB: 3 US States with highest yield: Hawaii - 47 kg Montana - 42kg and Mississippi - 39 kg
Source: USDA Honey Production 2018. p.3.

Source: Karasinski, John – Curtin University Economist, ‘The Flip side of the Australian Beekeeping Industry: A Global Perspective. Presentation at WA Apiarist’s Society, March 2020⁷⁴

Karasinski recently updated the figures to a productivity chart of Australia versus New Zealand in terms of kilogram of honey per hive from 1961-2019. In 2019, Australia’s yield per hive increased marginally from 2018 to 29.9kg, whereas New Zealand increased more than 12% to 25.1kg. Hobbyists produce far less than 30kg per hive, more like half that figure – 15kg per hive. ⁷⁹



Honey yield per hive: Australia and New Zealand 1961-2019 (kg)

Source: Karasiński J.M. 2021 Global Bee Hive Charts 1961 – 2019, Email Communication⁷⁹

The AgriFutures report ‘Size and scope of the Australian honey bee and pollination industry’ outlines that commercial hive honey production oscillated between 50kg and 70kg/hive/year whereas recreational beekeepers produce an annual output of 50kg per hive. Honey production for commercial producers has averaged 18 tonnes/year since 2003. Commercial honey production per hive may be in decline. Beekeepers attribute this decline to a loss of mature nectar producing trees and the opportunity cost associated with diverting hives to paid pollination.²

Data to estimate honey production per commercial beekeeper 1968 to 2019 in the AgriFutures report (2021) was derived from partial historical datasets and from estimates prepared by the report’s author in the table below.²

Honey production per commercial beekeeper – 1968 to 2019 (tonnes)

	1968	1969	1970	1979	1980	1997	2015	2018	2019
Commercial honey production: ABS/LRS data (t)	19,980	13,220	19,761	18,173	24,400	20,758	19,314	20,504	18,529
Commercial honey production: smaller producers, levy leakage (t)	0	0	0	0	0	8,000	10,000	10,000	10,000
Total commercial honey production (t)	19,980	13,220	19,761	18,173	24,400	28,758	29,314	30,504	28,529
Commercial beekeepers (no.)	2,231	2,104	2,176	2,201	2,141	2,350	1,337	1,781	1,868
Honey production per beekeeper (t)	9.0	6.3	9.1	8.3	11.4	12.2	21.9	17.1	15.3

Source: Honey production from AHB Annual Reports and DAWE levy data, beekeeper numbers from AHB Annual Reports, ABARES, AHBIC and PHA using hive registration data.
 NB: Estimates after 1985 based on partial levy data, and an allowance estimated by AgEconPlus has been included for smaller commercial producers and levy leakage.

Source: AgriFutures Report ‘Size and scope of the Australian honey bee and pollination industry – a snapshot’, February 2021²

Australian farm gate honey price

In 2018-19 the estimated farm gate price for beekeepers nationally was \$6.50/kg. The major honey packers Hive and Wellness Australia, Beechworth, Super Bee, Spring Gully etc. dictate the price paid to commercial beekeepers; the national price of honey is currently at \$6/kg, which it has been for the last 2 years. This however has increased over 90% in 10 years.

Below are some prices per kilogram for Australian produced honey based on industry data since 2012.

HONEY	2012	2015	2017	2021
Eucalypt (top table grade)	\$3.20 – 3.35	\$ 4.00	\$4.90	\$6.20
Table Grade Eucalypt	POA	\$ 3.95	\$ 4.80	6.10
Non-varietal Medium Table Grade	\$3.10 – 3.25	\$3.80	\$ 4.10	\$6.10
Ground Flora (lower grade)	\$3 – 3.10	\$ 3.00	\$3.20	\$5.80
Industrial Grade 1	\$2.50	\$ 2.95	\$ 3.00	\$5.05
Industrial Grade 2	POA	POA	\$ 3.00	\$3.80
Organic (ACO certified)	POA	\$ 6.00	\$6.30	\$8.00
Organic (NOP certified)	N/A	\$ 6.30	\$6.50	\$9.00
Manuka	POA	\$5-40	POA	Market rates \$30
Pure Active Jarrah 20+	\$ 4.50	\$ 6.10	\$12	Market rates \$ 15 – 25
Pure Jarrah	\$6	\$ 6.10	\$5.50	POA
Mixed Jarrah	\$4	\$ 4.30	\$5.45	POA

According to the AgriFutures report 'Size and scope of the Australian honey bee and pollination industry' honey produced by Australian commercial and recreational beekeepers is valued at around \$6.50/kg at farm gate. It outlines a proxy for honey price by dividing GVP of honey and beeswax (aggregate data prepared each year by ABARES) by the volume of honey production on which levy is paid.²

Honey price received by producers, 2012 to 2019

YEAR	HONEY PRODUCTION VOLUME ON WHICH LEVY IS COLLECTED (TONNES)	HONEY AND BEESWAX GVP (\$ MILLION)	FARMGATE PRICE 'PROXY' (\$/KG)	FARMGATE PRICE – BEEKEEPER ADJUSTED (\$/KG)
2011-12	21,744	85	3.65	3.65
2012-13	23,031	92	3.84	3.84
2013-14	21,920	88	4.02	4.02
2014-15	19,314	101	5.21	5.21
2015-16	15,957	110	6.91	6.50
2016-17	17,148	116	6.75	6.50
2017-18	20,504	140	6.84	6.50
2018-19	18,529	147 ^s	7.94	6.50

Source: DAWE Report to Levies Stakeholders 2017-18, 2018-19 and ABARES Commodity Statistics, various issues. s = ABARES estimate

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Beeswax is a minor contributor to total GVP and is estimated at between \$2 million and \$4 million pa (see analysis in 'Other hive products' below).

In recent years there has been an 'uptick' in the price beekeepers received for their honey.² Better honey prices are attributable to a shortage of Australian product, successful differentiation of Australian and imported product, and higher domestic demand (AgEconPlus 2016). Recognition and payment for highly profitable Australian Manuka honey has also been critical (IBIS World 2020). Rob Manning, AgriFutures Honey Bee and Pollination Program Advisory Panel member, notes that WA beekeepers are regularly receiving \$30/kg for jarrah and blackbutt honey, which has markedly increased beekeeper profitability in that state.²

Market outlook

According to the IBIS report⁶⁸, industry revenue is forecast to grow strongly over the next five years as output recovers from the bushfires and as trade flows normalise following the COVID-19 pandemic. Industry revenue is projected to grow at an annualised 8.2% over the five years through to 2025-26, to \$198.9 million. Rising health consciousness is anticipated to boost domestic demand for honey over the next five years, while rising incomes in Asia are forecast to boost export demand.⁶⁸

Australian Honey Market

As outlined in the Australian Honey Bee Industry Councils Annual Report (2019/20) the past year has seen packers and beekeepers alike consumed by the adverse effects of prolonged drought and the devastating fires of summer 2019/20. The year has been made even more interesting with the addition of the COVID-19 virus and the impacts that has had on society, community, economies and business. Ensuring the packers of Australia can meet a changed pandemic demand has been a new priority, considering the low honey production this season.⁵⁰

Reduced honey production stemming from the drought and exacerbated by bushfires has raised honey prices to record levels. This has led to the need to re-set wholesale prices for honey as input costs rise, leading to higher consumer retail prices. Most of the honey in Australia is sold through a concentrated group of supermarket chains, who have been supportive of the plight of Australian beekeepers and the rationale behind heightened beekeeper honey prices. The Packers and Marketers of the HPMAA have worked hard to ensure beekeepers get the best return.⁵⁰

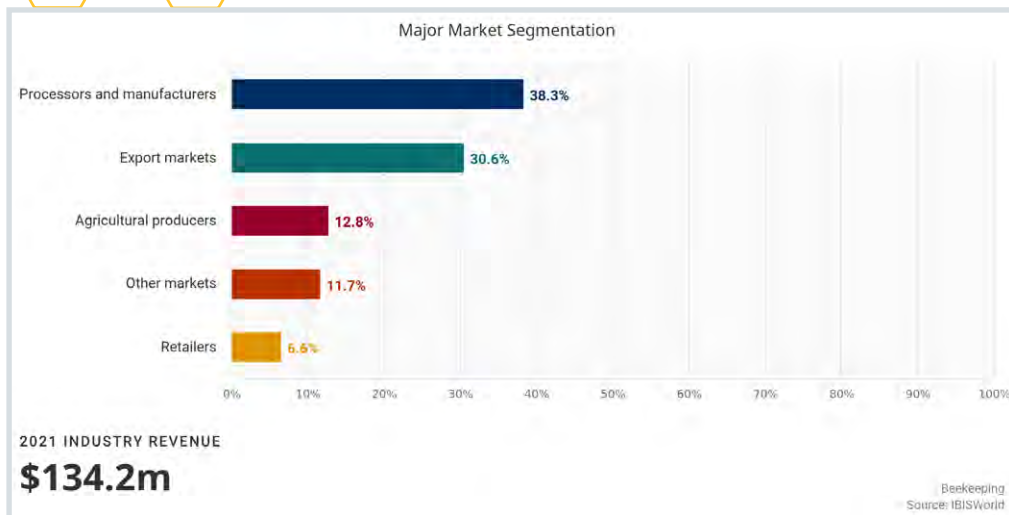
IBISWorld (2021) outlines that the major markets for Australian beekeepers include processing and manufacturing (38.3%), export (30.6%), agricultural producers for pollination (12.8%), other markets (11.7%) and retailers (6.6%).⁶⁸

Processors account for the largest share of industry revenue and include honey companies without their own hives that purchase raw honey from beekeepers and process it into the final product. Honey is also used in a variety of other products, as either an additional flavour or as an alternative to sugar. Honey is also used in medicinal products, due to its healing properties. Additionally, honey is the main ingredient in the alcoholic beverage mead. While the production of mead in Australia is still very small, the number of artisan mead producers has increased in recent years. Overall, this market has increased as a share of industry revenue over the past five years, as increasing consumer health consciousness has boosted downstream demand for honey as an alternative to sugar.⁶⁸

Exports account for a significant share of industry revenue. Industry operators export natural honey both pre-packaged and in bulk. Honeycomb is also exported, though in much smaller quantities than honey. Agricultural producers represent an important market for industry players, as European honeybees play a very important role in pollinating plants in Australia.⁶⁸

While beekeepers of all sizes sell directly to retailers, operators with 250 or more hives generate a larger proportion of revenue from this segment. Supermarkets and grocery stores account for the bulk of revenue from this segment, although industry products are also sold in delicatessens and other specialty food stores. This market has increased as a share of industry revenue over the past five years, as demand for premium products such as Manuka honey and honeycomb has risen.⁶⁸

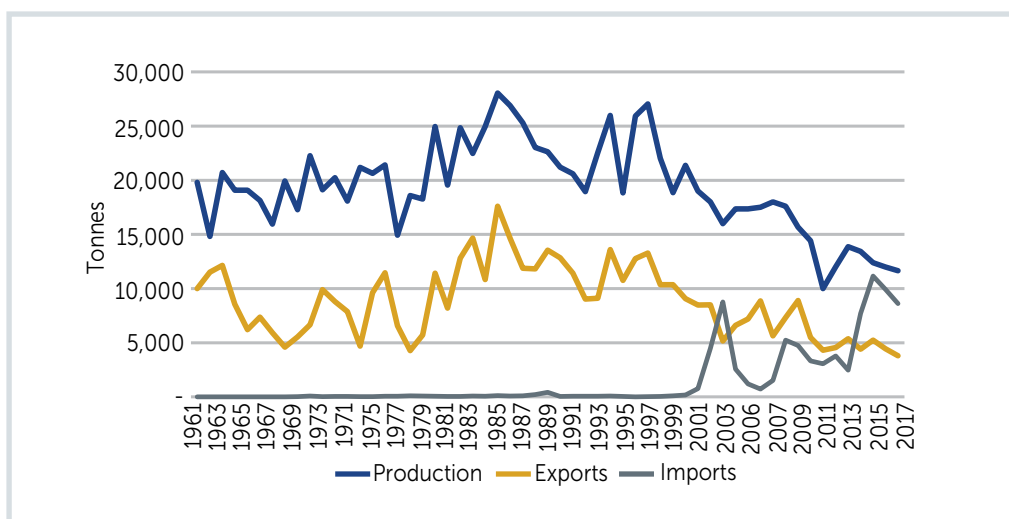
Beekeepers also sell honey and other bee products at local markets and directly to end-user markets. Rising demand for fresh, local produce has prompted consumers to increasingly visit farmers' markets over the past five years. As amateur beekeeping has become increasingly popular, sales of hives and live bees have risen. Nevertheless, this market has declined as a share of revenue over the past five years due to stronger demand from other markets.⁶⁸



Major Market Segmentation

According to IBIS exports are still expected to account for over 30% of industry revenue in the current year; they have declined as a share of industry revenue over the past five years due to the fall in production. Strong demand from consumers in Asia has supported export revenue over the period, as rising household incomes in the region have boosted demand for Australian produce which has a strong reputation in Asia. However, domestic beekeepers face strong competition from their New Zealand counterparts in both the export and the domestic markets. Imports are anticipated to account for over 35% of domestic demand in 2020-21.⁶⁸

Australian annual honey production as opposed to exports and imports for the period of 1961-2017 is outlined below and shows production was decreasing along with exports and imports, although there was a sharp increase from 2013-15.⁷⁴



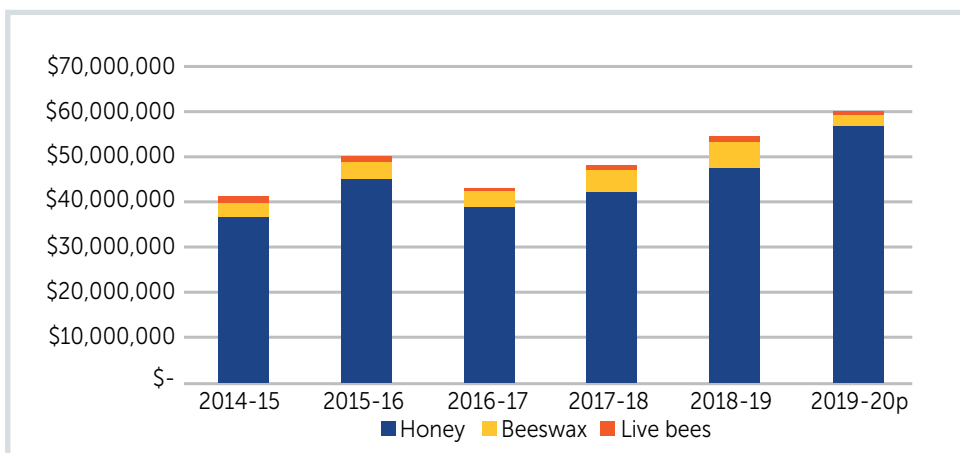
Annual honey – production, exports and imports, Australia 1961-2017 (tonnes)

Source: Karasinski, John – Curtin University Economist, 'The Flip side of the Australian Beekeeping Industry: A Global Perspective. Presentation at WA Apiarist's Society, March 2020'⁷⁴

International trade in the beekeeping industry is significant. Australia is a net importer of honey, with the industry having faced increased import penetration over the past five years. However, exports account for a high and increasing share of industry revenue. While exports and imports in the beekeeping industry in Australia are high, IBISWorld believes they are decreasing.⁶⁸

Australian Honey exports

Australia is one of the top honey producing countries in the world, with a large amount of honey produced in Australia exported to a variety of countries in both bulk and retail shipments. In 2019/20 more than \$60 million of total honey bee products were exported from Australia.⁸⁴

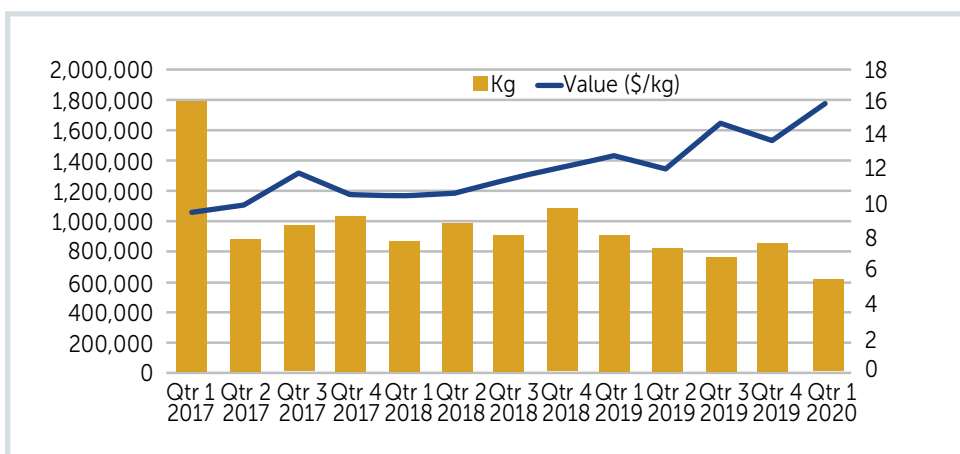


Honey bee products export (Australia)

Source: WA Dept. Primary Industries and Regional Development, various.

Currently Australia exports less than half the honey it did during the 1960s; only 4,000 tonnes each year. Australia has the potential to export more honey, but the supply is simply not available. Key markets for Australian honey include China, USA, Singapore, Canada and Malaysia.⁶ In 2019 approximately 20% of total industry value (\$39.6 million) was generated through export honey sales (IBIS World 2020).² Tridge data shows that honey exports from Australia in 2020 were worth US\$40.7 million, up on 2019. Australia was ranked 20th in the world in terms of export value and 27th in exporting volume with 4,000 tonnes in a year.²⁴

As outlined in the Australian Honey Bee Industry Council Annual Report (2019/20) export volumes of Australian honey have been in decline since the end of 2018, and more notably at the beginning of 2020, largely due to increased trade tensions with China and stronger growth in other segments. The rise in export value (\$/kg) has tracked in line with rising beekeeper honey prices, making Australian honey one of the highest priced premium table honeys in the world, being somewhat uncompetitive as a bulk industrial commodity.⁵⁰



Honey exports (kg) over time 2017-2020

Source: Australian Honey Bee Industry Council Annual Report 2019/20⁵⁰

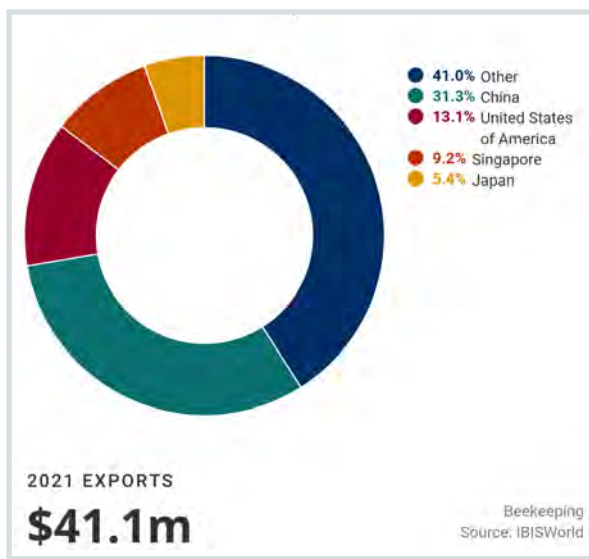
From the early 1960s through to 1990 Australia exported 40% to 60% of national production, averaging 9,500 tonnes pa. In the 1960s key markets were the UK, Japan and West Germany with Hamburg a major centre of honey import and re-export. In 1984 the BAE noted that variations in honey exports was primarily attributable to fluctuations in Australian honey production (i.e. the availability of product). In the five years to 2019 AgriFutures (2021) states that Australia exported 22% of the levied national honey crop, about 4,000 tonnes pa. Key export markets were China, the USA, Singapore, Canada, Malaysia, the UK and Hong Kong. The table below shows the top 10 export destinations for Australian honey, 2015 to 2019.²

Australian honey exports by country – 2015 to 2019 (tonnes for year ending 30 June)

	2015	2016	2017	2018	2019
Canada	491	403	339	313	323
China	520	726	729	434	672
Hong Kong	357	442	224	276	226
Japan	109	127	157	194	124
Malaysia	410	346	409	339	261
Oman	207	227	214	153	171
Singapore	345	450	448	527	382
United Arab Emirates	236	226	183	251	185
UK	367	236	283	323	241
USA	76	99	127	258	668
All other	1,060	1,197	628	803	594
Total	4,178	4,479	3,741	3,870	3,847

Source: DFAT STARS Database, based on ABS Cat No 5368.0, March 2020 data.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²



According to IBISWorld industry export revenue is expected to decline at an annualised 4.1% over the five years through 2020-21, to account for 30.6% of industry revenue. Exports largely comprise natural honey in pre-packaged containers under 4 kilograms in weight. However, exports of honeycomb have increased from a low base over the past five years. China is the largest market for Australian honey, with strong demand supported by the China-Australia Free Trade Agreement implemented in December 2015. However, the value of honey exports is anticipated to decline over the five years through 2020-21 due to lower production volumes and trade disruption caused by the COVID-19 pandemic. Other key export markets include the United States, Singapore and Hong Kong. Demand for Tasmanian Manuka and leatherwood honey in Singapore has grown in recent years.⁶⁸

The value of Australian honey exports to each of the destinations is outlined below in the Table, as provided by Tridge.²⁴

	Country	Export %	Export Value							
			2013	2014	2015	2016	2017	2018	2019	2020
1	China	24.96%	\$3.41M	\$4.61M	\$8.60M	\$8.33M	\$6.39M	\$6.30M	\$10.47M	\$10.16M
2	United States	10.63%	\$297.82K	\$262.87K	\$760.62K	\$672.75K	\$1.48M	\$4.23M	\$5.95M	\$4.32M
3	Singapore	10.07%	\$2.32M	\$2.01M	\$2.76M	\$2.88M	\$3.20M	\$3.43M	\$2.81M	\$4.10M
4	Japan	8.66%	\$851.57K	\$455.31K	\$669.30K	\$969.97K	\$1.50M	\$1.23M	\$1.30M	\$3.52M
5	Canada	5.91%	\$2.50M	\$2.64M	\$3.31M	\$2.75M	\$3.53M	\$1.83M	\$2.57M	\$2.40M
6	Hong Kong	5.68%	\$3.02M	\$2.92M	\$5.05M	\$3.55M	\$2.49M	\$2.81M	\$1.94M	\$2.31M
7	United Arab Emira...	5.56%	\$1.75M	\$1.70M	\$1.52M	\$1.45M	\$1.66M	\$1.73M	\$1.40M	\$2.26M
8	Malaysia	4.37%	\$2.10M	\$2.18M	\$2.03M	\$2.15M	\$2.07M	\$1.97M	\$1.48M	\$1.78M
9	Indonesia	3.39%	\$943.72K	\$421.64K	\$580.86K	\$335.07K	\$296.40K	\$453.89K	\$156.28K	\$1.38M
10	Oman	2.96%	\$1.26M	\$1.22M	\$1.35M	\$1.72M	\$1.12M	\$1.15M	\$1.36M	\$1.20M

Top Export Destinations for Australia honey

Source: Honey export from Australia – Tridge²⁴

Australian Honey Imports

Australia routinely imports twice what it exports according to AgriFutures (2021). Sources of imported honey include China, Argentina and New Zealand.⁶ Until 2001-02 imports of honey were minor and ad hoc, averaging 100 tonnes pa or less. Since 2001-01 imports have averaged close to 5,000 tonnes, routinely exceeding honey exports. In the five years to 2019, Australia imported an average of 8,300 tonnes of honey pa. Key sources of imports for low-cost honey were China and Argentina. High-value honey was imported from New Zealand. The top five import sources for honey 2015 to 2019 are shown in the table below.²

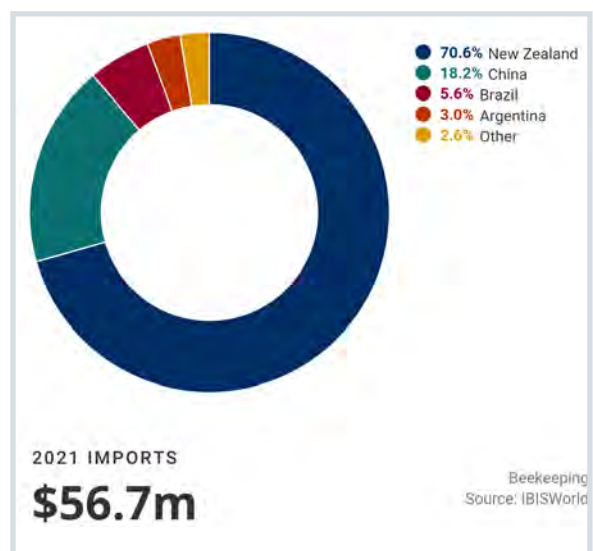
Australian honey imports by country – 2015 to 2019 (tonnes for year ending 30 June)

	2015	2016	2017	2018	2019
Argentina	778	1,378	756	387	274
Brazil	234	174	133	263	36
China	6,238	5,789	6,998	6,136	2,980
India	60	3	45	32	74
New Zealand	1,126	1,663	861	1,304	1,200
Other	637	893	117	335	403
Total	9,074	9,900	8,910	8,457	4,969

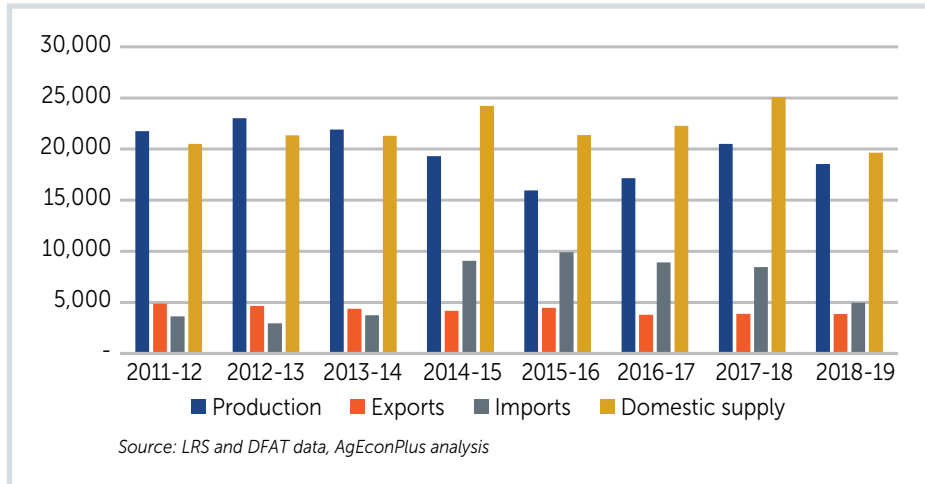
Source: DFAT STARS Database, based on ABS Cat No 5368.0, March 2020 data.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

According to IBISWorld (2021) the total value of imports is anticipated to fall at an annualised 9.0% over the five years through 2020-21, to account for 37.9% of domestic demand. However, this figure is partly skewed by a high base year, with imports fluctuating over the past five years. Over 70% of industry imports originate from New Zealand. Rising health consciousness has boosted demand for Manuka honey, which is regularly marketed as an alternative medicine. While some Manuka honey is produced in Australia, the majority is produced in New Zealand. China, Brazil and Argentina are the three next largest importers of honey into Australia. Demand for honey from China and Argentina has declined over the past five years, following a negative consumer reaction to their use in local honey products. This trend has in turn boosted demand for local honey and reduced overall demand for imports.⁶⁸



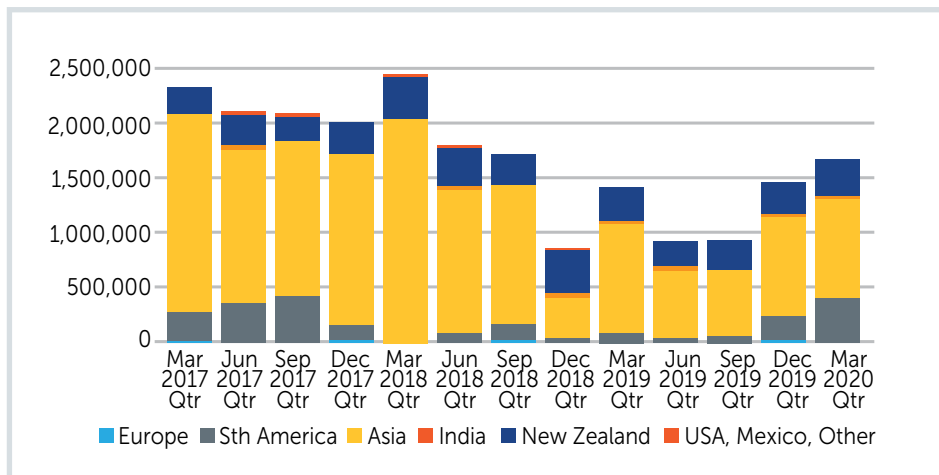
The graph below provided by AgriFutures (2021) shows a correlation between Australian production and the volume of honey imported.²



Australian honey supply and demand balance – 2012 to 2019

Source: AgriFutures Report ‘Size and scope of the Australian honey bee and pollination industry – a snapshot’, February 2021²

As quoted in the Australian Honey Bee Industry Council’s Annual Report (2019/20) ‘in times of reduced Australian honey production following the 2019/20 bushfires, imports commonly rise, which is evident in the data from the December 2019 and March 2020 quarter. Whilst imports have risen, they remain lower than in 2017 and 2018. Honeys from Asia, New Zealand and South America dominate origins of imports, as has historically been the case. New Zealand honey imported into Australia ranges in cost from \$30-\$45/kg and this is principally imported in Manuka retail honey packs, which has averaged approximately 100t a month over the last three years.⁵⁰



Honey imports (kg) over time (2017 to 2020)

Source: Australian Honey Bee Industry Council Annual Report 2019/20⁵⁰

The following table summarises the average Australian imported honey costs over time (\$/kg):⁵⁰

	2017	2018	2019
Europe	\$9.73	\$10.14	\$11.06
Sth America	\$4.34	\$4.00	\$3.65
Asia	\$2.46	\$2.41	\$2.89
India	\$4.53	\$4.92	\$3.39
NZ	\$36.60	\$38.90	\$36.70
USA, Mexico, Other	\$7.26	\$9.15	\$9.42

Source: Australian Honey Bee Industry Council Annual Report 2019/20⁵⁰

Nation Master website rated Australia 13th in terms of import value in 2019 of US\$54 million and 13th for volume with 9,000 tonnes of honey imported in 2017.⁴⁶ Data taken from Tridge states that the value of honey imports into Australia in 2020 was US\$41m for an import volume of 8,000 tonnes of honey. It shows in 2020 New Zealand provided the highest value of imports into Australia followed by China and Brazil.²⁴

	Country	Import %	Import Value							
			2013	2014	2015	2016	2017	2018	2019	2020
1	New Zealand	65%	\$15.30M	\$25.22M	\$33.58M	\$27.05M	\$28.16M	\$42.24M	\$28.13M	\$26.69M
2	China	17.65%	\$1.80M	\$8.73M	\$11.85M	\$12.05M	\$11.79M	\$8.73M	\$6.24M	\$7.25M
3	Brazil	8.49%	\$150.34K	-	\$1.15M	\$506.37K	\$1.65M	\$153.91K	\$439.96K	\$3.49M
4	Argentina	4.13%	\$1.56M	\$3.96M	\$5.18M	\$2.51M	\$2.54M	\$681.09K	\$606.72K	\$1.70M
5	Germany	1.83%	\$1.85K	\$3.14K	\$17.77K	\$5.84K	\$6.05K	\$110.72K	\$35.66K	\$753.44K
6	Saudi Arabia	0.63%	-	\$7.05K	\$31.92K	\$81.33K	\$43.00K	\$61.06K	\$4.46K	\$260.19K
7	Greece	0.47%	\$114.37K	\$93.12K	\$158.61K	\$135.17K	\$234.99K	\$150.60K	\$162.02K	\$194.02K
8	Turkey	0.42%	\$128.52K	\$22.84K	\$9.80K	-	\$43.75K	\$22.77K	\$18.07K	\$174.49K
9	India	0.26%	\$148.50K	\$62.52K	\$218.70K	\$70.40K	\$91.14K	\$133.51K	\$123.24K	\$104.75K
10	Serbia	0.25%	\$12.33K	\$139.50K	\$15.27K	\$51.60K	\$44.81K	\$49.91K	\$52.16K	\$102.67K

Top Import Origins for Australia

Source: Honey imports into Australia – Tridge²⁴

Australian Honey Domestic Market

The Australian honey retail category is dominated by sales through the large supermarkets Woolworths, Coles, Metcash and Aldi. There is limited data on sales through other channels such as health stores, pharmacies, gift shops, farmers markets and beekeeper direct sales.

The available retail market share figures do not include Aldi/Costco and smaller retail outlets that don't draw from Metcash as well as direct B2B and B2C outlets. There are also sales into the foodservice and industrial markets with honey used for cooking and ingredients, although these markets use a lot of imported honey.

Domestically about 12,000 tonnes of honey is sold through retail outlets according to AZTEC/ scan sales and warehouse withdrawal data, however these figures also include sales of imported honey in retail outlets. Industry sources report that about 2,300 tonnes of imported honey is sold through retail market channels.

The total sales are broken down as per the table below (working on the industry average of sales of 25,000t of Australian honey produced per annum).

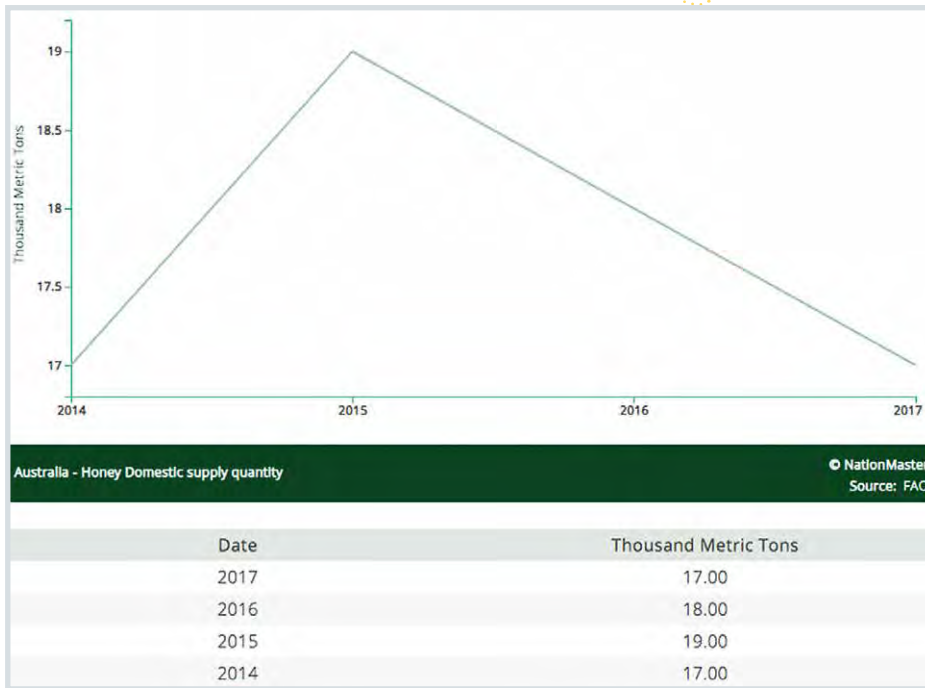
RETAILER	MAT – MARKET SHARE - AZTEC	TOTAL TONNES	ADJUSTED MARKET SHARE	COMMENTS
Woolworths	45%	5000	20%	Largest retailer about 40% of market
Coles	34%	4000	16%	About 33% of Australian market
Metcash	7%	1000	4%	Supplies IGA/ Independent stores
Aldi	5%	1000	4%	11% of national grocery market
Costco	2%	400	1.6%	Growing chain
Foodservice	n/a	2000	8%	Catering etc.
Industrial	n/a	3000	12%	Ingredient
Export	n/a	4000	16%	
Health	5%	1000	2%	Sales of high value product
Markets	n/a	1000	2%	BK direct
Directs	n/a	1000	8%	Farm direct/ online/ B2B/ B2C - BK direct
Other - unknown	2%	600	6.4%	Not Sold / Given away – stored – used for Bee feed etc.
TOTAL	100%	25,000	100%	

The Australian Honey Bee Industry Council’s Annual Report (2019/20) outlines that the impacts of the COVID-19 virus on consumer habits is seeing a recent increase in honey sales as consumers seek long-life natural products and bake at home more. As a consequence, the Australian retail supermarket and pharmacy segment is in growth at a total market size of greater than \$153m year to date (Source: Aztec Data YTD to 26/04/20). In the past year there has been a notable increase in private label sales domestically, with an increase in value of over 40% compared to last year.⁵⁰

The AHBIC say the work of the Australian Manuka Honey Association (AMHA) remains critical for sustained market access for Australian beekeepers producing Manuka honey. HPMAA is a member of the AMHA and encourages all facets of industry to support their work to overcome the commercial trademark applications stemming from New Zealand. The efforts of the New Zealand honey industry present a threat to the marketability and value of Australian premium honey exports.⁵⁰

Reduced honey production stemming from drought and exacerbated by bushfires has raised honey prices to record levels. This has led to the need to re-set wholesale prices for honey as input costs rise, leading to higher consumer retail prices. Most of the honey in Australia is sold through a concentrated group of supermarket chains, who have been supportive of the plight of Australian beekeepers and the rationale behind heightened beekeeper honey prices. The packers and marketers of the HPMAA have worked hard to ensure beekeepers get the best return.⁵⁰

There was no data available as to the amount of honey supplied domestically within Australia from Australian publications. Contact was made with the Australia Honey Bee Industry Council and the Honey Packers and Marketers Association of Australian Inc. and unfortunately none of them have this industry information. However, the Nation Master webpage shows the domestic honey supply quantity since 2014 has showed no change. With 17,000 tonnes in 2017, Australia was ranked 22nd amongst other countries in domestic supply quantity. China ranked the highest globally with 432,000 tonnes in 2017.⁴⁶



Australia – Honey Domestic supply quantity (Thousand metric tonnes – 2014-2017)

Source: Honey Domestic supply quantity in Australia (nationmaster.com)⁴⁶

Other hive products in Australia

While honey is the major commercial output of the honey bee industry, there are a number of other products that add to the income of honey bee businesses including beeswax production, honeycomb in sections, propolis, royal jelly, bee venom, pollen, queen bee and packaged bee sales.

On average these products contributed less than 5% of beekeeper total cash receipts in 2014-15 (ABARES 2016). Obviously beekeepers who specialise in some of these products earn a greater share of their income from these sources e.g. specialist queen breeders. The table below summarises the values estimated for other hive products. In 2019 the three most important products were queen bee sales, beeswax and sales of packaged bees.²

Estimated value of other hive products – 2019 (\$'million)

HIVE PRODUCT	FARMGATE VALUE (\$'MILLION)
Beeswax	3.7
Honeycomb sections	N/a
Propolis	0.1
Royal jelly	0
Bee venom	0
Pollen	1.6
Queen bees	6.8
Packaged bees (domestic + export)	3.5
Nucleus hives	N/a
Total	15.7

Source: AgEconPlus analysis

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Gibbs and Muirhead (1998) estimated the total value of propolis, royal jelly, bee venom and pollen at \$0.3 million per annum. With the exception of small volumes of propolis and pollen sales in WA, the sector has grown little in the past 20 years. Based on the commentary below, a value of \$1.7 million was estimated in 2018-19.²

Australia does not export value-added hive products produced in this country. Some retail products including pollen, royal jelly and propolis, are packaged in Australia using imported materials. Imports of value-added hive products include small quantities of bee venom for the treatment of allergies, and large quantities of propolis and royal jelly for their medicinal qualities.²

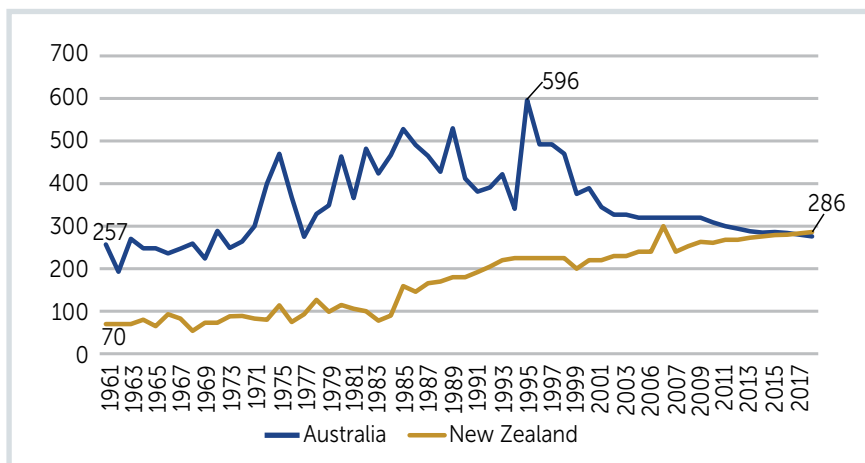
This section includes analysis of honey, beeswax, queen, and packaged bee exports. Data on growth of honey imports and commentary on import of value-added hive products is also provided where information was available.

Beeswax

Beeswax is used in certain pharmaceutical and cosmetic preparations as a base for polishes and some ointments, for candles and for comb foundation for beekeeping. It is typically sold by beekeepers in raw form. Production of beeswax is closely related to honey production.²

The AgriFutures report reports annual beeswax production is estimated at between 330 tonnes and 550 tonnes. While the price received by beekeepers has increased from \$3/kg to \$20/kg in the last 10 years, there has been no dramatic change in beeswax GVP since the 1960s. In 1961-62 beeswax GVP was \$0.3m, in 1988-89 it was \$1.9m, in 2001-02 it was \$2.5m, and in 2018-19 it was \$3.7m.²

In John Karasinski’s presentation to the WA Apiarist’s Society in March 2020 he shared data on the production of beeswax in Australia as opposed to New Zealand from 1961-2018. It shows that it was about equivalent at 286 tonnes in 2017. In 2018, Australia produced 276 tonnes of beeswax which was 0.39% of the global production of 69,633 tonnes.⁷³



Beeswax production: Australia and New Zealand, 1961 – 2018 (tonnes)

Source: Karasinski, John – Curtin University Economist, 'The Flip side of the Australian Beekeeping Industry: A Global Perspective'. Presentation at WA Apiarist’s Society, March 2020⁷⁴

Australian beeswax has always sold at a premium on world markets because it is free of adulteration and chemical residues. CIE (2005) estimated that about 80% of Australia’s beeswax is exported.² Gibbs and Muirhead (1998) reported Australian beeswax exports averaging 332 tonnes pa from 1991 to 1997. This study sourced data from DFAT that showed average beeswax exports 2015 to 2019 of 246 tonnes, and major export markets in Germany, Japan and the USA. Australia imports small volumes of refined beeswax. Raw beeswax imports are prohibited on biosecurity grounds.²

Honeycomb sections and chunk honey

Capped frames of honey are removed from the hive and cut into sections, which are either sold in flat containers (honeycomb sections) or bottled with liquid honey and sold in jars (chunk honey). Honeycomb in these forms tends to be marketed as a niche product through farmers markets, specialist retailers and to the food service sector. As consumer interest in honey provenance and honey medicinal qualities has increased, sales of honeycomb have also increased (IBIS World 2020). No data estimating the size of this sector has been identified.² There are a few specialist producers of section and chunk honey in Australia; overall the value is insignificant.² There is no record of honeycomb sections and chunk honey being exported from Australia.

Propolis

The antimicrobial properties of propolis are used for wound treatment, cold sores, mouth ulcers and for suppressing immune responses. Propolis has also been used in industrial processes (AgEconPlus 2019). There is no official data on the value and volume of propolis production in Australia. The sector is small. ABARES (2016) did not attempt to quantify either value or volume. ABARES (2003) estimated a national value of \$2.5 million for propolis, wax and honeycomb sections. Most of this value would be associated with wax and honeycomb.²

AgEconPlus (2019) estimated that the retail value of imported propolis products was \$32 million pa and that product is mostly sourced from China.² A report commissioned by AgriFutures in 2019 showed that Australian beekeepers could earn an extra \$1,400 a year by incorporating propolis production into their annual honey harvest.⁵³ Report author and principal consultant, Michael Clarke, from AgEconPlus investigated the status of propolis production in Australia and New Zealand. He worked closely with commercial beekeepers to prove that profitable harvesting of propolis in Australia was possible. In his report, Mr Clarke looks to New Zealand as a valuable model for which to create a thriving propolis industry in Australia. He also highlights the growing interest from companies in sourcing Australian produced propolis and a pathway for Australian beekeepers to enter the market.⁵³

More research on the chemistry of Australian propolis needs to be undertaken, but early studies show that it may have additional unique and potentially useful properties. While there has been an absence of consistent buyers, the tide is starting to turn with businesses looking to join the supply chain.⁵³

Capilano note that there is little to no propolis production in Australia (AgEconPlus 2019). Propolis production is profitable. Beekeepers, especially on Kangaroo Island SA are producing small volumes commercially, perhaps as much as \$0.1 million pa (AgEconPlus 2019).² According to the 2019 AgriFutures report 'Propolis Production: A Potential Boon for the Australian Beekeeping Industry' the commercial production status is summarised in the Table below.⁵³

Australian propolis production by region

STATE	PROPOLIS PRODUCTION
Queensland	<ul style="list-style-type: none"> Higher rainfall areas including the east coast appear to produce commercial quantities of propolis. However, supply is rainfall dependent. Production coincides with late autumn and winter. Warmer climate Queensland does not produce the same volume of propolis as New Zealand, Canada or the United Kingdom. Floral species known to produce propolis in southern Queensland include hoop pine and spotted gum. Commercial production has been attempted in the past and discontinued due to unachievable standards (resin content) and inconsistent demand.
NSW	<ul style="list-style-type: none"> Higher rainfall areas tend to produce more propolis and production in large quantity has been recorded up and down the NSW coast. Turpentine tree is understood to be an important source of propolis resin. Propolis production is prolific in the Blue Mountains with silver wattle, acacia, Tomah ferns, grass trees, yellow bloodwood and red bloodwood all contributing to supply. Production also attributed to honey bee genetics. The Central West of NSW does not seem to produce propolis in any volume despite having access to large areas of eucalypt forest. Apiaries in the Monaro produce large volumes of propolis and the principal source seems to be native pine and black cypress. Propolis is recovered and processed in the Young District of NSW

Australian propolis production by region (cont.)

STATE	PROPOLIS PRODUCTION
ACT	<ul style="list-style-type: none"> • Apiaries in the ACT produce large volumes of propolis and benefit from a cool climate and extensive plantings of European trees including poplar. • No known commercial production of propolis in ACT at the current time.
Victoria	<ul style="list-style-type: none"> • Victorian beekeepers report differing experiences with propolis. The most common experience is low volume production and certainly less than is achieved in countries like China and New Zealand. Mats have been trialled and propolis tends to accumulate unevenly across the apiary with weaker hives depositing most propolis at the beginning of winter. • Some beekeepers report consistent modest propolis accumulation across all of Victoria while others point to Western Victoria, through to and including the South Australian border, as a propolis production 'hot spot'. In this area propolis is sourced by honey bees from banksia and heath. • No known commercial production of propolis in Victoria at current time
Tasmania	<ul style="list-style-type: none"> • Propolis is accumulated in large volume in all parts of Tasmania. • Propolis production is particularly prolific in native prickly box areas. • No Tasmanian beekeepers currently collect and sell propolis.
South Australia	<ul style="list-style-type: none"> • Propolis is produced in a number of locations on the South Australian mainland. Drier areas are reported as being productive with small waxy plants and spinifex contributing propolis to managed hives. Beekeepers note that if strong hives with large bee populations are maintained, foraging bees will find sources of propolis in all parts of the South Australian mainland. • Kangaroo Island is a propolis production success story with a number of commercial beekeepers supplying local beekeeper processors and propolis researchers Dr Colin and Dr Rujee Duke. Propolis is sourced from a range of native species including sedge grass which is high in flavonoids and acacia. Dr Colin and Dr Rujee Duke will also purchase propolis from mainland South Australia. It is not known whether purchases are temporary for research purposes or a longer term commercial enterprise has been established.
Western Australia	<ul style="list-style-type: none"> • Propolis is produced in Western Australian managed bee hives. • Important propolis sources include grass trees with eucalypts species functioning as a secondary resin source. • Western Australian beekeepers retail propolis products but it is not known whether these are manufactured from locally sourced propolis.

Source: Agrifutures Australia, 'Propolis Production: A Potential Boon for the Australian Beekeeping Industry, 2019 Propolis Production: A Potential Boon for the Australian Beekeeping Industry | AgriFutures Australia'⁵³

South Australian based Bee Healthy Australia reports they have a healthy supply of Propolis emerging from South Australia. With their new state of the art facility in Glynde, Bee Healthy Australia claim to be Australia's first and only processing facility. They have identified significant challenges for propolis in the Australian market which is dominated by synthetic imported propolis.⁵⁹

Prices reported for raw Australian propolis are encouraging with Jim's Bee Products Group, Young NSW purchasing raw material that is 40% to 50% propolis for between A\$100 and \$120/kg (Jing Bang (Jim) Zou, Jim's Bee Products Group, pers. comm., October 2018). These prices are consistent with prices received for raw propolis in New Zealand which currently average NZ\$125.50/kg or A\$115/kg (Ministry of Agriculture New Zealand, 2017). Dr Colin and Dr Rujee Duke are reported as paying up to A \$300/kg for raw propolis of specific floral source from Kangaroo Island (Danny Le Feuvre, commercial beekeeper, pers. comm., August 2018).⁵³

The AgriFutures report (2021) outlines there is a market opportunity for propolis production in Australia, which includes re-export of consumer products to Asia, which is expected to grow 10% per annum to 2020. Australia imports up to 80 tonnes of pure propolis every year, which could be partially offset by future propolis production in Australia. To realise this opportunity beekeepers might partner with one of several companies with an interest in raw Australian propolis, including honey packers; an established processor looking for additional supply, a New Zealand processor exploring opportunities to set up in Australia or a buyer of imported pure propolis. The full report provides a list of current and potential buyers of raw propolis from Australian beekeepers.⁵³

For the Australian industry to be profitable, it will need to achieve price premiums of between 200% and 300%. The report suggests that if the product is well marketed and builds on Australia's clean, green image, these large premiums can be achieved.⁵³

Propolis harvest is moderately profitable and especially useful for smaller operators, who can incorporate the process into their usual honey bee harvest at particular times of the year. Using best estimate assumptions, raw propolis production in a 100-hive enterprise can add \$900 a year to net revenue if external labour is used and \$1,400 a year if the owner's labour is used. Additionally, Australian beekeepers will see greater outcomes should the processor provide a New Zealand style mat pick up and extraction service.⁵³

Royal Jelly

Royal jelly is a high-value apiary product that is not currently produced in Australia due to high labour costs associated with hand grafting larvae and the manual extraction of royal jelly (AgEconPlus 2017).²

The latest information available on the Royal Jelly market is a report produced by RIRDC in 2017 titled 'Australian Royal Jelly - Market Opportunity Assessment based on production that uses new labour saving technology'. It states that there is currently no domestic production of royal jelly although royal jelly has been produced and exported in the past by Browns Bees of Mendooran NSW.³¹

Bee Healthy Australia in South Australia is currently in the process of establishing a network co-op in Australia to significantly expand on the limited raw materials available. This will allow already established apiarists and bee farmers to easily integrate Bee Healthy Australia's systems to begin harvesting these products. Up until now all of Australia's competitors are importing the product already freeze dried, on-selling both nationally and internationally as 'Australian Made' and charging obscene premiums without the slightest clue on what they are distributing. Bee Healthy Australia has identified some unsavoury shortcuts and clever synthesis of some of these active components. Bee Healthy Australia is spending money and investing resources into better understanding how to identify and control these products being sold.⁵⁹

The Australian royal jelly market is dominated by the health supplements sector and products include fresh royal jelly and royal jelly capsules. The cosmetics preparation sector includes products which typically contain less than 1% royal jelly usually in a freeze dried form. Both the health supplement and cosmetic preparation sectors are growing strongly. China is able to supply royal jelly very cost effectively to the Australian market and counterfeit 'Australian' royal jelly is openly sold in China.³¹

AgEconPlus (2017) estimated a retail value of imported royal jelly of \$6 million per annum and that product is mostly sourced from China.² AgEconPlus estimates the Australian royal jelly market at somewhere around 17 tonnes per annum for freeze dried product and 3 tonnes per annum for fresh royal jelly. Both products are on-sold to the health supplement and cosmetic preparation sectors. Historically newly arrived Asian and European migrants were most interested in royal jelly and small quantities were imported to meet their needs. The dominant products in the health supplement sector are fresh royal jelly and royal jelly capsules. The average retail value of these products is close to \$300/kg.³¹

Due to Australia's strict food safety requirements and quarantine controls, Australian made products are highly sought after by Chinese consumers, who have become sceptical about products manufactured in their homeland. Therefore, exports of genuine Australian royal jelly would find a ready market in China (125 tonne per annum) and Japan (46 tonne per annum) with niche sales possible in other parts of Asia, Western Europe and North America. The overall market for Australian produced royal jelly, including domestic sales (2 tonnes per annum), is estimated at approximately 175 tonnes per annum. While a premium might be anticipated for Australian produced and certified royal jelly the market is known to be price sensitive and it is unlikely that Australian produced royal jelly will find a buyer at \$520/kg.³¹

Back in 2013 Mr Li Zhu of the Bao Chun Bee Products Company in China, inventor of royal jelly extraction equipment and marketer of Chinese royal jelly indicated an interest in sourcing and marketing Australian royal jelly. Mr Li Zhu would like to have royal jelly produced in Australia that he could export to China and Japan (Somerville June 2013). Mr Li Zhu indicated an indicative 'farm gate' price of A \$66.66/kg (400RMB/kg) for Australian produced royal jelly. A 'farm gate' price of A \$66.66/kg for Australian produced royal jelly is four times the price of China produced royal jelly at 'farm gate' but less than the price of Chinese produced royal jelly delivered to an Australian wholesaler.³¹

Bee Venom

There are only a few buyers of bee venom in the world; the market is relatively small compared to royal jelly, propolis and pollen. Currently no beekeepers in Australia produce bee venom commercially. Bee venom is imported, mainly from Romania (Gibbs and Muirhead 1998, CIE 2005).²

An ABC News story in 2019 highlighted that bee venom harvesting had amateur apiarists buzzing over a new revenue stream that does not damage their colonies. A new venom collection process utilises a battery-powered collector that is placed outside the hive, near the entrance to which bees are attracted, they sting a glass plate which collects the venom and it does not hurt the bee. The harvesting process takes less than an hour and the venom is then scraped from the glass plate and sells for more than \$120 per gram according to James Watts, who is the managing director of research and development company Whale Labs in Brisbane.³³

Bee Pollen

Pollen is used by bee colonies as a source of protein but can also be harvested by beekeepers, at a rate of around 7-10kg per hive per year. Harvesting pollen requires detailed knowledge of resources, hive management, species flowering variations and timing, and hive response to different honeys and pollens. Collected via specialised traps fitted to the hives, pollen must be processed rapidly after collection (usually via freezing or drying) to avoid fermentation and excessive moisture absorption. Many beekeepers harvest pollen to feed back to their hives during periods of natural pollen deficiency. Pollen is also sold for human consumption as a medicine and food supplement.

There are limited cash sales of pollen by beekeepers on the east coast. However WA production has increased; some WA beekeepers collect 3-4 tonnes of pollen for sale each year. Most of the pollen is sold either overseas or interstate (Gibbs and Muirhead 1998, CIE 2005, RIRDC 2007).²

Western Australian based SaxonBee Enterprises is the largest supplier of Australian bee pollen according to their webpage. They are currently servicing the Australian market and exporting to the USA and Asia.⁶⁰ Bee Healthy Australia, based in South Australia, also has a strong supply of premium quality, strictly Australian sourced bee pollen. Bee Healthy Australia also claims it is the largest global distributor of Australian bee pollen.⁵⁹

Queen and packaged bee sales

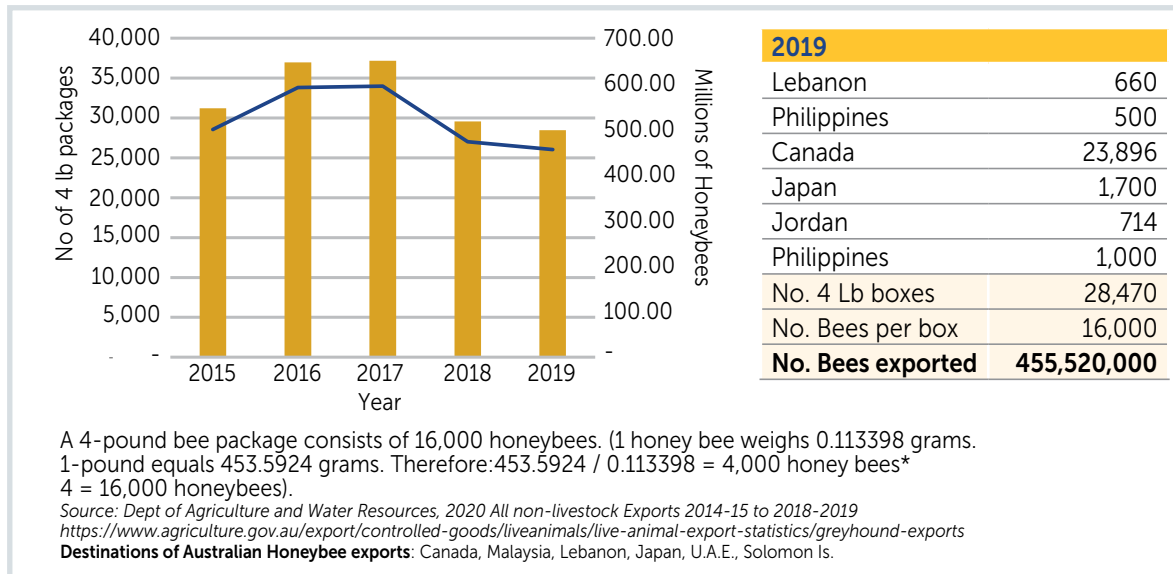
According to the AgriFutures report (2021), Australian live honey bees are exported, either as individual queen honey bees accompanied by a small number (usually less than 10) of nurse bees, or as package honey bees consisting of 10,000 bees weighing approximately 1.4kg per package. There is no official data on exports of either product (Karen Medson, Assistant Director, Statistics Section, DFAT, pers comm., May 2020).²

Packaged bee exports to Canada are a small but important industry for Tasmania and Western Australia. Both States are able to meet Canada's strict biosecurity requirements. Industry value peaked at \$7.5 million in 2010. In 2019 total queen and packaged bee exports were valued at \$2 million pa. Reopening the live bee export trade with the USA would add an estimated \$7.5 million to the Australian honey bee and pollination industry's value.^{6/2}

The production of packaged bees is labour intensive, requiring a crew of more than six people to undertake the smoking, hive drumming and shaking of bees into packages. Packages do not contain frames of honey, pollen or brood. Packages consist of 1.4kg of honey bees, a new mated queen and sugar syrup to feed the bees during transit.²

Packaged bees are sold on the domestic and export markets. Domestic package sales have increased as the recreational sector has grown. Recreational beekeeping supplier Hornsby Beekeeping Supplies reports that they sell 1,000 packages per year; nationally there may be 20 similar operations (Martin, Hornsby Beekeeping Supplies, pers comm., May 2020). Packages retail for \$150 each; a beekeeper price of \$75 is assumed. Domestic packaged bee sales were estimated at \$1.5 million in 2018-19.² Commercial beekeepers create and purchase nucleus hives to replace failed hives or to grow their business. The AgriFutures study (2021) was not able to value this sector.²

In John Karasinski’s presentation to the WAAS in March 2020 he shared data on Australian packaged bee exports which showed that exports declined in 2019. Destinations of Australian Honeybee exports include Canada, Malaysia, Lebanon, Japan, UAE and the Solomon Islands.⁷³



Australian packaged bee exports: 4 pound packages – 2015-2019

Source: Karasinski, John – Curtin University Economist, ‘The Flip side of the Australian Beekeeping Industry: A Global Perspective. Presentation at WA Apiarist’s Society, March 2020⁷⁴

Australian beekeepers probably rear more queens than they buy, but most professional beekeepers buy queens and queen cells from commercial queen breeders and also rear queens themselves. (RIRDC 2007, Liz Frost, Survey of Beekeeper Attitudes to Queen Production and Purchase, ABK June 2020). In commercial honey production, the usual practice is to replace the queen bee in a hive every 18 months. While half of the total replacement queen requirement is usually met by breeding within the commercial operation, the remaining queens are purchased from specialist breeders. On this basis, Gibbs and Muirhead (1998) estimated total queen bee sales at around 200,000, assuming a total commercial hive population of 602,557. In 1997, these queens were worth \$9 each, making a total value, excluding export sales and sales to recreational beekeepers, of \$1.8 million.²

Replicating the same process as Gibbs and Muirhead (1998) for 2018-19 would result in queen purchases of 177,000 (531,786 commercial hives, half requiring purchased queens every 18 months), with an average price of \$30 per queen to give a total value of \$5.5 million. Export sales and sales to the growing recreation sector are estimated at 50,000 queens per year (140,430 recreational hives requiring 46,000 queens plus 4,000 queens for export). The total current value of queen sales is estimated at \$6.8 million.²

In January 2021 ABC News reported that a shortage of queen bees across Australia is making it difficult for beekeepers to rebuild and increase their hive numbers. While demand for beehives and pollination services continues to skyrocket, the number of commercial queen bee breeders in Australia has been dwindling over the past 20 years, leaving some beekeepers struggling to secure new queens.⁵⁴

Chair of the Australian Honey Bee Industry Council Trevor Weatherhead said there was a real need for more beekeepers to enter the queen bee breeding business as many beekeepers are looking for queens to re-establish their hives. Queens are fairly hard to come by and a lot of beekeepers lost their hives and resources in the devastating bushfires.⁵⁴

Riverland beekeeper Kerry Chambers recently started queen bee rearing to expand her business and to support other beekeepers. She said Queen rearing is certainly a dying art and there is only a small number of people doing it full time. “Grafting is the hardest part, you have to pull out a frame that has day-old larvae without damaging them and place them in your prepared queen cup.”⁵⁴

The requirement for more bees to pollinate newly planted fruit and nut trees for food production across the country is putting additional pressure on beekeepers to expand their hive numbers. President of the South Australian Apiarist Association Joshua Kennett said the industry is using more queens now than they ever have.⁵⁴

AgEconPlus (2012) assembled this history of the Australian queen bee and packaged bee export industry post 2000:

- Small hive beetle (SHB) was discovered in eastern Australia in 2002. Southern WA (below the Tropic of Capricorn) established as being SHB free (there was an SHB incursion in the Kimberley area in 2007). Tasmania is SHB free and effectively isolated from east coast SHB populations. Internationally SHB is present only in Africa, the USA (including Hawaii since 2009) and eastern Australia. SHB reduces hive productivity and could, if left untreated, destroy the honeybee colony.
- Due to the risk of SHB being imported in large packages of Australian honey bees, packaged bee exports from the east coast of Australia were effectively prohibited by most countries. Queen bees, single queens with up to 10 companions, are relatively straightforward to inspect. Exports from the east coast of Australia are still permitted by some countries, provided they are hand caught and hand escorted.
- In 2000 the USDA completed a Pest Risk Assessment on the importation of Australian queen and packaged bees. It concluded that there are no major risks associated with the importation of Australian honey bees. The Australian packaged and queen bee trade with the USA was established in 2005 and flourished. Australian bees filled a supply shortfall created by US colony collapse. By 2007 more than 30,000 packages of Australian honey bees were exported to the USA in a single year; this market absorbed most of what Australia was able to supply.
- In 2010, after a second Pest Risk Assessment was completed for the USDA, exports of Australian honey bees to the USA were suspended in October 2010 and prohibited on 20 December 2010. Australia was notified in early January 2011.
- The US market has remained closed since 2011. In 2010, and before closure, the export of packaged bees to the USA was worth \$7.5 million to the Australian honey bee industry. (<https://www.science.org.au/curious/everything-else/bees>).
- Packaged bee exports are now focused on Canada. In 2014, Tasmania and WA exported a total of 14 pallets (7,000 packages) of bees to Canada; these packages had an FOB (free on board) value of \$110,000/pallet, a total industry value of \$1.54 million. In 2017, Tasmania and WA exported 17 pallets valued at \$110,000/pallet, a total industry value of \$1.87 million.

Imports of live honey bees are limited to a small number of queen bees for the purposes of genetic improvement. Queens are introduced to a hive inside the Australian Government quarantine facility, and brood is released to queen breeders. Imported queens are never released inside Australia. Strict biosecurity provisions also pertain to the importation of drone semen for genetic improvement (<https://www.agriculture.gov.au/biosecurity/risk-analysis/memos/ba2016-23>). No attempt has been made to value this trade.²

The Australian Queen Bee Breeders Association (AQBBA) recognises industry's desire for pathways to import new germplasm (queens and drones semen) into Australia and has been addressing two main impediments to importation: the capacity for successful queen/ nuc care in Post Entry Quarantine (PEQ) and the ability to import germplasm free of exotic viruses. Two AQBBA members ran a successful domestic trial at the Mickleham Post Entry Quarantine Facility along with DAWR staff in October 2019, with advice from Bruce White. This activity trouble-shooted problems encountered with the process of importing queens and helped create protocol and guidelines to inform future live imports. Live queens from Europe were scheduled to enter the quarantine facility in spring of 2020 as part of a joint AQBBA and CSIRO project funded by Hort Innovation. After much negotiation of specific wording on international health certificates, the first semen importation was due August 2020. The imported stock will be released to industry through the AQBBA after an 8–12-month assessment period.⁵⁰

Pollination services in Australia

Commercial beekeepers rent hives to growers of crops that benefit from honey bee pollination. This has become an important source of income for the beekeeping industry (RIRDC 2007). The gross value of production (GVP) for paid pollination services during 2019 was estimated to be \$40 million. The demand for paid pollination services is forecast to grow across the horticulture sector including, but not limited to, forecast growth in almond production. Growth in pollination opportunities is likely to result in the emergence of specialised pollination businesses, with honey production being the secondary income source.⁶

IBISWorld (2021) reports pollination services have grown as a share of revenue over the past five years, due to strong demand as a result of rising exports of Australian horticulture products. Demand for pollination services is forecast to continue rising over the next five years, providing another source of revenue for industry operators. However, the decline in Australia’s bee population following the bushfires will likely lead some horticulture companies to find alternative methods of pollination over the short term.⁶⁸

Beekeepers have generated a rising share of income from pollination services over the past five years. Increased demand for agricultural produce has driven this trend, with rising demand for fresh Australian fruit, vegetables and nuts both locally and overseas. Demand has come largely from almond growers in South Australia and Victoria, with the number of almond businesses increasing over the period.⁶⁸

Crops requiring honey bee and insect pollination

While the AgriFutures report² states that some 35 agricultural and horticultural industries depend on pollination services provided by commercial beekeepers, a paper prepared by John Karasinski in 2018 ‘The Economic Valuation of Australian Managed and Wild Honey Bee Pollinators’ identified 53 agriculture crops that were honey bee dependent. This number far exceeds the number of agriculture crops used in previous studies of the late 1980s and early 2000s. Along with the increased number of crops, the honey bee dependency factors of those crops have been comprehensively re-examined based on prevailing Australian scientific knowledge.⁵¹

An estimated 65 per cent of agricultural and horticultural crops introduced to Australia following European settlement require external sources of pollination (e.g., insects, birds, winds or bats). Some of these crops are 100 per cent reliant on insect pollinators, such as honey bees. Without bees these fruits, seeds, nuts and vegetables would not make it from the paddock to our plates. The dependence on honey bee and insect pollination of a range of crops is shown in the table below.²

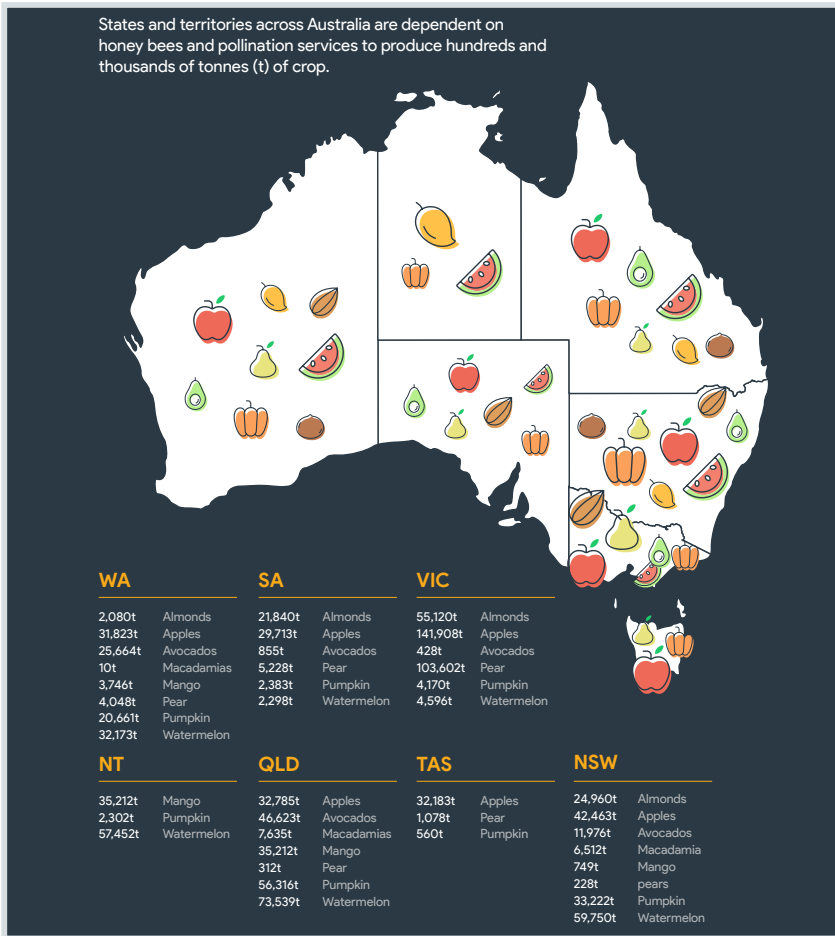
Honey bee and insect dependence for pollination of selected crops (as a percentage of yield)

CROP	DEPENDENCE %	CROP	DEPENDENCE %	CROP	DEPENDENCE %
TREE CROPS		BROADACRE CROPS		SEED PRODUCTION	
Almond	100	Canola	15	Beans	10
Apple	100	Faba beans	15	Broccoli	100
Apricot	70	Cotton	10	Brussel sprout	100
Avocado	100	Soy	10	Cabbage	100
Blueberry	100	Sunflower (depends on variety)	30-100	Canola	100
Cherries	90	VINE CROPS		Carrot	100
Citrus (depends on variety)	30-80	Cucumber	100	Cauliflower	100
Grapefruit	80	Kiwi	80	Celery	100
Lemon and lime	20	Pumpkin	100	Clover	100
Macadamia	90	Rockmelon	100	Lucerne	100
Mandarin	30	Squash	10	Mustard	100
Mango	90	Watermelon	70	Onions	100
Nectarine	60				
Orange	30				
Papaya	20				
Peach	60				
Pear (depends on variety)	50-100				
Plum and prune	70				

NB: Data is somewhat dated and does not consider varietal differences.

Source: Monck et al. (2008) and peer review with Danny Le Feuvre, beekeeper and pollination service provider.

Source: AgriFutures Report ‘Size and scope of the Australian honey bee and pollination industry – a snapshot’, February 2021²



Crop production by state 2018/2019

Source: Agrifutures Report 'The Extraordinary Honey Bee and its impact on the food we eat – Honey Bee and Pollination Program', 2020⁷

Number of hives needed for major crops

The number of honey bee hives used for major crops will depend on multiple factors, including:

- Grower awareness of the importance of pollination
- Grower willingness to pay for pollination
- The attractiveness of the crop to honey bees
- The crop's ability to generate honey and pollen
- The crop variety used
- The presence of unmanaged honey bee colonies
- The presence of other insect pollinators.²

In 2019, the almond industry, Australia's largest user of paid pollination services, hired 180,000 hives for crop pollination.² In 2020 an estimated 227,000 beehives or more than 9 billion bees were being trucked into Victoria to pollinate almond trees.⁵⁴

Production area and potential number of hives used per hectare for major crops is shown below. For pollination each hive contains between 40,000 and 70,000 honey bees (depending on the crop being pollinated).^{2/7}

Honey bee hives used by major crop type

CROP	PRODUCTION AREA (HA)	HIVES/HA (LOWER)	HIVES/HA (UPPER)
Almond	45,089	4	6.5
Apple	6,600	2	4
Avocado	4,500	5	8
Blueberry	1,375	2.5	10
Canola	970,000	0	0.5
Carrot seed	65	7	8
Cauliflower seed	25	3	5
Cherries	1,800	2.5	5
Cucumber	1,000	2.5	7.5
Kiwi	230	3	8
Macadamia	19,750	2.5	7.5
Mango	5,000	8	15
Pear	1,000	2.5	5
Peach/Nectarine	2,700	2	4
Plum/Apricot	700	2	5
Pumpkin	5,800	2.5	7.5
Watermelon	4,000	3.5	3.5

Source: Hort Innovation (2020), Monck et al. (2008), beekeeper advice.

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Major users of pollination services are almond, apple, avocado, blueberry, macadamia, pumpkin and watermelon crops. Honey bee pollination of major crops is staggered throughout late winter, spring and early summer. It helps with the scheduling of a limited number of commercially managed honey bee hives.²

Value of paid pollination services to beekeepers

In the last few years, the increase in demand for pollination services is due to the growth of the horticulture industry, and the reduction in feral bees from changing land management practices and the widespread damage caused by the honey bee pest SHB. The AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot' outlined that in 2020, with honey bees in short supply following extensive bushfires, beekeepers were offered up to \$180/hive for almond pollination. In May 2020, the price settled out at \$150/hive (Wayne Fuller, Commercial Beekeeper, NSW, pers. comm., May 2020). Globally, there has been a 300% growth in the demand for paid pollination services over the last 50 years (RRATRC 2014). A further report for WA in 2020 was \$220/hive for avocado pollination where horticulturalists must compete with highly profitable honey production opportunities from the flowering of jarrah and blackbutt (Rob Manning, AgriFutures Honey Bee and Pollination Committee, Advisory Panel member, September 2020).²

The Crop Pollination Association Inc. states that most pollinators would consider \$50 per hive as the base price for any short term pollination contracts. Longer pollination services would be significantly higher. 2011 prices for almond pollination in California were US\$150+ per hive. In Australia, almond pollination is \$73+ per hive, whilst apple pollination prices over \$65 per hive are common.⁵⁸

Almond growers require strong, healthy hives each August for pollination, for which they'll pay up to \$100 per hive. This is a fast expanding and valuable industry worth about \$1billion a year, with some 200,000 bee colonies taken to pollinate more than 30,000 hectares in NSW, Victoria and South Australia.⁵⁴

Estimates of the value of paid pollination services were prepared using data from BAE (1984), Gibbs and Muirhead (1998) and three ABARES honey bee industry surveys (2003, 2008, 2016). An estimate for 2019 was also prepared by the authors of the AgriFutures report 'Size and scope of the Australian honey bee and pollination industry'.²

Beekeeper engagement and revenue received, paid pollination services (\$'million)

	1983	1997	2001	2007	2015	2019
Beekeepers providing pollination services (no.)	N/a	N/a	N/a	363	563	N/a
Revenue received by beekeepers for paid pollination services (\$'million)	0.6	2.9	3.3	10.9	24.9	40.2

Source: BAE (1984), Gibbs et al. (1998), ABARES (2003, 2008, 2016) and AgEconPlus

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

Value of paid pollination services to horticulture and the economy

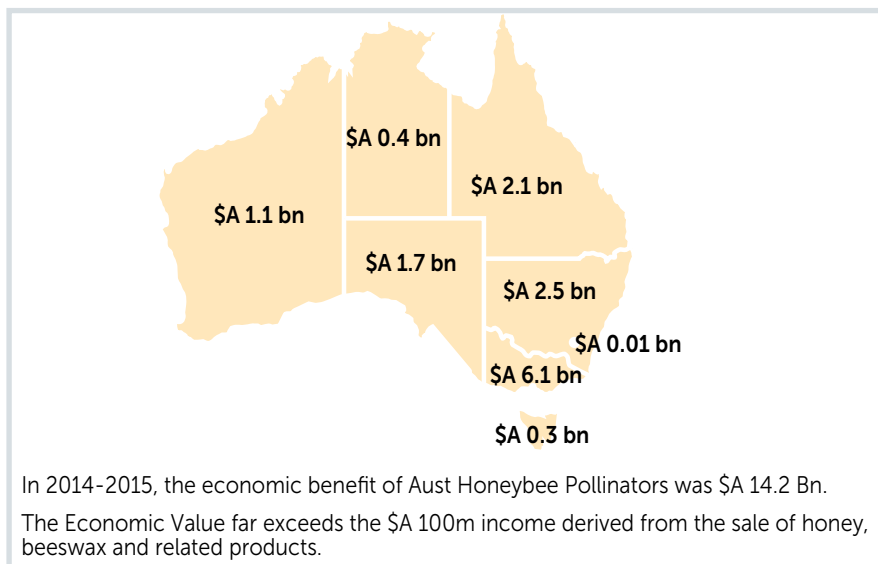
The value created for horticulture and the Australian economy from paid pollination services has been estimated in a number of studies where different methodologies have been used over time to estimate the value to the economy of paid pollination services. Estimates from different studies are not comparable. However, they do show a definite upward trend in values.²

Economic contribution of honey bee pollination (\$'billion)

	1989	1997	2002	2005	2018
Economic contribution of honey bee pollination	1.2	1.2	1.8	4 to 6	14.2
Source of estimate	Gill (1989)	Gibbs and Muirhead (1998)	Gordon and Davis (2003)	RIRDC submission Parl. Inquiry 2008	Karasinski (2018)

Source: AgriFutures Report 'Size and scope of the Australian honey bee and pollination industry – a snapshot', February 2021²

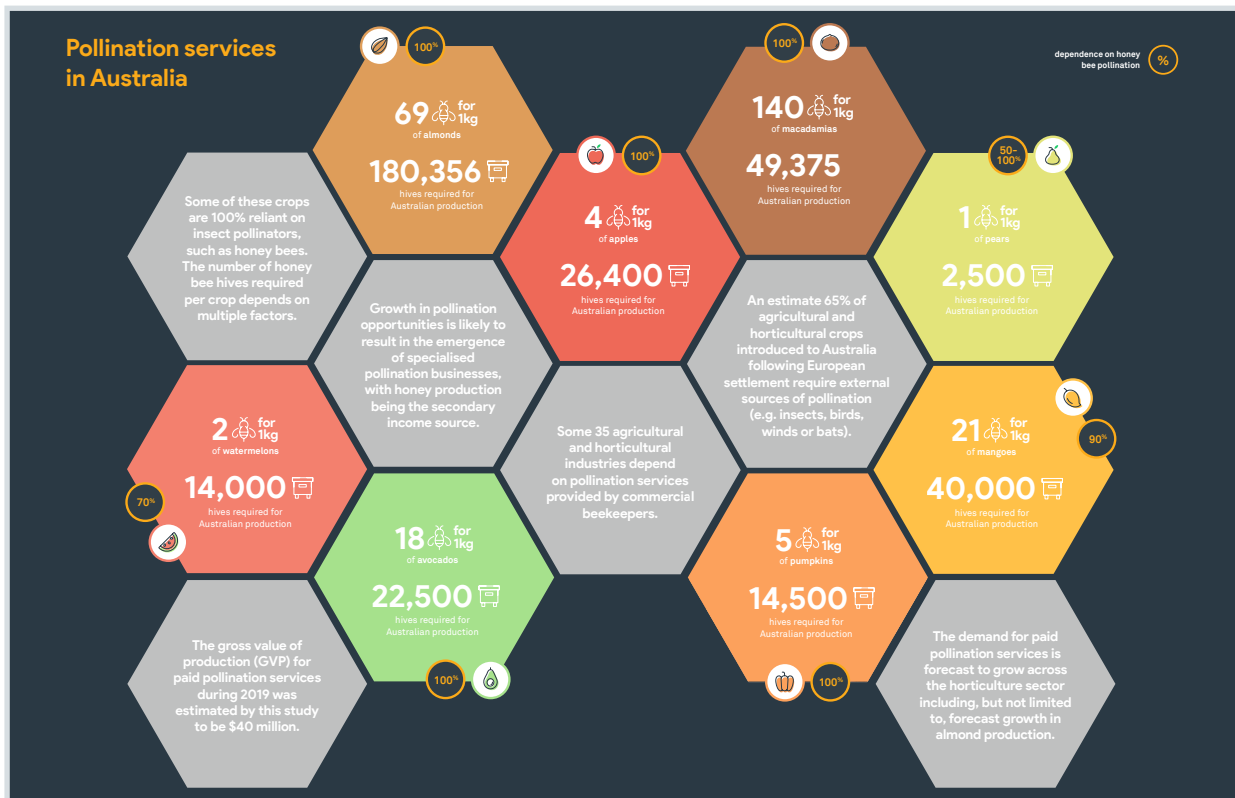
Karasinski's report 'The Economic Valuation of Australian Managed and Wild Honey Bee Pollinators in 2014-15'⁵¹ appears to be the most recent report done on the value of the pollination industry. It states that the arithmetic average economic value of honey bee insect pollinators was A\$14.2bn in the 2015 financial year. Australia wide, the economic value of honey bees is calculated to lie between \$8.35bn and \$19.97bn based on the two empirical price elasticities of demand coefficients for fresh fruit and fresh vegetables used in this study.⁵¹ The disparity in the economic values between the state and territories is explained by composition of agriculture crops grown across the states and territories, the volume of annual production and the prevailing farm gate price of agriculture crops in 2014 - 2015.⁵¹



The economic value of Australian managed and wild honeybee pollinators in 2014 – 2015.

Source: John M Karasinski – Curtin University, 'The Economic Valuation of Australian Managed and Wild Honey Bee Pollinators in 2014-15, September 2018'⁵¹

The almond industry is one of many horticultural and agricultural industries that make use of honey bee hives for pollination. It is now the single largest purchaser of paid pollination services. In 2019, the almond industry hired >180,000 hives for paid pollination (Almond Board of Australia 2019). The industry needs honey bee hives for pollination of orchards when plantings start to bear a crop. The almond industry has large areas of juvenile orchard and has plans to plant other greenfield sites. In 2017, the industry estimated that by 2027 it would need access to 300,000 hives (Almond Board of Australia, Annual Report 2017-18). Le Feuvre (2018) estimated that the industry will reach 300,000 hives by 2021 if recommended honey bee stocking rates are applied.²



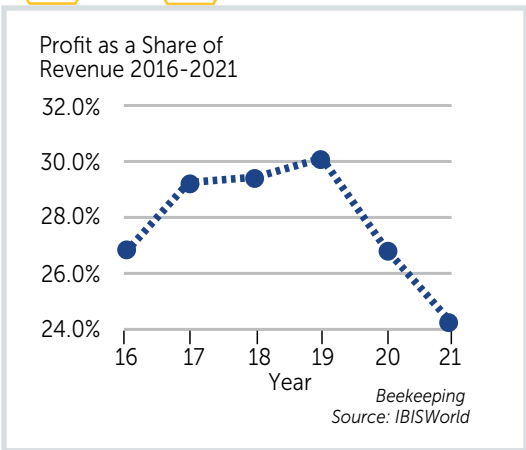
Polination services in Australia

Source: AgriFutures Report 'The honey bee and pollination industry: A hive of activity', 2021

Profitability of Australian beekeepers

IBISWorld (2021) reports operators in the beekeeping industry generate revenue from a range of products and services including beeswax, hives, queen bees and packed bees for export. Beekeepers have also been increasingly offering pollination services for other agricultural producers, such as fruit and nut growers. The vast majority of industry revenue is generated from selling honey (79.4%), followed by renting out bee hives for pollination services (12.8%) and other products (7.8%) which includes beeswax, queen bees and packed bees.⁶⁸

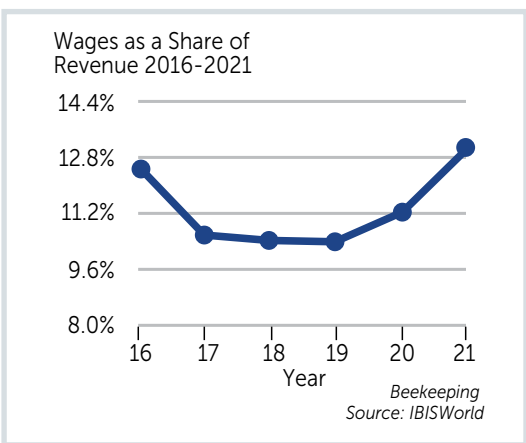
The industry's profitability is boosted by the high number of owner-operators that draw their incomes from profit rather than wages. Industry profitability has declined over the past five years, as the 2019-20 summer bushfires and the COVID-19 pandemic have reduced output and disrupted downstream demand. Nevertheless, Australian production of the highly profitable Manuka honey has risen over the past five years, limiting margin declines.⁶⁸



Industry-wide profitability is expected to fall in the current year due to the decline in production capacity, which reduces economies of scale. Overall, industry profit has declined over the past five years, largely due to falling margins over the two years through 2020-21. Nevertheless, beekeepers have benefited from strong demand for honey, with consumers increasingly looking to purchase premium, raw honey supplied by industry operators. Australian production of Manuka honey, which is highly profitable, has also been growing. In the future, profitability is forecast to grow over the next five years as production volumes rise, supporting greater economies of scale. Increased sales of Manuka honey are anticipated to boost some industry players' profit margins. Meanwhile, increased

demand for traditional honey is likely to boost the profitability of beekeepers that have a supplier contract in place with large honey processing companies such as Capilano Honey. However, the domestic price of sugar is anticipated to increase slightly over the next five years, limiting rises in profitability, as sugar is a key feed input for bees.⁶⁸

Employment within the Australian beekeeping industry



IBISWorld reports that in April 2021 the Australian beekeeping industry employed 2,026 people.⁶⁸

As well as its role in horticultural and agricultural production, commercial honey bee pollination generates employment in regional areas. Recent analysis has shown the pollination of Australia's almond crop alone directly generates 400 full-time equivalent jobs and \$18 million in wage value.⁷⁰

According to the ABS just over 75% of all beekeeping enterprises were classified as non-employing in 2019-20 (latest data available). As a result of the high proportion of owner-operators and family-run businesses in the industry, the industry's profit margins are relatively high for the agriculture

sector. Owner-operators typically take their income from their earnings rather than assigning themselves a traditional wage, which boosts profit and reduces wage expenses. However, wage expenses have increased as a share of industry revenue over the past five years, as more businesses have hired staff to increase production.⁶⁸

Labour is crucial in the industry but wage expenses only relate to hired labour. As a result, total wage expenses are limited by the high number of owner-operators and family businesses in the industry. Most beekeeping operations only hire staff members on a part time or casual basis, which keeps the industry's average wage relatively low. As the industry has expanded over the past five years, the need for permanent employees has increased. In addition, lower production volumes have reduced economies of scale and increased per unit production costs. As a result, wages have grown as a share of industry revenue over the past five years.⁶⁸

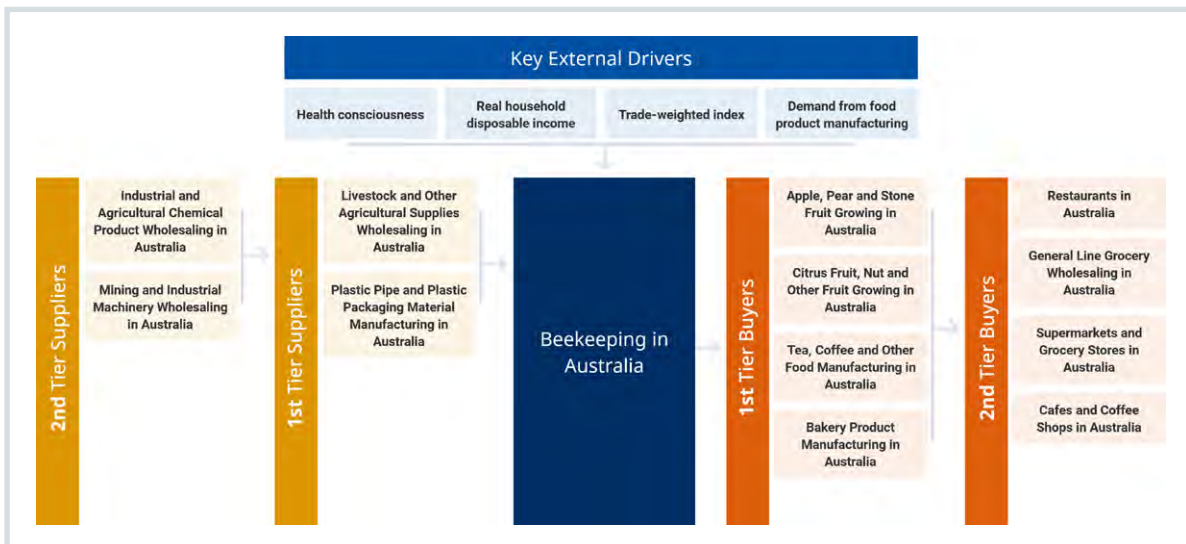
Australian Bee Breeding Research Programs

The Australian Queen Bee Breeding program (AQBBP) was established to help the beekeeping industry and having a pool of genetic material lends itself to having evaluations carried out in many areas. The national honey bee genetic improvement program (Plan Bee) seeks to create a sustainable breeding program using innovative technologies to transform the performance of honey bees in Australia.⁶²

Queen bees are bred at NSW DPI however they do not expect to supply all the queens needed by industry from this stock. It may not be appropriate for a beekeeper in Tasmania to choose queens on the basis of how they perform in northern NSW. Different traits will be needed and the queens may not perform as well in Tasmania as they did in NSW.⁶²

They want to assist queen breeders in improving their own stock, if they choose to work with them. Queen breeders will continue to select for traits that they and their customers are interested in. The data they collect when evaluating their queens can be entered into a database with pedigree information and estimated breeding values will be generated. This will provide the breeder with additional tools and information when they make their breeding decisions.⁶²

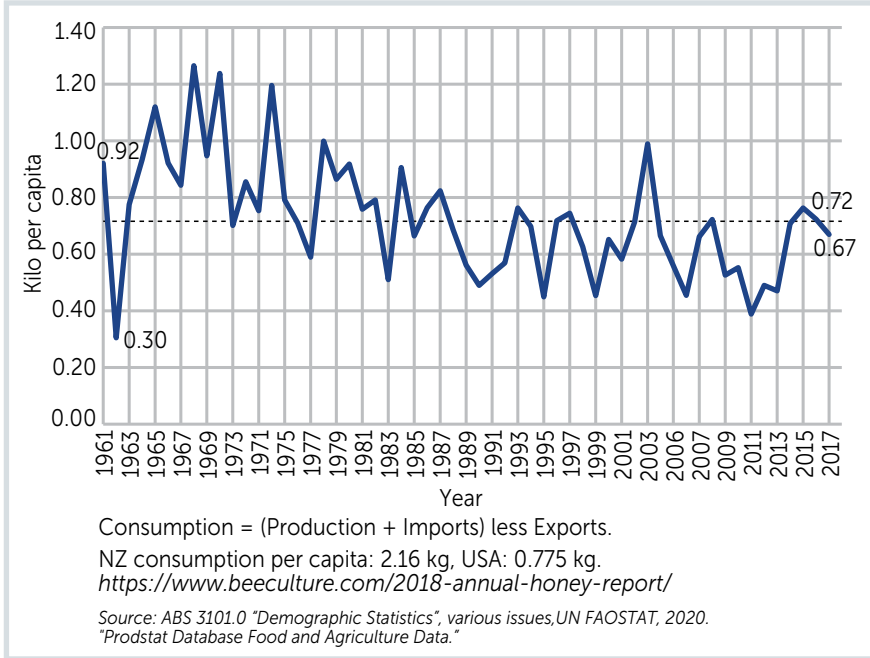
Australian honey supply chain



Source: IBIS World – William Chapman, 'Beekeeping in Australia', April 2021⁶⁸

Australian consumption and consumer trends

In 2016 in Australia on average people were consuming about a kilogram of honey per person per annum⁷⁶ however according to John Karasinski⁷⁴ after using data from the UN and ABS, honey consumption per capita in Australia in 2017 was 0.67kg/pp/pa.



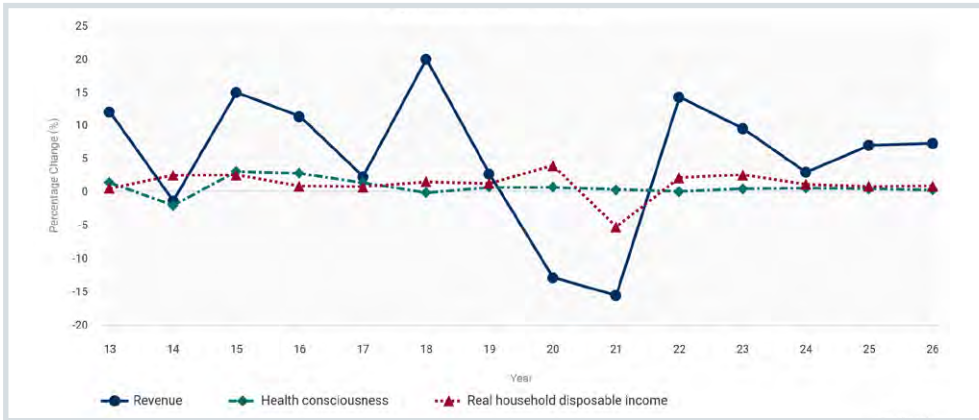
Australian per capita* honey consumption: 1961-2017 (kg)

Source: Karasinski, John – Curtin University Economist, 'The Flip side of the Australian Beekeeping Industry: A Global Perspective. Presentation at WA Apiarist's Society, March 2020⁷⁴

According to AgriFutures (2021) in recent years the industry has had some success in repositioning honey in the market as historically honey was largely undifferentiated (often exported in bulk) and positioned as a competitor to other breakfast spreads such as peanut butter. In the last 10 years there has been some other recognition of brands, differences in processing method and the benefits of 'raw' honey ('lightly filtered, no heat treatment'). Rising health consciousness has also encouraged consumers to eat more honey, as it is often used as an alternative to sugar due to its perceived and real health benefits (IBIS World 2020). Most importantly consumers are starting to recognise honey's medicinal properties (Manuka, Jarrah, Medihoney®, antibiotic, prebiotic, etc.). There would appear to be even more opportunity to successfully differentiate the product, capture price premiums and expand the honey category.²

The IBIS report outlines that health consciousness is a key driver in demand for honey, as it is often used as a healthier substitute to sugar. In addition, as consumers move away from overly processed foods, demand for locally produced, raw honey is growing, boosting demand. As a result, when health consciousness increases, it provides an opportunity for industry revenue growth. Health consciousness is expected to rise in 2020-21.⁶⁸

Real household disposable income represents the income available for consumers to spend on items like groceries. When disposable income rises, consumers have more money to spend on food items like honey. Typically, consumers with higher incomes tend to purchase more expensive honey, rather than increase their consumption significantly. Increased purchases of premium honey tend to boost industry revenue. Real household disposable income is expected to fall in 2020-21.⁶⁸



Key external drivers 2013-2026

Source: IBIS World – William Chapman, 'Beekeeping in Australia', April 2021⁶⁸

Per capita honey consumption has risen over the past five years, as consumers look for healthier alternatives to sugar. Rising honey consumption has increased demand from major honey processor Capilano Honey. However, the honey processor came under scrutiny in 2018, due to reports that some of its products that were labelled as '100% honey' contained sugar syrup. While the ACCC decided to not pursue the claims further, in November 2018, Capilano Honey decided to remove its Allowrie honey brand from supermarkets and transition to primarily using domestic honey in its products. As a result, demand from Capilano Honey has risen since 2019, supporting domestic beekeepers.⁶⁸

Rising consumer awareness around the anti-bacterial properties of honey is slowly seeing it shift from a staple on the breakfast table, to a niche product in the health food sector.⁷¹ And it's a trend the Cooperative Research Centre (CRC) for Honeybee Products suspect is behind a spike in honey sales across Australia in mid-2020, during the coronavirus pandemic. "Basically all honey sales went through the roof, it was just incredible nobody could keep up at one stage," said CEO Liz Barbour.⁷²

Once a market dominated by the New Zealand Manuka product, the medicinal potential of honey has Australian researchers on the hunt for more liquid gold. Last year, scientists funded by AgriFutures Australia discovered that specific chemical components relating to antibacterial activity of several Australian *Leptospermum* honeys was similar to that of its Manuka counterpart in New Zealand. The study found at least seven Australian *Leptospermum* varieties are as active or more active than the one species from across the ditch.⁷²

As consumer demand has risen, new operators have entered the industry to benefit from this trend over the past five years. Consequently, industry enterprise numbers have risen over the period. Consumer demand for premium honeys, such as Manuka honey and raw honey, has also increased over the past five years. Per capita honey consumption is forecast to rise, flowing through the supply chain and boosting demand at the farming level. In addition, some consumers are likely to move from buying processed honey in supermarkets towards buying raw honey from beekeepers, with honey sales in farmers' markets projected to increase. Sales of high-value Manuka honey are also forecast to continue increasing, further boosting industry revenue.⁶⁸

Australian Honey Bee and Pollination industry bodies

Australian Honey Bee Industry Council - The Australian Honey Bee Industry Council Inc. (AHBIC) is the peak body for beekeeping in Australia that represents the interests of its member state beekeeping organisations and beekeepers from around Australia. Responsibilities of the representative body include:

- biosecurity planning and implementation at the national and farm levels.
- liaising with federal and state governments on trade issues.
- funding and supporting biosecurity initiatives.
- participating in national committees and response efforts in an emergency.⁶³

AHBIC is made up of six State Associations and three National Associations, each representing various sections of the beekeeping industry in Australia:

State bodies

- NSW Apiarists' Association
- Queensland Beekeepers' Association
- Victorian Apiarists' Association
- South Australian Apiarists' Association
- Bee Industry Council of Western Australia
- Tasmanian Beekeepers' Association

National Associations

- Australian Queen Bee Breeders Association – representing the queen breeders of Australia
- National Council of Pollination Associations – representing the honey bee pollinators of Australia
- Honey Packers and Marketers Association of Australia Inc. – representing the honey packers of Australia
- Amateur Beekeepers Association of NSW

AHBIC works in partnership with other industries and governments to protect the health of bees with several biosecurity initiatives. One is the National Bee Pest Surveillance Program, which operates at ports around Australia to provide an early detection mechanism for exotic pests of bees and pest bees.

Another was to work with Plant Health Australia and state and territory governments to develop the Australian Honey Bee Industry Biosecurity Code of Practice, which was endorsed nationally by the honey bee industry in 2016. The aim of the Code of Practice is to improve the management of established pests and diseases, as well as increase preparedness and surveillance for exotic pest threats.

The honey bee industry also funds the National Bee Biosecurity Program, a partnership between industry and government, which employs Bee Biosecurity Officers (BBO) in all Australian states. BBOs provide training and education to help beekeepers to implement biosecurity measures and ensure they are complying with the Code of Practice and relevant legislation.

Other industry bodies involved in the Australian honey bee and pollination industry include:

National Bee Pest Surveillance Program Plant Health Australia – The National Bee Pest Surveillance Program is an early warning system to detect new incursions of exotic bee pests and pest bees. The program involves a range of surveillance methods conducted at sea and air ports throughout Australia considered to be the most likely entry points for bee pests and pest bees.

The National Bee Pest Surveillance Program has two major objectives:

- **Trade support** to facilitate the export of queen bees and packaged bees to countries sensitive to a range of bee pests and pest bees. This program provides technical, evidence based, information to support Australia's pest free status claims during export negotiations and assists exporters in meeting export certification requirements.
- **Exotic bee pest and pest bee early warning** to detect new incursions of exotic bee pests and pest bees. This greatly increases the possibility of eradicating an incursion and limits the scale and cost of an eradication program.

The program is jointly funded by the Australian Honey Bee Industry Council, Hort Innovation, Grain Producers Australia and the Australian Government Department of Agriculture and Water Resources. In-kind contributions for the implementation of the program are provided through each state and territory Department of Agriculture as well as volunteer beekeepers. At a national level, PHA coordinates and administers the program.⁶⁴

Bee Aware – BeeAware is a hub of information for beekeepers and growers about honey bee biosecurity and pollination of agricultural and horticultural crops. The site contains an extensive range of information about exotic and established pests and diseases of honey bees, and helps beekeepers to identify and respond to these pest threats. It also contains information about the pollination of crops and how beekeepers and growers can work together to provide and receive best practice pollination services. BeeAware is funded by the Australian honey bee industry, pollinator-reliant plant industries, Plant Health Australia, governments and R&D agencies.

The AgriFutures Honey Bee and Pollination Program aims to support RD&E that will ensure a productive, sustainable and more profitable Australian beekeeping industry and secure the pollination of Australia's horticultural and agricultural crops. Key components of this program include increasing productivity and profitability of beekeepers, reducing the incidence and impact of pests and diseases, and increasing understanding of the role of flora in honey bee management.³

The AgriFutures Honey Bee & Pollination Strategic RD&E Plan (2020-2025) has identified six high-impact, far-reaching objectives to benefit the industry:

- Identify and develop technology for improved hive performance.
- Increase capacity within research community and future industry leaders.
- Improve understanding of nutrition best practice and disease interaction.
- Improve understanding of the benefits of honey and develop chain traceability.
- Improve understanding of pollination strategies that impact crop yields and improve hive health.
- Improve understanding of floral resources as assets for the Australian honey bee industry.³

CRC for Honey Bee Products

The federally funded Cooperative Research Centre (CRC) resolves industry problems that limit both the value and expansion of the Australian honey bee products industry. The CRC contributes to disease insurance policies to address a major global threat to Australian honey bees. Established in 2017, the five-year CRC aims to resolve current industry problems that limit the value and expansion of the industry.

The CRC for Honey Bee Products is trans-disciplinary across four programs, driving innovation within the industry to meet export demands. These include:

- **Hive sites** - the hive site program helps protect existing sites, inform bee hive movement and rehabilitate land into new high-value hive sites. Australian Manuka honey will be a new product.
- **Bee health** - to contribute to honey bee health, the CRC works towards future-proofing the bee industry and developing a catalogue of disease markers.
- **Honey products** - the honey bee product program adds value to the industry through developing honeys from known floral sources for the export market.
- **Chain of Custody** - this program uses all the information from the CRC to develop a Chain of Custody. This is linked to developing and testing product quality labels in the export market.⁶⁵
Home - CRCHBP (crchoneybeeproducts.com)

Awareness and Education – The Wheen Bee Foundation – is an Australian registered not-for-profit charity that promotes awareness of the importance of bees for food security, and raises funds for research that addresses the national and global threats to bees. They engage with all levels of government, the apiculture industry, bee reliant food industries, universities, research organisations and community. They fund vital strategic research, education and conservation initiatives that strengthen bees, improve pollination efficiency and increase food security and ecosystem health.

The Global Initiative for Honey bee Health (csiro.au) – GIHH is an international collaboration of researchers, beekeepers, farmers, industry and technology companies set up to research the threats to bee health in order to better understand bee colony collapse and find solutions that will help secure crop pollination. CSIRO is leading the GIHH – a tightly-focussed, well-coordinated national and international effort that is addressing the challenges facing honey bee health globally. The GIHH aims to protect and improve the health of honey bees, ensure sustainable production of crops dependent on honey bee pollination, and increase productivity through coordinated management of pollination to increase the environmental and economic benefits for farmers and beekeepers while making a valuable contribution to sustainable farming practices and food security.

The Australian Manuka Honey Association (AMHA) (manukaaustralia.org.au) – AMHA is the leading national body for the production and promotion of Manuka honey in Australia. Formed by the leaders of the largest and most influential honey companies in Australia and supported by hundreds of beekeepers, the AMHA represents 180 years of Australian beekeeping practice and honey production. The AMHA mission is to protect and promote the global appeal and awareness of Manuka honey produced in Australia and their objectives are:

- Foster the growth of the local Manuka honey industry and the sale of Australian Manuka honey internationally.
- Provide authenticity to all Australian produced Manuka honey.
- Support scientific research of Australian Manuka honey and its uses.
- Increase the knowledge and understanding of the properties of Australian Manuka honey.
- Restrict international naming or market rights to Manuka honey.
- Protect and promote Australian *Leptospermum* species plant material.
- Represent Australian Manuka producers and packers through one common organisation.
- Advocate for the interests of our industry in administrative and legislative matters.

B-QUAL Australia Pty Limited

The Industry Owned Quality Assurance (bqual.com.au) - B-QUAL Australia Pty Limited has been established by the Australian Honey Bee Industry Council (AHBIC) as an independently developed and audited food safety program. B-QUAL aims to ensure that 90% of honey produced in Australia is quality assured for both the domestic and export markets. The specific requirements of the European Union (EU) for the export of honey and honey products will be met. B-QUAL meets the requirements of FSANZ Food Safety Standard. The adoption of these standards will enable continued market access both in Australia and overseas. B-QUAL aims to address the current industry biosecurity codes of practice which includes an auditable biosecurity plan.

It is also proposed that the adoption of a national quality standard will form the basis of an ongoing program, to ensure industry best practice and ongoing industry training. Product standards include all facets of production and services of the industry including honey, queen bees, pollination and honey packing. The resulting system provides a self-policing means of ensuring standards are kept at industry best practice and meet the domestic and international market demands.

BeeConnected is a user-driven smart-phone app that enables collaboration between beekeepers, farmers and spray service contractors to facilitate best-practice pollinator protection. It was developed by Croplife Australia in partnership with the Australian Honey Bee Industry Council.⁶⁹

In June 2016 Hort Innovation launched a significant pollination research investment fund to increase crop quality and yields through more effective pollination and alternate pollinators. Supported with Australian Government funding, the fund comprises multiple projects being delivered in partnership with co-investors such as research institutions, government agencies or international and commercial enterprises. More information about research currently underway is available on *Hort Innovation's Pollination Fund webpage*.⁶⁹

CSIRO

Scientists at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) are playing a role in global research networks to better understand the causes of declining bee health in many parts of the world. More recent innovation by CSIRO scientists has led to enormous improvement in microsensor technology for tracking bees in and around hives and the opportunity for new insights into hive health and bee response to diseases or chemicals. More information on this work is available from the *CSIRO website*.⁶⁹

A range of research groups based at Australian universities are also studying honey bee health. Some of these research groups are:

- *The Centre for Integrative Bee Research at the University of Western Australia*
- *The Social Insects Lab at the University of Sydney*⁶⁹

Western Australian Honey Bee Industry and Pollination Industry

The WA beekeeping industry utilises unique flora resources throughout WA for honey production; honey bee products (wax, pollen, propolis); and supporting bee health to provide vital crop pollinations services state-wide.²¹

The industry situation within Western Australia is harder to determine as there is not a lot of data available. According to Gerard Leddin, Principal Agribusiness Development Consultant with DPIRD there is a glaring gap in WA as the honey industry figures and sales data are vague or non-existent and therefore it creates a huge challenge for industry. DPIRD is aware of the activity of professional beekeepers, and somewhat across the semi-professionals but the problem lies with the amateur beekeepers, as Gerard says they have no idea of their production or sales. Leddin (2021) said there are lots of holes in terms of data, including the domestic market and how much honey is sold locally and interstate as well. While it is frustrating, Leddin said it is because it is a smallish industry, and it has been fragmented, and the market base is pretty diverse so finding the data is impossible.¹²

The estimated value of the Western Australia honey bee industry (including honey sales, wax sales, queen bee sales etc.) is \$50 million according to DPIRD with exports worth in the vicinity of \$8-10 million which according to Gerard Leddin is underrated. The value of the pollination industry which includes the apple, almond and avocado industries sits at about \$1.1 billion for WA and it is expected to further increase in the near future.¹²

In 2021 the Bee Industry Council of Western Australia (BICWA) values the WA pollination industry at \$1.2 billion and honey and associated products at \$30-50 million. Exports of natural honey in 2019 were \$8.1 million.²¹

Michael Bellman, Supply Manager for Capilano Honey estimates the honey bee industry alone is worth \$30 million to Western Australia of which Wescobee contributes \$15 million and the balance is made up of smaller producers. He said there is a lot of growth from hobby and small beekeepers starting up their own backyard hives; a lot go direct to IGA supermarkets and markets for which there is no data available.¹³

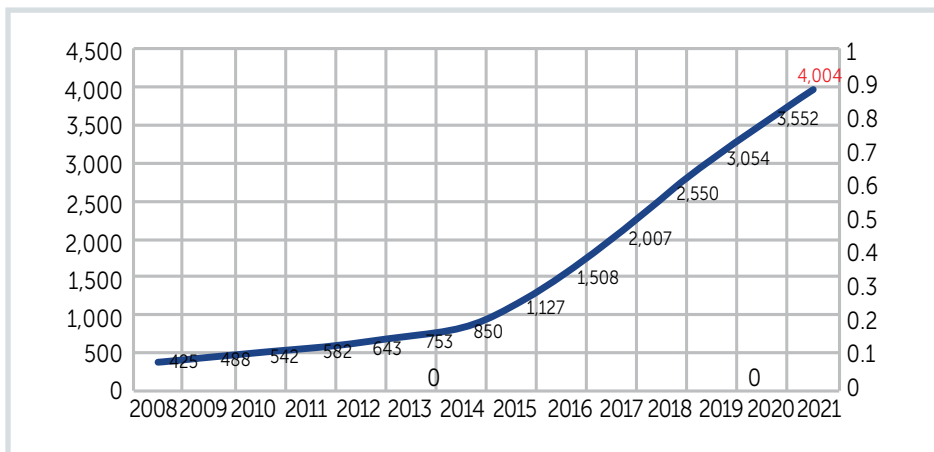
Number of Beekeepers and Hives

As stated in the AgriFutures report 'Size and Scope of the Australian honey bee and pollination industry – a snapshot' in 2019 there were a total of 3,303 beekeepers in Western Australia which consisted of 161 commercial beekeepers (>50 hives) and 3,142 recreational beekeepers. They operated a total of 48,978 hives. In comparison to other states, WA was fourth in terms of the number of beekeepers behind NSW, Victoria and Queensland and ranked fifth in the total number of hives behind NSW, Victoria, Queensland and SA. The number of commercial hives available for pollination in 2019 and 2020 in WA was around 50,000.²

Bee Industry Council of WA (BICWA) reports current numbers show nearly 4,000 registered beekeepers with a total of 48,600 hives and 157 beekeepers with more than 50 hives which are viewed as commercial hives which total 32,500 hives.²¹

Figures from DPIRD, estimate there are about 160 commercial producers (which is in line with the Coriolis Report²) and a further 300-400 producers who are semi-commercial and a further 3,000 amateurs. Commercial producers have an average of 400 hives, semi-commercial producers range from 50-150 hives and amateurs have below 50 hives with some backyard producers who only have 1-2 hives, but those lines are blurred according to DPIRDs Gerard Leddin. Leddin (2021) said commercial beekeepers can be easily tracked, along with the semi-commercial ones but it is the amateurs that can't be tracked, and there is concern that some of those are also commercial producers who are deliberately flying below the radar.¹²

Curtin University Economist John Karasinski, who has a keen interest in the honey bee and pollination industry, has tracked the DPIRD beekeeper registrations for a number of years. The latest figures, as of 30 June 2021, bring the total year to date registrations to 4,004 beekeepers registered in WA. During the month 14 new registrations were reported. This is a new state record for beekeeper registrations and is directly linked to advent of Flow Hive and interest in beekeeping as a hobby. John (2021) estimates that 100 of these are commercial beekeepers and the rest are hobbyists. The chart below shows annual registrations from 2008 when there were 425 registered WA beekeepers.⁶⁷



Annual registered number of WA beekeepers: June 2008 to June 2021

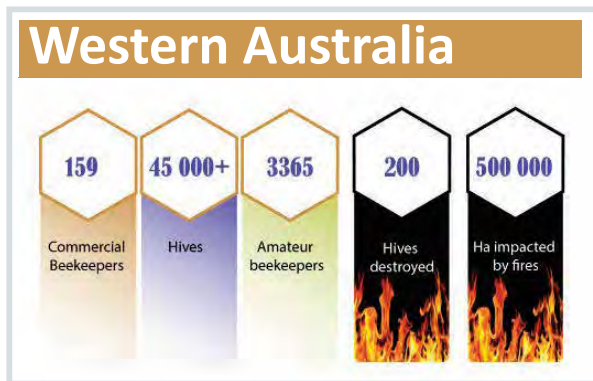
Source: WA Dept. Primary Industries and Regional Development, various.

The annual compound growth rate has been 18.8% p.a. The growth rate between 2008 and 2021 has been 842% driven by the appearance of hobbyist beekeepers. In 2021 there were 425 new registrations and compared with previous years the annual increase has shown a decline since 2018 when 543 new registrations occurred.⁶⁷

CRCHBP chief executive officer Dr Liz Barbour said the number of beekeepers in WA has grown exponentially since the arrival of the Flow Hive in 2015. “The Flow Hive is a hive design that simplifies the extraction of honey, generally it is thought that hobbyists are doing a good thing for the industry, but their present influence is totally unknown. Of the 4,000 beekeepers in WA, it is estimated that only 50 of these run commercial operations. There is much unknown about hive distribution, use of natural resources, honey production and sales across the industry.”⁷⁵

Western Australian commercial beekeepers have a high reliance on public land apiary sites with 2019 data revealing that there were 3,200 sites in WA of which there was 80% share of honey production and pollination services.²

The 2019/20 annual report for the Australian Honey Bee Industry Council outlines that Western Australia has 159 commercial beekeepers and 3,365 amateur beekeepers who have more than 45,000 hives. However in that financial year more than 500,000ha of land was impacted by fires and 200 hives were destroyed as a result. Currently the state’s beekeepers have access to approximately 4,000 Apiary sites across the state.⁵⁰



Source: Australian Honey Bee Industry Council Annual Report 2019/20⁵⁰

Honey Production in Western Australia

Honey production figures in Western Australia are based on guestimates as there is no formal process that requires beekeepers to annually report honey production. Based on historical snapshots, honey production in Western Australia in 2000 was around 1,596 tonnes which comprised about 7% of Australia’s production. Total production according to the AgriFutures report (2019) remains relatively unchanged with NSW, Victoria, SA and Queensland continuing to dominate national production. Western Australia is fifth ahead of Tasmania.²

DPIRDs Gerard Leddin (2021) said there is no formal system for reporting the amount of honey produced as production data is not collected from producers. Leddin (2021) said 2020 was a poor honey season due to the low winter rainfall and the lower than expected flowering event of the native forests. Volumes produced are unknown to the Department.¹²

Capilano Supply Manager, Michael Bellman (2021) estimates that Western Australian’s honey production is around 4,500 tonnes, and it can vary according to the seasonal conditions.¹³

Regional breakdown of Beekeepers and Hives

The breakdown of beekeepers by region within Western Australia is near impossible to determine because professional beekeepers move their hives around. One week they are in Geraldton, the next week Wickepin, and then Bunbury. Therefore, it destroys any data, as it is not feasible.¹²

Honey production per beekeeper / hive

Nationally in 1997 the average honey production per hive was about 100kg. The Hive + Wellness (Capilano) estimates show per hive honey production oscillating between 50kg and 70kg. However, honey production per hive in WA is reported in the literature as being much higher. In the late 1990s annual hive production levels of 200kg per hive were common in the state.²

Production per hive in Western Australia as estimated by DPIRD, is that commercial producers pump out 150kg per hive per year, semi-commercial producers about 90kg a hive and then the amateurs is anyone’s guess.¹² Whereas according to Michael Bellman (2021) hive production is around 75-100kg for commercial beekeepers and production for amateurs is more like 20 kilograms of honey per hive per year.¹³ This figure has been a rule of thumb for the industry since 1943, according to John Karasinski.⁶⁷

Karasinski’s ⁷⁹ research on the average honey yield across Australia shows it to be 29.9kg/hive which is far more conservative than the figures above. According to the Agdots report¹¹, average production per hive is 100kg/hive, but experienced bee keepers can do 300kg/hive and that is not just about site, it’s about good bee management. The huge variation in the honey production per hive figures further add confusion to industry data that is available and true calculations of honey production.

Western Australian farm gate honey price

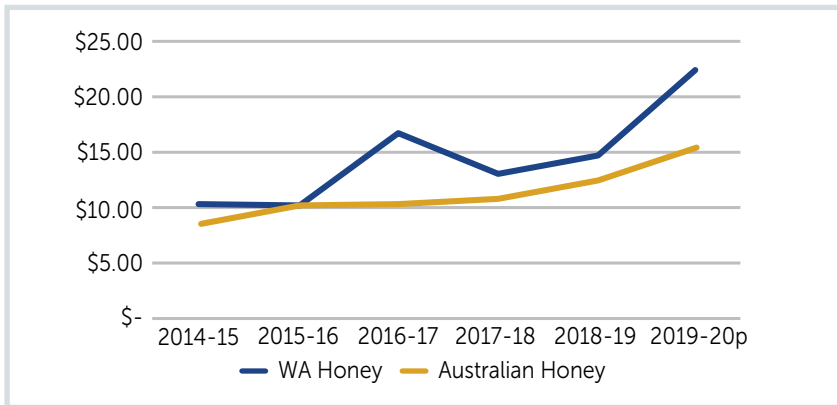
The farm gate pricing of WA honey generally matches the national price, however certain varieties can command a premium depending on supply and what the market is prepared to pay.

In 2018-19, the estimated farm gate price for beekeepers nationally was \$6.50/kg. Rob Manning, AgriFutures Honey Bee and Pollination Program Advisory Panel member, notes that WA beekeepers are regularly receiving \$30/kg for jarrah and blackbutt honey, which has markedly increased beekeeper profitability in WA.²

Gerard Leddin from DPIRD reports that bulk honey (mainly canola honey) generates around \$ 7/kg at the farm gate in WA. Leddin (2021) said as the quality improves the value improves – for example wildflower honey averages around \$20/kg and jarrah honey brings \$50 +/kg.¹² Jarrah and Manuka honey are the two most expensive honeys and are the main ones that are exported.

The Agdots report¹¹ reports that in 2020 Jarrah honey was worth about \$30/kg wholesale and ranged from \$60-70 retail and higher, based on how its sold. Jarrah honey is rated as ‘better than Manuka honey from New Zealand’.

The Jarrah and Marri monofloral varieties have seen new markets over the past few years and beekeepers are expecting a higher dollars per kg as a result. Information presented by DPIRD’s I-Lyn Loo at the BICWA 2021 conference showed that from 2014 up until 2019-20 the Western Australian honey price is significantly higher than the Australian price.⁸⁴

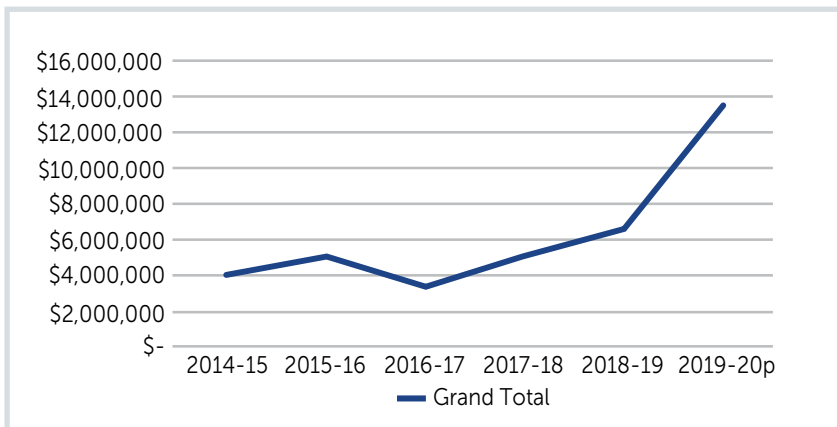


Average price per kg for WA Honey and Australia Honey

Source: WA Dept. Primary Industries and Regional Development, various

Western Australian Honey Market

Western Australia honey bee product exports including beeswax and live bees increased significantly in 2019-20 from the previous year to \$13.5 million. ⁸⁴

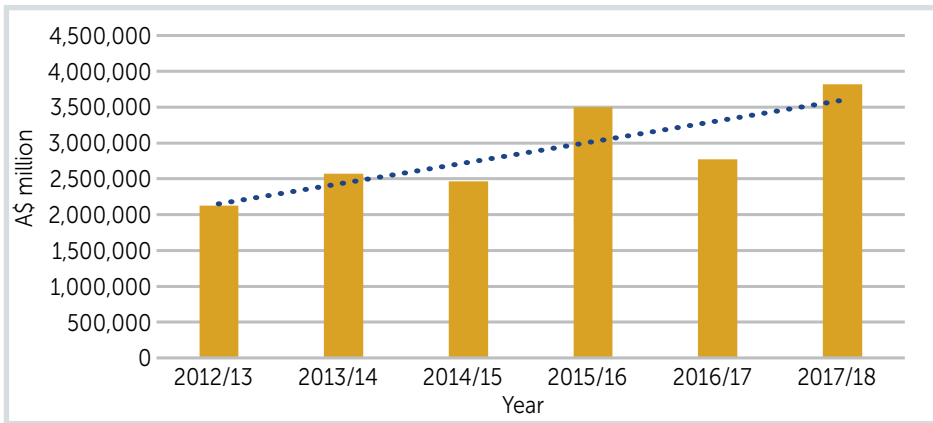


Honey bee products exports (WA)

Source: WA Dept. Primary Industries and Regional Development, various.

Western Australian Honey Exports

DPIRD reports that total honey exports from Western Australia of raw honey in 2020 were about \$7.5 million which was sent mainly to Singapore, Hong Kong, Malaysia, UAE and Japan.¹² Below is a graph that shows the WA export honey value from 2012 to 2018 (supplied by DPIRD) where export value reached \$3.8 million with a compound annual growth rate of 12.8%. As reported above, there was a big increase in value exported from WA in 2019-20 which also includes beeswax and live bees.



WA honey export value

Source: WA Dept. Primary Industries and Regional Development, various.

The top export destinations for WA honey are China, Mauritius, Singapore, Japan and Malaysia.⁸⁴ According to Hive and Wellness, there was a 20% increase in exports last year in terms of value, and export markets are all growing. This growth was limited by the supply of high value honey, Jarrah and Manuka honey with access to resources and/or plantations being contained, however HWA believes the export market could easily triple in 10 years. BICWA reports that WA exported \$8.1 million of natural honey in 2019.²¹

Western Australian Honey Imports

There is no official data for honey imports into Western Australia. Australia currently imports about 5,000 tonnes of honey per annum.

Western Australian Domestic Market

Like the national retail picture, the Western Australian honey retail category is dominated by sales through the large supermarkets – Woolworths, Coles, Metcash and Aldi. The available retail market share figures do not include Aldi/ Costco and smaller retail outlets that don't draw from Metcash as well as direct B2B and B2C outlets.

There are also sales into the Foodservice and Industrial markets with honey used for cooking and ingredients, although these markets use a lot of imported honey. The total sales are broken down below. (Working on the industry average of 3,000t of WA honey produced/sold/packed per annum.)

RETAILER	MAT – MARKET SHARE – AZTEC	TOTAL TONNES	ADJUSTED MARKET SHARE	COMMENTS
Woolworths	42%	450	15%	Largest retailer about 40% of market
Coles	38%	417	14%	About 35%
Metcash	12%	120	4%	
Aldi	4%	80	3%	11% of national grocery market
Costco	1%	30	1%	Growing
Foodservice	n/a	400	13%	
Industrial	n/a	300	10%	
Export	n/a	500	17%	
Health	2 %	100	3%	Sales of High value product
Markets	n/a	60	2%	BK direct B2C
Directs	n/a	100	3%	BK direct – B2B – B2C
Other – unknown	1%	243	8%	Not sold – storing – selling east coast
TOTAL	100%	3000 T	100%	

Based on information from industry sources, the Western Australian sales of honey through the retail channels market is about 1,100 tonnes of which about 950 tonnes are Australian honey, with about 50% coming from the eastern states or overseas with 151 tonnes of imported honey. This only includes the major retailers and Western Australia is about 10% of the Australian domestic market mentioned above.

Other hive products in Western Australia

DPIRD reports that Western Australia currently exports about \$400,000 in queen bees and packaged bees.¹² Once again data is limited in terms of the production of other hive products within Western Australia.

Propolis

According to the 2019 AgriFutures report, 'Propolis Production: A Potential Boon for the Australian Beekeeping Industry' propolis is produced in Western Australia in managed bee hives. Important propolis sources include grass trees, with eucalyptus species functioning as a secondary resin source. Western Australian beekeepers retail propolis products but it is not known whether these are manufactured from locally sourced propolis.⁵³ There are no production-based figures available.

Bee Pollen

While there are limited cash sales of pollen by beekeepers on the east coast, WA production of pollen has increased; some beekeepers collect 3-4 tonnes of pollen for sale each year. Most of the pollen is sold either overseas or interstate.²

SaxonBee Enterprises, according to its webpage, is the largest supplier of Australian bee pollen. Based at Gidgegannup the company was established in 1990 and is WA family owned and operated. It produces pollen of the highest standards sourced from WA's leading pollen producers. Western Australia produces some of the best bee pollen in the world.⁶⁰

Saxonbee's personnel have been closely involved in industry organisations including the Australian Honeybee Industry Council and the WA Farmers Federation and were closely involved in the development of a Hazard Analysis Critical Control Point (HACCP) system which guides the beekeeping industry in WA. Saxonbee's most recent achievement is adding certified organic and has the highest quality certified organic bee pollen. It is currently servicing Australian markets and is exporting to the USA and Asia. Prices on their webpage show 1kg of dry bee pollen is \$65 and 5kg is worth \$220.⁶⁰

Queen and packaged bee sales

WA packaged bees are sold on the domestic and export markets. Domestic package sales have increased as the recreational sector has grown.² Queen Bees are available for purchase in WA from Beewise (www.beewise.com.au) located in O'Connor in Perth. They are bred from high-quality breeder queens selected for docility, hygienic behaviour, honey production and disease resistance. The Queen Bees are supplied in Queen Cages with 5-6 attendants. They are priced at \$60 for one Queen Bees or 10 plus is \$55 each or in excess of 30 is \$50.¹⁹

Export packages of packaged bees are presently sent to Canada from WA and Tasmania as both states are able to meet Canada's strict biosecurity requirements. Packaged bee exports from Australia are currently valued at \$2 million pa.² In 2014, Tasmania and WA exported a total of 14 pallets (7,000 packages) of bees to Canada. These packages had an FOB (free on board) value of \$110,000/pallet, a total industry value of \$1.54 million. In 2017, Tasmania and WA exported 17 pallets valued at \$110,000/ pallet, a total industry value of \$1.87 million.² Gerard Leddin from DPIRD reports that WA exported a total of \$400,000 in queen bees and package bees in 2020.¹²

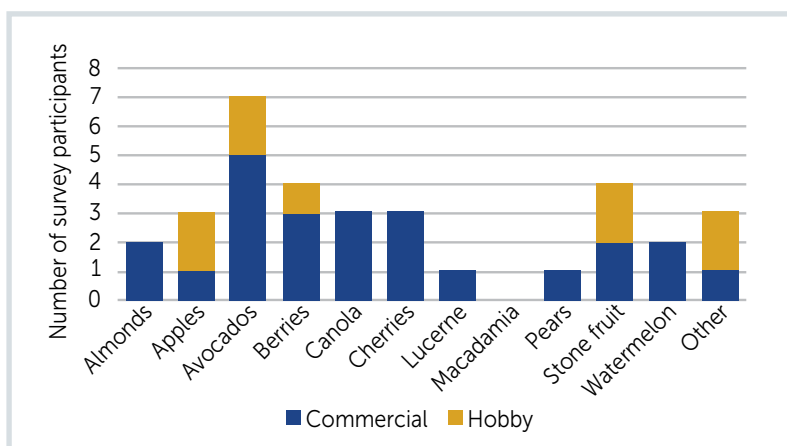
Pollination services in Western Australia

DPIRD values pollination services to be around \$1.1 billion this year within Western Australia, which is reflective of the value of fruit that relies on the bee industry. The value is expected to increase in the near future with further demand from the avocado and almond industries.¹²

Capilano Honey Supply Manager, Michael Bellman (2021) said pollination is the biggest driver and he expects the almond industry to grow 4-5 fold over the next five years. The avocado industry will also need at least 6,000-7,000 hives in the next 5-7 years. Industries like avocados, almonds, rockmelon and watermelons in Carnarvon can't germinate without bees pollinating crops. Bellman said currently there are a lot of native bees where avocados are but if they get disease and have biosecurity issues, the bees will die and the crops won't get pollinated.¹³ As stated in the Agdots report¹¹ (2020), there is currently only enough bees to do 20% of the pollination required once the avocados come online.

Crops requiring honey bee and insect pollination

The main industries that require bees for pollination include pome fruit, almonds, walnuts and avocado. The Honey Bee Health Survey 2019 examined the health of Australian honey bees, focusing on issues such as pests and diseases, pollination services and the level of biosecurity awareness amongst Australian beekeepers. The survey had 2,549 participants representing 8.5 % of Australian beekeepers¹. Of these participants 7.6% were defined being commercial beekeepers (50 or more hives) with 91% being hobby beekeepers (less than 50 hives). The survey found that avocado is the major crop pollinated in Western Australia by bees.²²



Major crops pollinated by beekeepers in Western Australia. Note berries represents blueberries, strawberries and raspberries with stone fruit representing apricots, peaches, nectarines and plums.

Source: Plant Health Australia, 'Honey Bee Health Survey', 2019²²

Value of paid pollination services to beekeepers

It was reported in the Coriolis Report 'Size and Scope of the Australian honey bee and pollination industry – a snapshot' in 2019 that beekeepers were receiving \$220/hive for avocado pollination in Western Australia and the industry required 2,000 hives. Horticulturalists must compete with highly profitable honey production opportunities with the flowering of jarrah and blackbutt (Rob Manning, AgriFutures Honey Bee and Pollination Committee, Advisory Panel member, September 2020).²

Michael Bellman (2021), Supply Manager for Capilano Honey reports that beekeepers get paid about \$150/hive per week to pollinate avocado crops in WA. The industry requires bees from August to November which is good honey season.¹³

Value of paid pollination services to horticulture and the economy

Karasinki's report 'The Economic Valuation of Australian Managed and Wild Honey Bee Pollinators in 2014-15'⁵¹ appears to be the most recent report done on the value of the pollination industry. It states that the arithmetic average economic value of honey bee insect pollinators is \$14.2bn in the 2015 financial year and for Western Australia it was \$1.1bn. In comparison to other states, WA has the fourth largest economic value behind Victoria, NSW and Queensland.⁵¹

A Western Australian example back in 2015, as outlined by Karasinski⁵¹ is the economic value of the strawberry industry in the Avon region. The Avon region's strawberry industry is a very important regional industry having a substantial economic value ranging between \$4.7m and \$5.6m. It also accounts for one quarter of the WA strawberry industry.⁵¹

The Economic Value of Strawberry crop in the WA Avon Region, 2014-2015

LOCATION	ECONOMIC VALUE OF HONEY BEE POLLINATORS \$A		AVERAGE ECONOMIC VALUE \$A
Price Elasticity of Demand	-0.526	-1.049	
Australia	146,563,470	126,756,234	136,659,852
Western Australia	22,175,701	18,517,608	20,346,655
Avon Valley, WA	5,570,305	4,651,430	5,110,868

Source: John M Karasinski – Curtin University, 'The Economic Valuation of Australian Managed and Wild Honey Bee Pollinators in 2014-15, September 201851

By comparison, the strawberry industry's national economic value lies in a range between \$126.8m and \$146.6m, while at the state level, the economic value is approximately 14.6% of the national industry (\$18.5m and \$22.2m).⁵¹

Profitability of Western Australian Beekeepers

The profitability of WA beekeepers is currently unknown, however a research project at The University of WA is looking at the activities of the States beekeepers. Beekeeping is a growing industry under stress in WA. Economically this was signalled as far back as 2016 when the Federal government released its analysis of the 2014-15 industry survey according to University of Western Australia associate professor Ben White.⁷⁵

From the small sample of WA commercial beekeepers who completed the survey, low levels of profitability were indicated. The economic stress is partly due to a decline in flowering events in native vegetation due to long-term environment changes and human impact through bushfires, logging and urban expansion.⁷⁵

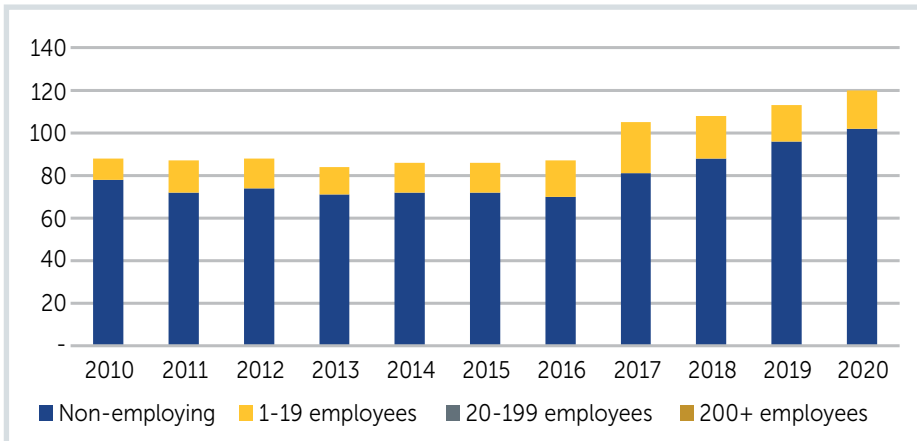
Concerns of commercial beekeepers have led the Co-operative Research Centre for Honey Bee Products (CRCHBP) to conduct a research project to understand the state of the industry use of available natural resources.⁷⁵

The research aims to update the last comprehensive questionnaire of this type undertaken more than 30 years ago by the WA Department of Agriculture to provide a snapshot of the industry in 2020-21. Led by professor White and research assistant Cheryl Day, the survey is inclusive of all beekeeper interests from hobbyists and amateurs through to current and retired commercial beekeepers.⁷⁵

There is much unknown about hive distribution, use of natural resources, honey production and sales across the industry. It will look into which regions are used for honey production and pollination, and the importance of those regions; distances travelled and species used; the fee charged for pollination services; how many hives beekeepers have and the impact of logging and/or fires.⁷⁵

Employment in the Western Australian beekeeping industry

Employment in the beekeeping industry in Western Australia has continued to increase in recent years amongst the 18 businesses who employ 1-19 employees, although more than 102 WA businesses are not using any additional labour.



Western Australian beekeeping industry employment

Source: ABS 8165.0

Western Australian Bee Breeding Research Programs

WA has what is thought to be the world’s oldest continuous queen bee breeding program on Rottneest Island which could be crucial if Australia has to survive a future incursion of varroa mite.⁷⁷

The program began in 1980 when the Department of Agriculture started 20 new breeding lines because quarantine restrictions meant local bee keepers could no longer import queens from the eastern states. The Better Bee program is now a collaboration between eight commercial bee keepers who send drones and queens to Rottneest every year to help maintain the genetic health and diversity of their hives.⁷⁷

For six weeks every year, tens of thousands of bees are taken to the island to breed, free from exotic diseases and genetically unsuitable pests. About 20 hives of drone bees are brought over in September and placed in an isolated area near the island’s centre.⁷⁸ Several weeks later, the virgin queen bees are taken to the island for mating. They mate with between 20 and 90 drones, which all die immediately. About 600 mated queen bees – now worth about \$1000 each – are returned to the mainland where they use the stored semen to produce fertilised eggs every day for the rest of their lives.⁷⁸

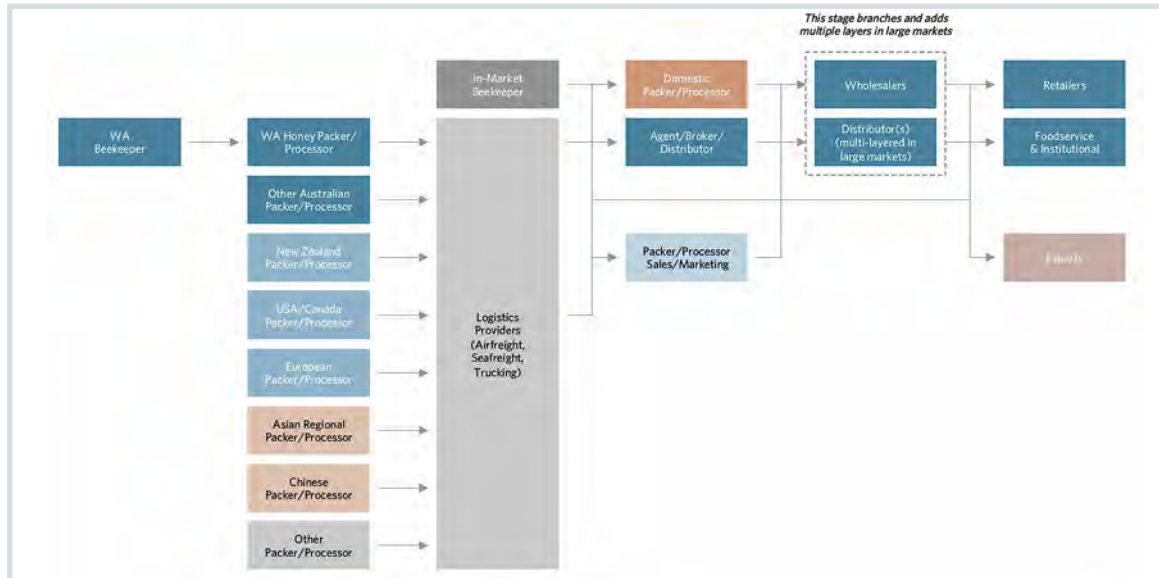
Male bees can’t fly further than 12km to find a virgin queen which means good quality males can be used on Rottneest without the risk of unwanted mates. And the Rottneest-bred bees seem to have a gentleness.⁷⁸ The queens bred on the holiday island are famed for their calm temperament and ability to produce bees which yield up to double the global average of honey per hive.⁷⁷

Bee disease such as EFB, Varroa mites and Colony Collapse Disorder which affects bees in a number of overseas countries is having a serious impact on global food production. The mating of bees on Rottneest Island plays a crucial role in helping to ensure the State’s bees remain free of exotic bee diseases.⁷⁸

According to Colin Fleay, who is one of the Rottneest breeders, the island could be crucial for the survival of the industry if there is a varroa mite incursion. He said a permanent breeding program could be set up on the island to supply the rest of the mainland and trial varroa resistant stock, so the Rottneest Island project is an integral part of the whole survival mechanism for the industry.⁷⁷

Honey Supply Chain for Western Australia

The flow of honey from the beekeeper through to the consumer is relatively straight forward.



Simplified model of supply chain: honey, Model 2016

Source: Coriolis – part of the Asia Market Success, 'Target Market Opportunities in Asia for Honey', April 201610

Western Australian consumption and consumer trends

There is no data available for honey consumption within Western Australia. Based on information outlined previously, in 2016 in Australia on average people were consuming about a kilogram of honey per person per year, which equates to about 7.5kg/pp/pa.⁷⁶ Whereas according to John Karasinski⁷⁴ after using data from the UN and ABS, honey consumption per capita in Australia in 2017 was 0.67kg/pp/pa.

Western Australian Honey Bee and Pollination industry bodies

Historically the WA industry has exhibited little cooperative strategic development. As a result, it has lagged in its ability to seize opportunities such as the global rush to buy natural products like honey. Examples such as the WA grain and rock lobster industries highlight what can be achieved when a motivated and well organised peak body works hand in hand with the state government to bring about substantive industry change. The establishment of BICWA has been a game changer with representatives from all areas of the industry now coming together to develop a clear vision and strategic plan for industry transformation.²¹

There are a number of different entities involved within the honey bee and pollination industry in Western Australia:

Bee Industry Council of WA (BICWA)

BICWA was established in December 2015 by existing WA bee organisations to represent the bee industry in Western Australia. BICWA is a non-profit public company limited by guarantee. BICWA represents the following groups:

- Agricultural Producers Commission (APC)
- Western Australia Apiarists Society (WAAS)
- Western Australia Beekeeping Association (WABA)
- WA Farmers (WAF) – Beekeepers Section



BICWA's goal is to coordinate industry activity and funds to achieve the BICWA vision which is to secure a profitable and sustainable bee industry in WA by protecting the interests of producers and co-dependent industries, identifying and actioning threats to industry and supporting initiatives for industry growth and development.¹⁴

BICWA as the peak industry body engages with all levels of government, the apiculture industry, universities, research organisations and the community. They support and fund vital strategic research projects to secure a profitable and sustainable bee industry in Western Australia.

BICWA is committed to representing the interest of all beekeepers on issues including changing environmental conditions, prescribed burning and threats of new pests and diseases.¹⁴



APC Beekeepers Producers' Committee

The APC Beekeepers Producers' Committee was established in 2003 to provide leadership to beekeepers, ensure governance accountability and identify and implement initiatives for the industry on behalf of all beekeepers in Western Australia.



All registered beekeepers pay the yearly APC beekeeper fee for service charge. Funded by beekeepers, the following services are provided by the committee:

- Supports enhanced Pest and Disease Surveillance to protect the WA beekeeping industry
- Represents and advocates for producers' interests on local and national committees and with regulators and policy makers
- Supports Beekeeper Training - assists beekeepers to be knowledgeable and skilled in all areas of keeping bees.
- Supports research initiatives - ensures the industry is supported by cutting edge research and knowledge about bee health and pest disease prevention, honey quality and properties.
- Produces BeelInformed - the WA beekeeping industry newsletter- keeps beekeepers up-to-date on bio-security and other industry related matters.¹⁴

WA Apiarist Society (WAAS)

The WA Apiarists' Society has over 800 members, the majority being hobbyists who meet to learn, share and promote the craft of beekeeping. Formed in 1953, the Society has been guided by a committee of volunteers and membership numbers have steadily increased. WAAS is the second oldest Beekeeping Association in WA and has the largest membership not only in WA but in Australia.¹⁴



WAFarmers Beekeepers Section

WAFarmers Beekeepers Section represents the majority of commercial beekeepers in the state, both in number and production of honey.

The Beekeepers Section meets four times per year to deal with state and national policy issues affecting beekeepers in Western Australia. Executive members are represented on a number of Committees ensuring that views of beekeepers are maintained.



The Beekeepers Section is the state representative body that has membership to the national peak body, the Australian Honey Bee Industry Council. National representation around the table is of paramount importance for the future sustainability of the bee industry which is in a unique position on a global scale.¹⁴

WA Beekeepers Association (WABA)

The Western Australian Beekeepers Association (WABA) was formed about 15 years ago to represent the interests of all beekeepers in Western Australia, from the professional level to amateur and hobbyists.

It focuses on providing extension and education activities, as well as representing the beekeepers in their interaction with government agencies at both state and national levels. It also works closely with researchers based in universities.



Other groups/ organisations with a focus on research within the honey bee and pollination industry that are located in Western Australia include the following:

The Cooperative Research Centre (CRC) for Honey Bee Products

Established in 2017, the five-year CRC aims to resolve current industry problems that limit the value and expansion of the industry. Led by The University of Western Australia the CRC brings together both industry and academic expertise from across Australia. The CRC for Honey Bee Products will help provide pollination security by increasing the value of the industry to attract and train new professional beekeepers and increase the number of hives. It will also pursue a marketing approach similar to the successful efforts with New Zealand's Manuka honey from a *Leptospermum* species.

Aligning with Australia's 'clean and green' marketing focus, the CRC will also develop a chain of custody from bush to product that becomes core to the training and education of stakeholders to protect the brand. It will use geographic information system (GIS) and economic expertise to value hive sites for both product quality and impact on bee health, and develop a 'bee credit', which together with the 'carbon credit' will give new found value to native bush sites and support their conservation.¹⁶

The CRC for Honey Bee Products is trans-disciplinary across four programs, driving innovation within the industry to meet export demands. These include:

- **Hive Sites** – the hive site program will help protect existing sites, inform bee hive movement and rehabilitate land into new high-value hive sites. Australian Manuka honey will be a new product.
- **Bee Health** – to contribute to honey bee health, the CRC will work towards future-proofing the bee industry and developing a catalogue of disease markers.
- **Honey Products** – the honey bee product program will add value to the industry through developing honeys from known floral sources for the export market.
- **Chain of Custody** – this program will use all the information from the CRC to develop a Chain of Custody. This will be linked to developing and testing product quality labels in the export market.²⁰

(crchoneybeeproducts.com) / *Honey bee research: Faculty of Science: The University of Western Australia (uwa.edu.au)*

ChemCentre Honey Research Work

ChemCentre is internationally recognised as being at the forefront of research involving the certification of Western Australian mono-floral honeys. Research being done at ChemCentre aims to assist efforts by the WA bee industry to address the increasing problems of honey fraud and adulteration, and the traceability of bee products, which are posing challenges to the world honey trade. Work is being undertaken in collaboration between ChemCentre and CRC for Honey Bee Products; BICWA; WA Farmers Federation; DPIRD; UWA and DBCA.¹⁷ *Honey Research Work – Assist Efforts By WA Bee Industry - ChemCentre*

DPIRD

The Department of Primary Industries and Regional Development (DPIRD) assists the bee industry in its commitment to quality assurance and ensuring apiary products are clean, safe and free from chemical contamination. DPIRD has a strong focus on research in honeybee nutrition and queen bee breeding.¹⁵

Jarrah Honey WA - Antibacterial and Antimicrobial - Jarrah Honey Information Western Australia

Appendices

John Karasiński

Curtin University Economist – phone conversation, June 2021

Lecturer – Western Australian School of Mines: Minerals, Energy and Chemical Engineering

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- Need to be very careful as there is a lot of mischievous information on the internet on the honey industry globally and in Australia, some deliberate while others are not sure of what they are doing.
- Has done a number of reports which are evidence based. Had a problem in collecting evidence, it has taken a lot of time to collect data because people say stupid things on the internet. I was frustrated with seeing information available and then in checking it to see if it was accurate would discover it wasn't.
- Collects data on the WA industry and have been doing it on WA industry since 2018 and distributes it to people within the industry.
- IBIS World do a report on the American honey industry, and they do lots of industry reports and update every 12 months. It is current information.
- Pollination – need hives for pollinating avocados and the like. It is not as big as it has been made out to be but it is growing. The difference between Australia and America – honey bee keeping in the US is an industry of pollination and 90% of the industry is focused on pollination, they import \$500 million of honey from SE Asia each year. It is about food not sweetener. Our industry is about sweetener and a little bit of food.
- What I have done is modelled the Australian pollination industry by states by crop, what is the economic value of the pollination industry for WA – \$1 billion. This information has been used by Victoria when they have gone to government to seek money. The report is over 5 years old now but is still the latest information.
- WA commercial beekeepers there's only 50-75 of them, 4,000 registered in WA by end of this month, the rest are amateurs 3,700 are hobbyists. But industry needs a survey to find out who's who, WAAS put together a questionnaire and then the Honey CRC put one out and they should have results.
- WA doesn't know the number of registered hives; the number of hives is important because the definition of a beekeeper is based on the number of hives – commercial or amateur, 50 hives commercial – 49 amateur same definition in NZ. WA has a lot of comparisons with New Zealand. In US 500 hives is commercial.
- In 2008 425 bee keepers were registered in WA, now 4,000 and mostly attributed to Flowhive as these are all amateurs coming on, there was a mad rush for people to get hives, that is where the increase came from. WA during the April 2020 COVID-19 lockdown there was growth in the number of Flowhives into WA and growth in registrations; that month of April had 40 new registrations compared to same month in previous years. This April returned to normality, away from lockdown.
- Queen bees \$1,000 in WA and NSW \$50 – high quality more productive queen bees.
- Number of hives – there's lots of holes in data sets and Australia is overestimating. The reason is the doubling up in counting of hives on the east coast where pollination industry exists – each state requires bee hives to be registered therefore if operating in a few states across borders, they are counted more than once.
- Until 2008 Australia had more hives than NZ but since then they have continued to grow. NZ now has 900,000 hives and Australia has 300,000 hives.

- Pollination of crops – there are 53 food crops, not 35 as originally stated in research reports.
- Global bee numbers / hives have done a report and will update the information.
- In WA it's estimated about 50% of hives are unreported. The royalties that commercial beekeepers pay to DPIRD is based on the number of hives. My suspicion is that it is similar to the crayfish industry.
- Amateurs – with 3,900 amateurs in WA (who produce 20kg a hive a year) what do they do with the honey they produce? They're not selling 8,000 kilograms in WA. What is the impact of that honey for commercial beekeepers – they argue about impact on industry and need evidence to support it. It may be a threat to the industry. Price – \$5kg x 20 = \$100 x 8,000 is the potential loss to WA beekeepers and loss of income to industry if it is true.
- Increase in population in Perth 2010-20 has the net increase absorbed the extra production?
- Prices are sticky – price is set by Capilano and remains constant. If the above is true with amateur honey production, the extra 8,000 tonnes what impact would that have on price – will it come down? What is the price per kg for each year since 2010 – look at the price movement.
- There is no production data or consumption data for WA, there are national figures for consumption. I have done some calculations. I am hearing people are becoming more health conscious, but I am not sure if it is an industry myth – we have no evidence.
- Reports available:
 - WAAS presentation
 - Global bee and hive numbers
 - Value of pollination industry
 - WA beekeeper registrations to date from DPIRD figures.

Gerard Leddin

DPIRD – phone conversation, June 2021

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- DPIRD estimates the WA honey industry is currently worth \$50m in terms of honey sales, wax sales, queen bee sales etc. We think that is underrated and there is huge potential there.
- Value of pollination – The Department values pollination services at around \$1.1 billion this year – this reflects the value of fruit (apples, almonds etc.) that require pollination. If you look at avocados, almonds they are exploding in plantings at the moment and we expect to see a fair push upwards in demand for pollination services in WA in the next 12-24 months.
- Honey exports (around \$7 m/year) from WA last year were worth \$8m, exports were mostly to Singapore, Hong Kong, Malaysia, UAE and Japan. We export about \$7.5m worth of raw honey, about \$400,000 in queen bees and packaged bees.
- Consumption of honey in WA there is no data. About \$40 million of local honey is sold within Australia. Because the market is so diverse – Coles and Woolies right down to the road sidlers – it is not a consistent market like eggs where we can track and define the market clearly.
- Producers – with honey there are 160 commercial producers, we know another 300-400 are semi-commercial and there are about 3,000 amateurs and to what degree they sell honey is unknown.
- Data for WA is vague, one of the things the Minister requested two years ago and we couldn't find was any data on the WA industry. That was part of the reason for the Agdots report. The lack of data is a huge challenge which the industry faces.
- I have some export data on honey and queen bees and how much wax is exported from WA but it doesn't take into account the domestic market. There are lots of holes in terms of data and we don't know how much is sold locally and interstate which is half the problem. We are pushing up hill to find data, it is very frustrating. Because it is a smallish industry and it has been fragmented, it is small scale, and the market base is pretty diverse so finding the data is impossible.

Gerard Leddin (cont.)

- The problem is that we can track the commercial guys, and ABARE has some data around them, and we can somewhat track the semi commercials, but it is hard with the 3,000 amateurs who we can't track at all. Some of those are commercial guys who are deliberately flying below the radar.
- Honey production per beekeeper – on average professional bee keepers get 150kgs of honey per hive per year, semi professionals get around 90kgs/year and it's a lotto for the amateurs.
- Honey price received for bulk honey (mainly canola honey) will generate around \$7/kg at the farm gate. As the quality improves the value improves – for example wildflower honey will average around \$20/kg and jarrah honey will bring \$50 +/-kg.
- Quality is a major issue the CRC /BQUAL are working on – speak to Liz Barbour (CRC) on this issue.
- Number of hives – commercial average is 400, semi commercial ranges from 150-50 hives and then below 50 hives is amateurs, but those lines are blurred.
- Production in WA – there is no data so there is a glaring gap, we have spent many hours scratching our heads as to how to resolve that but the reality is we know how much comes from professionals, we are semi confident around semi-professionals but we have no idea around amateurs.
- Production on a desktop calculation, professionals have 400 hives on average and produce 150kg in an average season, there are 160 commercial producers that gives a rough indication.
- One of the issues that is somewhat neglected is the issue of biosecurity – it doesn't get the audience it should, we are lucky in this state, we have the most disease free bees in the world. We don't have any of the diseases that the east coast has. When you get a spread of amateurs, biosecurity becomes a key issue for the industry because we are more likely to see risks in amateurs as opposed to professionals as they are not experienced at seeing disease and tracking it. Some hives are not well attended. You only have to look at New Zealand which had varroa mite and see it can have a huge impact on the industry. Biosecurity is the biggest issue the industry faces.
- Amateurs range from quite a few with 30-50 hives down to backyarders with 1-2 hives.
- Getting data is very hard and because industry is so fragmented it makes it more difficult.
- Beekeepers by region is basically near in possible to identify because professionals move their hives around, one week they are in Geraldton and the next week Wickiepin then Bunbury. It destroys any data as it is not feasible to track this movement.
- Crops requiring honey bee and insect pollination are pome fruit, almond, apples, walnuts, avocados.
- Profit margin for beekeepers – there is no data.

Michael Bellman

Capilano Honey Supply Manager - phone conversation 2021

Agknowledge recently delivered a project for DPIRD on Development and application of a prioritisation framework to analyse and rank WA agribusiness investment opportunities.

Below is an extract of the interview with Michael Bellman, Capilano Honey Supply Manager as part of that project. The same questions were posed to individuals from 26 identified business opportunities.

What are the drivers within honey the industry?

- The biggest driver is pollination as a lot of industries rely on bee keepers for pollinating, like almonds want to grow 4-5-fold over next 5 years, and there is a push in resources in regards to beekeeping sites and bees in general.
- Industry worth including pollination in WA is \$1 billion, honey bee industry is \$30 million. Wescobee is \$15 million alone and the balance of \$15m is made up of smaller producers. There is a lot of growth from hobby and small beekeepers starting up their own backyard hives; a lot go direct to IGAs and markets and we haven't got the data for those. Production is 20kg honey per hive/year.
- Industries like avocados, almonds, fruit in Carnarvon like rock melons and watermelons and some other fruit and veg can't produce without bees pollinating crops. At the moment they are lucky as there is still a lot of native bees where avocados are but if they get disease and have biosecurity issues, bees will die and they won't get the pollination.
- Export markets are Japan, Malaysia, Singapore, Mauritius, Africa, China, Philippines, Europe, Canada, US; they are all growing – 20% increase in exports last year in terms of value.
- Manuka honey is higher value, standard honey is ground flora or spring honey.
- Wescobee has different honeys to get a taste range – spring honey, eucalyptus, jarrah, mallee etc. Jarrah and Manuka are the two most expensive honeys and these are the main ones exported.

What are the main barriers to industry/activity?

- Capital is limited. In terms of beekeepers, they are limited by investing in their own business – buying hives, trucks, bees. Extraction plants are expensive to get honey off - \$100,000 for a plant and most commercial guys have their own.
- We are limited by the margin we make at supermarkets; consumers are only prepared to pay so much for honey and if the price is too high the market will drop quickly. Export is the way to go, the last 12 months it has been off the boil because of China trade disruption and COVID-19.
- We don't have enough bee keeping sites in WA, we are limited by what is available in state and Crown land and private property. Flowering seasons have changed over the past 10 years due to climate change, clearing, fires, suburban sprawl etc. Intake is down 30% into Wescobee – it used to do 3,000kg, now around 1,000kg but that could also be because there are more packers.
- The honey industry is quite labour intensive, we are struggling to get beekeepers and backpackers.
- Knowledge is a limitation– knowing when things flower and where to go next; we need to look at training.

What opportunities are there for future investment (throughout the supply chain)?

- Investing in packers to grow their businesses or packing if someone wants to target export markets. We could double the size of the industry but our machinery is old and needs upgrading. Another packer would help with competition. There is potential to grow the export market – it is huge, but limited by supply with jarrah and high value honey and resources. It could easily triple in 10 years. Plantations like Manuka and even Jarrah where we could grow monofloral product to help keep up with the demand overseas. If you look at doubling the high value market you will need more access to resources to get it or plantations.

Michael Bellman (cont.)

- Job creation – beekeeping is very labour intensive; 2,000 hives require 10 people, extra 10,000 hives you need at least another 100 people. Extraction and packing plants anything up to 5-10 people running those. We have 15 people at our packing plant, we could double up. Downstream a lot of industries rely on beekeeping – suppliers and beekeeper wholesalers, packaging companies. We could easily double the number of jobs.
- Our company has Kerry Stokes' involvement, and Twiggy Forest is also looking to invest.
- Australian honey is in demand, but in the past 6 months it has dropped off because of China. We are clean green and in a unique position where we don't have varroa mite (it's everywhere apart from Australia). We don't have to worry about using pesticides. Otherwise, opportunity to buy into market to get product.
- There is room for other players, 22 packers in WA now and that has grown from 2-7 in the last 4-5 years. A lot are beekeeper packers with their own gear and own label. It would be nice to have people invest in beekeepers, hives, and extraction plants to supply us.
- In terms of pollination, the industry will need to invest in that area as well as avocados will need at least 6-7,000 hives in the next 5-7 years.
- We need promotion and marketing to get to the next level, and that requires investment.
- Agritourism spin offs as well - House of Honey in the Swan Valley, Colony Concept in the south west and small honey shops.
- ROI – we work on 30% margin in our business, if you go more high value it can be a 50-60% margin. Potential with high value honey and with pollination, they are making \$50 hive, you can double that.
- Pollinators – avocado industry requires bees from August to November and that is good honey season. You don't get honey at the same time and that is offset with a charge of \$150 per hive per week so there is about \$50 profit. After pollination, the bee gets knocked around from pollination so need to build up for 6-7 weeks for the next honey season and then they are ready to go in Jan/ Feb.
- Industry has the potential to be a sustainable agribusiness that employs people and it has a lot of potential as a high value product that is in demand.
- At the moment we are 2-3rd priority in the government/state forest area in terms of prioritisation of products, I would like honey to be first. Currently it is timber first, and then mining. If it is flowering, we should have access, we are shut out of places at the moment.
- The industry is still below the radar with regard to potential, if we can follow down the wine path and focus on what flowers are there and what consumers overseas want, the industry will grow rapidly.

What is your vision of where the industry/activity will be in 5 years' time?

- I would like to see at least 60% of product exported overseas and all high value Australian unique product like the wine industry so we don't have to rely on the supermarkets to dictate pricing to us. At the same time there will be a flow on effect as the beekeepers will make more, packers will make more and they will employ more people and need more resources.

Can you nominate anyone else we should speak to?

- Honey for Life, Shane McLindon – beekeeper and packer, sells to Japan looking at investing in that. Had some outside investors.
- Matt Colvin, APIS operations – beekeepers, head of WA Farmers Bee Keepers Section, own extraction plant, exports honey.

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Agknowledge®

Agknowledge® is a small company providing strategic management advice to a range of agribusiness companies and farming enterprises across Australia. Agknowledge® principals Peter Cooke and Nicol Taylor work nationally from a base in Western Australia, and combined they have over 65 years of involvement in agribusiness at all levels from strategic planning for agribusiness companies, government and industry policy, research, succession planning and business development.

Agknowledge® has extensive experience of working closely with agribusinesses to assist in the development of individual business units and overall group strategy. Agknowledge® has a reputation for bringing clarity and depth of thinking to complex situations and for identifying viable strategic pathways that will build value and stand the test of time.

Our advice and contribution is informed by:

- **Extensive specialist knowledge of key industry sectors** and the issues that are driving operational and strategic change, a significant first-hand experience of working in roles with responsibility for strategic development, and the practical factors that may constrain the implementation of strategic initiatives.
- **Government strategy development experience:** Agknowledge® has completed many successful strategy and innovation engagements with government. We also bring practical experience of how to develop strategy in the government context.
- **Industry and infrastructure experience.** We draw on our team's strong knowledge of regional industries as well as our numerous engagements in conducting industry analysis and building strategic business cases. Our robust quantitative analysis supports the qualitative perspectives, underpinned by strong analytical capabilities.

Julia Ashby has worked with Agknowledge® since 2014 conducting one on one industry interviews on topics including: inland aquaculture opportunities, the value of grower groups, citrus industry consumer research, surveillance needs for invasive species, consultation for the WA Wild Dog Action Plan, and risk management in the Western Rock Lobster industry.

Julia has been involved in the agriculture industry in a professional capacity for more than 25 years. With a Bachelor of Business in Agriculture Julia is a former ABC Reporter who has also worked with grower groups in a communications role in Mingenew and Esperance. Julia took up the reins as the first employee for the South East Premium Wheat Growers' Association, based in the Esperance Port Zone of WA. Over thirteen years with SEPWA Julia worked as sponsorship officer, group development officer and media officer. Julia now runs a communications consultancy business where she provides her media and communications expertise to a range of agribusiness, industries, farmers and agricultural projects.

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