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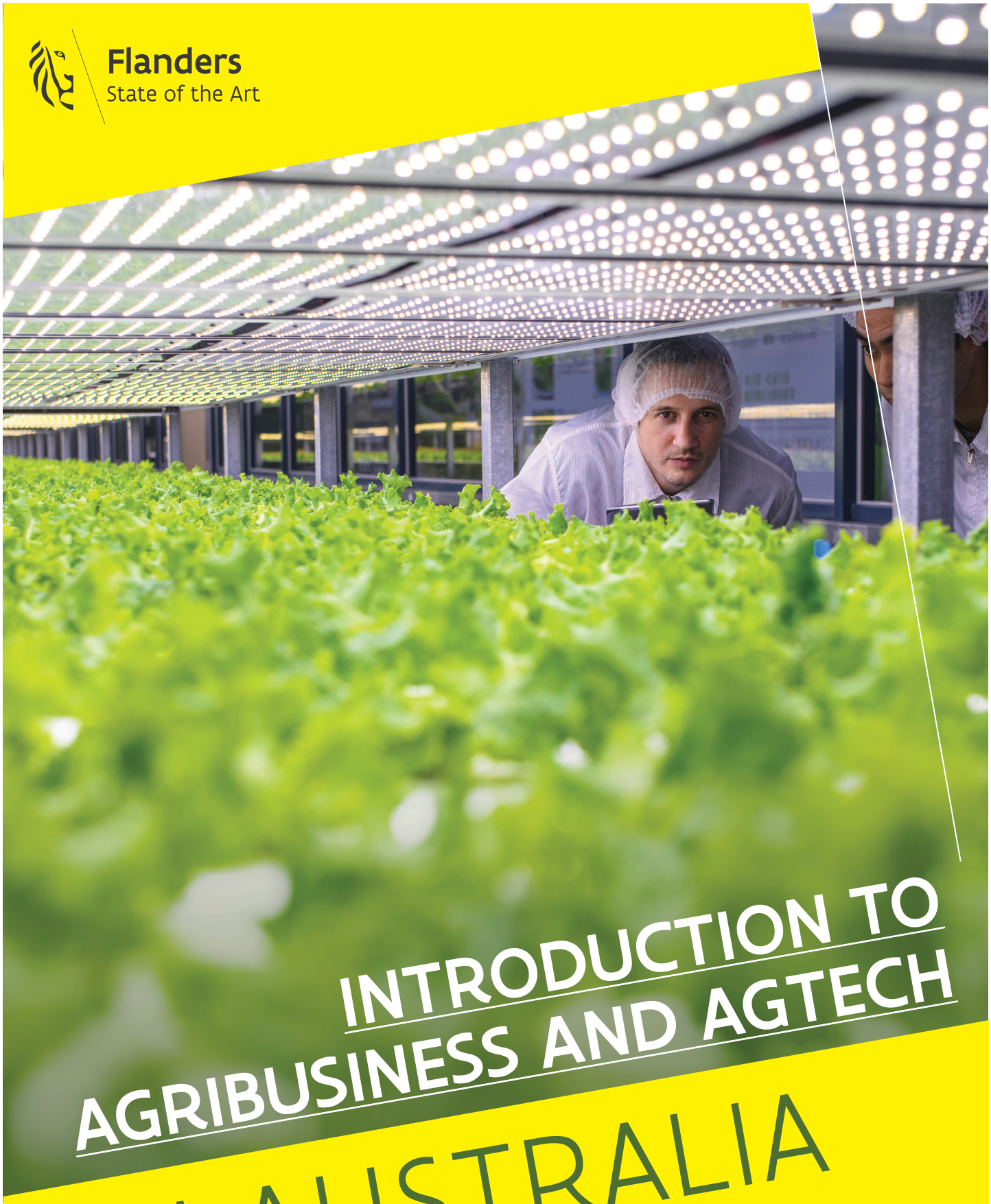

# INTRODUCTION TO AGRIBUSINESS AND AGTECH IN AUSTRALIA

**FLANDERS** INVESTMENT & TRADE MARKET SURVEY

FLANDERS
INVESTMENT &
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Market Study

# INTRODUCTION TO AGRIBUSINESS AND AGTECH IN AUSTRALIA

2020

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# EXECUTIVE SUMMARY

There are an estimated 85,681 farms in Australia, spread over 372 million hectares of land used for agricultural production. Agricultural businesses occupy and manage 48% of Australia's landmass. As such, Australia is the second largest agricultural area in the world, after China and before the US. The average Australian farm is 4,331 ha and its size keeps increasing slightly. 99% of Australian farms are operated by families.

In 2019, total revenue in agribusiness in Australia was valued at AUD 282.2 billion. Due to its variety of climates, Australian farmers grow a large variety of products. The main subsectors include meat, livestock and fish, grains and cereals, fruit and vegetables, and dairy.

Australia exports about 70% of its agricultural production (by volume), including 71% of its wheat crop, 75% of beef and veal production, and 40% of its dairy products. In turn, about 11% by value (not volume) of food and beverages consumed in Australia comes from overseas.

The National Farmers' Federation (NFF) hopes to grow the industry to produce AUD 100 billion in farm gate output by 2030. In the 2018 financial year that figure was AUD 59 billion, meaning Australia's agricultural sector would need to grow by almost 70%. To achieve this ambitious goal, the sector needs to change significantly and AgTech plays a key role in this.

This market study aims to be an introduction to the agribusiness sector in Australia. In chapters 2 "Agribusiness in Australia" and 3 "Economic Data: Production, Consumption and Export of Agricultural Products", FIT Melbourne provides an overview of the sector as a whole, but also looks into subcategories like animal (product), horticulture and grains farming and processing, and different types of farming (organic, hydroponic).

The second part of this market study looks at the equipment and technology that is needed in the industry. Chapter 4 "Available Technology" provides an overview of the technology (including packaging) already available in Australia and chapter 5 "Challenges, Trends and new AgTech" looks at what's needed in the future.

Lastly, chapters 6 and 7 contain more practical information for Flemish companies such as an introduction to Standards and Customer Service, and Trade Fairs and Conferences respectively. For additional information, companies can consult chapter 8 "Additional Resources and Related Associations".

**Impact of COVID-19 on the agricultural sector**

KPMG reports that in Australia, the COVID-19 crisis started off as a supply shock (i.e. less workers producing less output) and it is flowing into a demand shock (i.e. people buying less and buying different things to what they normally purchase). Economic activity in accommodation and food services sectors halved by June 2020 before an expected long recovery to their pre-COVID levels by March 2021.
These reductions in demand have been countered to a degree by strong wholesale demand for agricultural products as major retailers service strong demand during the lockdown and continuing restrictions.

International demand has and will continue to be impacted in the short term as unemployment and uncertainty from COVID-19 reduces disposal income for premium Australian products. However, assessment of Australia's top 10 agricultural markets (India, China, Indonesia, USA, Vietnam, Malaysia, Hong Kong, New Zealand, Korea and Japan) over the short to mid-term remains favourable, with income growth projected to increase marginally from 3.5% in 2020 to 3.7% in 2025.

In response to COVID-19, a number of Australia's key trading partners are implementing more protectionist trade agendas, standing up both tariff and non-tariff measures. In May 2020, China revealed it was applying a series of import tariffs on Australian barley (~80%) which is considerable, given China previously received 49% of Australia's barley. China also announced it was suspending imports from four Australian meat processing plants in response to 'technical breaches' by Australian parties over the course of 2019. Australia's future export growth will in part, be dependent on how its political relationship plays out with China and the speed at which the Chinese economy recovers. This will be particularly important for high-value food goods such as seafood and fresh meat.

As the global supply chain (shipping and ports) continues to be disrupted, Australia may have issues accessing critical production inputs, notably packaging which could further affect its production and export capacity. Key agricultural inputs such as fertilisers, pesticides and the labour force may also be affected if regular trade flows do not resume.

**Some important notes:**

- The Australian financial year runs from 1 July until 30 June the next year. Therefore, economic information is often presented in a multiyear format, e.g. 2018-19 indicates 1 July 2018 until 30 June 2019.
- This market study is based on economic data and information from the last two years which of course includes pre COVID-19 information. Where possible, FIT Melbourne included data published after March 2020 but in many cases this information was not yet available.

# 1. INTRODUCTION: ECONOMY & AGRICULTURAL LANDSCAPE

## 1.1 MACRO-ECONOMIC ANALYSIS OF AUSTRALIA

To gain a better understanding of the Australian Agribusiness sector, an overview of local key macro-factors is useful to understand the demographics of the population and the financial status (before COVID-19 impact).

### 1.1.1 Demographic factors

As at 30 September 2019, Australia's preliminary estimated resident population (ERP) amounted to 25,464,116 people. The annual growth was 371,100 people (1.5%): 37.5% was due to natural increase, and 62.5% was due to net overseas migration.

**Annual population change by state and territory**

| | Population at 30 Sep 2019 '000 | Change over previous year '000 | Change over previous year % |
|---|---|---|---|
| New South Wales | 8 118.0 | 102.0 | 1.3 |
| Victoria | 6 629.9 | 129.6 | 2.0 |
| Queensland | 5 115.5 | 84.7 | 1.7 |
| South Australia | 1 756.5 | 15.4 | 0.9 |
| Western Australia | 2 630.6 | 29.3 | 1.1 |
| Tasmania | 535.5 | 5.3 | 1.0 |
| Northern Territory | 245.6 | -1.4 | –0.6 |
| Australian Capital Territory | 428.1 | 6.2 | 1.5 |
| **Australia** (a) | **25 464.1** | **371.1** | **1.5** |

*Australia's ERP 31/12/2019 (Australian Bureau of Statistics, 2019)*

Despite the fact that Australia is a vast geographical area, it is important to notice that approx. 90% of Australian populations live in urban areas, with 67% living in capital cities:

| Capital city | Change over 2018-19 Number | Per cent | Population at 30 Jun 2019 Number |
|---|---|---|---|
| Melbourne | 113,500 | 2.3 | 5,078,200 |
| Sydney | 87,100 | 1.7 | 5,312,200 |
| Brisbane | 52,600 | 2.1 | 2,514,200 |
| Perth | 27,400 | 1.3 | 2,086,000 |
| Adelaide | 13,900 | 1.0 | 1,359,800 |
| Canberra | 6,300 | 1.5 | 426,700 |
| Hobart | 3,400 | 1.5 | 236,100 |
| Darwin | -1,100 | -0.8 | 147,300 |
| **All capital cities** | **303,100** | **1.8** | **17,160,400** |

*Australia's Regional Population Growth 2018-2019 (Australian Bureau of Statistics, 2019)*

Just over 17 million people live in Australia's capitals (+303,100 people during 2018-19). Capital city growth accounted for 79% of Australia's total population increase in the year ending 30 June 2019.

Melbourne's population grew by 113,500 to reach 5 million residents during 2018-19. This was the largest growth for any capital city and was followed by Sydney (up 87,100 people), Brisbane (52,600) and Perth (27,400). Melbourne also had the highest growth rate (2.3%), ahead of Brisbane (2.1%) and Sydney (1.7%).

The population of Australia consists of a unique composition. In 2018, there were 7.3 million migrants living in Australia. This means that 29% of the population was born abroad. The majority of the migrants are born in the following countries: a] England - 992,000 people; b] China - 651,000 people; c] India - 592,000 people; d] New Zealand - 568,000 people.

The median age of the Australian population has increased by two years over the last two decades, from 35 years at 30 June 1998 to 37 years at 30 June 2018. Australians live longer than ever before, but half of the population lives with at least one chronic condition. Many of these chronic conditions such as overweight and obesity, insufficient physical activity and alcohol consumption are related to lifestyle factors. Overweight and obesity are major public health problems in Australia. Obesity is one of the main causes of disease and premature death in Australia. Australia's measured obesity rate ranked ninth in 2016 among Organisation for Economic Co-Operation and Development (OECD) countries. In the same list, Belgium was ranked as twentieth.

### 1.1.2 Economic Factors

Australian GDP has grown for the last 28 years, with a growth rate above the OECD average, confirming the successful transition from the largest resources investment boom in Australian history to a broader-based growth. Official data reveals that this GDP growth reflected the strong performance of 15 out of 20 industries, with Health and Education (13% industry share of output), Mining (10%), Finance (9%), Construction (8%) and Manufacturing (6%) and professional scientific and technical services greatly performing.

The Reserve Bank of Australia (RBA) put out the following figures on 4 March 2020:

- Estimated GDP of AUD 1.89 trillion as of 2019 (14th GDP global rank), with estimated growth of 1.7% in 2019. For 2020, due to the recent bushfires and the restrictive measures related to COVID-19, it is expected that Australia will go into recession with Q1 down by 0,3% and a much steeper drop in Q2. IMF projected a 6,7% GDP contraction for 2020 (and a 6,1% increase in 2021);
- Official cash rate 0.25% (following recent Australia's central bank cut due to COVID-19);
- Unemployment rate 5.3% (this is unfortunately predicted to double by the end of 2020);
- Inflation rate 1.8%;
- Average weekly earnings AUD 1,257 with a household saving ratio of 5.5% (Reserve Bank of Australia, 10 June 2020)
- Exchange rate Euro: 0.6146 (in Units of foreign currencies per Australian dollar on 2 July 2020)

The Australian cost of living stands as one of the highest with a Consumer Price Index (CPI) of USD 110 (in Belgium USD 104): as a practical example, compared to an USD 123 value shopping basket in Australia, you can buy the same products in Belgium for only USD 100 (approx. € 115 versus € 93). This is also an indication of the Purchasing Power, which is worth USD 1.45 in Australia and USD 0.8 in Belgium (OECD, 2017).

Australia's political stability, transparent regulatory system, and sound governance frameworks underpin its economic resilience. Ranked in the global top five on the Index of Economic Freedom, Australia's effective governance provides multinationals with a safe, secure business environment.
Australia offers:

- A business environment that is ranked 15th out of 190 economies for ease of doing business;
- A robust regulatory system noted for its stable institutional frameworks and strong finance and banking regulations;

- Competitive rates for office space and the remuneration of professionals;
- A quality of life that is rated the seventh highest in the world.

In terms of purchasing power, consumer behaviour and multi-ethnic properties, Australia is somewhere between Europe and the US. In addition to Aboriginal and Torres Strait Islander peoples, the Australian population consists mainly of European immigrants. Australia is also a relatively young country, which means that it has many cultural similarities with the US, e.g. in terms of lifestyle or marketing. Economically stable, resilient and diversified, Australia is a low-risk environment in which to do business.

## 1.2 AUSTRALIA'S FARMING LANDSCAPE

Before providing more information about the specifics of Australia's agricultural sector, FIT Melbourne outlines the main agricultural regions across the country as they will be mentioned several times throughout the report. Special note should be take about the Murray Darling Basin ("The Basin") and the drought it is currently experiencing.

Australia's size and climate has shaped its agricultural output. The country's vast landscape lends itself to livestock farming and to broadacre crop growing. Broadacre agriculture is a term mostly unique to Australia and describes large-scale crop growing operations. These crops commonly include wheat, barley, peas, sorghum and maize.

The Australian landmass is mostly arid, limiting crop and horticultural production to sporadically located growing regions. It also explains Australia's robust livestock farming segment, as semi-arid land can be suitable for grazing. In areas with highly arable land, vegetables, fruits and nuts are the most common produce. Some of the most notable arable regions include the Murray-Darling Basin and the South-West of Western Australia.

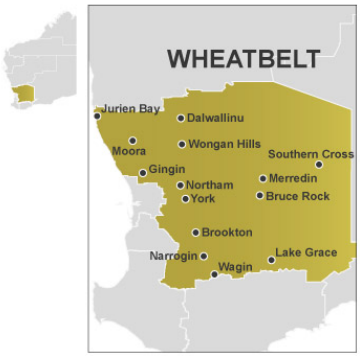
### 1.2.1 The Murray-Darling Basin and the drought


The largest and most well-known of Australia's agricultural growing areas is the Murray-Darling Basin, which covers 1,059,000 square kilometres, or 14% of Australia's land. The Basin starts in southern Queensland as a series of rivers and creeks, most of which flow south into the Darling River. The southern end of the Basin stretches into Victoria, where many waterways meet the Murray River. The Murray flows West, eventually meeting the Darling River near Mildura, before winding through South Australia to meet Lake Alexandria and the Southern Ocean, almost 100km from Adelaide.
The Murray-Darling Basin can be subdivided into several smaller regions due to its expansive size. These regions include the Goulburn Valley in Victoria, the Riverland region of South Australia and the Riverina in New South Wales.

The Murray-Darling Basin is a complex and intertwined natural water system. Australians have – often controversially - extracted water from the Basin's many winding rivers, lakes and creeks to grow a range of produce for over a century (see chapter 5.2.2 Water and Irrigation for more information). In an average year, over 40% of Australian agricultural businesses are established in the Murray-Darling Basin.
Farmers across New South Wales and Queensland (including in the Basin) are currently experiencing a drought which has been described the worst in living memory. For some regions the drought has been going on for only a year, whilst other regions have battled it for almost seven years now. The Murray

Darling Basin saw twelve consecutive seasons of below-average rainfall – the longest such period since 1900. According to the Bureau of Meteorology, a wetter than average first five months of 2020 has eased the severity of short-term deficiencies over much of Eastern Australia and has provided a better start to the winter cropping season in many regions.

### 1.2.2 Western Australia




Western Australia has several growing regions. Produce varies in accordance with climatic changes across the state's immense area. The most prominent region in terms of revenue is the Wheatbelt, which produces approximately 36% of Australian wheat in an average year. The Wheatbelt spans across 154,862 square kilometres in the south west of Western Australia and has five subregions: Avon, Central Coast, Central East, Central Midlands and Wheatbelt South.


The other notable agricultural area in Western Australia, is the Southwest region, which is located in the south-western corner of Australia and covers an area of nearly 24,000 square kilometres. A range of crops and produce grow in the Southwest region, including strawberries, stone fruit, wine grapes, potatoes, lettuce and avocados. The Wheatbelt and Southwest growing regions typically have a cool climate and above average rainfall. However, rainfall volumes in these regions have been in decline over the past two decades.

### 1.2.3 Queensland

In 2017-18, 88.4% of Queensland's land area was dedicated to agricultural practices. However, the state is heavily skewed towards livestock products, with only 2.5% of the state's land used for non-livestock agriculture. Most of Queensland's growing activities occur in two regions: Southern Queensland (livestock, dairy, cotton, grain, fruit, nuts, vegetables) and Tropical North Queensland sugar cane, bananas, coffee, mangoes, tea).

### 1.2.4 Tasmania

Tasmania contributes to national output through high-quality produce attributable to its clean atmosphere, mild climate and fertile soil. Although renowned for its apple orchards, the state produces more cherries, hay and potatoes than apples, in value terms. Notably, Tasmania is the world's largest producer of legal alkaloid material through its robust poppy growing industry. The state meets half of global demand for alkaloid material, commonly used in pharmaceutical products such as morphine, thebaine and codeine.

# 2. AGRIBUSINESS IN AUSTRALIA

## 2.1 THE INDUSTRY AS A WHOLE

The Australian agribusiness sector is highly diverse and consists of operators involved in agricultural services or production across the food supply chain. Operators included in this sub-chapter are primary producers of agricultural commodities, processors, manufacturers and wholesalers.

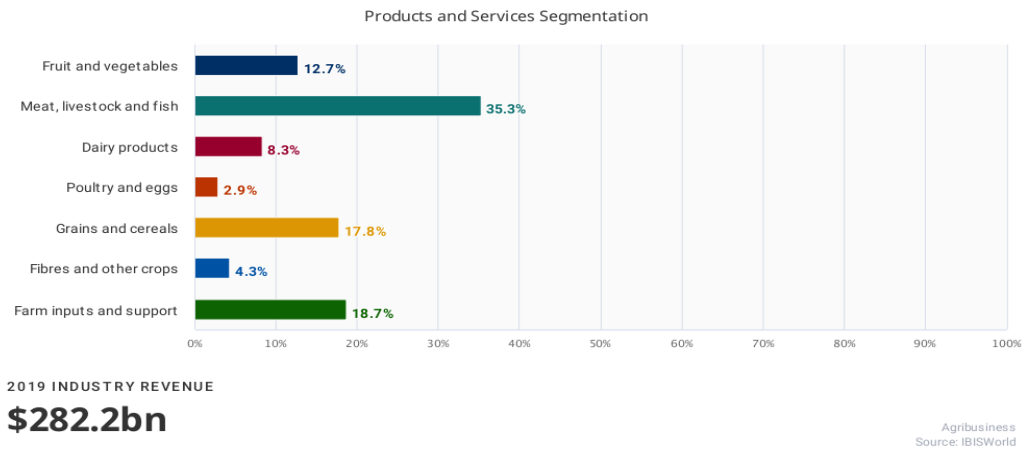
### Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $282.2bn | 1.7% | 1.6% | 8.8% | 8.2% | -1.2% |

Weather patterns heavily influence farm yields and input prices across the supply chain and have caused revenue to fluctuate in each segment over the past five years. However, the diversity of operators in the sector has mitigated the effects of fluctuations on the overall sector.
Rising demand from Asian export markets, along with increasing disposable incomes and changing diets, have supported sector growth over the past five years. In particular, overseas income growth has boosted demand for high-value meat products and cattle.

Multinational companies have become increasingly involved in Australian agribusiness over the past five years. often growing their market share through acquisitions. However, the need for government approval has constrained this approach. Corporations have been encouraging vertical integration across all sector segments.

The sector is forecast to grow over the next five years due to the increasingly globalised nature of the industry. Export markets in China, Japan and South Korea are anticipated to be major growth areas for domestic produce. Revenue in the industry is predicted to rise up to AUD 305.0 billion.




In the following sub-chapters, FIT Melbourne looks into the different types of products being farmed and processed in Australia.

## 2.2 ANIMAL FARMING & PROCESSING

Livestock includes beef cattle, sheep and pig farming. Poultry and dairy are discussed in sub-chapters 2.2.2 and 2.2.3 respectively. More information about the Seafood industry can be found in chapter 2.2.4.

### 2.2.1 Livestock

Within 'livestock' FIT Melbourne has included information about the different kinds of livestock farming practised in Australia. For example, beef can be exclusively farmed on traditional farms where cattle can roam (chapter 2.2.1.1) but it can also be farmed in feedlots (chapter 2.2.1.2) and in conjunction with sheep (chapter 2.2.1.3). Lastly, beef or sheep are sometimes also be farmed together with grain (chapter 2.2.1.4). For more information about organic livestock farming, please refer to chapter 2.5.3.

Industry group Meat & Livestock Australia announced that in 2017-18, the red meat and livestock industry contributed AUD 18.5 billion to GDP – or 1.5% of Australia's key industry GDP - through close to 80,300 Australian businesses. Red meat and livestock exports were valued at AUD 13.7 billion. The Australian red meat and livestock industry created (direct and indirect) employment for approximately 404,800 people.

#### 2.2.1.1 Beef Cattle Farming

The Beef Cattle Farming industry has recorded strong revenue growth over the past five years. Varying weather patterns, fluctuating turnoff rates and government policies abroad have all influenced the industry's performance over the period. Strong demand for Australian cattle and beef in export markets boosted industry revenue over the two years through 2015-16. Adverse weather conditions influenced the industry's performance in subsequent years, with drought conditions pushing up saleyard prices over the two years through 2019-20. However, the ongoing COVID-19 outbreak is expected to constrain industry revenue growth in the current year.

Industry revenue is projected to decline over the next five years as industry farmers rebuild their cattle herds in the wake of prolonged drought conditions. Rising health consciousness is anticipated to contribute to weak growth in domestic meat consumption over the next five years, constraining industry revenue. However, rising incomes in Asian countries and a weak Australian dollar are forecast to support demand for Australian beef in export markets over the period. Organic beef products, which generally attract higher prices and profit margins, represent a potential growth area for domestic beef cattle farmers.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $18.7bn | 5.2% | -4.4% | 32.2% | 5.8% | -1.1% |

#### 2.2.1.2 Beef Cattle Feedlots

Lot feeders are the final stage of production for almost one-third of beef cattle slaughtered in Australia. The length of time cattle spend on the feedlot depends on which downstream market they serve. Cattle that produce grain-fed beef products for the domestic market (58%) spend less time on the feedlot compared with cattle that become exported grain-fed beef products (42%).

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $4.6bn | 9.0% | 1.4% | 11.0% | 1.4% | -1.8% |

The Beef Cattle Feedlots industry has displayed strong revenue growth over the past five years due to rising global beef consumption. Consequently, export markets (42% of production) have become increasingly important for lot feeders, contributing to the industry's growth. However, the domestic market remains the largest market for grain-fed beef produced in Australia. Major domestic customers, particularly the national supermarket chains, have remained important to the industry. High over-the-hook prices and cattle turn-off rates have stimulated substantial revenue growth over the period.

#### 2.2.1.3 Sheep-Beef Cattle Farming

Revenue in this category has grown significantly over the past five years as industry livestock and downstream meat product prices have surged. Beef, sheep meat and wool prices largely increased over the three years through 2015-16 as turn-off rates for cattle and sheep were high. While uncharacteristic of the industry's typical conditions, this price growth allowed sheep-beef cattle farms to post substantial growth over the same period. Slaughter rates declined significantly in 2016-17 as rainfall allowed farms to rebuild herds and flocks. However, ongoing price increases allowed the industry operators to continue growing revenue during the year.

Industry revenue is projected to fluctuate over the next five years and will continue to depend on weather conditions. Sustained high prices for lamb and beef compared to the long-term average are forecast to assist revenue growth. However, growth is likely to be constrained by herd and flock rebuilding activities over the period.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $6.2bn | 6.1% | 3.8% | 8.5% | 2.5% | 0.8% |

#### 2.2.1.4 Grain-Sheep or Grain-Beef Cattle Farming

The Grain-Sheep or Grain-Beef Cattle Farming industry includes farms that either farm sheep and grow grains, or farm beef cattle and grow grains, but not both. Beef cattle makes up 42.1% of production in this overview, Grain account for 31.7% and lambs, sheep and wool for 26.2%.

The industry's performance has been volatile over the past five years as fluctuations in annual rainfall have significantly influenced output. However, strong demand for downstream meat products from export markets and rising domestic prices have supported industry revenue growth over the past five years. Farmers will continue to be at the mercy of weather patterns, as extreme weather has the potential to negatively affect the industry. Additionally, farmers will have restricted access to water from the Murray-Darling Basin over the period due to policies that limit water extraction. These restrictions could create production difficulties for operators located in the region.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $12.0bn | -0.4% | 0.0% | 4.0% | 12.1% | -0.1% |

#### 2.2.1.5 Sheep Farming

The Sheep Farming industry has displayed strong growth over the past five years, despite variations in turn-off rates and wool production volumes. Rising demand for wool and downstream sheep meat from export markets has stimulated strong price growth for both wool (36.8% of production) and sheep meat (55.9%), which has boosted livestock prices at the farm gate. Operators have increasingly focused on export markets to expand revenue over the period.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $4.7bn | 5.5% | 2.6% | 17.1% | 2.5% | -3.3% |

Australia total sheep flock has declined over the past five years and is now home to approximately 66 million sheep. Wool production historically forms the largest portion of industry revenue. However, yearly production of wool or livestock for meat depends on weather conditions.

External factors will largely determine the industry's performance over the next five years. Continuing high prices for wool are anticipated to assist industry revenue growth. Lamb prices are forecast to decline over the next five years but will remain at a historically high level. Export revenue is projected to grow over the period due to rising incomes and demand for lamb in overseas markets. Technological advancements will benefit the industry over the next five years. New GPS and chip-based sensor technology designed to track flocks using Google Earth will aid property and flock management.

#### 2.2.1.6 Pig Farming

Production in the Pig Farming industry has increased over the past five years due to an increase in pig meat consumption. Rising pig production, coupled with an increase in imported processed pig meat products in the domestic market, has caused oversupply issues. As the increased consumption of pig meat

has not been enough to offset oversupply issues, domestic pig meat prices have fallen strongly from the heights of 2015-16.

Firms have trended towards larger and more commercialised pig production systems to achieve economies of scale over the past five years. In addition, the number of industry enterprises has declined over the period, as many small-scale farms exited the industry due to an inability to secure supplier contracts with downstream markets.

Pig meat consumption is likely to rise further over the period. Furthermore, the domestic price of pig meat is projected to rise over the period, with oversupply issues expected to lessen as demand for domestically produced fresh pork products increases. Rising pig meat consumption and higher prices are likely to encourage increased production over the next five years.

The Australian Government is currently discussing a free trade agreement with the European Union. As a possible consequence, any trade deal between the European Union and Australia could lessen Australia's strict pig meat import protocols, with the European Union stating in October 2017 that Australia's pig meat import biosecurity measures are stricter than necessary and trade restrictive. If a trade deal occurs over the next five years and opens up trade of fresh pig meat between the European Union and Australia, it could significantly boost pig meat imports and rise biosecurity risks.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $999.3m | -2.5% | 5.2% | 7.4% | 12.1% | -3.5% |

#### 2.2.1.7 Meat Processing

Industry operators primarily process live animals into meat products. This chapter excludes poultry (chapter 2.2.2.3) and seafood processors (chapter 2.2.4.3), and smallgoods manufacturers (such as bacon, ham and corned meat producers).

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $21.1bn | 0.1% | 0.8% | 4.8% | 9.0% | -5.1% |

The Meat Processing industry has performed weakly over the past five years, mainly due to a large base year in 2014-15. In addition, the COVID-19 outbreak has limited industry growth in the current year, further constraining the industry's performance. Production volumes of lamb and mutton, and beef and veal have been volatile over the past five years.

Australia's meat processors export over 70% of production by value, with beef accounting for most industry exports. Over the past five years, demand has increased in some of the industry's largest export markets, including Japan and South Korea. New export markets, such as the Middle East and China, have been the strongest growth areas, as world demand for meat has increased.

The industry is forecast to grow at a limited rate over the next five years. Global meat supplies are projected to increase as the United States rebuilds its cattle herd, boosting competition for local processors in export markets. However, free trade agreements with China, Japan and South Korea that came into effect between December 2014 and 2015 will likely boost local meat exports to these nations. A free trade agreement signed with Indonesia in March 2019 is also projected to support industry demand.

### 2.2.2 Poultry

Poultry includes chicken, duck, turkey and game birds. For more information about organic poultry farming, please refer to chapter 2.5.3.

#### 2.2.2.1 Poultry Meat Farming

Industry operators primarily farm poultry for meat production. Industry operators typically supply live birds that are ready for slaughter, usually aged between five and eight weeks, to poultry processors.

The Poultry Meat Farming industry has benefited from a rise in poultry consumption over the past five years. Increased poultry consumption has ensured strong downstream demand and boosted industry revenue over the period. Retail poultry prices have declined over the period, while the price of many substitute products, such as fish and seafood, beef and lamb, has risen. Consequently, the relatively cheaper price of poultry in retail outlets has encouraged more consumers to purchase and consume poultry over the past five years. In addition, rising health consciousness has driven demand for leaner sources of protein, such as poultry, benefiting the industry.

The industry is projected to grow further over the next five years. Per-capita poultry consumption is forecast to increase over the period, in line with rising demand for meats that are perceived as offering greater health benefits. Growing poultry consumption is anticipated to support strong downstream demand from processors, boosting industry revenue over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $603.9m | 0.6% | 1.1% | 5.2% | 9.6% | -1.3% |

#### 2.2.2.2 Egg Farming

Industry companies farm poultry to produce eggs and hatch egg-breed chicks. The Egg Farming industry has recorded moderate growth over the past five years. Industry operators have benefited from rising per capita egg consumption over the period. However, sluggish growth in prices has constrained growth in industry revenue over the past five years.

Industry operators have increasingly shifted from cage to free-range egg production due to consumers' animal welfare concerns Consequently, cage eggs have declined as a share of industry revenue over the

past five years. The Federal Government introduced a mandatory legal definition for free-range eggs in March 2016, setting the maximum stocking density to 10,000 birds per hectare.

The industry is forecast to record slow revenue growth over the next five years. Population growth is projected to support a rise in total egg consumption over the period. However, demand from the food-service sector is not anticipated to return to pre-COVID-19 levels until 2022. Furthermore, stronger demand at the retail level is expected to gradually weaken. However, the industry's move towards organic and free-range eggs will likely contribute to higher egg prices over the next five years, boosting profit margins.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $867.6m | 1.9% | 0.4% | 3.8% | 12.0% | 2.8% |

#### 2.2.2.3 Poultry Processing

Industry firms process live poultry, including chickens, ducks and turkeys, into cuts and value-added products. Industry operations begin when live poultry is purchased or prepared for processing (usually aged between five and eight weeks) and includes abattoir operation, dressing, frozen poultry manufacturing, poultry meat manufacturing and poultry packing.

Operators in the Poultry Processing industry have contended with mixed operating conditions over the past five years. Strong price competition among the major supermarkets has lowered the domestic price of poultry, negatively affecting industry revenue. In addition, a strong rise in the price of wheat feed earlier in the period has increased operating costs, causing industry profit margins to fall. These trends have encouraged industry players to consolidate and undertake restructuring efforts in a bid to improve productivity and bolster profitability. However, several trends (such as increased consumption of healthier white meat) have supported the industry's performance over the past five years and the industry is forecast to return to growth over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $6.8bn | -0.5% | 1.3% | 5.0% | 13.7% | -1.6% |

### 2.2.3 Dairy

Dairy is one of Australia's most important rural industries, producing about 9.3 billion litres of milk in 2017-18 and directly employing approximately 42,600 people. The majority of milk production occurs on the south-east seaboard in Victoria, New South Wales, and Tasmania.

#### 2.2.3.1 Dairy Cattle Farming

The industry is made up of numerous small dairy farms that produce raw milk. These farms are mostly family owned and operated. Operators in the Dairy Cattle Farming industry have faced a range of challenges over the past five years, including demand fluctuations, global market shifts and volatile

farmgate prices. Demand for Australian dairy products has decreased due to import penetration: this trend has contributed to a decrease in milk production over the past five years, putting downward pressure on industry revenue over the period.

Milk production is projected to slowly increase over the next five years. Developments in farming and milking technologies are likely to provide a competitive advantage for farmers that can make further capital investments. Farm efficiency is likely to improve as the trend towards larger farms with greater economies of scale and more advanced technology continues. The opportunity for smaller farms to share new technology through dairy cooperatives is also anticipated to increase farm efficiency.

Demand from overseas markets in regions with rapidly rising household incomes is anticipated to further support industry revenue growth over the period. If weather conditions improve it will support profitability and production volumes in the industry.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $4.4bn | -3.0% | 1.2% | 16.3% | 6.1% | -2.2% |

#### 2.2.3.2 Butter and Dairy Product Manufacturing

Industry operators primarily manufacture dairy products, such as butter, yoghurt, condensed milk, evaporated milk and other dairy products. Cheese (chapter 2.2.2.3), ice cream, milk and milk powder (chapter 2.2.3.4) manufacturing is not included in the industry.

Operators in the Butter and Dairy Product Manufacturing industry have faced challenging conditions over the past five years. Global dairy prices have been volatile over the period, declining overall. Production of butter, the single largest product segment, has fallen significantly due to major shifts in overseas demand and consumer preferences in the local market. Milk supply constraints caused butter production to fall by 33.1% in 2018-19, driving the industry's decline in the same year. However, domestic consumer demand has increased over the past five years. Currently, yoghurt and other cultured products hold a 33.9% market share, followed by butter products at 23.5% and proteins at 15%.

Industry revenue volatility is forecast to moderate over the next five years and revenue is projected to increase as domestic demand for industry goods rises, especially for premium and nutritionally-boosted varieties. The industry will likely benefit from free trade agreements with Japan, China and Korea signed over the two years through 2014-15. The industry is also forecast to benefit from the new Trans-Pacific Partnership signed by Australia and ten other nations in the Asia-Pacific region will gradually take effect over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $7.2bn | 0.4% | 2.6% | 5.4% | 10.2% | -0.2% |

#### 2.2.3.3 Cheese Manufacturing

Varying cheese prices in export markets, a fluctuating Australian dollar, variable local raw milk production and shifting domestic consumer preferences have played a part in the industry's revenue performance over the period. Industry competition has intensified due to the increasing prominence of private-label cheeses, constraining domestic prices.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $3.1bn | 2.9% | 1.1% | 4.4% | 8.2% | 0.6% |

At 31.4% of the cheese manufacturing market, export is important for the industry. Export revenue has increased over the past five years due to shifting global demand and prices: rising demand from Japan, Australia's largest cheese export market (48.8%), and South Korea (5.3%) have boosted export revenue growth. Demand from China (9.8%), while increasing over the past five years, has slowed significantly.

Numerous external factors will continue to influence the industry's revenue performance over the next five years. Export revenue is expected to continue to grow, as new trade agreements create new opportunities for industry operators. Competition is anticipated to increase in the domestic market, due to increasing promotion of private-label products.

#### 2.2.3.4 Milk Powder Manufacturing

Volatile commodity prices have influenced strong revenue fluctuations over the period. As a significant portion of the industry's revenue is derived from exports, the industry's performance is susceptible to changes in the global price of milk powder. Global milk powder prices rose prior to the current five-year period and stayed high until their peak in 2013-14.
Prices subsequently collapsed over the two years through 2015-16 amid concerns about excessive increases in milk powder supplies, contributing to plummeting industry revenue early in the period.

The industry's prospects are projected to improve over the next five years, driven by demand growth for dairy products in Asia and falling trade barriers. The rising wealth of the middle class in Asia is anticipated to help drive demand for industry products, while lower trade barriers should make Australian dairy products more affordable overseas. Currently, exports to China account for 27.8% of market share in this industry, with export to other Asian countries amounting to 43.5%. Exports to other destinations are valued at 11.9% of the market. This means only 16.8% of production is intended for domestic markets.

Dairy product prices are volatile and further price fluctuations cannot be ruled out. As a result, the industry's performance is projected to remain unstable. Nevertheless, global demand growth is forecast

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $828.2m | -14.6% | 0.7% | 2.2% | 7.7% | -12.6% |

to sufficiently sustain a production increase. The domestic market for milk powder is anticipated to remain small due to strong competition from other dairy products, particularly fresh milk.

#### 2.2.3.5 Milk and Cream Processing

Industry operators primarily pasteurise and separate raw milk to make milk and cream products with varying amounts of fat content. The industry excludes cultured buttermilk, flavoured milk (whole and skim), sour cream and yoghurt manufacturing.

The Milk and Cream Processing industry has grown moderately over the past five years, despite volatile conditions in the domestic market. Rising demand for Australian milk in export markets, particularly in China, has boosted industry revenue over the period, while falling domestic production and consumption have constrained growth. Industry profitability has fallen over the past five years as operating costs have increased.

The industry is forecast to continue growing over the next five years due to anticipated growth in milk production and rising foreign demand. Projected growth in disposable incomes, in addition to anticipated population growth, are likely to drive domestic demand over the period. Overall, industry revenue is forecast to grow slightly.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $3.2bn | 4.0% | 0.8% | 2.5% | 9.9% | 3.4% |

### 2.2.4 Seafood

#### 2.2.4.1 Fishing

Industry operators primarily catch ocean fish and seafood products, including finfish (28.1%), molluscs (11.6%), prawns (17.8%), rock lobsters (38.7%), other crustaceans (3.8%), oysters, pearls and other seafood products.

Operators in the fishing industry have benefited from strong export demand (57.3% of industry value) over the past five years. Developing export markets, particularly in Asia, have boosted industry revenue. Domestically, rising fish and seafood prices, and strong demand from seafood processors, have supported industry operators over the past five years. However, government-imposed fishing quotas have constrained industry revenue growth by limiting the volume of seafood caught. The presence of low-cost imports from Asia limited industry revenue growth over the past five years.

The depreciation of the Australian dollar has been a key driver of increased overseas demand as local produce has become more competitive in export markets. In particular, countries in Asia, such as Vietnam, Japan, China and Hong Kong, have increasingly purchased Australian-caught fish and seafood.

Industry revenue growth is projected to slow over the next five years due to ongoing catch restrictions. The Aquaculture industry (chapter 2.2.4.2) is anticipated to account for a rising share of total fish and seafood production over the period, negatively affecting the industry's growth prospects. However, rising incomes among the middle class in countries such as China are forecast to boost export demand and overseas earnings over the next five years, providing some opportunities for the industry.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $2.0bn | 2.2% | 0.9% | 8.6% | 9.1% | -1.2% |

### 2.2.4.2 Aquaculture

Industry operators breed and farm fish, molluscs and crustaceans. Rising seafood consumption has driven revenue growth in the Aquaculture industry over the past five years. Increasing health consciousness has encouraged many consumers to opt for sources of protein that they perceive to be healthier, such as fish and seafood. In addition, rising demand for premium products, such as Atlantic salmon and abalone, has supported industry operators over the past five years. Strong import penetration across the overall domestic fish and seafood market has limited industry growth over the past five years. Processed imports from countries such as China and Thailand have limited demand for domestic produce from key downstream markets, such as seafood processing establishments and retailers, over the period.

At 59.4%, salmon accounts for a significant share of the industry's revenue. Other key industry products include tuna (9%), edible oysters (8.8%) and pearl oysters (5.5%). The remainder of the industry is made up of crustaceans (7.1%), other fish (6.6%) and other molluscs (3.6%).

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.9bn | 4.3% | 1.8% | 9.0% | 19.8% | -1.3% |

The industry is anticipated to post slower revenue growth over the next five years because it has reached the maturity stage. The Aquaculture industry is likely to benefit from its sustainability due to falling wild fish stocks. Consumers and downstream markets forecast to increasingly purchase farmed fish. Consequently, production is projected to increase over the next five years.

### 2.2.4.3 Seafood Processing

The industry includes businesses that operate vessels that process, but do not catch fish or other seafood. The industry also includes firms that freeze whole finfish, or shell, freeze or bottle oysters in brine.

Seafood imports have met an increasing proportion of domestic demand over the past five years, increasing competition for the Seafood Processing industry. Industry operators have effectively responded to rising imports by developing export channels over the period. Growing economic prosperity and rising disposable incomes in key export markets have increased export sales and offset limited domestic demand.

The Seafood Processing industry is anticipated to continue growing as it becomes more export-focused over the next five years (currently only 8.1% of the industry is focused on the domestic market). Positive economic conditions in key export markets like China (currently 42.4% of the market) and Vietnam (24.6%) will likely drive demand for Australian seafood, particularly for high-value products. Key trade deals are anticipated to liberalise trade over the next five years, which will grow export but is also forecast to increase import volumes.

Export opportunities and import competition are projected to spur significant innovation in the industry. Capital intensity is anticipated to increase further as large-scale seafood processors adopt automated production processes. Several seafood producers are also expected to invest in new infrastructure to improve product quality and quantity. For example, the ongoing development of seafood storage facilities near Australian airports has enabled rock lobster and abalone to be transported live to export markets.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $1.1bn | 3.0% | 4.5% | 7.8% | 9.3% | -2.1% |

## 2.3 HORTICULTURE FARMING & PROCESSING

### 2.3.1 Fruit

#### 2.3.1.1 Apple, Pear and Stone Fruit Growing

The performance of the Apple, Pear and Stone Fruit Growing industry largely depends on external factors such as climate conditions, exchange rate fluctuations, consumer health consciousness, the strength of downstream fruit processors and the major supermarkets, Coles and Woolworths.

Extreme weather events such as heatwaves and hailstorms have reduced output in some years. However, the largest contributing factor to industry revenue decline has been the COVID-19 pandemic. The outbreak of the virus in China led to weaker export demand for stone fruit in the current year. Furthermore, demand from the local food-service sector has declined due to restrictions on eating out. Industry imports have declined over the past five years, while exports have grown, providing some relief for growers.
Weather conditions will likely influence the industry over the next five years. Growing demand from export markets in Asia will likely provide an opportunity for industry growth.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.1bn | -0.4% | 1.6% | 8.3% | 9.0% | -4.0% |

Apples account for the largest share of produce at 40.3%, followed by nectarines (17.5%), cherries (14.7%), peaches (9.6%), pears and other pome fruits (9.3%). The remaining 8.6% is made up by a variety of other stone fruit.

#### 2.3.1.2 Citrus Fruit, Nut and Other Fruit Growing

The Citrus Fruit, Nut and Other Fruit Growing industry grows a range of produce, including citrus fruits, almonds, bananas, berries, avocados, olives and other fruits and nuts.

Industry export revenue has grown strongly over the past five years, with domestic growers benefiting from Australia's reputation for high-quality produce. The industry also maintains a competitive advantage due to its counter-seasonal harvesting periods to other major exporting nations in the Northern Hemisphere. A depreciating Australian dollar and falling tariffs due to new free trade agreements have further supported growth in industry export revenue over the past five years. Furthermore, imports have fallen as a share of domestic demand over the period due to increased local production.

Health consciousness is projected to rise over the next five years, supporting demand growth for industry produce as consumers endeavour to eat more fruit. Demand from the industry's export markets is anticipated to grow strongly over the period, particularly from Asia, as rising incomes fuel greater demand for premium Australian produce. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership, is forecast to aid industry growth over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $4.0bn | 8.3% | 3.0% | 14.3% | 10.7% | -1.3% |

Almonds account for 18.8% of market share, closely followed by citrus fruits at 18.6%. Bananas (13.3%) come in third place, before avocados (10%), strawberries (8.8%), macadamias and other nuts (7.2%) and olives (3.5%). The remaining 19.8% contains a variety of other fruits.

#### 2.3.1.3 Grape Growing

Operators in the Grape Growing industry primarily grow or sun-dry grapes. Grapes are grown for winemaking or to be sold as table grapes. Some of the grapes are dehydrated or dried for sale as sultanas. Grapes harvested by wineries are processed in-house rather than sold to third parties and are therefore excluded from the industry.

The Grape Growing industry has grown strongly over the past five years. As wine grapes make up an estimated 60.3% of industry revenue, the industry is highly dependent on the downstream Wine Production industry. Increasing demand from China for Australian wine and also contractions in global supply has supported the industry revenue growth. Additionally, the depreciation of the Australian dollar and the ratification of several Asian free trade agreements over the past five years have improved trade conditions and provided an opportunity for export expansion

The Grape Growing industry is highly volatile and dependent on climate conditions and irrigation. Growers in warm climate zones rely on irrigation more than growers in cool climate zones and as such they have struggled more than cooler climate growers due to lower than average rainfall levels over much of the past five years. Additionally, bushfires in South Australia in late 2019 caused significant damage.

Assuming relatively consistent rainfall levels and continued improvements in trade conditions, industry production volumes are anticipated to increase. Production of table and dried grapes is projected to rise as demand from export markets, particularly in Asia, increase.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.5bn | 5.6% | 3.0% | 10.1% | 16.8% | -4.0% |

Side note regarding wine production in Australia:
The Australian wine production industry is valued at AUD 7 billion. There are an estimated 2,468 wineries and 6,251 grapegrowers across 65 winegrowing regions in Australia, contributing over AUD 45 billion annually to the Australian economy. In 2019 winemakers produced 1.2 billion litres of wine making Australia the 7th largest producer of wine in the world. Export makes up 41% of market share (valued at AUD 2.9 billion) of the Australian wine production industry. Top export destinations are China, the United States, the United Kingdom and Canada. This strong export market makes Australia the 5th largest wine exporter in the world.

#### 2.3.1.4 Olive Growing

Industry firms primarily grow olives, which are further processed into table olives or olive oil. The Olive Growing industry is highly fragmented and includes numerous small hobby farms and olive producers that do not have a strong brand and grow fruit for the bulk olive oil market.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $127.1m | -1.0% | 2.0% | 20.2% | 12.1% | -1.1% |

The industry also includes large vertically integrated companies that supply table olives for supermarkets, target export markets and manufacture olive oil. As a result, the scale of olive production varies significantly among operators. Olive production has been volatile over the past five years, but is expected to have fallen overall. However, the industry is anticipated to expand over the next five years.

The Australian olive industry comprises more than 1,500 olive growing operations. Australia produced 21,000 tonnes of olive oil in on 2018-19. Consumption in that timeframe was more than 45,000 tonnes meaning the country has to import more than 50% of the olive oil it consumes.

### 2.3.2 Vegetables

#### 2.3.2.1 Outdoor Vegetable Growing

Australia's range of climates and soils allows a variety of vegetables to be produced across the country. The performance of different crops can also vary significantly from year to year, making for a volatile

revenue growth. Greater health consciousness and higher household incomes have boosted demand for vegetables over most of the past five years, while favourable weather conditions increased output volumes and farm yields. However, increased import restrictions on pulses led to significant reductions in industry revenue over the two years through 2018-19.

Industry farmers will face both challenges and opportunities over the next five years. Outdoor vegetable growers are anticipated to contend with intensifying competition from cheap processed vegetable imports and the continued dominance of the supermarket giants.
However, newer markets such as the Middle East, and the signing of the multilateral free trade agreement with ten nations from Asia and the Americas will provide exporters with significant expansion opportunities.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $4.2bn | 0.1% | 1.6% | 8.3% | 13.2% | -5.4% |

Fruit vegetables such as tomatoes, melons, capsicums, pumpkins, zucchini, squash and cucumbers take up the largest market share of this industry at 21.9%. They are closely followed by pulses at 20.9%, leafy and green vegetables (17.6%) come in third place, followed by potatoes (15.4%) and other root vegetables (13.2%) such as onions, carrots, sweet potatoes, beetroots, parsnips and turnips The remaining 11% is made up of other vegetables (sweet corn, spring onions, Chinese cabbage, bok choy, leeks, shallots, brussels sprouts and chilies).

#### 2.3.2.2 Under Cover Vegetable Growing

Industry operators grow vegetables in greenhouses, cold frames, cloth houses and lath houses. The Under Cover Vegetable Growing industry has flourished over the past five years, as under cover vegetables are grown in controlled environments and depend less on weather conditions and seasonal changes than field-grown vegetables. Protected growing enables farmers to produce a more constant stream of supply compared with outdoor growing, while using fewer inputs and reducing their environmental footprint, which has supported the industry's performance.

Rising consumer health consciousness, which is anticipated to increase vegetable consumption per capita, is projected to help boost industry revenue in future. Improved public perception and awareness of the benefits of undercover growing are expected to further aid industry revenue growth.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $748.0m | 7.8% | 1.9% | 11.0% | 20.3% | 2.3% |

Mushrooms (48.8%) are the most widely produced vegetable in under cover farms, followed by tomatoes (29.6%), cucumbers (8.2%) and capsicums (4.9%). The remaining 8.5% is made up of other produce such as lettuce, some herbs, and sprouts.

### 2.3.3 Nursery Production

Nurseries (=kwekerijen) primarily grow trees and shrubs (65.9% of products in this sector), bedding and ornamental plants (13.1%), indoor and patio plants (9.6%), propagation stock (6%) and other plants (5.6%). The industry excludes flower growing (chapter 2.3.4) and turf growing (chapter 2.3.5).

The Nursery Production industry's revenue has fluctuated over the past five years. Price competition from hardware stores such as Bunnings has put pressure on industry operators. Furthermore, significant variations in annual rainfall over the past five years have affected the production volumes of outdoor nursery products. Activity from new dwelling commencements also influences the industry's performance, as new buildings typically require landscaping. Homebuyers' shift away from traditional single-dwelling houses and towards higher density living has restricted demand for outdoor plants, trees and shrubs over the past five years. However, this trend has boosted demand for indoor and patio plants.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $725.5m | -1.2% | 2.7% | 7.9% | 18.0% | -1.8% |

Rising real household discretionary incomes and positive consumer sentiment are projected to drive the industry's performance in the next five years. Dwelling commencements are anticipated to rise slightly over the same period, driving growth in industry demand. However, ongoing price competition from large hardware stores is anticipated to force some small operators out of the industry, contributing to a decline in enterprise numbers over the next five years.

### 2.3.4 Floriculture Production

Industry firms grow or produce cut flowers, foliage and seeds, either outdoors or under cover. Industry firms have faced falling demand from Australian consumers, adverse weather conditions and rising import penetration. Despite these negative factors, downstream sales of lower value mass market flowers to supermarkets and convenience stores have increased over the past five years.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $274.3m | -1.4% | 1.3% | 4.3% | 30.6% | -3.9% |

Industry revenue is forecast to grow moderately over the next five years. Slower import growth as a result of new import restrictions is projected to fuel industry revenue growth. However, greater demand is anticipated from supermarkets and convenience stores focusing on lower value floriculture products,

which will likely keep prices low. This focus on lower value products and the bargaining power of supermarkets are projected to cause industry profit margins to fall further over the next five years.

### 2.3.5 Turf Growing

Industry firms primarily grow turf for transplanting in landscaped areas. This includes grass growing, turf growing and lawn seed growing. Operators plant, maintain and harvest turf farms. Landscapers, households, governments, sport venues, revegetation contractors, and plant hire and garden service providers then install the turf.

Consumer sentiment and household discretionary income growth have been weak or negative over the period, in response to mixed global and domestic economic conditions. Furthermore, increasing high-density living has played a role in the industry's moderate performance, despite solid growth in institutional building construction. Greater acceptance of artificial turf as an alternative to natural turf has also dampened industry revenue growth, while the heightened consciousness of water use has supported the popularity of artificial turf.
Growth in dwelling commencements, higher household incomes and positive consumer sentiment are anticipated to benefit the industry over the next five years. However, the continued popularity of inner-city and high-density living is projected to limit demand growth for standalone houses, subsequently constraining demand for natural turf. Furthermore, the quality of artificial turf is likely to continue improving over the next five years, making it an increasingly viable alternative to natural grass.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $258.5m | 1.8% | 2.2% | 15.1% | 23.6% | -0.7% |

### 2.3.6 Other produce

#### 2.3.6.1 Tree Nut Growing

Industry operators grow almonds, macadamias, walnuts, pecans, chestnuts, pistachios, hazelnuts and other tree nuts. Peanuts are classified as a legume (= peulvrucht) and are excluded from the industry.

Operating conditions in the industry have been volatile over the past five years. However, industry revenue has ultimately grown strongly over the period. Industry operators have benefited from rising global nut consumption, with export growth being a key driver of industry performance.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $967.8m | 7.2% | 4.5% | 11.1% | 8.5% | 5.5% |

Over the next five years the industry is forecast to consolidate, and average orchard sizes are likely to increase. Industry participation is projected to continue rising in response to growing global demand for tree nuts, boosting employment over the period.

#### 2.3.6.2 Sugar Cane Growing

The Sugar Cane Growing industry has faced volatile trading conditions over the past five years. Industry revenue is influenced by a range of factors, including variable weather patterns and fluctuations in global sugar production and commodity prices. Favourable weather conditions allowed growers to increase sugar cane output over the three years through 2016-17. However, both drought conditions and flooding have had a negative impact on output over the past three years. A forecast decline in the domestic price of sugar over the second half of the year is expected to reduce industry revenue in the current year. Over 75% of Australia's processed sugar is exported.

Prospects for sugar cane growers are anticipated to remain modestly positive over the next five years. An anticipated rise in total sugar consumption across many developing economies will drive demand for sugar cane growers, while the projected weak Australian dollar will support export demand for Australian sugar. Furthermore, increasing demand for alternative fuel sources such as ethanol, which uses sugar cane as a key input, is forecast to support industry expansion and open additional export revenue channels for the industry.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.1bn | -4.4% | 2.0% | 9.0% | 12.3% | -1.6% |

Finasucre Investments (Australia) Pty Limited (owner of Bundaberg Sugar Group Ltd) is a wholly owned subsidiary of Belgian sugar giant Societe Financiere des Sucres. The company is one of Australia's largest sugar cane growers and owns over 8,000 hectares of cane farms.

### 2.3.7 Processing & Related Product Manufacturing

Below, FIT Melbourne provides an overview of fruit and vegetable processing as well as manufacturing of related products.

#### 2.3.7.1 Fruit and Vegetable Processing

Industry operators primarily can, bottle, preserve, quick-freeze or dried fruit and vegetables. Industry products include dehydrated vegetable products, soups, sauces, pickles, mixed meat and vegetable products, and non-milk based baby foods. The industry does not include sun-dried products.

Industry operators have faced tough trading conditions due to increasing external competition over the past five years. Rising import penetration and high operating costs have negatively affected the industry's performance, reducing the competitiveness of industry products in overseas markets. Exports have risen as a share of revenue over the past five years (currently 59.3% of the sector), aided by the depreciating Australian dollar and growing international reputation of Australian products. However, changes in consumer preferences have had mixed effects on industry revenue. While increasing demand for convenience products, such as pre-packaged salad bowls and kits, has contributed to sales for industry

processors and presented opportunities for small-scale niche operators, growing health-consciousness has driven demand away from previous staple products.

The COVID-19 outbreak is expected to negatively affect industry export revenue, due to disrupted international trade. Industry revenue is forecast to continue falling over the next five years. Industry players are anticipated to struggle with increasing pressures from private-label products and imports over the period, exacerbated by a forecast appreciation of the Australian dollar. Additionally, exports are expected to fall as a share of revenue, as stronger dollar lowers the competitiveness of locally made industry products.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $5.3bn | -2.0% | -0.6% | 4.3% | 13.8% | 3.4% |

The main product categories in this sector include sauces and condiments (44%), frozen, packaged and pickled vegetables (24.7%), frozen, dried and shelf-stable fruit (17.3%). Other products include soups (6.8%) and baked beans and canned spaghetti (3.5%). The remaining 3.7% can be attributed to tomato paste, non-milk-based baby foods, fresh vegetable salads, vinegar (excluding wine vinegar) and processed fruit and vegetables not elsewhere classified.

#### 2.3.7.2 Fruit Juice Drink Manufacturing

Industry firms manufacture fruit and fruit juice drinks, but do not manufacture 100% pure, concentrated or single strength fruit juice.

Operators in the Fruit Juice Drink Manufacturing industry have faced a difficult trading environment over the past five years. Strong competition, both internally from private labels and externally from other beverages, has negatively affected industry revenue. In addition, slow growth in household disposable income has caused consumer preferences to shift to cheaper alternatives over the period. Despite these factors, rising health consciousness and product packaging innovations have benefited industry operators.

Key Statistics Snapshot

| Total Revenue in 2019 | Annual Growth 2014–2019 | Annual Growth 2019–2024 | Profit Margin in 2019 | Wages as a share of Revenue in 2019 | Number of Businesses 2014–2019 |
|---|---|---|---|---|---|
| $822.8m | -0.4% | 1.3% | 7.5% | 10.9% | 1.9% |

Over the next five years, the industry's major players are anticipated to innovate by introducing new, higher margin juice drinks with added health benefits to bolster demand. As foreign companies dominate the mature market, these firms will likely introduce products that are successful in their home countries to the domestic market. Health consciousness is forecast to continue rising over the next five years. This trend, coupled with greater consumer demand for natural and higher quality products, is anticipated to bolster growth in the industry's high-value segments. Premium, chilled and organic products, and beverages featuring exotic combinations of fruits will likely be particularly popular.

#### 2.3.7.3 Cider Production

The Cider Production industry has grown moderately over the past five years. This has been driven largely by increased overseas demand, particularly from New Zealand. Domestic demand is shifting towards premium locally produced cider, with per capita cider consumption declining significantly during the period. Rising health consciousness has seen greater demand for low- and no-alcohol beer, as well as other products such as kombucha over the period. Australia's warm climate has provided an ideal environment for cider consumption, as many people perceive cider as light and refreshing. This trend has contributed to cider's growing popularity.

Encouraged by previous growth, new, smaller players have entered the industry, particularly fruit growers that pick and crush fruit themselves. These enterprises have capitalised on their product being perceived as hand-crafted and unique.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $356.1m | 2.2% | 1.6% | 8.5% | 12.8% | 3.6% |

Industry enterprise numbers are projected to continue growing, although at a much slower rate. To sustain strong growth over the period, industry firms will need to continue innovating, and create new flavours and marketing techniques to maintain cider's appeal. Consumer tastes are anticipated to continue shifting towards locally produced premium products from craft cider breweries over the next five years. As a result, imports are forecast to decrease as a percentage of domestic demand over the period. Premium foreign products and popular foreign brands, such as Rekorderlig and Kopparberg, will somewhat offset this trend, as demand for these ciders is anticipated to remain relatively steady.

#### 2.3.7.4 Potato Chip Production

Industry companies manufacture potato chips for consumption. The industry excludes corn chip, tortilla chip and other chip product manufacturing. Operators in the Potato Chip Production industry have faced changing downstream consumption patterns and increased competition from substitute and private-label products over the past five years. Most notably, rising health consciousness has encouraged many consumers to take up healthier eating habits over the period.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $917.5m | 1.2% | 1.3% | 5.3% | 13.1% | 0.9% |

The challenges facing the industry are forecast to continue over the next five years. Growing consumer demand for premium chip varieties is projected to offset declining demand for traditional industry products over the period, boosting industry revenue and profit margins.

#### 2.3.7.5 Edible Oils Manufacturing

Industry players manufacture plant-based oils for immediate use or for use in cooking. Industry companies purchase their products from upstream growers or may grow their own grains or oilseeds. Industry players include those manufacturing private-label oils.

The Edible Oils Manufacturing industry's revenue has fluctuated over the past five years, partly driven by volatile growing conditions in upstream farming industries, which influence industry production volumes. Changing consumer preferences, and competition from supermarket private-label brands and imports have also influenced industry revenue over the period.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $433.0m | 0.5% | 2.5% | 3.2% | 10.3% | -1.1% |

The industry is projected to expand over the next five years. Consumer demand for premium edible oils will likely keep rising, driven by changing health and taste trends. However, supermarket private-label brands are anticipated to play a larger role in the industry, with private-label product ranges likely to include premium and healthier varieties of edible oils. This trend is anticipated to put price pressure on industry operators, constraining revenue growth.

#### 2.3.7.6 Cooking Oil and Margarine Manufacturing

Industry companies manufacture a range of refined and unrefined cooking oils, such as olive, avocado, coconut, and canola oil. In addition, industry companies produce margarine, lard and several other products using vegetable and animal oils and fats.

Rising health consciousness, changing consumer preferences and volatility in the agriculture sector have affected the Cooking Oil and Margarine Manufacturing industry's performance over the past five years. An increase in output and a rise in farm incomes contributed to strong industry growth over the two years through 2016-17. In particular, robust activity in many livestock farming industries boosted demand for meal, a by-product of oil processing. However, drought across much of eastern Australia is expected to result in demand from agricultural firms declining over the three years through 2019-20.

Forecast steady growth in downstream markets is projected to boost industry revenue over the next five years. However, firms that offer cheaper products are likely to report revenue declines, in response to growing supermarket private label threats, which often compete based on price. While export revenue is anticipated to continue growing over the period, the Australian dollar is forecast to appreciate and dampen export demand. Modest price growth is anticipated to increase industry profitability over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $2.3bn | 3.8% | 1.6% | 4.5% | 5.9% | -3.9% |

#### 2.3.7.7 Herbs and Spice Processing

Industry operators process and package herbs and spices for use in food production, hospitality and home cooking. The industry does not include fresh herbs and spices.

Consumer appetites for processed herbs and spices have grown over the past five years. While many of the industry's products are staple items, consumers have demonstrated an increasing willingness to try new food products and flavours. Cultural trends favouring higher quality and healthier food have driven industry revenue growth over the past five years.

Industry growth is projected to be moderate over the next five years. While the popularity of industry products is not likely to continue growing rapidly, consumers are anticipated to continue experimenting with their cooking, benefiting demand for industry products. However, major supermarkets are forecast to continue limiting prices through sales of private-label products and industry operators face significant fees for shelf space.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $422.5m | 4.0% | 2.4% | 3.2% | 13.7% | 5.6% |

## 2.4 GRAINS GROWING & PROCESSING

### 2.4.1 Grain Growing

The industry includes farms that grow wheat (51.5%), coarse grains (33.9%) or other cereal crops. Other industry farms grow oilseeds (15%). The industry excludes rice and pulse growing which are covered in chapters 2.4.2 and 2.4.3 respectively. For more information about grain growing in combination with sheep or beef cattle farming, please refer to chapter 2.2.1.4.

The Grain Growing industry is export oriented and produces wheat, barley, canola, and other grains and oilseeds. Industry revenue has fluctuated significantly over the past five years, largely due to volatile weather conditions affecting local supply in certain years. Fluctuations in global grain prices and crop supplies over the period have further contributed to revenue volatility. In addition, the novel coronavirus (COVID-19) outbreak is expected to negatively affect export demand in the current year, further reducing revenue.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $9.8bn | -6.6% | 3.2% | 17.5% | 4.5% | -1.7% |

The industry's greatest growth prospect is in emerging Asian economies, where rising per capita income and changing dietary habits are boosting demand for industry products. Growing meat consumption in this region is anticipated to cause livestock industries to expand, boosting demand for feed grains. Rising

overseas demand and a weak Australian dollar are forecast to increase industry export revenue over the next five years.

### 2.4.2 Rice Growing

The amount of water operators in the Rice Growing industry can access influences production, as rice is a water-intensive crop. Therefore, the level of annual rainfall and water availability are key determinants of industry performance. An example of this is the industry's projected performance over the two years through 2019-20. Industry output and revenue are expected to be negligible over this period, as severe drought in the Murray-Darling Basin, which hosts most industry establishments, has forced farmers out of the industry. In weight terms, the national rice crop declined by 92.9% over the two years through 2018-19. While rising demand for rice, particularly for premium varieties, has benefited farmers, the drought has offset industry output. Industry revenue is expected to decline by an annualised 38% over the five years through 2019-20, to AUD 27.2 million.

Most rice grown in Australia is sold to Ricegrowers Limited, trading as SunRice. The company plays a significant role in the industry, such as deciding what proportion of different rice varieties should be grown.

Industry revenue is forecast to rise over the next five years as rainfall returns closer to average. However, water extraction is anticipated to be restricted as a result of the Murray Darling Basin Plan. Water availability is projected to continue declining over the next five years, constraining rice production.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $27.2m | -38.0% | 58.2% | 14.8% | 12.1% | 0.4% |

### 2.4.3 Pulse Growing

Industry operators grow pulses, such as chickpeas (29.7%), lupins (14%), field peas (10.6%) and other pulses such as lentils, faba beans, mung beans, azuki beans (red mung bean), navy beans, cowpeas, vetch and pigeon peas (45.7% with lentils and faba beans being the largest contributors to that share). Production in this industry is highly volatile, and is influenced by several factors. Annual rainfall is a key driver of pulse production and fluctuating rainfall levels have prompted very high industry revenue volatility over the past five years.

As most local pulse production is exported, any upturn or downturn in export demand also influences industry revenue. For example, demand for domestically produced pulses is particularly strong in the Indian subcontinent. Monsoon seasons that reduced local production in India, Bangladesh and Pakistan over the two years through 2016-17 significantly boosted export demand, causing a spike in prices and encouraging more farmers to grow pulses. However, the Indian Government applied stronger import tariffs on pulses in late 2017 and early 2018, which reduced export demand and discouraged farmers from growing large areas of pulse crops. As a result, pulse production and industry revenue are expected to decline substantially over the three years through 2019-20.

Pulse production and industry revenue are projected to continue being volatile over the next five years. Fluctuating growing conditions, such as annual rainfall, and ongoing global supply and demand issues are anticipated to heavily influence industry performance over the period. However, growing global consumption of pulses, such as chickpeas, will likely benefit industry operators over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.0bn | -1.4% | 2.9% | 10.2% | 14.8% | 2.3% |

### 2.4.4 Flour and Grain Mill Product Manufacturing

Industry manufacturers mill flour or meal intended for human consumption from grains, vegetables or plants. The industry also manufactures rice, rice flour, rice starch, sago, tapioca and baking powder.

The industry is highly concentrated, with the largest player, Manildra Milling, expected to account for over a quarter of industry revenue. Greater domestic demand for artisan and premium grain products have supported the industry over the past five years. Industry operators have benefited from increasing economic prosperity in Asian markets, such as Vietnam, and rising demand for high-quality Australian products in countries such as the United Arab Emirates. The depreciation of the Australian dollar has also boosted the industry's competitiveness in export markets. However, drought conditions on the East coast have led to a shortage of key inputs, resulting in increased input costs. As a result, industry revenue is expected to rise only slightly in the last five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $4.6bn | 3.1% | 1.6% | 3.5% | 7.2% | 2.7% |

Industry revenue is anticipated to grow at a faster pace over the next five years. Rainfall patterns are anticipated to stabilize, returning the supply of key inputs to their long-term average. The signing of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership is also expected to allow greater competitiveness for industry exports, and provide some support for industry operators. As a result, industry revenue is forecast to increase over the next five years.

## 2.5 HYDROPONIC AND ORGANIC FARMING

This chapter looks at alternative farming methods such as hydroponic and organic farming. Both sectors have shown significant growth in the past five years and are expected to continue this trajectory.

Australia has the largest area of organic farmland in the world, covering more than 35 million hectares. Most of this land is large rangelands for organic cattle farming. Organic produce, once considered an alternative food eaten only by a minority of the population, has become increasingly common in consumer

diets and retail stores. Consumer demand for organic produce is anticipated to strengthen over the next five years, due to rising health consciousness and growth in disposable incomes.

### 2.5.1 Hydroponic Crop Farming

The Hydroponic Crop Farming industry has performed well over the past five years because operators grow crops in controlled conditions with reduced water requirements, which has allowed these crops to better withstand the unfavourable weather that has affected the agriculture sector over the past five years.

Increased capital investment has helped boost industry yields and overall productivity over the past five years. Industry farms have also been increasingly investing in automation to regulate variables such as temperature and moisture to optimise the cultivation process and improve yield and quality. The industry has numerous small owner-operator.

The future remains bright for hydroponic crop farms. An increase in health consciousness and rising fruit and vegetable consumption are forecast to support industry demand over the next five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $553.4m | 8.7% | 7.5% | 13.3% | 35.8% | 3.7% |

At 52.2% tomatoes make up more than half of production in this industry. Flowers (16.5%) come in second place, closely followed by leaved greens (15.8%). Herbs take up 5.6% and other fruit and vegetables account for 9.9%. This category includes strawberries, capsicums, cucumbers, eggplant and Asian vegetables.

### 2.5.2 Organic Farming as a whole

Industry farms primarily produce organic fruits, vegetables, grains, other crops or livestock. This report focuses on producers that are certified organic by any of the 6 organic certification organisations recognized by the Australian Department of Agriculture, Water and the Environment. All certification bodies have to adhere to the national standards but two organisations have their own additional standards. For more information about organic livestock and poultry farming and organic crop farming, please refer to chapters 2.5.3 and 2.5.4 below.

The industry mainly consists of small operators, which makes it difficult to maintain consistency in the quantity and quality of produce. The industry remains highly fragmented and organic farming techniques are not yet as efficient as those used in conventional farming. The impact of lower levels of annual rainfall in 2017-18 and 2018-19 has impacted growers. However, the industry continues to grow strongly as

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.8bn | 13.5% | 15.1% | 27.3% | 7.3% | -0.3% |

consumption of organic produce becomes increasingly mainstream. The industry's higher profit margins derive from the price premium consumers are willing to pay for organic produce, as they generally view organic produce as superior to conventionally farmed produce.

The industry is projected to continue growing strongly, as rising demand in domestic and export markets (currently at 17% of market share) are forecast to drive industry revenue growth over the next five years. In addition, supermarket chains are anticipated to increasingly stock organic products over the period.

Fruit, vegetables and herbs make up just over half of market share at 50.9% Meat (excl. poultry) accounts for 35.8%. Smaller product categories include grains (5.2%), eggs and poultry meat (5%), milk (1.9%) and other products (1.2%) such as honey and nuts.

### 2.5.3 Organic Livestock & Poultry Farming

The Organic Livestock and Poultry Farming industry has grown its revenue strongly over the past five years. The acceptance of organic products as a healthy food option has supported revenue growth over the period. In particular, organic meat has surged in popularity, contributing to the industry's rapid expansion. However, drought severely affected supply over the two years through 2018-19, constraining revenue growth.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $632.5m | 12.0% | 16.8% | 29.5% | 2.0% | -0.7% |

Demand from overseas markets is expected to rise and play a vital role in the industry's growth. Export currently accounts for 63% of the market. In terms of livestock and poultry farmed organically, cattle takes up 86.7% of the industry, followed by lambs at 10.4%, poultry at 2.8% and pigs at 0.1%.

### 2.5.4 Organic Crop Farming

The Organic Crop Farming industry has strongly benefited from increasing consumer demand for organic food over the past five years. Organic fruits and vegetables are often perceived as healthier than their conventionally farmed counterparts. This factor has driven demand for organic fruits, vegetables, grains, nuts and herbs over the past five years.

Strong overseas demand for organic beef is projected to increase demand for organic feedstock, further supporting revenue growth over the period. However, price competition is expected to rise over the next

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.1bn | 18.4% | 14.6% | 21.5% | 8.2% | -0.2% |

five years, as operators expand and compete for supply contracts with supermarkets. This trend is anticipated to limit industry growth over the period.

Root vegetables are the largest product category in this industry at 24.4% of market share. They are closely followed by cucurbit vegetables such as cucumber, zucchini, capsicum, pumpkins, squash and melons at 22.4%. Nuts are the third largest single product category at 10.6%, with pome fruit coming in fourth place at 10.2%. Other fruits such as berries, stone fruit, tropical fruit and citrus fruit account for 7% of market share. Grains are worth 8.7% of market share and other products such as cut flowers and seeds account for 1.5% of market share.

## 2.6 COTTON AND HAY FARMING IN AUSTRALIA

This chapter looks at other farmed products which fall outside of the categories listed above. Cotton is one such significant sector.

### 2.6.1 Cotton Growing

Operators in the Cotton Growing industry have endured extreme revenue volatility and fluctuating profit margins over the past five years, with a range of external factors influencing industry performance. Sufficient rainfall and an increase in the price per bale paid to Australian farmers resulted in the industry growing strongly over the three years through 2017-18. Rising global demand for cotton drove this price growth. However, significantly below-average rainfall has reduced irrigation water availability over the past two years, with some cotton growing regions reporting their lowest annual rainfall on record. As a result the industry is expected to decline sharply (-68.8%) in the current year.

Although Australia is not a significant cotton producer on a global scale, the industry relies on exports through downstream markets. Growers sell almost all Australian-grown cotton lint abroad and increased demand for Australian cotton from Asian textile industries has supported the industry over the past five years.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $433.7m | -19.6% | 36.2% | 15.9% | 19.8% | -6.9% |

The industry is forecast to recover over the next five years, assuming a return to near-average annual rainfall. Easing drought conditions are anticipated to result in participation and output growing and returning to historical averages. Rising demand in export markets and an increase in the world price of cotton are projected to aid the industry's performance over the period.

### 2.6.2 Cotton Ginning

Firms in the industry are mainly engaged in ginning (separating the cotton fibres, lint, from the cottonseed) and trading cotton. Cleaned lint is pressed into bales and sold to cotton spinners and textile manufacturers. The industry's performance is closely linked to the Cotton Growing industry. It is also indirectly affected by factors such as climatic conditions, water supply regulation, fluctuations in global cotton consumption, and cotton stockpiling.

Trends in the global price of cotton, local rainfall and the value of the Australian dollar in foreign currency terms will be the main determiners of future revenue movements. Industry revenue is projected to remain low during the early part of the next five-year period, as drought continues to limit raw cotton production. Industry revenue is forecast to grow from 2020-21 onwards as raw cotton supply begins to normalise and the world price of cotton modestly increases.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.2bn | -9.5% | 11.4% | 0.4% | 7.0% | -4.0% |

Currently, cotton lint destined for China takes up 23.1% of market share in this industry. Cotton lint going to other export markets takes up 58.6% and cottonseeds account for 18.2%. Only 0.1% of cotton lint is destined for the Australian market.

### 2.6.3 Hay and other crop growing

Operators in the industry grow fodder crops such as hay, silage and alfalfa, and other niche crops such as peanuts, ginger, coffee, chicory and lavender. The industry has been highly volatile, as varying rainfall has presented some challenges to industry operators, but overall weather conditions have positively affected the industry. Severe drought in New South Wales and parts of Queensland and South Australia created a surge in demand for hay as pasture conditions in these regions deteriorated. Many producers could not keep pace with rapidly increasing demand, resulting in hay shortages that pushed up prices. Growing international demand for Australian beef and dairy products has benefited the industry.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.6bn | 1.6% | 1.9% | 9.8% | 5.9% | -1.6% |

Rising incomes in many Asian countries are projected to fuel demand for quality beef and dairy products, boosting demand from downstream markets. However, the domestic price of wheat feed is expected to decrease over the next five years. This trend is expected to increase price-based competition for industry farmers, as some livestock farmers substitute industry products for wheat feed.

# 3. PRODUCTION, VALUE, CONSUMPTION AND EXPORT OF AGRICULTURAL PRODUCTS (DATA)

## 3.1 ANIMAL (DERIVED) PRODUCTS

### 3.1.1 Meat

OECD data for **meat consumption per capita** (2018) reveals that Australians eat an average of 92.2 kg of meat per person per year. In comparison, EU countries, consume only 71.3 kg per person per year. According to the Australian Department of Agriculture, Water and the Environment poultry is the most consumed meat at over 40 kg per person. Beef and veal and pig meat each account for between 20 and 30 kg per person. Fish accounts for around 15 kg per person and sheep meat for less than 10 kg per person. Over the 20 years to 2018 per person meat consumption has grown 13% in Australia. Consumer preferences globally have shifted towards higher consumption of fish and poultry, which is also the case in Australia and which now account for a much larger share of meat consumption. Between 2019 and 2024 meat consumption growth in Australia is expected to be minimal, and moderate increases in poultry meat will be mostly offset by declines in beef, veal and sheep meat.

Australia's **(beef) cattle** herd was 26.4 million head at June 2018 and the **sheep** flock was 70.6 million head. Australia produced 736,557 tonnes cwt (carcass weight) of lamb and mutton and 2.3 million tonnes cwt of beef and veal in 2018.

Statistics from Meat & Livestock Australia show that Australia was the third largest beef exporter in 2018, behind Brazil and India. Australia is the world's largest exporter of sheep meat and is the world's second largest producer of lamb and mutton.

Australian Pork reports that in the year to March 2020, 399,801 tonnes of **pork** was produced, which is a decrease of 5.1% compared to the year before. During the same timeframe 36,531 tonnes of pork valued at AUD 141 million was exported, mainly to Singapore and other countries in the Asia-Pacific region. At the same time 204,431 tonnes of pork valued at AUD 934.6 million was imported, mainly from the US, Denmark and The Netherlands. (Please note there are severe restrictions for the import of pig meat from Belgium into Australia. For more information, please refer to FIT Melbourne's market study "Food and Beverage Industry Market in Australia" dated December 2019)

The Australian Chicken Meat Federation reports that in 2019-20 1218 tonnes of **chicken meat** was produced in Australia. During the same period 40.1 tonnes valued at AUD 75.7 million was exported.

### 3.1.2 Seafood

A 2018 report by the Australian Bureau of Agricultural and Resource Economics and Science (ABARES) states that total seafood production in Australia increased 4% to AUD 3.18 billion and 265,975 tonnes. Exports increased by 10% to a total of AUD 1.58 billion while imports increased only slightly by 0.3% to AUD 2.18 billion.
Australia's total consumption of seafood increased, on average, at an annual rate of 1.9% between 1999 and 2018 to 341,272 tonnes. Per person consumption of seafood, however, decreased slightly between 2007–08 and 2017–18 and stands at 13.7 kg. Similarly, consumption of seafood in Belgium decreased 2% from 2016 until 2017 to an average of 8 kg per person.

### 3.1.3 Dairy

#### 3.1.3.1 Cheese

Cheese is a major product for the Australian dairy industry, utilising more than a third of Australian milk. Australia produced approximately 381,000 tonnes of cheese in 2018–19. Cheese consumption has stabilised in recent years at around 13.5 kg per person (compared to 14.2 kg per person in Belgium in 2018). Whilst cheddar types remain the most popular variety of cheese, non-cheddar cheese varieties available in Australia have increased. These varieties have grown in popularity due to increased demand for mozzarella cheese in foodservice, as well as growth in specialist cheese varieties. Cheese sales have risen to around AUD 2.3bn.

In 2018–19 Australia exported close to 166,000 tonnes of cheese, worth approximately AUD 987 million. Australian cheese was exported to 56 countries. Japan continues to be Australia's most important overseas cheese market and accounted for more than 51% of cheese exports in 2018–19. Most of this cheese is fresh or cream cheese varieties for processing. Other important overseas markets include Greater China, South Korea, Malaysia, the Philippines and Singapore.

Australia is also a major importer of cheese and over the past ten years imports have grown 60%. Imports from New Zealand totalled almost 43,000 tonnes, with the European Union and United States largely accounting for the balance.

#### 3.1.3.2 Milk

In 2017-18, Australia produced about 9.3 billion litres of milk in 2017-18. Per capita consumption of drinking milk is currently estimated at 98.6 litres (compared to 45.3l in Belgium). This marks a small decline over recent years. However, consumption remains high compared to other developed countries. This is possibly thanks to the expansion of the 'coffee culture' in Australia and growth in flavoured milk products. Australia exports approximately 36% of its milk production, with exports valued at AUD 3.4 billion in 2017-18.

### 3.1.4 Eggs

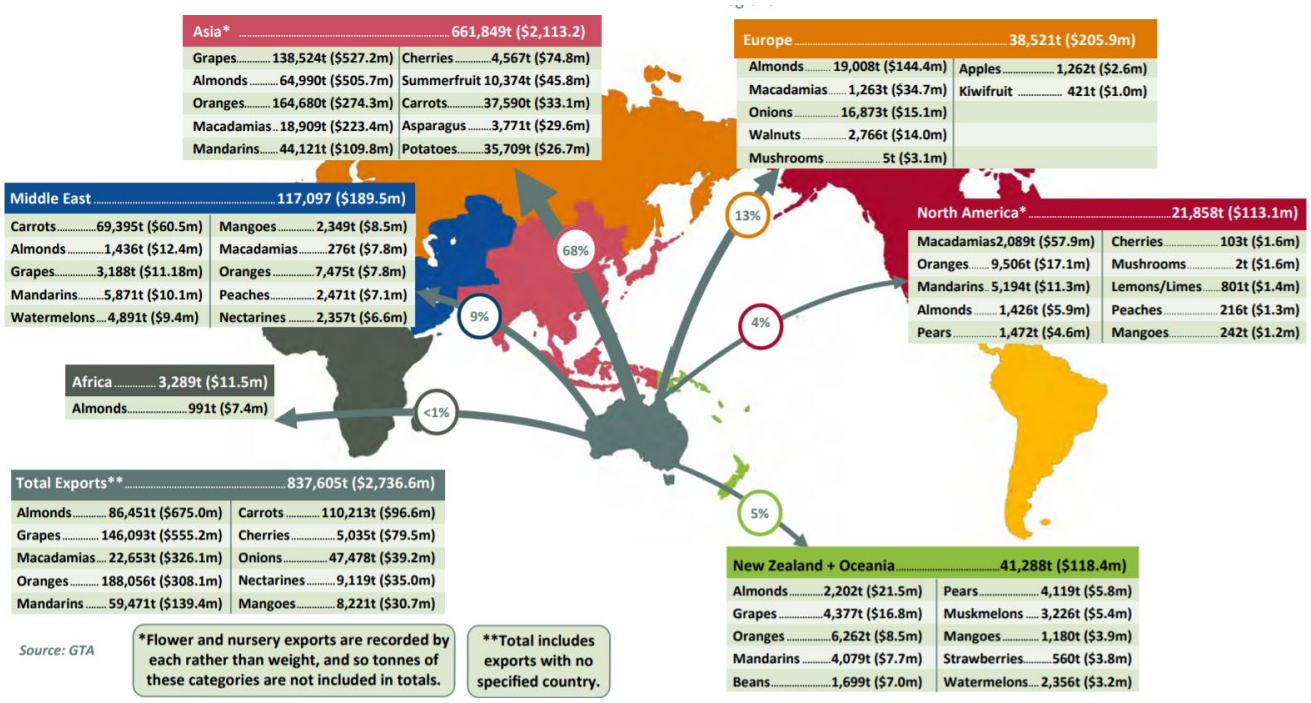
Industry group Australian Eggs reports that in the 2018-19 financial year, Australian egg farmers produced 6.22 billion eggs with a national flock size of 28,605,990 layers and pullets (= young hen, less than 1 year old). There are three main egg farming systems used in Australia: free range, cage and barn-laid. Free range egg production has grown significantly over the last 15 years and now makes up 47% of all grocery retail sales. However, there remains strong demand for cage and barn-laid eggs as an affordable source of high-quality protein. In the 2019 financial year, New South Wales produced 33% of Australia's eggs with Victoria (26%) & Queensland (25%) not far behind.

Australians consume 17 million eggs every day and per capita egg consumption grew to 247 eggs in the 2018-19 financial year, up from 221 in the 2014-15 financial year.

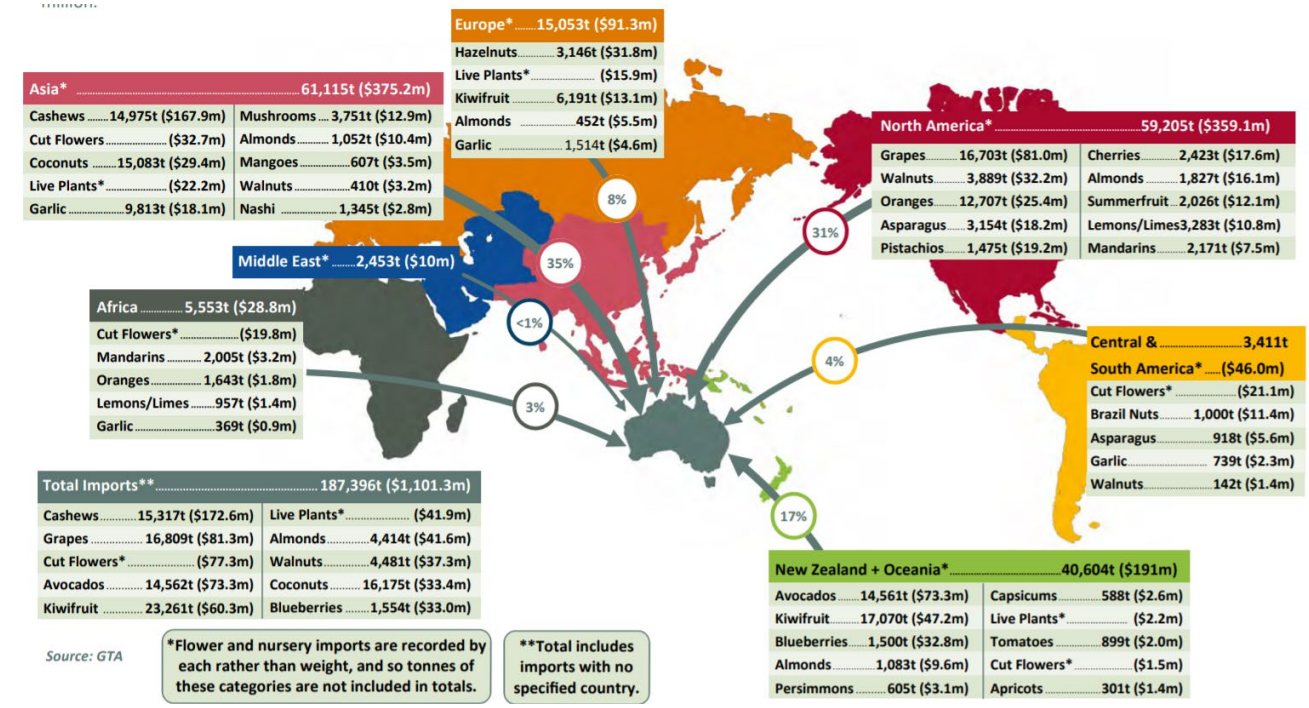
Most eggs produced in Australia are consumed locally. However, exports rose sharply over two years through 2017-18. This trend has been primarily due to increased demand from the Philippines (currently at 70.2% of exports) for fertilised eggs for incubation. In May 2020, egg exports were valued to AUD 9.8 million, while imports only amounted to AUD 3.5 million which is due to import of shell eggs for human consumption being banned under quarantine regulations.

## 3.2 HORTICULTURE

Industry Group Hort Innovation reports that in the year ending June 2019, Australia produced a total of 6.73 million tonnes of horticulture products valued at AUD 14.63 billion. Total exports that year amounted to 837,605 tonnes valued at AUD 2.73 billion. Below is an overview of where the majority of fresh horticulture exports went to, including the top products per region.

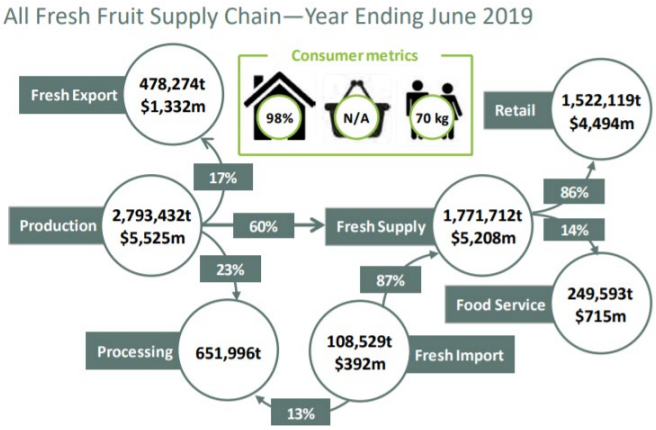



At the same time, Australia also imported fresh horticulture imports amounting to 187,396 tonnes valued at AUD 1.1 billion. Below is an overview of the where these products came from, including top products per region.



### 3.2.1 Fruit

In the year ending June 2019, Australia produced 2.79 million tonnes of fruit valued at AUD 5.5 billion. The majority of this was for domestic consumption with 98% of Australian households purchasing fresh fruit, amounting to 70 kg per person. Australia is a net exporter of fresh fruit. In 2019 Australia exported over 478,274 tonnes worth AUD 1.33 billion in fresh fruit.




Below is a breakdown of production per type of fruit.

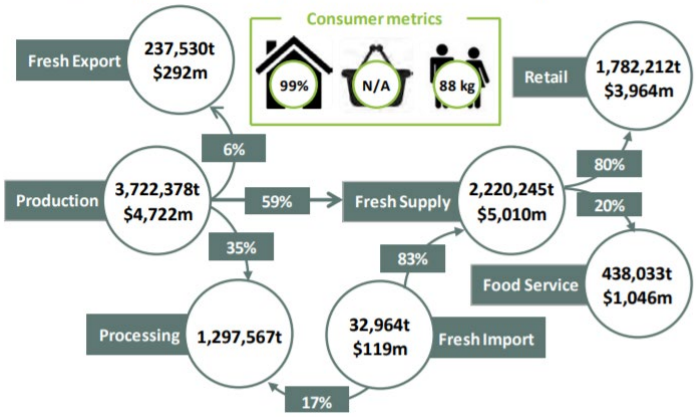
| Year Ending June 2019 | Production (t) |
|---|---|
| **All Fruit** | **2,793,432** |
| Apples | 310,875 |
| Avocados | 85,546 |
| Bananas | 372,204 |
| Berries - Combined | 105,090 |
| Blueberries | 19,008 |
| Rubus Berries | 9,478 |
| Strawberries | 76,604 |
| Cherries | 20,148 |
| Citrus - Combined | 744,374 |
| Grapefruit | 11,132 |
| Lemons/Limes | 48,232 |
| Mandarins | 156,914 |
| Oranges | 528,095 |
| Custard Apples | 1,836 |
| Kiwifruit | 7,134 |
| Lychees | 2,733 |
| Mangoes | 74,920 |
| Melons - Combined | 291,089 |
| Muskmelons | 61,280 |
| Watermelons | 229,809 |
| Nashi | 1,384 |

| Year Ending June 2019 | Production (t) |
|---|---|
| Passionfruit | 4,469 |
| Papaya/Pawpaw | 14,921 |
| Persimmons | 2,600 |
| Pears | 114,496 |
| Pineapples | 70,538 |
| Summerfruit - Combined | 161,044 |
| Apricots | 9,027 |
| Nectarines/Peaches | 119,775 |
| Plums | 32,241 |
| Table Grapes | 208,276 |
| Processing Fruit Combined* | 259,167 |
| Dried Grapes | 68,616 |
| Prunes* | 6,983 |
| Other Dried Tree Fruit* | 1,722 |
| Canned Fruit* | 56,845 |
| Olives | 125,000 |
| *Other Fruit* | *6,138* |

### 3.2.2 Vegetables

For the year ending June 2019, Australia produced 3.7 million tonnes of vegetables valued at AUD 4.7 billion. Australian households purchased 88 kg vegetables per person. Australia is a net exporter of fresh vegetables, as it exported over 230,000 tonnes worth AUD 299 million in fresh vegetables in 2019.

All Fresh Vegetables Supply Chain—Year Ending June 2019




Below is an breakdown of production per type of vegetable.

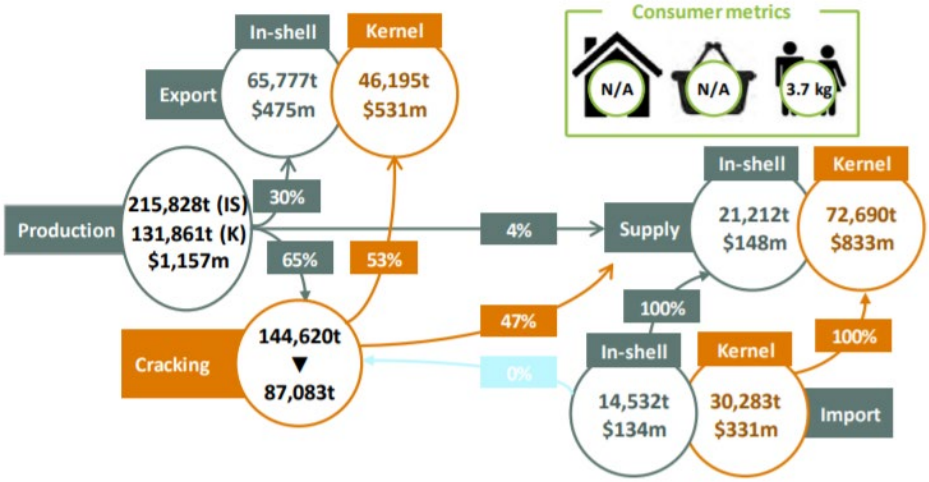
| Year Ending June 2019 | Production (t) |
|---|---|
| **All Vegetables** | **3,722,378** |
| Artichokes | 449 |
| Asparagus | 10,237 |
| Beans | 38,012 |
| Beetroot | 14,262 |
| Broccoli/Baby Broccoli | 75,957 |

| Year Ending June 2019 | Production (t) |
|---|---|
| Potatoes | 1,380,385 |
| Pumpkins | 117,790 |
| Sweet Corn | 71,794 |
| Sweetpotatoes | 101,196 |
| Tomatoes | 469,199 |
| Zucchini | 43,671 |
| *Other Vegetables* | *24,797* |

| Year Ending June 2019 | Production (t) |
|---|---|
| Brussels Sprouts | 5,733 |
| Cabbage | 77,422 |
| Capsicums | 77,030 |
| Carrots | 332,598 |
| Cauliflower | 75,647 |
| Celery | 61,245 |
| Chillies | 2,255 |
| Cucumbers | 93,768 |
| Eggplant | 9,509 |
| Eng.Spinach/Silverbeet/Kale | 7,061 |
| Fresh Herbs - Combined | 11,749 |
| Fennel | 1,449 |
| Parsley and Other Herbs | 10,301 |
| Garlic | 2,812 |
| Ginger | 6,992 |
| Leafy Asian Vegetables | 29,229 |
| Leafy Salad Vegetables | 67,039 |
| Leeks | 10,809 |
| Head Lettuce | 136,937 |
| Mushrooms | 72,007 |
| Onions | 258,195 |
| Parsnips | 3,315 |
| Peas | 33,278 |

### 3.2.3 Nuts

In the year ending June 2019, a total of 215,828 tonnes of nuts valued at AUD 1.15 billion was produced in Australia. On average, Australians consume 3.7 kg of nuts per person per year.




Below is a breakdown of production per type of nut, expressed in tonnes.

| All Nuts | 215,828 |
|---|---|
| Almonds (Inshell)** | 148,571 |
| Chestnuts (Inshell) | 1,050 |
| Hazelnuts (Inshell)** | 1,000 |
| Macadamias (Inshell) | 42,900 |
| Pecans (Inshell) | 3,100 |
| Pistachios (Inshell) | 1,850 |
| Walnuts (Inshell) | 12,300 |
| *Other Nuts (Inshell)* | 5,057 |

## 3.3 GRAINS

Australia has two broad grain growing regions: a) the **Northern region** takes in central and Southern Queensland through to Northern New South Wales down as far as Dubbo; b) the **Southern region** stretches from central New South Wales (south of Dubbo) through to Victoria, Tasmania, South Australia and the Southwest corner of Western Australia.

Production of crops is heavily influenced by the weather and the Eastern states have been heavily impacted by ongoing drought. In contrast, Western states have sometimes seen increased production. Therefore production numbers vary between different parts of the country and different years.

Statistics by industry group Australian Grain Growers show that based on a **5 year average to 2018-19**, Australia produced 44.1 million tonnes of grains valued at AUD 13.7 billion. Approximately 29 million tonnes valued at AUD 11.9 billion was exported, mainly to Asian markets.

The Australian Bureau of Statistics reports that **grain crops production: in 2018-19** was as follows:

- Wheat: 18 million tonnes produced, down 16%, valued at AUD 6 billion, up 9%
- Barley: 9 million tonnes, down 5%, valued at AUD 3 billion, up 32%
- Canola: 2 million tonnes, down 39%, valued at AUD 1 billion, down 35%
- Rice: 66,800 tonnes, down 90%, valued at AUD 34 million, down 86%

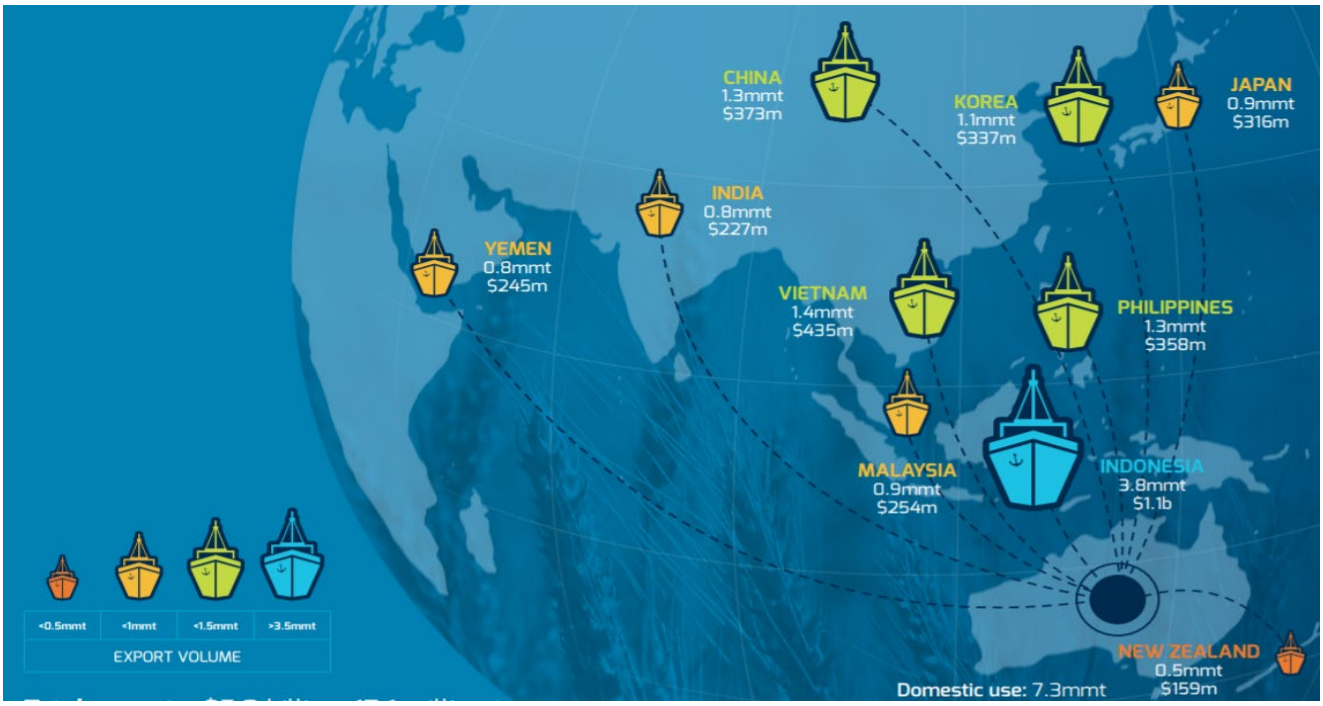
The Department of Agriculture, Water and the Environment reports that in 2017–18, production of grains, oilseeds and pulse crops accounted for around 21 % (AUD 12.8 billion) of the total gross value of farm production (GVP) and around 23% of the total value of farm export income. Around 26% of all Australian farms produced grains, oilseeds and pulses in 2017–18.

### 3.3.1 Wheat

While wheat remains the largest grain crop in Australia with 18 million tonnes harvested in 2018-19, production was down 16% from 2017-18 and at its lowest level since 2008, according to the Australian Bureau of Statistics. The Australian Bureau of Agricultural and Resource Economics and Science forecasts that Australian wheat production is set "to increase by 76% in 2020–21 to 26.7 million tonnes". If realised, this will be the biggest wheat crop Australia has produced since the record high of 2016–17. Australian wheat supply has been adversely affected by three consecutive years of below average production.

Domestic wheat use comprises milling wheat for flour, livestock feed, wheat for industrial use and for use as seed. Milling wheat for flour usually accounts for around 35% of total domestic use at an average of around 3 million tonnes."

AgriFutures reports that wheat grown in Western Australia is mostly exported while about 40% of crops grown in the eastern regions of Australia are used for domestic consumption and animal feed. The major export markets are in the Asian and Middle East regions, including Indonesia, Japan, South Korea, Malaysia, Vietnam and Sudan.



### 3.3.2 Barley

The Australian Bureau of Agricultural and Resource Economics and Science reports that improved seasonal conditions are expected to result in a 17% increase in barley production in 2020–21 to around 11 million tonnes, 18.5% above the pre-drought 10-year average to 2017–18.

The Australian Export Grains Innovation Centre states that "of average annual production, about 30-40% is graded as malting barley. Claiming more than 30% of the world's malting barley trade, Australia is the world's largest exporter of malting barley."

China was by far the largest importer of Australian barley, importing 4.2 billion tonnes valued at AUD 1.2 billion during the 2016-17 financial year. Other major export countries for Australian barley include Saudi Arabia and Japan. The remainder of exports went to other countries in the Middle East and Asia.

International demand for Australian barley is, however, expected to fall because of newly imposed tariffs by China which were announced in May 2020. Over the medium term, Chinese tariffs are expected to result in lower export prices for barley, and some substitution towards wheat and other broadacre crops in response to lower barley margins. Short-term production impacts are likely to be relatively minor because most barley was planted before the tariffs were announced.

### 3.3.3 Rice

As indicated in chapter 2.4.2 above Rice production has been severely impacted by Australia's most recent drought and as such Australian farmers have harvested only 57,000 tonnes of rice for the 2019–20 season, compared to around 629,000 tonnes per year before that (10 year average to 2018-19). However, the Australian Bureau of Agricultural and Resource Economics and Science forecasts that a return to average seasonal conditions and a fall in water prices would lead to an increase in rice production around 266,000 tonnes in 2020–21. Farms that produce rice also typically produce other crops using irrigation water, such as cotton, pastures and perennial horticulture, as well as dryland crops such as wheat. Many also have beef and sheep enterprises.

Australians are estimated to consume about 300,000 tonnes of rice every year. About half of this volume typically comes from imports (mostly long grain rice, such as basmati and jasmine) and the other half from domestic production (mostly medium grain rice). While Australian rice production is highly variable, consumption and imports are more stable. This is because exports and domestic stocks act as a shock absorber—exports increase in good production years and decrease in poor production years

Australia exported an average of 350,000 tonnes per year of rice between 2010–11 and 2019–20, with significant year-to-year variability as production varied. In recent years around 74% of the crop was exported. Australia is a small exporter of mostly medium grain rice, representing around 5% of global medium and short grain rice exports and 0.4% of total global rice exports in 2019. Globally, Australia competes primarily with China and the United States in medium grain rice markets. The main export destinations are the Middle East and Oceania.

# 4. AVAILABLE TECHNOLOGY

## 4.1 AGRICULTURAL MACHINERY & EQUIPMENT

### 4.1.1 Agricultural Machinery Manufacturing in Australia

#### 4.1.1.1 General

Industry firms primarily manufacture agricultural machinery, equipment and specialised parts. This machinery includes lawnmowers and planting and harvesting equipment.

Import competition and mixed downstream conditions have affected the industry's performance over the past five years. Australia's agriculture division has grown, with increased revenue driven by strong demand in local and export markets. Farm incomes have displayed significant volatility over the period. Nevertheless, an overall rise in farm incomes has benefited industry operators as farmers spent more on industry machinery and equipment. However, rising competition from imports has constrained overall growth.

International trade has expanded across the industry over the past five years. Despite a depreciating Australian dollar, import penetration is high and has increased over the period. High-quality imports have a brand and reputational advantage in the domestic market, while low-priced imports can undercut local suppliers and cater to buyers looking to reduce costs. Industry firms have been transitioning to producing more niche and value-added products, which have gained popularity in overseas markets. As a result, industry exports have increased over the past five years.

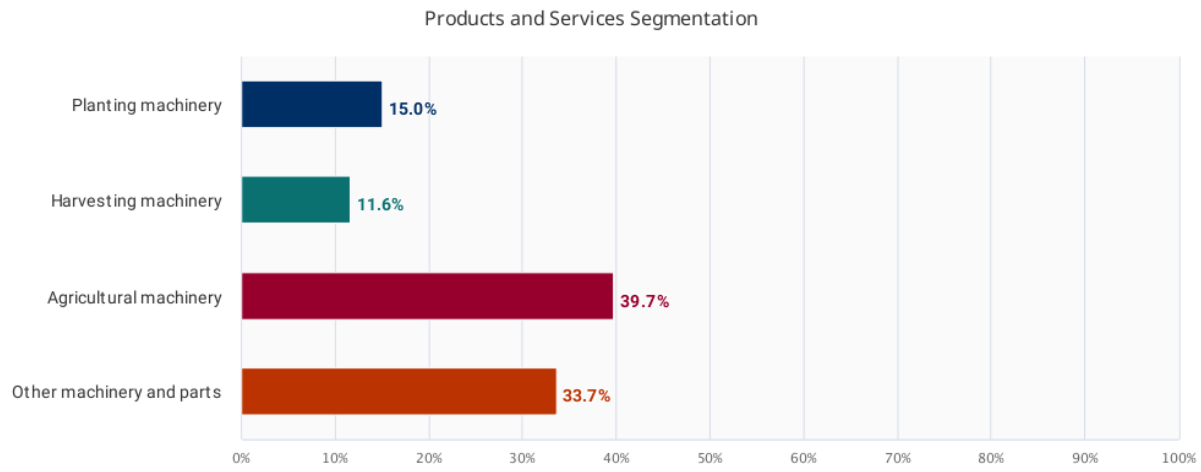
The industry is forecast to grow modestly over the next five years. Volatile operating conditions will likely remain a defining feature of the industry over the period. However, overall growth in the agriculture sector and increasing farm incomes is projected to boost the industry's performance. Import penetration is projected to continue rising over the period, particularly from highly advanced manufacturers in the United States and Germany.

Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $2.2bn | 0.9% | 1.1% | 6.0% | 16.2% | -1.6% |

#### 4.1.1.2 Products and markets

Until the 1970s, most tractors used in Australia were manufactured locally. However, removal of trade barriers and competition from low-cost labour countries contributed to tractor manufacturing moving offshore.




2020 INDUSTRY REVENUE

**$2.2bn**

Agricultural Machinery Manufacturing
Source: IBISWorld

**Agricultural machinery**

Agricultural machinery includes lawn mowing equipment, irrigation systems, windmills, sprayers, dairy machinery and farming machinery. Demand from the Dairy Cattle industry has risen over the past five years because it has become increasingly mechanized. Furthermore, demand for irrigation equipment has increased, as limited water availability has encouraged farmers to install or modernise their irrigation systems. Overall, this segment has increased slightly as a share of industry revenue.

**Planting machinery**

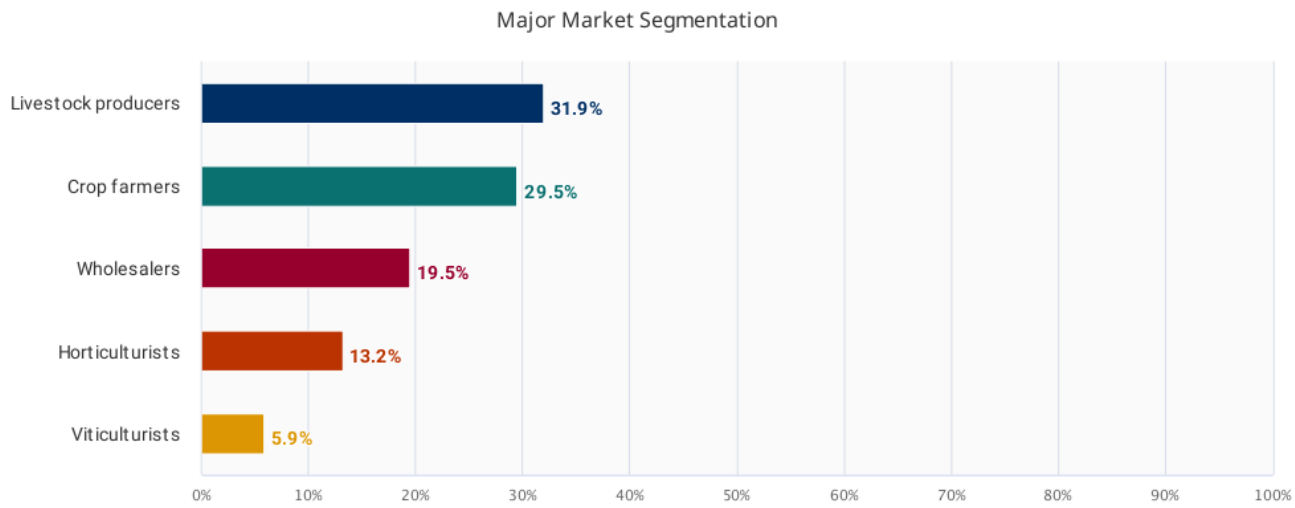
Planting machinery includes any machinery used to prepare soil and plant crops, such as tillage machines and seeders. Overall, planting machinery has decreased as a share of industry revenue over the past five years.

**Harvesting machinery**

Growing import penetration has negatively affected this segment. Foreign manufacturers can operate with far lower labour and overhead costs, which allows them to undercut local manufacturers on price. As a result, this segment's share of industry revenue has fallen over the past five years.

**Other machinery and parts**

This segment includes parts and accessories for industry products which make up the bulk of revenue in this segment. Imported machines often have to be adjusted to suit Australian conditions, which increases demand for domestically made components. As a result, this segment has been less affected by growing import penetration. However, many modern agricultural machines require licenced dealers to perform repairs. The intricate software found in such equipment means parts are not independent of themselves and wholesalers, such as John Deere, require farmers to use approved technicians. This trend has softened demand for parts and components. Overall, this segment has grown as a share of revenue over the past five years.



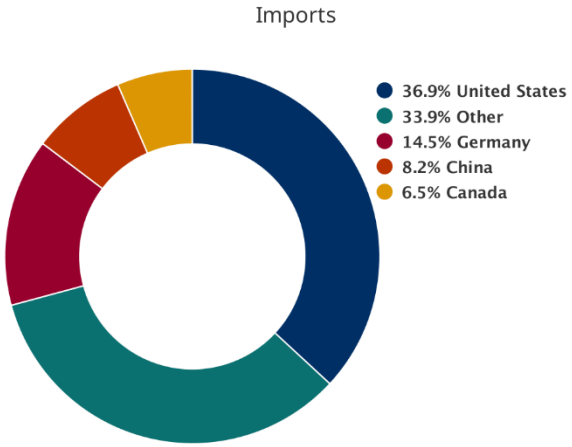

2020 INDUSTRY REVENUE

**$2.2bn**

Agricultural Machinery Manufacturing
Source: IBISWorld

#### 4.1.1.3 International trade

International trade in the Agricultural Machinery Manufacturing industry has increased over the past five years.

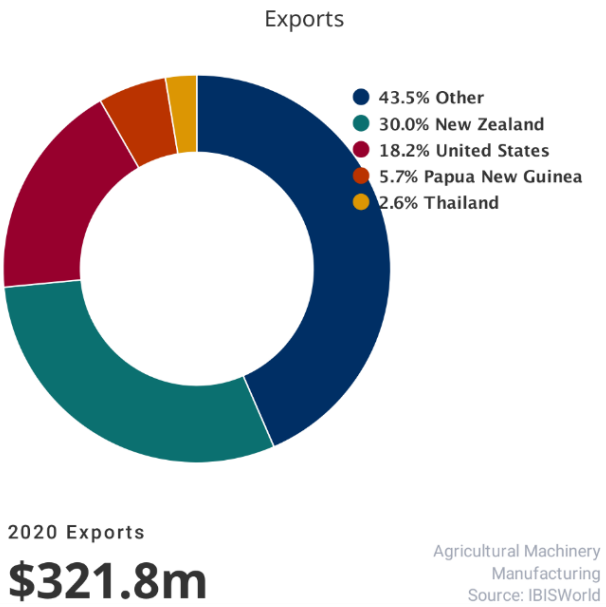



2020 Imports

**$2.3bn**

Agricultural Machinery Manufacturing
Source: IBISWorld

Imports are expected to increase at an annualised 3.6% over the five years through 2019-20, to AUD 2.3 billion. Over half of the industry's imports come from the United States and Germany. These high-quality and value-added products, particularly tractors and harvesters, are highly prized by Australian farmers. Low-value high-volume products from Asian manufacturers are less prevalent in the Australian market compared with other manufacturing industries. Trust among farmers for low-cost products has not yet been established, and quality assurance is an important factor for farmers when contemplating large investments.




Export revenue is anticipated to increase at an annualised 2.1% over the five years through 2019-20, to AUD 321.8 million. Many domestic firms manufacture products tailored to suit Australian conditions, making their goods unsuitable for export markets. However, other companies target export markets to diversify revenue streams and help insulate themselves from poor demand conditions in the local market. Overall, exports have risen as a share of industry revenue over the past five years, and are expected to account for 14.7% of total revenue in 2019-20. Export revenue from most major industry trading partners has increased over the past five years, with particularly strong growth from the United States.

#### 4.1.1.4 Main Industry players

More information about the main industry players is available upon request. Please contact us via melbourne@fitagency.com.

### 4.1.2 Farm and Construction Machinery Wholesaling

#### 4.1.2.1 General

Industry operators wholesale agricultural machinery, agricultural implements, earthmoving machinery, and other construction machinery and equipment. Industry operators also wholesale parts for this equipment. In this overview, FIT Melbourne will only focus on agricultural machinery.

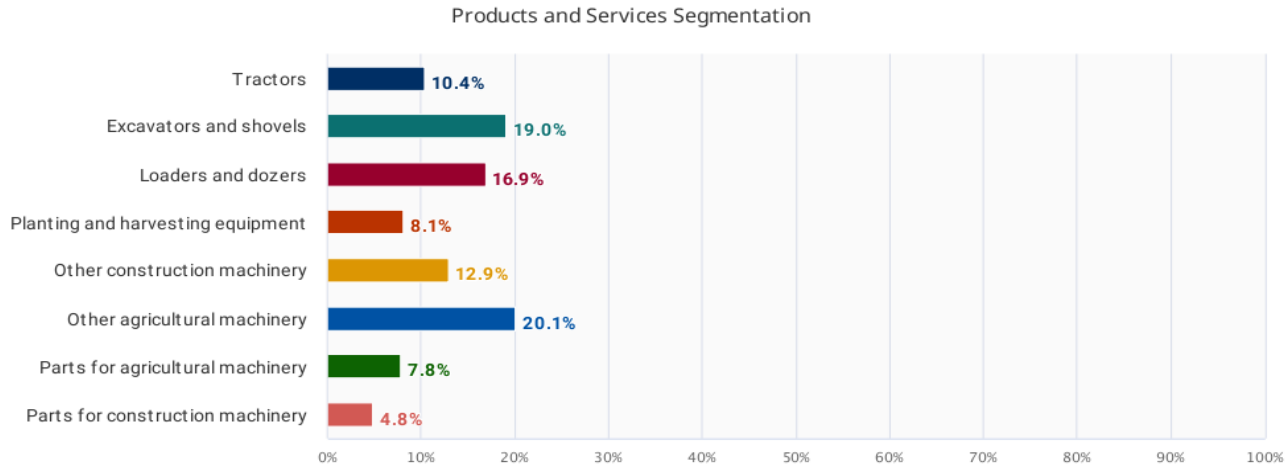
Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $23.4bn | -1.4% | 1.8% | 3.8% | 8.3% | 0.9% |

Operators in the Farm and Construction Machinery Wholesaling industry have faced fluctuating conditions over the past five years. Demand from the Agriculture division has increased over the period due to rising farm incomes, boosting demand for farming machinery. Future growth is expected in this industry, in part due to growth in the agricultural sector, which currently accounts for the largest market share at 38.8%

#### 4.1.2.2 Products and markets

The industry sells a diverse range of products, that are primarily used by agricultural, construction, mining and horticultural industries. Many of these products have long life spans and slow rates of technological development. Consequently, industry demand heavily depends on new project investment. Each segment's share represents its contribution to total industry revenue. Of all downstream customers, the agriculture sector takes up the largest market share at 38.8%




2020 INDUSTRY REVENUE

**$23.4bn**

Farm and Construction Machinery Wholesaling
Source: IBISWorld

#### 4.1.2.3 Main Industry Players

More information about the main industry players is available upon request. Please contact us via melbourne@fitagency.com.

## 4.2 FOOD PROCESSING MACHINERY MANUFACTURING IN AUSTRALIA

#### 4.2.1.1 General

The Food Processing Machinery Manufacturing industry's performance depends on activity among downstream food and beverage manufacturers, and their capital investment in equipment and machinery. Growth in food and beverage product manufacturing over the past five years has supported demand for industry food processing equipment. Continued capital expenditure on machinery and equipment over the period has also driven industry demand. However, slow export growth, coupled with strong import competition, has limited the industry's expansion. Although industry revenue has grown over the past five years, establishments, enterprises and employment have all declined over the period. These declines have been due to growing import penetration, which has threatened local operators' viability.

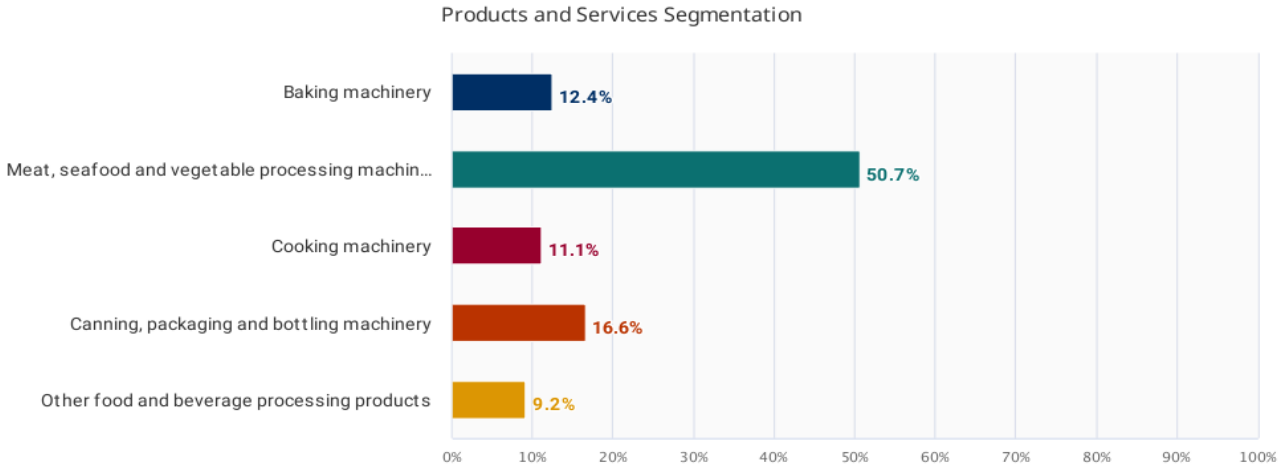
Key Statistics Snapshot

| Total Revenue in 2020 | Annual Growth 2015–2020 | Annual Growth 2020–2025 | Profit Margin in 2020 | Wages as a share of Revenue in 2020 | Number of Businesses 2015–2020 |
|---|---|---|---|---|---|
| $1.1bn | 1.2% | 0.9% | 12.0% | 14.7% | -1.3% |

Demand from downstream food production industries is forecast to rise slightly over the next five years from 2019, underpinned by higher domestic consumption and a growing middle class in Asia that demands Australian food products. These factors are anticipated to contribute steady demand growth for industry products, as food and beverage manufacturers expand their operations over the period to meet this demand. However, import penetration will likely increase over the next five years, despite the Australian dollar appreciating slightly over the period.

#### 4.2.1.2 Products

Industry firms manufacture a variety of food processing machinery (baking machinery, bottling machinery, canning machinery, packaging machinery, distilling machinery, crushing machinery, flour-milling machinery and juice extractors). Each segment is divided based on its contribution to industry revenue.




2020 INDUSTRY REVENUE

**$1.1bn**

Food Processing Machinery Manufacturing
Source: IBISWorld

**Meat, seafood and vegetable processing machinery**

Machinery used in production-line processes accounts for the largest share of industry revenue. This type of machinery is highly specialised and often purpose-built or modified for customers. This segment is expected to increase as a share of industry revenue over the five years through 2019-20 due to these products' customised nature, which lowers competition from imports.

**Canning, packaging and bottling machinery**

The industry manufactures canning, packaging and bottling machinery. The industry's product mix has been influenced by rising health consciousness and greater convenience demanded by consumers. These trends have boosted the popularity of fresher and less processed foods, such as pre-packaged salads, and fruit and vegetables that require bagging and packing with industrial equipment. Overall, this product segment is expected to increase as a proportion of industry revenue over the five years through 2019-20.

**Baking machinery**

This product segment is expected to decrease as a proportion of industry revenue over the five years through 2019-20 due to greater import competition for these products.

**Cooking machinery**

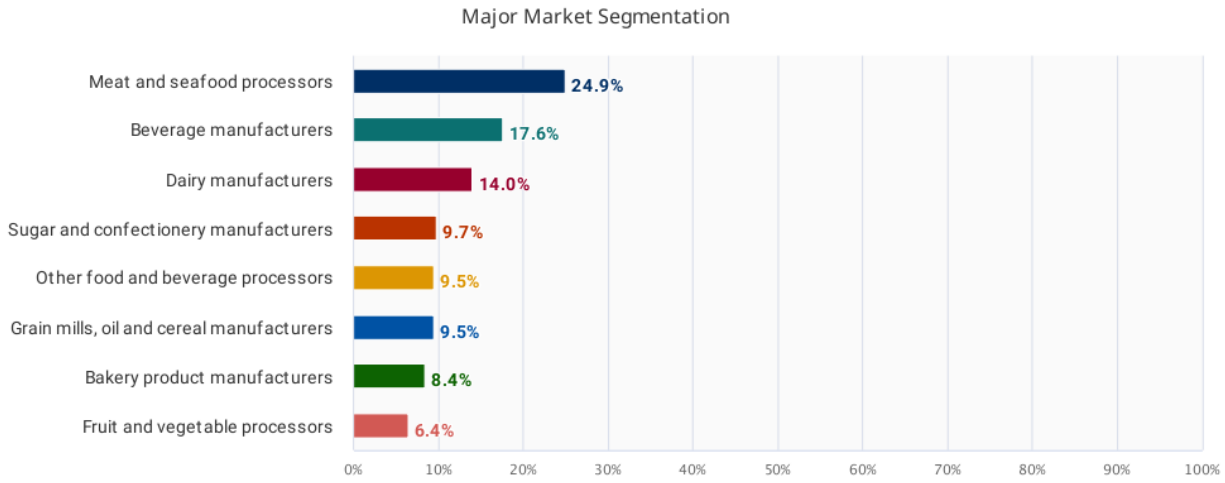
This product segment is expected to decrease as a proportion of industry revenue over the five years through 2019-20 due to high import competition for these goods.

### Other food and beverage processing products

The industry manufactures a range of miscellaneous food processing products. These products include weighing and metal detection equipment; distillers, filters and juice extractors; chillers; and numerous parts and accessories that are used to modify and repair food processing machinery. This segment is expected to remain stable as a share of industry revenue over the five years through 2019-20 as it has been subject to less competition from imports than other industry product segments.

#### 4.2.1.3 Markets

This market can be broken down into a range of industries that use various types of industry machinery and equipment.




2020 INDUSTRY REVENUE

**$1.1bn**

Food Processing Machinery Manufacturing
Source: IBISWorld

### Meat and seafood processors

Meat and seafood processors are the largest industry market and include processors of cattle meat, poultry meat, pig meat, smallgoods and seafood. This market is expected to increase as a portion of industry revenue over the five years through 2019-20.

### Beverage manufacturers

Beverage manufacturers are the second-largest industry market. This segment includes manufacturers of soft drink, beer, wine and spirits. Low growth in capital expenditure by beverage manufacturers is expected to limit demand growth from this market for food processing machinery. As a result, this segment is projected to decline as a proportion of industry revenue over the five years through 2019-20.

### Dairy manufacturers

Dairy manufacturers use a range of industry products as the production of milk and value-added products such as butter and cheese requires various types of food processing and packaging machinery. This market is expected to slightly decline as a portion of industry revenue over the five years through 2019-20.

### Sugar and confectionery manufacturers

Sugar and confectionery manufacturers produce products like chocolate, marshmallows, crystallised or glazed confectionery and various snack foods. Sugar and confectionery manufacturers are projected to increase as a proportion of industry revenue over the five years through 2019-20.

### Grain mills, oil and cereal manufacturers

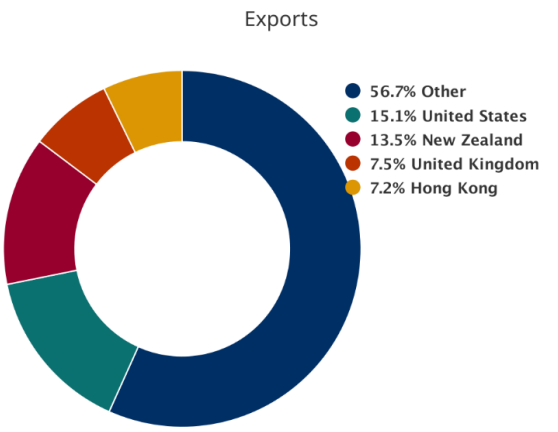
Grain milling and cereal product manufacturing industries make up another major industry market. This segment has declined as a share of revenue over the past five years.

**Bakery product manufacturers**
This market is expected to decrease slightly as a portion of industry revenue over the five years through 2019-20 as many local bakeries have closed down due to competition from cheap supermarket bakeries within Coles and Woolworths stores.

**Fruit and vegetable processors**
Fruit and vegetable processors are primarily focused on fruit drying and freezing, vegetable freezing and frozen potato production. This market uses packaging machines, specialised ovens and freezers and is driven by domestic prices of vegetables and fruit. Fruit and vegetable processors are expected to increase as a portion of industry revenue over the five years through 2019-20.

**Other food and beverage processors**
This market includes restaurants, cafes and hotels that require food processing equipment. Other food and beverage processors also include companies that process food as a service for other firms. Overall, this market is projected to remain unchanged as a proportion of industry revenue over the five years through 2019-20.

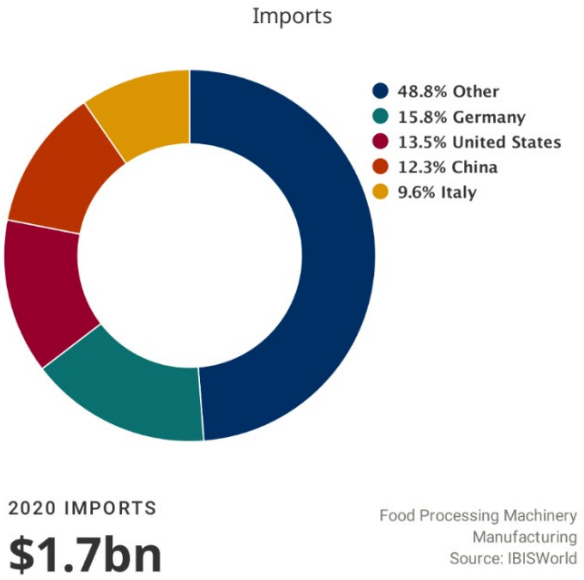
#### 4.2.1.4 International trade




2020 EXPORTS
**$298.2m**

Food Processing Machinery Manufacturing
Source: IBISWorld

Industry exports have increased at a strong rate over the past five years due to the high quality of Australian food processing products and the continued weakness of the Australian dollar. Exports are projected to account for 27.5% of industry revenue in 2019-20. The most prominent export destinations for Australian food processing machinery are the United States, New Zealand, the Philippines and Asian markets. Demand from these countries has mostly increased over the past five years, reflecting the beneficial effects of the weak Australian dollar.




Imports are expected to account for 68.2% of domestic demand in 2019-20, with an estimated value of AUD 1.7 billion. The value of imports can be highly volatile, as most industry trade is conducted through short-term contracts rather than reoccurring long-term supply arrangements. Germany, China, the United States and Italy are the four single largest sources of imports into the Australian market.

#### 4.2.1.5 Main Industry Players

More information about the main industry players is available upon request. Please contact us via melbourne@fitagency.com.

## 4.3 PACKAGING SERVICES AND MATERIALS

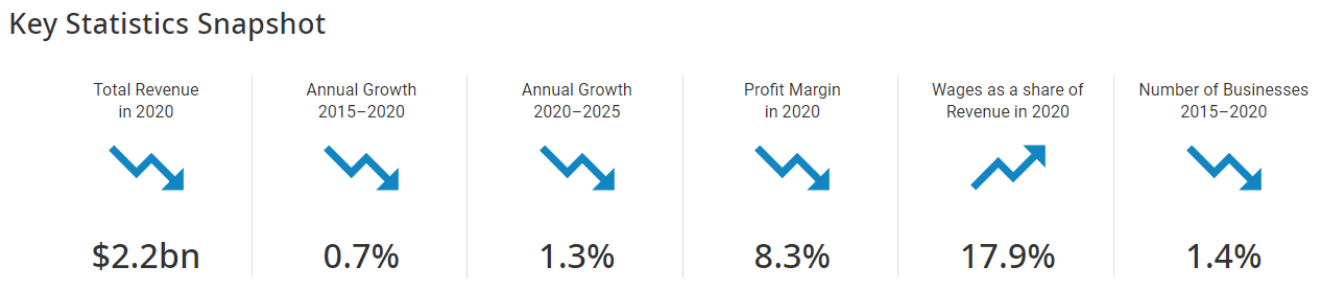
In this section, FIT Melbourne provides an overview of the packaging services sector before looking more closely at different packaging materials.

### 4.3.1 Packaging Services

Industry firms pack goods in bottles, cans, collapsible tubes, cartons, plastic sachets, film or bags, and other containers or materials. The Packaging Services industry has performed relatively well over the past five years, despite poor downstream demand.

Downstream manufacturing industries have struggled against rising import penetration from economies with low-cost production methods, prompting many to cease operations or move overseas. As domestic manufacturing conditions have become tougher, manufacturers have been outsourcing non-core activities such as packaging to reduce costs and remain competitive in the face of rising import penetration.

The industry is anticipated to continue its expansion over the next five years, supported by improving demand across many of its key markets. Despite this, rising competition among industry operators and



the threat of imports eroding local manufacturers' domestic market share are likely to weigh against the industry and subdue revenue growth over the period.

Food and beverage packaging makes up 48.8% of the industry. This segment includes the contracted packing of foodstuffs, fresh fruits and vegetables, and alcoholic and non-alcoholic beverages. The growing range of food products manufactured in Australia has offered an opportunity for contract packagers to grow, particularly as food manufacturers seek to cut costs by outsourcing non-core operations. Overall, the food and beverage packaging segment has grown slightly as a share of industry revenue over the past five years.

The Packaging Services industry is highly fragmented and primarily consists of small-scale operators. According to the latest data from the Australian Bureau of Statistics, approximately 80% of industry operators generate less than AUD 2 million per year, and 89% have fewer than 20 employees.

Annex Holdings Proprietary Limited

Annex Holdings Proprietary Limited is an Australian private company that provides contract packaging, contract manufacturing and third-party warehousing services. The company has operations in Clayton South and Moorabbin in Melbourne. Annex specialises in single-serve and portion-controlled packaging, and partners with several of Australia's leading consumer brands and retailers.

### 4.3.2 Packaging Materials

#### 4.3.2.1 Plastic

**Solid plastic packaging** includes packaging materials for food products including yoghurt, margarine and ice cream tubs. This segment also includes various small products used for packaging such as baskets, bottle caps and closures. The manufacturing of these types of plastic products is largely protected from import due to its low value-to-weight ratio. Overall, Australian manufacturing of these products is estimated at AUD 990 million and accounts for the largest market share in the Australian solid plastic manufacturing industry. This segment has increased as a share of industry revenue over the past five years, due to solid demand from the Food Manufacturing industry and declines in other product segments.

**Soft plastic** manufacturing includes products such as plastic bags, thin plastic films, food wrapping, garbage bags and bubble wrap packaging. A large share of these products are used to store, package and transport agricultural and food goods.

Plastic films manufacturing is valued at roughly AUD 1.57 billion, which amounts to two-thirds of the "Plastic bag and film manufacturing" industry in Australia. This segment also includes household products as well as agricultural and horticultural products such as silage films, grain bags, silage tubes and mulch films. Demand for plastic films has grown over the past five years, particularly those used to package fresh and perishable food stocked in supermarkets and grocery stores. Consumer demand for fresh produce has increased over the period, increasing demand for plastic films. Demand has also increased from the agriculture sector, as output has risen over the past five years. Increased commitment to drought-assistance processes, such as using plastic film mulch to aid water retention in the soil, has also aided the industry. Overall, this segment has grown as a share of revenue over the past five years.

Plastic bags manufacturing is valued at AUD 595 million and accounts for a quarter of the "Plastic bag and film manufacturing" industry in Australia. This segment has declined as a share of revenue over the past five years due to intensifying import penetration and environmental consciousness.

**Plastic bottles**

Contrary to Belgium, water and most soft drinks in Australia are sold in plastic bottles. The main products manufactured in this industry are soft drink bottles, household product containers, milk bottles and fruit juice bottles. A small (but increasing) number of alcoholic beverages such as beer and wine are also packaged in plastic bottles and containers. This seems to be due to increasing environmental concerns since plastic bottles are easier to recycle than glass bottles.

Manufacturing of soft drink bottles is valued at AUD 755 million. Industry firms manufacture a variety of soft drink bottles, with the most common sizes being 375, 500 or 600 ml. Common soft drink brands such as Coca Cola, Pepsi, Fanta and Sprite also use 1.25 and 2 litre bottles. Soft drink bottles are primarily manufactured using polyethylene terephthalate (PET). This segment has increased slightly as a share of industry revenue over the past five years.

Dairy processors require plastic bottles to package and distribute milk products. Milk bottles are mainly manufactured using HDPE. This segment has decreased as a share of revenue over the past five years despite rising demand from milk processors. Currently the manufacturing of these types of bottles is valued at AUD 132 million. Rising environment awareness has resulted in consumers purchasing from micro-dairy milk producers that sell milk in glass bottles.

#### 4.3.2.2 Paper

Treated paper and paperboard accounts for 63.9% of the "Pulp, Paper and Paperboard Manufacturing" industry in Australia and is valued at AUD 1.85 billion. Food and Beverages manufacturers make up 13.6% of market share, valued at AUD 394 million, making it the "Pulp, Paper and Paperboard Manufacturing" industry's second largest market. Demand from this market has increased over the past five years, partly due to growth in the Wine Production and Meat Processing industries. Consequently, this market has increased as a share of industry revenue over the past five years.

Industry operators in the "Paperboard Container Manufacturing" Industry convert paper and paperboard into solid paperboard packaging containers. Demand from food and beverage manufacturers has risen over the period, supporting industry growth. Fast food and takeaway food services is projected to boost the volume of paperboard containers ordered by downstream markets.

Food containers account for the largest share of industry revenue and are valued at AUD 200 million. Supermarkets and fast food restaurants comprise a substantial portion of the food container segment. Grocery items packaged in paperboard containers include fresh fruit, bakery items and dry foods. A significant portion of dry food produced in Australia is packaged in solid paperboard containers. Time-poor consumers have lifted demand for fast food services, frozen dinners and snack foods over the past five years. As a result, this segment has increased as a share of industry revenue over the past five years.

The manufacturing of beverage containers in Australia is valued at AUD 99 million. The industry produces two types of beverage containers: gable-top cartons and aseptic packaging. Demand for beverage containers depends on activity in downstream industries such as milk processing, fruit juice production and wine manufacturing, which use cask wine and Tetra Pak packaging. Demand from wine production has increased over the past five years. However, strong competition from plastic and glass substitutes has eroded demand for paperboard beverage containers. This segment has fallen as a share of industry revenue over the past five years, due to relatively stronger growth in other segments and competition from substitute products.

#### 4.3.2.3 Glass

Firms in the glass container segment primarily manufacture glass bottles, jars and specialised containers. This segment also includes other similar containers used for packaging goods. The main glass container products in order of volume are beer bottles, wine bottles, soft drink bottles, bottles and jars for processed food, and spirit bottles. The industry produces approximately 1 million tonnes of glass containers each year, including an estimated 2.5 billion wine and beer bottles. The industry is exposed to competition from glass product imports and substitute packaging containers, such as plastic or cardboard.

Glass containers take up 42.1% of the Australian "Glass Product Manufacturing" industry which is valued at AUD 4.2 billion and also includes glass for the construction sector. The glass container segment has decreased as a share of revenue since the early 2000s, due to the rising popularity of alternative container products, such as PET bottles and cardboard containers. However, this segment's share of revenue has remained stable over the past five years. Furthermore, this product segment is anticipated to strengthen in the current year, due to rising demand from local wine producers and the boutique beer market.

#### 4.3.2.4 Cans

Metal cans manufactured for beverage industries represent the largest source of revenue for the "Metal Drum, Can and Bin Manufacturing" industry in Australia. It takes up 41.8% and is valued at AUD 794 million. This segment includes cans manufactured from aluminum, and other metals including tin and steel. This segment has increased as a share of industry revenue over the past five years, reflecting greater demand from beverage manufacturing over the period. Additionally, the recyclability of aluminium products has allowed the industry to benefit from rising concern about the environment, as consumer preferences have moved away from plastic bottles.

Food cans are largely made of steel, given its superior ability to protect and retain the freshness of food, and the ease of packaging. This segment has slightly increased as a share of industry revenue over the past five years and currently takes up the second largest industry share at 21.4%, valued at AUD 406 million. Growth in demand from food product manufacturing has boosted demand for metal food cans. However, this segment has been increasingly exposed to substitution by imported tinned foodstuffs (e.g. canned tomatoes), limiting the segment's growth over the past five years.

#### 4.3.2.5 Major companies

More information about the main industry players is available upon request. Please contact us via melbourne@fitagency.com.

## 4.4 IMPORT INTO AUSTRALIA FROM FLANDERS

Below is an overview of imported machinery, spare parts and packaging material from Flanders to Australia between January and December 2019. The list broadly covers the types of machinery and packaging that were discussed in chapters 4.1 until 4.3 above.

FIT Melbourne has taken great care to make this list as complete as possible but some smaller categories may be missing. Nevertheless, this overview will give a good indication of recent trade in these products from Flanders to Australia. Trade values are x 1000 EUR.

| Product level: CN4 | 2017 | 2018 | 2019 | % share in 2019 | % change 2017 - 2018 | % change 2018 - 2019 |
|---|---|---|---|---|---|---|
| Total | 1.589.173 | 1.639.614 | 1.564.250 | *100%* | +3,17% | -4,60% |
| Machinery & Spare Parts | | | | | | |
| 8433 - harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers; machines for cleaning, sorting or grading eggs, fruit or other agricultural produce; parts thereof (other than machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables of heading 8437) | 36.466 | 30.745 | 34.749 | *2,22%* | -15,69% | +13,02% |
| 8708 - parts and accessories for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles of heading 8701 to 8705, n.e.s. | 35.903 | 39.139 | 32.709 | *2,09%* | +9,01% | -16,43% |
| 8421 - centrifuges, incl. centrifugal dryers (excl. those for isotope separation); filtering or purifying machinery and apparatus, for liquids or gases; parts thereof (excl. artificial kidneys) | 16.945 | 16.958 | 15.209 | *0,97%* | +0,08% | -10,32% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Example: cream separators | | | | | | |
| 8419 - machinery, plant or laboratory equipment whether or not electrically heated (excl. furnaces, ovens and other equipment of heading 8514), for the treatment of materials by a process involving a change of temperature such as heating, cooking, roasting, distilling, rectifying, sterilising, pasteurising, steaming, drying, evaporating, vaporising, condensing or cooling (excl. those used for domestic purposes); instantaneous or storage water heaters, non-electric; parts thereof | 4.906 | 3.313 | 6.203 | *0,40%* | -32,48% | +87,27% |
| 8438 - machinery, not specified or included elsewhere in this chapter, for the industrial preparation or manufacture of food or drink (other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils); parts thereof | 2.576 | 3.358 | 2.524 | *0,16%* | +30,35% | -24,83% |
| 8424 - mechanical appliances, whether or not hand-operated, for projecting, dispersing or spraying liquids or powders, n.e.s.; fire extinguishers, charged or not (excl. fire-extinguishing bombs and grenades); spray guns and similar appliances (excl. electric machines and apparatus for hot spraying of metals or sintered metal carbides of heading 8515); steam or sand blasting machines and similar jet projecting machines; parts thereof, n.e.s.<br>Example: agricultural and horticultural sprayers | 673 | 921 | 1.379 | *0,09%* | +36,92% | +49,71% |
| 8422 - dishwashing machines; machinery for cleaning or drying bottles or other containers; machinery for filling, closing, sealing or labelling bottles, cans, boxes, bags or other containers; machinery for capsuling bottles, jars, tubes and similar containers; other packing or wrapping machinery, incl. heat-shrink wrapping machinery; machinery for aerating beverages; parts thereof | 4.047 | 2.012 | 1.164 | *0,07%* | -50,28% | -42,13% |
| 8436 - agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery, incl. germination plant fitted with mechanical or thermal equipment; poultry incubators and brooders; parts thereof | 2.343 | 1.471 | 1.053 | *0,07%* | -37,23% | -28,38% |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8418 - refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat pumps; parts thereof (excl. air conditioning machines of heading 8415) | 1.441 | 1.323 | 857 | *0,05%* | -8,22% | -35,19% |
| 8432 - agricultural, horticultural or forestry machinery for soil preparation or cultivation (excl. sprayers and dusters); lawn or sports-ground rollers; parts thereof | 1.305 | 1.740 | 603 | *0,04%* | +33,36% | -65,34% |
| 8701 - tractors (other than tractors of heading 8709) | 582 | 143 | 451 | *0,03%* | -75,51% | +216,09% |
| 8707 - bodies, incl. cabs, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles of heading 8701 to 8705 | 219 | 185 | 377 | *0,02%* | -15,65% | +104,02% |
| 8538 - parts suitable for use solely or principally with the apparatus of heading 8535, 8536 or 8537, n.e.s. | 306 | 521 | 329 | *0,02%* | +70,05% | -36,75% |
| 8439 - machinery for making pulp of fibrous cellulosic material or for making or finishing paper or paperboard (excl. autoclaves, boilers, dryers, other heating appliances and calenders); parts thereof | 349 | 322 | 328 | *0,02%* | -7,75% | +1,88% |
| 8441 - machinery for making up paper pulp, paper or paperboard, incl. cutting machines of all kinds, n.e.s.; parts thereof | 2 | 223 | 291 | *0,02%* | +11468,08% | +30,57% |
| 8417 - industrial or laboratory furnaces and ovens, non-electric, incl. incinerators (excl. drying ovens and ovens for cracking operations) Example: Bakery ovens, including biscuit ovens | 135 | 427 | 273 | *0,02%* | +216,00% | -36,02% |
| 8423 - weighing machinery, incl. weight-operated counting or checking machines (excl. balances of a sensitivity of 5 cg or better); weighing machine weights of all kinds; parts thereof | 16 | 3 | 77 | *0,00%* | -84,00% | +2975,66% |
| 8437 - machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables; machinery used in the milling industry or for the working of cereals or dried leguminous vegetables (excl. farm-type machinery, heat treatment equipment, centrifugal dryers and air filters); parts thereof | 350 | 41 | 71 | *0,00%* | -88,21% | +72,92% |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8434 - milking machines and dairy machinery (excl. refrigerating or heat treatment equipment, cream separators, clarifying centrifuges, filter presses and other filtering equipment); parts thereof | 12 | 6 | 9 | *0,00%* | -46,34% | +44,79% |
| 8435 - presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages (excl. machinery for the treatment of these beverages, incl. centrifuges, filter presses, other filtering equipment and domestic appliances); parts thereof | | 23 | 1 | *0,00%* | | -94,18% |
| **Packaging materials: paper (derived) products, plastics** | | | | | | |
| 4810 - paper and paperboard, coated on one or both sides with kaolin "china clay" or other inorganic substances, with or without a binder, and with no other coating, whether or not surface-coloured, surface-decorated or printed, in rolls or in square or rectangular sheets, of any size (excl. all other coated papers and paperboards) | 8.881 | 9.050 | 7.428 | *0,47%* | +1,90% | -17,92% |
| 3926 - articles of plastics and articles of other materials of heading 3901 to 3914, n.e.s. | 5.675 | 4.241 | 5.709 | *0,36%* | -25,26% | +34,59% |
| 3901 - polymers of ethylene, in primary forms | 2.862 | 2.976 | 1.825 | *0,12%* | +3,99% | -38,66% |
| 4821 - paper or paperboard labels of all kinds, whether or not printed | 1.219 | 1.478 | 1.463 | *0,09%* | +21,32% | -1,05% |
| 4811 - paper, paperboard, cellulose wadding and webs of cellulose fibres, coated, impregnated, covered, surface-coloured, surface-decorated or printed, in rolls or in square or rectangular sheets, of any size (excl. goods of heading 4803, 4809 and 4810) | 2.168 | 1.759 | 1.411 | *0,09%* | -18,85% | -19,79% |
| 4823 - paper, paperboard, cellulose wadding and webs of cellulose fibres, in strips or rolls of a width <= 36 cm, in rectangular or square sheets of which no side > 36 cm in the unfolded state, or cut to shape other than rectangular or square, and articles of paper pulp, paper, paperboard, cellulose wadding or webs or cellulose fibres, n.e.s. | 244 | 172 | 203 | *0,01%* | -29,53% | +18,35% |
| 4819 - cartons, boxes, cases, bags and other packing containers, of paper, paperboard, cellulose wadding or webs of cellulose fibres, n.e.s.; | 641 | 450 | 198 | *0,01%* | -29,81% | -55,99% |

| | | | | | | |
|---|---|---|---|---|---|---|
| box files, letter trays, and similar articles, of paperboard of a kind used in offices, shops or the like | | | | | | |
| 3914 - ion-exchangers based on polymers of heading 3901 to 3913, in primary forms | 1 | 33 | 2 | *0,00%* | +2782,56% | -95,28% |

# 5. CHALLENGES, TRENDS AND NEW AGTECH

## 5.1 THE FUTURE: "TALKING 2030"

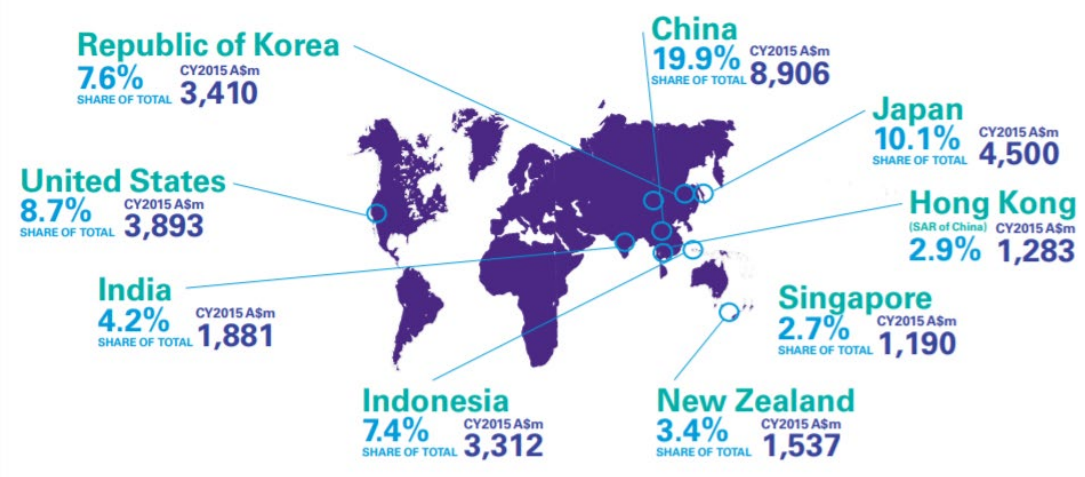
In 2018, the National Farmers' Federation laid down its vision for the industry: AUD 100 billion in farm gate output by 2030. In the 2018 financial year that figure was AUD 59 billion, meaning Australia's agricultural sector would need to grow by almost 70%. Together with KPMG and Telstra (major telecommunications company in Australia) the NFF created a discussion paper, which it considers to be a first step in the process titled "Talking 2030".

The "Talking 2030" paper discusses a series of topics, including financial investment and labour. For the purpose of this report, FIT Melbourne focuses on only the technology that will be needed to achieve the goals.

At the start of its report, the NFF sets the scene for future decades, where key drivers for the industry will be population growth and changing consumer demands.

### 5.1.1 Population Growth

The planet must produce more food in the next four decades than all farmers in history have harvested over the past 8000 years. That is because by 2050, the Earth will be home to as many as 10 billion people, up from today's 7.5 billion. The largest increase in population is expected in Africa. Asia is expected to represent the second largest growth in population with an additional 750 million people. Given that Asia is the largest export market for Australian agribusinesses (see chart below), Asia's growth is expected to be a key driver for Australian Agribusiness expansion.




By 2030, Australia should have preferential trade deals in place with Asia's five largest economies, including Korea (since 2014) China and Japan (since 2015), neighbour Indonesia (5 July 2020) and India (under negotiation). Other notable FTA's include ASEAN-Australia-New Zealand (since between 2010 and 2012) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership since 2018. Currently, Australia is in FTA talks with the EU (expected by mid-2021) and the UK (negotiations only just started).

While it is hoped that these FTAs will boost the Australian agribusiness industry, recent geopolitical trends could also be of concern for Australian farmers, especially now that Australia's relationship with China,

its most important economic partner, is becoming more complex. As reported in chapter 3.3.2 above, "China established 80% tariffs on Australian barley and withdrew approvals for four major Australian beef abattoirs – instantly removing significant export revenues for these industries, placing pressure upon local producers and processors". For more information about how geopolitical trends (incl. COVID-19) present challenges and opportunities for the Australian agribusiness sector, please refer to this report by KPMG.

### 5.1.2 Changing Consumer Demands

Consumers are rapidly embracing non-traditional crops, based on new cultural and wellbeing trends. While forecasts for meat demand remain strong, wealthy countries are taking steps to reduce per capita consumption which has led to a rise in meat alternatives. This is evident in Australia which is the third fastest growing vegan market in the world, after the United Arab Emirates and China.

Customers are increasingly focused on where their food and fibres come from, and how it's produced. Increasingly, characteristics like taste or price are taking a back seat to animal welfare, sustainability, safety and nutrition. Farmers must meet their customers' ethical, environmental and nutritional requirements. Australia has a competitive advantage in this race as it is a global leader in sustainability, animal welfare and food safety. Australia has world-class traceability systems for agricultural products, but these were designed for biosecurity and food safety. Innovations like blockchain and smart packaging will play a role in reshaping these systems in coming years to create a seamless digital journey from paddock to plate.

## 5.2 CLIMATE, WATER AND IRRIGATION

### 5.2.1 Australia's Climate

Australia is the driest inhabited continent on earth, and 70% of Australian soil is either arid or semi-arid. As a result of climate change, global and Australian temperatures have risen over the past century. This has started to affect Australia's weather, both temperature and rain-wise.

According to annual rainfall statistics reported by the Australian Bureau of Meteorology, total Australian rainfall is yet to show a downward trend. There have been regional trends, however, with rainfall in the South of Australia having declined over the long term, and instances of extreme heat having increased. Conversely, rainfall in Northern Australia, particularly in the Northern Territory, has risen over the past two decades. Previously, these fronts typically moved Southwards, providing rainfall to drier inland regions. Today, however, this is no longer the case and this trend partially explains annual rainfall declines reported in inland New South Wales and the Murray-Darling Basin over the past decade. Declining rainfall in that area as well as in Australia's Southwest region is concerning, as they are two of Australia's key growing regions in terms of produce volume and diversity.

Global warming has negatively affected other crucial aspects of growing conditions. For example, increases in the severity of heat-related stresses on produce, such as wilting, have decreased crop quality, quantity and yields. Additionally, higher temperatures have led to increased pan evaporation, which has made vegetation and soil drier. As a result, bushfires in Southern states, such as Victoria, have become more common.

Combined, these trends are forecast to make Australia's climate warmer, more and more volatile. They paint a bleak picture for the long-term viability of crop growing nationwide. These trends pose an obvious threat to crop growing. Some effects of global warming are already being felt by some crop growers. For

example, in some wine growing regions, unseasonal weather is causing white and red wine grapes to ripen at the same time.

While droughts have always been a part of Australian life, research by The University of Melbourne and reported by the ABC (national, state-owned broadcaster) indicates that in Southern Australia, droughts of the late 20th and early 21st centuries have been found to be the worst in the past 400 years, and droughts are expected to become more prevalent in the future.

### 5.2.2 Water and Irrigation

In 2017-18, 85,483 agricultural businesses used 10,491 gigalitres of water. This water came from several sources:

- Irrigation channels and pipelines: 37.6%
- Rivers, creeks, lakes: 28.6%
- Groundwater: 20.6%
- On-farm dams and tanks: 11.1%

Australian agricultural firms have been increasing the amount of water they use. In addition to farms getting larger, they are also using more water per hectare and have become increasingly irrigated. Despite the decline in total farming area, irrigated farming area increased at an annualised 2.2% over the decade through 2017-18. Water usage per hectare increased at an annualised 5.2% over the same period. Water usage per farm increased at an annualised 9.5% from 2007-08 to 2017- 18.

Increases in water usage are partially attributable to the types of crop being grown. In addition, participation in the domestic cotton farming; rice farming; and citrus fruit and nut growing industries has increased over the past decade. These crops are among the most water intensive in terms of application per hectare.
The amount of water that irrigators can extract from waterways depends on several factors. Primarily, this determination stems from the water shares an individual or corporation owns (and which it can trade and sell for profit). Water shares are considered rights to water held in public dams, rivers and other waterways for private use and they are measured in percentages depending on a region's water availability. For example, when high rainfall leaves abundant water in a region's rivers and lakes, irrigators are more likely to be allowed to pump their entire water entitlement. However, in periods of drought, state governments may determine there is not enough water to allow the full allocation of water rights. In this case, a percentage of a title holder's total water share will be allocated.

The use of technology in water management is already prevalent and growing. For example, Victoria's Goulburn-Murray irrigation system is controlled, monitored and measured by a wireless IoT network.

**Case study: Rubicon Water - How is IoT driving regulation of water?**

Water management is one of Australian agriculture's greatest challenges. Rubicon Water, based in Victoria, offers merged hardware-software technology solutions to provide farmers with more information and capability in managing irrigation of their land. Rubicon's water-saving technology is currently used by most of Australia's rural water authorities to automate the supply of irrigation water to farms. Now the company has developed technology that integrates farm operations with these supply systems and promises farmers water savings and improved yields.

The solution uses existing water authority infrastructure to enable each farm to have an IoT network, opening up a world of on-farm automation technology. This is coupled with an app that is integrated with the water authority's software and gives farms access to local weather and satellite information

and analysis tools, so they can schedule their irrigations accurately and apply water precisely, leading to water efficiencies and improved productivity. Data and connectivity is at the core of this solution, with tangible efficiency gains for both farmer and local community.

## 5.3 CONNECTIVITY

According to KPMP Australia, a lack of connectivity has been a key contributor to why Australian agriculture has struggled to innovate and implement technologies as quickly and as effectively as other leading food producing nations. Living and working on remote bush properties or even on the outskirts of regional towns has meant operating in 'digital darkness', without mobile or internet coverage. KPMG states that technology is not the barrier because there are suitable solutions available to Australian farmers. The barriers that they've identified include the complexity of navigating the technology marketplace, especially as statistics show that most farmers are not early technology adopters. Other barriers include a lack of real life case studies to learn from, and the difficulty in proving the business case.

In May 2019, KPMG, in partnership with Meat & Livestock Australia and AATLIS released a report providing deep insights for Australian farmers to understand the connectivity options available on farms. The report outlines the connectivity solutions that are currently available in Australia:

- **LPWAN** (Low Powered Wide Area Network) which is a variety of technologies used to connect Internet of Things (IoT) devices to a network beyond the reach of the traditional networks such as Bluetooth and WiFi. Two unlicensed LPWAN technologies capable of providing on-farm connectivity for IoT use are LoRaWAN (e.g. The Things Network, Meshed, SimplyCity) and Sigfox (e.g. thinxstra). Licensed LPWAN technologies (operated by telecommunication companies) are NB-IoT (Narrow Band IoT), Satellite IoT technology. Australian market players for licensed LPWAN technologies include Australia's three biggest telecom companies Telstra, Optus and Vodafone.
- **Nanosatellites** which provide connectivity for IoT sensors from any location without the need for local infrastructure. These are particularly viable solutions in remote locations and for intermittent data transfer use. Australian market players include Myriota and Fleet.
- **Wireless Mesh (On-Farm WiFi)**. This technology provides farmers with internet coverage across their properties and helps eliminate black spots using repeaters to extend an existing connection. Australian market players include wi-sky, radlink communications and origo farm.

## 5.4 SUPPLY CHAIN

In order to reach the Talking 2030 target, the supply chain is set to undergo drastic changes. Investments in the food supply chain will be underpinned by new technologies in plant breeding, indoor farming, energy and water management, food safety and quality, digital and IoT.

The NFF sees the Inland Rail project as a key infrastructure requirement to grow agribusiness in the future. The project has been positioned as a once-in-a-generation project to connect regional Australia to domestic and international markets. Comprising 13 individual projects and spanning more than 1,700 km, it is Australia's largest-ever freight rail infrastructure project. It claims to provide a transit time of 24 hours or less for freight trains between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland. Construction has begun and is scheduled to be complete by 2025.
Coupled with this project, the NFF would like to see all major food producing regions in Australia have a **borderless fresh food precinct** capable of air-freighting food directly to key markets. For example, fresh seafood, meat and some fruit and vegetables are already air freighted to export markets, e.g. from Wellcamp Airport in Toowoomba to Hong Kong).

A third, and important part of the supply chain in the future will be **digital platforms such as blockchain** that enable seamless global transacting for food and fiber and provide real-time supply chain monitoring and validation. Blockchain is described as a public ledger available to all parties within a supply chain including producers, retailers, logistics providers, and regulators. It provides a comprehensive record of each asset, all transaction history, and its current ownership. It provides a platform for food assurance, serving as a repository for data that demonstrates where, how and when food was produced, processed and distributed, thereby improving traceability and transparency of food. Some food retailers are already implementing blockchain associated with simple solutions such as scanning QR codes with a smartphone that is linked to a unique code used to demonstrate product provenance.


**Case Study Blockchain – Fresh Chain: Watermelons with paddock-to-plate traceability**

Queensland seedless watermelon grower Marto Farms is using a blockchain end-to-end consumer traceability and marketing system designed by FreshChain Systems. The system provides end-to-end traceability that allows consumers to track the watermelon from its origin and learn more about the farmers that grew it.

FreshChain is a fully integrated, blockchain-enabled, paddock-to-plate assurance system that verifies the product. In just a few seconds, the system is designed to provide traceability throughout the supply chain and provide insights to help consumers make better decisions during a product's life cycle.

By simply scanning the QR code of the label attached to the Marto Farms watermelon, consumers can find out detailed information about the harvest, conditions and certifications, as well as handy hints relating to that specific melon.

## 5.5 SUSTAINABILITY

Future food requirements will continue to have an impact on our planet. Given Australia's increasingly extreme climate (see chapter 5.2.1), **water and irrigation** will continue to be a key point in growing the agribusiness sector.

There is also an increasing push for all segments of Australia's agribusiness industry to become **climate neutral by 2030** (i.e. Meat and Livestock Australia has set a climate neutral goal for 2030). Other "industries are well advanced, such as the wine grape industry which has been dealing with the loss of one day in growing season over the last 20 years and has made transformational changes to viticulture and its location around Australia", according to Lucinda Corrigan, Chair of Farmers for Climate Action.

A third important factor in making the Australia's food chain more sustainable is **packaging**, which plays an important role in ensuring freshness and food safety, thereby reducing food waste. On the flip side, the widespread use of single-use plastics creates another waste problem and is becoming increasingly controversial in Australia. The last few years have seen state-wide bans on the use of plastic shopping bags that were still given away for free in most supermarkets (a practice that has been banned in Belgium for quite some time now). Consumers are demanding more eco-friendly options which is leading to changes in the packaging industry.

The Australian Packaging Covenant Organisation reports that in 2018 Australia established the 2025 National Packaging Targets to create a new sustainable pathway for the way packaging is managed in Australia. The four targets, to be achieved by 2025, are:

- 100 percent reusable, recyclable or compostable packaging;
- 70 percent of plastic packaging being recycled or composted;
- 30 percent of average recycled content used in packaging;
- Phasing out of problematic and unnecessary single-use plastics packaging.

| MATERIAL TYPE | CURRENT RECYCLED CONTENT RATE | 2025 TARGETS |
|---|---|---|
| ALL PACKAGING | 35% | 50% |
| PLASTICS | 2% | 20% |
| PET | 12% | 30% |
| HDPE | 2% | 20% |
| PP | 3% | 20% |
| FLEXIBLE PLASTICS | UNKNOWN | 10% |
| PAPER | 49% | 60% |
| METALS | 30% | 35% |
| GLASS | 32% | 50% |

Australia successfully achieved the target for 30% average recycled content included in all packaging in 2019. In 2020 - after significant consultation and industry-wide engagement - the overall recycled content target was increased from 30% to 50%.

Companies such as supermarket chain Woolworths are working toward these goals. However there are associated challenges that still need to be considered, such as compostable packaging as Australia doesn't yet have collection processes for disposing of all the compostable packaging.

The use of environmentally friendly and biodegradable packaging materials is becoming more widespread. The current trend in the bioplastics market is plant- and even petroleum-based 'plastics', creating slightly different make-ups of the same cellulose, vegetable oil, starch and acid components.

**Case study – Carapac: Biodegradable packaging from crustacean waste**

The majority of biodegradable plastics only break down under specific conditions and that process can still take up to five years. The people behind Carapac, however, wanted to find a more sustainable material base which led them to crustacean shells, an abundant nutrient-rich waste source. Frozen food processing plants across the Asia–Pacific region cumulatively produce around 8.1 million tons of crustacean waste per year.

"This enabled us to develop a packaging material built from the chitosan contained in crustacean skeletons as a truly biodegradable alternative to plastic food packaging. Given the little amount required to produce the packaging, our research shows there is a market for Carapac as well as a supply of chitosan that can keep up with growing product demand," said Kimberly Bolton, CEO of Carapac.

"Crustacean shells embed anti-fungal properties that, when acting as packaging, prevent mould or fungi from growing on produce. Product shelf life can increase by up to 14 days pending the product type, making prawn plastic an excellent packaging option for fresh foods," Bolton said.

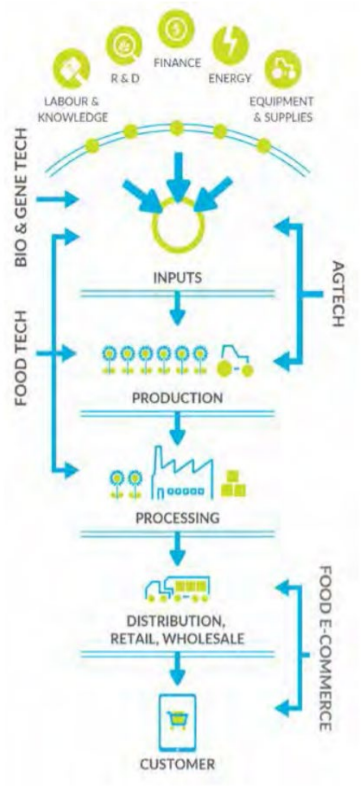
According to the company, the material is safe to use for those with a shellfish allergy as the protein component that causes the reaction is removed.

According to industry experts, other trends that are driving a change in the packaging industry are:

- Convenient disposable packaging. Foods that can be heated in microwave ovens, salads, meals, zippers, and gas replacement packages on the supermarket are common convenience packages;
- Changes in family structures such as single parent families (independent packaging, small packaging), growth of elderly population (needing easy-to-open packaging, clear labels.

## 5.6 AUTOMATION AND ARTIFICIAL INTELLIGENCE

How AgTech can improve the connectedness across the value chain, from farmers to customers




Australia's agricultural productivity growth rate has been averaging 1.1% which is below the global average of 1.7%. Economic modelling conducted through the Precision 2 Decision (P2D) project indicates that digital technologies for agriculture could unlock AUD 20.3 billion in gross value of agricultural production.

The P2D report affirms that "a lack of access to mobile and internet **telecommunications infrastructure** is a major impediment to the adoption of digital agriculture systems". More information about connectivity for farmers can be found in chapter 5.3.
**Blockchain** technology is a second key component of new technology and is addressed above, in chapter 5.4.
A third aspect of new technology includes **automation and artificial intelligence** such as *Unmanned Aerial Vehicles UAV or drones* that can collect real-time data seven days a week, automate arduous work, reduce costs and support the environmental cause. The advantages of *Electric and autonomous vehicles* are two-fold: 1) they will enhance rural-urban connectivity which will be achieved through productivity and cost efficiencies (such as lower fuel costs); 2) supply chains will be optimized as a result of big data analytical capabilities, especially in delivery, efficiency and assurance. Other technologies include robotic farmers (which KPMG predicts will become standard farm tools), as well as wearable augmented reality glasses to enable them to repair and service high-tech equipment with the support of specialists.

### Case Study Robotic Farmer - Mango auto-harvester in Queensland

CQUniversity (in corporation with Horticulture Innovation) conducted field trials of the first prototype of its mango sensor and auto-harvest technologies at Yeppoon in Central Queensland. In May 2019, it was reported that the technologies were achieving a 75% efficiency in automatically identifying and picking fruit in view. The aim of the research team is to take it to commercial-ready deployment with over 90% efficiency. The prototype harvester takes approximately five seconds to harvest a fruit, from detection to placement.

"The auto-harvester has the potential to solve some of the major labour force issues that currently limit the industry," said Professor Kerry Walsh. "The harvester is part of an integrated system which will ensure farmers know exactly how many fruit are on their trees, when they will be in perfect condition for the consumer and when to employ the right number of people for picking and packing."

The auto-harvester was mounted on a trailer and towed by a utility vehicle. The next phase of research will investigate options for it to be mounted on a terrestrial drone to operate autonomously, at faster speeds and higher accuracies.

*Artificial Intelligence* has the ability to disrupt and digitise the supply chain of knowledge in the agricultural sector in the next 15 years. Where a farmer currently relies on an agronomist at points in time within the production cycle to relay farm management processes and long-term outcomes to drive actions, machine learning approaches can provide information 24 hours a day, 7 days a week, giving a farmer more flexibility and opportunity for experimentation with real-time results. This shortens the time between knowledge and practice, and can begin to collapse the time that knowledge is transferred as it's gained in the university, to R&D, to the agronomist and farmer.

**Case Study – Live monitoring of milk supply chains**

Swinburne University's Internet of Things Lab is leading the Milk Supply Chain Project (AUD 2 million budget) to develop technology that allows live monitoring of milk supply chains. It will be conducted in collaboration with Bega Cheese and 100 Australian milk suppliers using Telstra's Narrowband Internet of Things (NB-IoT) network.

The two main objectives of project are to improve the operational efficiency of the milk supply chain and as a result create opportunities to generate revenue for the Australian dairy industry. The project will develop an Internet of Things (IoT)-based system using over 700 sensors, to measure specific aspects of the supply chain that links dairy farms, milk carriers and a milk processor, and allows live monitoring of milk supply chains.

Sensors will be installed to monitor both the temperature and quantity of the milk collection process. "The project will also develop a milk quality sensor to detect protein in the milk," said Prof Georgakopoulos, Director of Swinburne's Internet of Things Lab and project researcher. This means that the high-quality milk can be kept separate and then used for the production of high-yield products such as macrobiotic yoghurts.

Environmental sensors will also be used to monitor weather. During the milk pick-up process, sensors will be used to identify the trucks, and microphones will sense when important tasks, such as washing tanks, are completed. As the supply is added, the milk collection sensors will advise the quality and quantity of the milk, and the sensors on the truck will locate the trucks for dynamic scheduling in real time.

Various challenges still exist for the successful implementation of machine learning techniques in the agricultural sector. The largest challenge is in the variable spatiotemporal nature of food production. Unlike industries such as mining and aviation, the algorithms developed for the agricultural sector are required to keep up with the ever-changing environmental factors. To do this, machine learning techniques not only need lots of data but also the computation capabilities to analyse that data either offline or in real time. Furthermore, technologies such as drones, ground robots, tractor-based and hand-held sensors are going to create an explosion of data in the coming years across the broad spectral band. The most immediate barrier is a digital divide, a lack of synergy between computer scientists and agricultural experts.

**Case study – Weed management with the help of robotics**

Tackling the challenge of weeds, which costs Australian farmers annually around AUD 1.5 billion in weed management and AUD 2.5 billion in lost production, is one area that is attracting automation/robotic solutions. Australian-based agriculture robotics companies such as Swarm Farm are working to help tackle the nation's weed problem. Lightweight, sensor-guided, autonomous 'swarmbots' have applications for weed spot spraying and mowing for the broadacre and horticulture sectors, with more applications anticipated. The Australian Centre for Field Robotics at the University of Sydney is also actively working to design on-farm robotic solutions to weed management through RIPPA, as well as herding cattle through Swagbot.

Short to medium term implementations of Artificial Intelligence include:

- Sensors embedded in soil which can track moisture and soil health, making it easier for farmers to efficiently distribute water and fertilisers. At the other end of the logistics chain, sensors that can sniff the ripeness of food will be integrated into packaging and storage units, optimising not just the delivery chain for freshness and reduced wastage but also enabling the consumers to use ingredients optimally;
- Ingestible sensors monitoring livestock health, rumination across an entire herd of cattle, health of prized breeding stock and fertility across a range of breeds can be monitored and tracked in real time.
- Connected farming equipment will increasingly become autonomous for precision planting and other cropping activities; performance data being aggregated at the homestead or office via a farm-wide dashboard that provides an integrated view of not only livestock and crop health but tracking and forecasting business health and profitability as well.
- Widespread use of drones for various activities. For example, drones can diagnose many crop-related diseases early, and drones equipped with hyperspectral sensors allow measurement of water and nitrogen levels – a much more efficient method than labor-intensive ground surveys. Drones can even be used for livestock mustering instead of expensive helicopters.

## 5.7 AUSTRALIAN AGTECH ECOSYSTEM

### 5.7.1 The Ecosystem

Adopting technology presents a huge opportunity for the food and fiber sectors in Australia. Digital technologies alone hold the potential to increase the gross value of production by over AUD 20 billion, an increase of 25% (compared to 2018 levels).

AgriFutures reports that Australia has a relatively immature AgTech ecosystem compared to other countries, such as the UK, the US and Israel. Despite this, KPMG reports that there are close to 300 AgTech and FoodTech companies operating in Australia (data from 2018), and the sector is seeing an increase in both capital invested and the players in the supporting innovation ecosystem.

Below is an overview of the Australian AgTech ecosystem.


MURU

| | |
|---|---|
| Address: | Level 9, 175 Liverpool Street, Sydney NSW 2000 |
| Email: | hi@muru-D.com |
| Website: | https://muru-d.com/ |
| About: | Muru a startup accelerator running programs in Australia that help tech founders scale their business smarter and faster. They're backed by Telstra, a world-class technology company. Located in Sydney, Perth and Singapore. |

SPROUTX

| | |
|---|---|
| Address: | 710 Collins Street, Docklands (Melbourne) VIC 3008 |
| Email: | online form |
| Website: | https://www.sproutx.com.au/ |
| About: | SproutX is an Australian Food and Agtech Accelerator. With the backing of our AUD 10 million venture fund, they offer startups hands-on support, capital, community, on farm visits, travel, Amazone Web Credits. |

CSIRO'S ON INNOVATION PROGRAM

| | |
|---|---|
| Location: | Australia wide |
| Email: | on@csiro.au |
| Website: | https://oninnovation.com.au/ |
| About: | CSIRO's ON Program is a national deep-tech innovation program designed to fast-track great research and technology into real world outcomes. |

UNLEASHED / LIONCO ACCELERATORED BY SLINGSHOT

| | |
|---|---|
| Location: | Australia wide |
| Email: | online form |
| Website: | https://unleashed.lionco.com/ |
| About: | Lionco is one of Australia's largest food and beverages companies. Their Unleashed program is open to both early stage startups and later stage companies (scaleups). |

ROCKET SEEDER

| | |
|---|---|
| Contact: | Emma Coath, Managing Director |
| Address: | 710 Collins Street, Docklands (Melbourne) VIC 3008 |
| Email: | emma.coath@rocketseeder.com |
| Website: | https://www.rocketseeder.com/ |
| About: | Rocket Seeder is a free, 12 week early stage startup accelerator program, led by some of the brightest minds in the Australian Food and Agriculture industry. |

CHOBANI INCUBATOR

| | |
|---|---|
| Location: | Australia wide |
| Email: | info@chobaniincubator.com |
| Website: | https://chobaniincubator.com/ |
| About: | The Chobani Incubator is a program for small food startup companies taking on broken food systems to bring better food to more people. In addition to investment, they give startups access to their network and expertise in order to scale up their operations and achieve significant growth. |

CICADA INNOVATIONS: GROWLAB

| | |
|---|---|
| Address: | 4 Cornwallis Street, Eveleigh (Sydney) NSW 2015 |
| Email: | growlab@cicadainnovations.com |
| Website: | https://growlab.cicadainnovations.com/ |
| About: | Since 2017, Cicada GrowLab has supported visionary startup founders with everything they need to build a strong, investable agrifood tech company. They're launching their newest program, Sponsored Incubation, in September 2020. |

SPARKLABS CULTIV8 AGTECH ACCELERATOR PROGRAM

| | |
|---|---|
| Address: | 1447 Forest Road, Orange 2800 NSW |
| Email: | info@sparklabscultiv8.com |
| Website: | https://www.sparklabscultiv8.com/ |
| About: | A global agriculture and food technology accelerator based in Australia, SparkLabs Cultiv8 is a tight-knit community of farmers, investors, entrepreneurs and executives focused on transforming Australia's agricultural sector by supporting world-changing start-ups. |

THE GATE

| | |
|---|---|
| Address: | 1447 Forest Road, Orange 2800 NSW |
| Tel: | +61 2 8732 3212 |
| Email: | thegate@dpi.nsw.gov.au |
| Website: | https://www.thegate.org.au/ |
| About: | The GATE is a collaborative research and technology facility in Australia specifically designed to develop ag-tech ideas. The GATE is an initiative of the NSW Department of Primary Industries (DPI) and it provides a gateway to the DPI research expertise and fosters opportunities for innovation. |

AGRISTART HARVEST 2020 AGRIFOOD INNOVATION PROGRAM

| | |
|---|---|
| Address: | * Unit 1, 14 Burler Drive, Vasse (Busselton) WA 6280<br>* 143 Barrack Street, Perth WA 6000 |
| Tel: | +61 8 9755 4997 |
| Email: | info@agristart.com.au |
| Website: | https://www.agristart.com.au/ |
| About: | HARVEST 2020 is WA's leading business development program for businesses looking to innovate in the agrifood industry. Over the last 2 years, HARVEST programs have had more than 30 graduates and successfully delivered new connections, partners, customers, and investment opportunities to participants, while also supporting collaboration across the agrifood industry in WA. |

FUTURE FOOD BRISBANE

| | |
|---|---|
| Contact: | Lisa Cavallaro, Manager Industry Development |
| Location: | Brisbane and South East Queensland |
| Tel: | +61 7 3006 6208 |
| Email: | lcavallaro@brisbanemarketing.com.au |
| Website: | https://www.choosebrisbane.com.au/corporate/news-centre/news/future-food-program?sc_lang=en-au |
| About: | Brisbane Economic Development Agency offers established food and beverage companies based within Brisbane and South East Queensland the opportunity to accelerate growth, enter international markets and attract investment through the Future Food Initiative. |

**Case Studies: "On Innovation" accelerator results**

The 2019 cohort of the CSIRO-powered research accelerator "On Innovation" resulted in four Australian technologies that are relevant to the agribusiness and food industry.

* *Adaptive Eggs* technology is designed to improve sustainability within the egg industry by providing a new way to identify male eggs early, thus avoiding the costly and undesirable culling practices in the egg laying industry. Point-of-lay technology is industry scalable and prototypes are available now.

* *Bee Innovative* is designed to maximise bee pollination to increase crop yields. A radar-like sensor identifies, tracks and reports bee pollination activity across orchards and fields in near-real time.

* *Parts Per Billion* is an on-the-spot food testing device which can detect almost any molecule of interest to deliver lab-quality results for food producers and processes. The test can, for example, detect lactose in lactose-free products in minutes compared to weeks spent previously, as the product was required to be sent to off-site laboratories.

* *Contactile* is designed to give robots a human sense of touch. A tactile sensor provides the sensory advantages of the human hand without the physical limitations related to size and strength, while also enabling robotic gripping with just the right amount of force. The team is now looking to commercialise the sensor prototype.

### 5.7.2 The Companies

More information about the companies in this ecosystem is available upon request. Please contact us via melbourne@fitagency.com.

# 6. STANDARDS AND CUSTOMER SERVICE

## 6.1 AUSTRALIAN STANDARDS

### 6.1.1 Electrical Standards

All electrical equipment imported and sold in Australia must be proven to be electrically safe. All electrical products, regardless of use, must comply with AS/NZS 3820 which is the general electrical safety standard. These standards can be searched and purchased online.

Reports from overseas testing of the device for CE and/or FCC certification might be used in Australia as the device will (most likely) have been tested to similar standards than those in Australia. It is, however, advised to have the overseas testing reports reviewed by an Australian certification body to guarantee 100% compliance or advise of any missing documentation or testing. Here is a list of electrical safety certification providers in Australia:

AUSTEST LABORATORIES

| | |
|---|---|
| Address: | 2 Brex Court, Reservoir (Melbourne) VIC 3073 |
| Tel: | +61 3 9464 4019 |
| E-mail: | austest@austest.com.au |
| Website: | www.austest.com.au |
| About: | Austest Laboratories is an independent testing and certification company assisting manufacturers, importers and exporters in gaining access to local and international markets. Services provided: accelerated ageing, acoustic engineering and consultation, climatic, electrical product safety, EMC, enclosure protection, energy efficiency, mechanical and dynamic, pressure and altitude, salt corrosion, telecommunications, toy testing, UV and solar radiation, vibration and shock, wireless testing. |

CERTIFICATION BODY AUSTRALIA

| | |
|---|---|
| Address: | G18, Rear – Tower 1, 169 Mona Vale Road, St Ives (Sydney) NSW 2075 |
| Tel: | +61 2 9099 1557 |
| E-mail: | contact@certificationbody.com.au |
| Website: | www.certificationbody.com.au |
| Remark: | Certification Body Australia (CBA) is an independent provider of product compliance and inspection services to manufacturers and distributors of electrical and electronic devices. Certification for the following types of products: consumer products, medical devices, telecommunications products. |

COMTEST GROUP

| | |
|---|---|
| Address: | Unit 1, 570 City Road, South Melbourne VIC 3205 |
| Tel: | +61 3 9645 5933 |
| E-mail: | online form |
| Website: | www.comtestlabs.com |
| About: | The Comtest group is a leader in the Australian and New Zealand telecommunications and electrical compliance testing and certification fields. Services provided: Testing for telecommunications, electrical safety, energy efficiency, electromagnetic compatibility, global compliance, calibration services and quality assurance. |

EMC TECHNOLOGIES

| | |
|---|---|
| Address: | 176 Harrick Road, Keilor Park (Melbourne) VIC 3042 |
| Tel: | +61 3 9365 1000 |
| E-mail: | online form |
| Website: | www.emctech.com.au |
| About: | EMC Technologies is a large, experienced and accredited EMI/EMC/EMR/Safety facility in Australia with over 40 professional staff employed across branches in Melbourne, Sydney and New Zealand. Operating since 1992, they are an independent, privately owned Australian company providing specialist approval and certifications testing to Electromagnetic (EMC, EMI, EMR/EMF/SAR), Electrical Safety, Telecommunications and compliance engineering consultation and special projects services to all areas of the electrical/electronics industry. |

SAA APPROVALS

| | |
|---|---|
| Address: | Unit 5, 20 Rivergate Place, Murarrie (Brisbane) QLD 4172 |
| Tel: | +61 7 3393 9455 |
| E-mail: | info@saaaprovals.com.au |
| Website: | www.saaapprovals.com.au |
| About: | SAA Approvals is accredited by the Joint Accreditation Service of Australia and New Zealand (JAS-ANZ) as a third party certification body to issue of Certificates of Approval for declared and non-declared electrical equipment that has proven to comply with the safety requirements of the applicable Australian Standard. |

### 6.1.2 Equipment-Specific Standards

Equipment imported or manufactured in Australia also needs to comply with equipment-specific standards. Standards Australia is recognised by the Government as Australia's peak Standards body. It coordinates standardisation activities and develops Australian Standards. These can be searched and purchased online.

### 6.1.3 Biosecurity Regulation

Importing machinery into Australia is subject to strict biosecurity measures designed to protect plant and animal health. These measures are set and controlled by the Department of Agriculture, Water and the Environment. All imported machinery must be free from contamination such as seeds, soil, plant and animal materials. More information about Machinery Cleaning Guides and Checklists and Cleanliness Requirements for Imported Machinery, Equipment and Spare Parts via the hyperlinks provided.

Please note that adherence to import conditions and paperwork is the responsibility of the (Australian) importer. In case regulations are not completely respected, the Department of Agriculture, Water and the Environment can deny the contaminated machinery to enter and request their shipment back at the importer's or owner's expense.
FIT Melbourne recommends contacting a customs broker for specific information and guidance. The Customs Brokers and Forwarders Council of Australia has an online directory to simplify the search.

## 6.2 CUSTOMER SERVICE

In Australia, warranties are legislated under the Australian Consumer Law (ACL). It includes:

- a national unfair contract terms law covering standard form consumer and small business contracts;
- a national law guaranteeing consumer rights when buying goods and services;

- a national product safety law and enforcement system;
- a national law for unsolicited consumer agreements covering door-to-door sales and telephone sales;
- simple national rules for lay-by agreements; and
- penalties, enforcement powers and consumer redress options.

The ACL applies nationally and in all states and territories, and to all Australian businesses. The ACL is administered by the Australian Competition & Consumer Commission (ACCC) and state and territory consumer protection agencies and is enforced by all Australian courts and tribunals, including the courts and tribunals of the States and Territories.

### 6.2.1 Warranty & Customer Guarantee

The ACCC outlines the rules regarding warranties on its website. It's important to understand the difference between warranties and automatic consumer guarantees. A warranty is a voluntary promise offered by the person or business who sells a product or service. Once the product or service is bought, the promise becomes a right that can be enforced under the ACL. Warranties are separate from a consumer's automatic consumer guarantees. The consumer guarantees which apply regardless of any warranties suppliers sell or give to their customers, apply for a reasonable time depending on the nature of the goods or services. This means consumer guarantees may continue to apply after the time period for the warranty has expired.

#### 6.2.1.1 Consumer Guarantee

The following consumer guarantees on products apply:
* Products must be of acceptable quality, that is:
  - safe, lasting, with no faults;
  - look acceptable;
  - do all the things someone would normally expect them to do.

  Acceptable quality takes into account what would normally be expected for the type of product and cost.

* Products must:
  - match descriptions made by the salesperson, on packaging and labels, and in promotions or advertising;
  - match any demonstration model or sample the consumer asked for;
  - be fit for the purpose the business told the consumer it would be fit for and for any purpose that the consumer made known to the business before purchasing;
  - come with full title and ownership;
  - not carry any hidden debts or extra charges;
  - come with undisturbed possession, so no one has a right to take the goods away or prevent the consumer from using them;
  - meet any extra promises made about performance, condition and quality, such as life time guarantees and money back offers;
  - have spare parts and repair facilities available for a reasonable time after purchase unless the consumer was told otherwise.

Consumer guarantees on products and services also apply to:
- bundled products and services;
- gifts with proof of purchase;
- sale items;

- online products and services bought from Australian businesses;
- second-hand products from businesses, taking into account age and condition.

According to the ACCC, **the consumer guarantee lasts for "a reasonable amount of time"**. How long this timeframe is, is not specified (as it is in Europe) and is a bit of a grey area in the law. In practice, it depends on how much the product cost, how it's looked after, etc.

#### 6.2.1.2 Warranty

As mentioned above, a warranty is an additional promise by a manufacturer or retailer. A business can amend the terms and conditions, length, etc. of the warranty and, as such, they can offer different types of warranties to consumers. These warranties do not override or limit consumer guarantees and consumers may be entitled to a repair, replacement or refund, even if any voluntary or extended warranty has expired.

# 7. TRADE FAIRS AND CONFERENCES

2020 AIP AUSTRALASIAN PACKAGING CONFERENCE

Dates: 6-7 October 2020

Location: Crown Promenade Melbourne

Website: http://aipack.com.au/event-registration/?ee=248

About: The V 2.0 AIP Australasian Packaging Conference will attract delegates from all facets of food, beverage, pharmaceutical, manufacturing and packaging industries.

FOODSERVICE AUSTRALIA 2020

Dates: 8 November – 10 November 2020

Location: International Convention Centre Sydney

Website: https://www.foodserviceaustralia.com.au/

About: Discover over 350 exhibitors and aisle upon aisle of new products and fresh ideas on show. Thousands of chefs, restaurateurs, café owners, bakers, pâtissiers, caterers, suppliers and producers will gather for three action-packed days. Make sure you are one of them.

AUSPACK 2021

Dates: 25 May 2021 – 28 May 2021

Location: Sydney Showground

Website: https://www.auspack.com.au/

About: AUSPACK is the southern hemisphere's largest and most prestigious event on the food, beverage and pharmaceutical processing and packaging calendar, bringing together thousands of leaders to experience world-class equipment, technology and solutions.

FOOD PRO SYDNEY 2021

Dates: 25-28 July 2021

Location: Sydney Showground

Website; https://foodproexh.com/

About: Foodpro is a celebration of the contribution of Australian food producers, distributors and manufacturers.

EVOKE 2022

Dates: 15-16 February 2022

Location: Claremont Showgrounds, Perth

Website: https://evokeag.com/

About: evokeAG. 2022 is the Asia Pacific's premier agrifood tech event.

# 8. ADDITIONAL RESOURCES AND RELATED ASSOCIATIONS

A full list of additional resources and related associations is available upon request. This extensive list includes government agencies, industry federations, media, research & development. Please contact us via melbourne@fitagency.com.

# 9. SOURCES

## 9.1 IBIS WORLD

- Agribusiness in Australia, June 2019
- Agricultural Machinery Manufacturing, February 2020
- Apple, Pear and Stone Fruit Growing, May 2020
- Aquaculture, August 2019
- Beef Cattle Farming, March 2020
- Beef Cattle Feedlots, April 2019
- Butter and Dairy Product Manufacturing, January 2020
- Cider Production, April 2020
- Citrus Fruit, Nut and other Fruit Growing, March 2020
- Cheese Manufacturing, June 2019
- Cooking Oil and Margarine Manufacturing, October 2019
- Cotton Growing, May 2020
- Cotton Ginning, December 2019
- Dairy Cattle Farming, December 2019
- Edible Oils Manufacturing, April 2020
- Egg Farming, May 2020
- Farm and Construction Machinery Wholesaling, November 2019
- Fishing, August 2019
- Floriculture Production, March 2019
- Flour and Grain Mill Product Manufacturing, April 2019
- Food Processing Machinery Manufacturing, October 2019
- Fruit and Vegetable Processing, May 2020
- Fruit Juice Drink Manufacturing, February 2019
- Glass and Glass Product Manufacturing, June 2020
- Grain Growing, March 2020
- Grain-Sheep or Grain-Beef Cattle Farming, March 2020
- Grain Storage, May 2020
- Grape Growing, April 2020
- Hay and other Crop Growing, February 2020
- Heavy Machinery Repair and Maintenance, December 2019
- Herbs and Spice processing, January 2020
- Hydroponic Crop Farming, January 2020
- Meat Processing, March 2020
- Metal Drum, Can and Bin Manufacturing, June 2019
- Milk and Cream Processing, March 2020
- Milk Powder Manufacturing, June 2019
- Nursery Production, June 2019

- Olive Growing, December 2019
- Organic Crop Farming, September 2019
- Organic Farming, December 2019
- Organic Livestock and Poultry Farming, January 2020
- Outdoor Vegetable Growing, February 2019
- Packaging Services, February 2020
- Paperboard Container Manufacturing, May 2019
- Pig Farming, March 2019
- Plastic Bag and Film Manufacturing, May 2019
- Plastic Pipe and Plastic Packaging Manufacturing, June 2020
- Poultry Meat Farming, January 2020
- Poultry Processing, April 2020
- Potato Chip Production, November 2019
- Pulp, Paper and Paperboard Manufacturing, June 2020
- Pulse Growing, January 2020
- Rice Growing, July 2019
- Seafood Processing, May 2019
- Sheep Farming, April 2020
- Sheep-Beef Cattle Farming, March 2020
- Sugar Cane Growing, April 2020
- Tree Nut Growing, August 2019
- Turf Growing, March 2020
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## 9.2 OTHER SOURCES

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