

AUSTRALIAN FOOD, BEVERAGE AND
PHARMACEUTICAL PRODUCT MANUFACTURING
INDUSTRY SECTOR

IRC Skills Forecast and Proposed Schedule of Work

2018–2021

Prepared on behalf of the Food, Beverage and Pharmaceutical Industry Reference Committee and the Pharmaceutical Manufacturing Industry Reference Committee for the Australian Industry and Skills Committee.

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IRC SKILLS FORECAST AND PROPOSED SCHEDULE OF WORK 2018–2021

Purpose

This skills forecast represents the latest industry intelligence and resulting schedule of work of the Food, Beverage and Pharmaceutical Industry Reference Committee and the Pharmaceutical Manufacturing Industry Reference Committee. It was developed through research of national and industry data sources and ongoing input from IRC members and key stakeholders. The report is designed to provide industry intelligence to support the Australian Industry and Skills Committee's (AISC) four-year rolling National Schedule of training product development and review work.

This industry intelligence covers the following sections:

Sector Overview – examining the depth and breadth of the industry and identifying the macro environment that currently challenges and/or provides opportunities for the industry

Employment – reviewing the employment projections by the Department of Employment and outlining the current workforce profile and supply for the industry

Skills Outlook – identifying the key priority skills for the industry and how they can benefit from improvement or development of national skills standards

Training Product Review Work Plan – establishing the scope and timeframe of proposed training package development in line with industry priority skills.

Administrative Information

Name of Applicable Industry Reference Committees (IRCs)	Food, Beverage and Pharmaceutical Industry Reference Committee
	Pharmaceutical Manufacturing Industry Reference Committee
Name of Applicable Skills Service Organisation (SSO)	Skills Impact Ltd

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A. EXECUTIVE SUMMARY

This report provides an overview of workforce development and skills needs for the Australian food, beverage and pharmaceutical manufacturing industry sectors. The report was commissioned to support the Australian Industry and Skills Committee (AISC) in developing the four-year rolling National Schedule of training product development and review work. The report is structured in three main sections as follows: Sector Overview, Employment and Skills Outlook. The methods used to collect, collate and analyse this data included research of published national and industry data sources, and consultation with Industry Reference Committee (IRC) members and key stakeholders.

Increased capacity to supply products, exponential population growth and new demands for food and medicines provide these industries with the potential for growth and new business opportunities. This growth is shaped by government policies and regulations. These industries now enjoy access to a diverse range of overseas markets and can prioritise investment in technology and business development to suit these new markets. Domestic and international markets for food, beverages and pharmaceuticals are characterised by a growing focus on healthier, 'ready to eat' and 'grab and go' food and drink options, an increase in supplementary medicines and locally made pharmaceuticals, a growing export trade and the implementation and ongoing development of advanced technologies.

This report describes the industry sector's workforce. Consistent with many other industry sectors, the workforce is ageing. The retirement age of workers in food and beverage manufacturing is being reached in high numbers. This trend creates significant challenges for employers in attracting people to the industry and developing relevant, modern skills.

Employers are increasingly seeking higher-level skills to support more demanding job functions. Businesses respond to opportunities with strategies that create value, structure capital, develop products and invest in innovation and new technologies. The workforce needs to be able to support higher efficiency targets, innovations and an increasingly automated manufacturing environment.

Job roles are changing. Work functions need to meet higher, more complex demands. Operational employees now need to plan, inspect quality, report, improve processes, and operate and maintain technical equipment and computerised platforms. Specialist managers are required to support strategic developments and targets. This includes strategic leadership and change-management skills, marketing skills, developing investment project skills, global supply chain and logistics skills and other high-level managerial skills.

Many of the skills needed in the industries associated with food processing, beverage manufacturing and pharmaceutical and nutraceutical manufacturing address new and emerging fields of work, such as artisan food manufacturing and pharmaceutical bioprocessing. There is also a range of generic skills and knowledge needed in the range of occupations addressed within the FBP Training Package. These include using sustainable work practices, energy consumption, adapting to new technologies in an increasingly automated workforce, innovative product development and workplace health and safety regulations. The increasing demand for traceability of consumable products has created a need for skills in recording, maintaining and tracing food and pharmaceutical provenance and to monitor and prevent fraudulent activity within supply chains.

Summary of Key Points in each Section

Sector overview

- The food, beverage and pharmaceutical product manufacturing industries can be described as having five sectors: food processing and manufacturing, beverage manufacturing, pharmaceutical manufacturing, nutraceutical manufacturing, and wholesaling/retailing of the above. The industry can also be described in more detail through a range of sub-sectors.
- The industry includes approximately 12,480 manufacturing businesses and 27,000 wholesalers and retailers, who collectively employ approximately 217,632 people.
- In general, the sectors are characterised by a large number of small and medium-sized producers who produce for local or niche markets, and a smaller number of large producers who are often multinational companies and operating globally.
- Total sales turnover of the manufacturing sectors decreased by 0.4 per cent (or \$414 million) to \$101.9 billion between 2014–2015 and 2015–2016.
- These industries are represented by about 55 peak organisations at a national and state level, including industry and industry sub-sectors associations, industry services bodies such as research and development (R&D) corporations, professional associations, employee associations and regulatory bodies.
- Key regulations for these industries include, or are related to:
 - Food Standards Australia New Zealand; industry/customer standards
 - Australian Consumer Law; the Australian Packaging Covenant
 - sugar industry regulations
 - excise compliance
 - export licence
 - advertising and packaging regulations
 - environmental protection measures
 - pharmaceuticals regulations, including international regulations such as the FDA in the USA for exports
 - complementary medicines regulations
 - biological regulations
 - wine industry regulations
 - alcohol product retail regulations.
- Key macro forces that currently challenge and provide opportunities for these five industry sectors include:
 - the trend towards healthy living, including less sugar, more nutritious foods and more raw, unprocessed foods affects the food industry in shifting a focus from weight management towards nutrition and natural wellbeing
 - an increase in sustainable food systems, foods and technologies, and the agriculture that underpins them, to maximise and replenish their environmental resource footprint, to balance population growth and deal with environmental challenges

- global food security significance and higher food demand in expanding markets, such as the Asia-Pacific region, reflected also in a number of government policies aimed at facilitating the sector's growth
- the range of therapeutic goods reforms, which is expected to encourage innovation and provide patients with faster and early access to lifesaving, innovative medicines
- climate change and its effects on the upstream sectors, which create both challenges and opportunities for many food processing sectors to increase collaboration with the supply chains; these partnerships will aim to support decisions and development of more resilient crop varieties and large-scale farming systems
- export growth of food, beverage and pharmaceutical products and clear customer trends, which provide opportunities for businesses to achieve greater adaptation of products to more diversified markets; and, where there is the greatest potential for value-adding, develop targeted marketing of different product qualities to market segments
- ongoing development of enabling technologies that allow for more efficient and sustainable food, beverage and pharmaceutical processing, integrated packaging, enhancement of the nutritional value of products and reduction of waste and water use.

Employment and training

- Employment in the food, beverage and pharmaceutical industry sector is expected to grow by 5 per cent over the next five years.
- The industry workforce is ageing. The proportion of employees in each age group category over 50 years increased by up to 3 per cent in 2016 when compared with 2006.
- The most common occupations in the food and beverage industry are food and drink factory workers, sales assistants, bakers and pastry cooks, packers, sales representatives, storepersons and forklift drivers. In the pharmaceutical industry, the majority of people are employed as technical sales representatives, storepersons, advertising and sales managers, specialist managers, pharmacists, marketing professionals, logistics and supply chain officers, and machine operators.

Skills outlook

- Priority skills in the food, beverage and pharmaceutical industry over the next four years, 2018–2021, are summarised in the following tables:

PRIORITY SKILL	DESCRIPTION	DRIVERS	TRAINING PACKAGE SOLUTION
Industry Specific			
Bioprocessing technologies	This involves the manufacture of chemically processed drugs, and medicines that are manufactured in living organisms such as bacteria, yeast and mammalian cells.	Bioprocessing technology is increasing in use as the biopharma industry expands, attracts investment, grows its workforce and improves processing capabilities.	<ul style="list-style-type: none"> • 1 new qualification • 1 new skill set • 15 new units of competency

PRIORITY SKILL	DESCRIPTION	DRIVERS	TRAINING PACKAGE SOLUTION
		<p>The skills required by this growing workforce are not currently addressed within the vocational education and training sector.</p> <p>These include being able to manage higher risks of product degradation, process variability, contamination and complex analytical techniques.</p>	<ul style="list-style-type: none"> • Revision of 9 existing units of competency • Assessment of AQF level for the new qualification
Artisanal cheesemaking	<p>This project addresses the skills needed by artisan cheesemakers. The skills required include managing the <i>affinage</i> process, working with complex molecular and biological processes, small-scale pasteurisation, developing new recipes, identifying and troubleshooting mistakes and problems, and setting up a functioning cheese factory.</p>	<p>Drivers of the need for this work include:</p> <ul style="list-style-type: none"> • the growth in popularity of artisanal cheesemaking resulting in a need for trained workers with skills in complex processing of raw milks • the inadequacy of qualifications and courses available in Australia • introduction of different types of milks and cheeses that the current market demands • increased regulatory requirements for food safety and processing of raw milk products. 	<ul style="list-style-type: none"> • 1 new qualification or skill set • 19 new units of competency • Revision of 17 existing units of competency • Assessment of AQF level for the new qualifications
Brewing and distilling	<p>This project will identify and fill the gaps in current food processing qualifications to address the complex skills required for brewing beer and distilling spirits using a range of methods and products.</p>	<p>Drivers of the need to undertake this work include:</p> <ul style="list-style-type: none"> • the increase in popularity of craft or artisan beer, cider and distilled spirits • substantial growth in production and employee numbers in small breweries and distilleries 	<ul style="list-style-type: none"> • 2 new qualifications • 3 new skill sets • 10 new units of competency • Revision of 20 existing units of competency

PRIORITY SKILL	DESCRIPTION	DRIVERS	TRAINING PACKAGE SOLUTION
		<ul style="list-style-type: none"> establishment of many new independent breweries in recent years many successful small breweries partnering with larger producers to access infrastructure for further growth current training options are insufficient to meet this growing need regulations around food processing and food safety have recently been enhanced. 	<ul style="list-style-type: none"> Assessment of AQF level for the new qualifications
Food and beverage fermentation	This project will identify and fill the gaps in current food processing qualifications to address food safety and processes involved in the growing field of fermented food and non-alcoholic fermented beverage production.	<p>Due to low-cost entry to market and growing demand for functional fermented food and non-alcoholic fermented beverage products, small home-based and medium-sized businesses have started to appear in greater numbers.</p> <p>Occupational standards are required to support the growth in industry and ensure consistent and safe products are produced.</p>	<ul style="list-style-type: none"> 1 new qualification 3 skill sets 9 new units of competency Revision of 4 existing units of competency Assessment of AQF level for the new qualification
Pharmaceutical auditing and compliance skills	This project addresses the increasing regulations and laws that govern pharmaceutical manufacturing in Australia and the skills required to administer, audit and monitor compliance.	Global trends in pharmaceutical manufacturing include the push for transparency in recordkeeping and reporting, enhanced requirements for the registration of medicines, more rigorous requirements for Therapeutic Goods Administration (TGA) compliance and international regulations affecting the growing export market of	<ul style="list-style-type: none"> 1 new skill set 5 new units of competency Revision of 4 existing units of competency

PRIORITY SKILL	DESCRIPTION	DRIVERS	TRAINING PACKAGE SOLUTION
		Australian pharmaceuticals and nutraceuticals.	

Food, Beverage and Pharmaceutical Cross-Sector issues			
Automation/ digitalisation in pharmaceutical, food and beverage manufacturing processes	This project addresses the need for skills and knowledge to operate and maintain increasingly complex and computerised equipment in manufacturing processes.	<p>Computerisation and advanced technology are playing a major role in food, beverage and pharmaceutical manufacturing industries. They are experiencing an increasing reliance on computers and advanced technologies.</p> <p>Improved quality, efficiency and productivity allow these industries to compete in a global economy. Manufacturers are installing complex automated equipment to remain globally competitive, which means the workforce is now required to operate more complex automated equipment within advanced manufacturing systems.</p> <p>Automated systems to eliminate counterfeit products and improve tamper proofing of products and systems are being heavily pushed by the regulators.</p>	Revision and redevelopment of all units of competency that have not been substantially reviewed over the past three years.
Sustainability/ energy consumption	This project will review all components of the FBP Training Package to ensure current sustainable practices and minimal energy consumption are addressed.	The issues of energy consumption and sustainability of natural resources permeate all aspects of our lives and are vital to most food, beverage and pharmaceutical manufacturing operations.	Review of all components of the FBP Training Package.
Traceability, supply chain management and food fraud	This project will review all components of the FBP Training Package to address current expectations of product traceability, supply chain management and	Increased presence of the Australian food businesses in the global marketplace and international expansion of businesses demand abilities to deal with global supply chain management and logistics including full	Review all components of the FBP Training Package for current expectations of traceability and food fraud management

	mitigation of fraudulent practices.	<p>traceability, especially in times of product recall.</p> <p>The motivation to adulterate food for financial gain is growing and current food safety management systems are not always designed for fraud detection or mitigation.</p> <p>Globalisation and complex supply chains are creating more opportunities for fraudulent activities. Food safety regulations require monitoring and action to eliminate risks of food fraud.</p> <p>Food Standards Australia and New Zealand (FSANZ) requires producers on request to provide details about food on premises and its source, and provides a code that covers the 'one step back and one step forward' elements of traceability among other related elements.</p>	skills and knowledge.
Innovation in product development and food packaging	This project will review all components of the FBP Training Package to identify where innovative practices in the development of new food products and food packaging can be addressed.	<p>Higher business targets for efficiency, productivity and competitiveness reached through innovative new products and packaging, addressing industry-wide challenges while realising business opportunities.</p> <p>Existing new product development and packaging innovation to maximise opportunities in new markets, supply channels and food and beverage categories.</p> <p>New process and technological developments in food and beverage product making based on chemistry and microbiology discoveries of opportunities</p>	Review all components of the FBP Training Package, especially units within the bottling and packaging skill sets.

		for existing food manufacturers.	
Work health and safety (WHS)	This project will review all components of the FBP Training Package to identify where safe and healthy work practices can be incorporated into tasks and work activities.	Work health and safety remains a focus across the sector. Risk management skills and knowledge across all occupations will be needed as processes and procedures change within production and other aspects of the industry.	Review all components of the FBP Training Package.
Higher-level strategic planning and management skills across the food and beverage industry	This project will review the components of the FBP Training Package that address management skills, and consider importing relevant units from other packages to meet the needs of these industries.	Increased demand for Australia's quality food and beverage products from international domestic markets. Growing adoption in some food industry sectors of vertical integration and other approaches.	Review all relevant components of the FBP Training Package related to management skills. Consider importing units from other training packages. Consider developing a skill set for managers within the food processing industry.
Online sales and customer service skills for the food processing industry	This project will review all components of the FBP Training Package that relate to sales and customer service, and consider importing relevant units from other training packages to allow for these skills to be developed specifically for the food processing industry.	Opportunities exist for Australian producers across the food and beverage sectors to expand existing markets and enter new international markets, particularly in the Asian regions.	Review all relevant components of the FBP Training Package related to sales and customer service. Consider importing units from other training packages. Consider developing a skill set for sales representatives within the food processing industry.

SECTOR OVERVIEW

Sector Description

The food, beverage and pharmaceutical product manufacturing industry sector integrates all businesses that operate in the following sub-sectors.

- food processing and manufacturing
- dairy product manufacturing
- bakery product manufacturing
- grain processing, cereal and pasta manufacturing
- fruit and vegetable processing
- sugar manufacturing
- confectionery manufacturing
- snack food manufacturing
- functional food and beverage manufacturing
- beverage manufacturing
- wine and spirit manufacturing
- beer manufacturing
- soft drinks manufacturing
- livestock and pet feed manufacturing
- pharmaceutical and nutraceutical product manufacturing
- human pharmaceuticals and medicinal product manufacturing
- complementary medicine manufacturing
- veterinary pharmaceuticals and medicinal product manufacturing
- wholesaling of the above.

In 2016, the sector included 12,480 manufacturing businesses and 27,000 wholesalers and retailers, employing 217,632 people.^{1,2}

The sector's contribution to the Australian economy includes³:

- total sales turnover, which decreased by 0.4 per cent (or \$414 million) to \$101.9 billion between 2014–2015 and 2015–2016
- industry value added (IVA), which decreased by 2.9 per cent (or \$725 million) to \$23.7 billion over the same period.

¹ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

² ABS, 2016 Census

³ ABS, Australian Industry, 2015-16, Cat No 8155.0.

Relevant Training Package Qualifications

The two training packages for the food, beverage and pharmaceutical industries are *FBP – Food, Beverage and Pharmaceutical* and *FDF10 Food Processing*. Once current activities are completed, FDF10 will be superseded and FBP will become the sole training package for these industries.

- FBP comprises 14 qualifications, 211 units of competency and 3 skill sets.
- FDF10 comprises 14 qualifications, 284 units of competency and 24 skill sets.

FBP QUALIFICATIONS

Qualification Level: Certificate I

Certificate I in Food Processing

Certificate I in Baking

Qualification Level: Certificate II

Certificate II in Baking

Certificate II in Food Processing

Certificate II in Food Processing (Sales)

Qualification Level: Certificate III

Certificate III in Baking

Certificate III in Bread Baking

Certificate III in Cake and Pastry

Certificate III in Food Processing

Certificate III in Food Processing (Sales)

Certificate III in Plant Baking

Certificate III in Rice Processing

Qualification Level: Certificate IV

Certificate IV in Baking

Certificate IV in Flour Milling

FDF10 QUALIFICATIONS

Qualification Level: Certificate I

Certificate I in Pharmaceutical Manufacturing

Certificate I in Sugar Milling Industry Operations

Qualification Level: Certificate II

Certificate II in Pharmaceutical Manufacturing

Certificate II in Wine Industry Operations

Certificate II in Sugar Milling Industry Operations

Qualification Level: Certificate III

Certificate III in Pharmaceutical Manufacturing

Certificate III in Wine Industry Operations

Certificate III in Sugar Milling Industry Operations

Qualification Level: Certificate IV

Certificate IV in Food Processing

Certificate IV in Pharmaceutical Manufacturing

Certificate IV in Food Science and Technology

Qualification Level: Diploma

Diploma of Food Processing

Diploma of Pharmaceutical Manufacturing

Diploma of Food Science and Technology

Sector Analysis

Sub-sector description and analysis of businesses involved

FOOD PROCESSING AND MANUFACTURING

SUB-SECTOR NAME	DAIRY PRODUCT MANUFACTURING
SCOPE OF WORK	<p>The sector consists of businesses that process milk and cream, make milk and cream products with varying levels of fat content, and manufacture dairy products such as cheese, butter, yoghurt, condensed milk, ice cream and milk powder.</p>
PRODUCERS	<p>In 2016, there were 563 businesses in the sector, with the majority being small and medium-sized operators.⁴ However, dairy processing in the sector is dominated by a small number of large, diversified dairy companies with global operations and multiple production sites across Australia. Smaller producers specialise in niche products or cater for smaller local or foreign markets.</p> <p>Major producers⁵</p> <ul style="list-style-type: none">• Devondale Murray Goulburn Cooperative Co. Ltd (MGC) (Australian dairy farmers' cooperative)• Lion Pty Ltd (subsidiary of Japanese Kirin Holdings Company Ltd)• Parmalat Australia Pty Ltd (subsidiary of Parmalat Belgium SA)• Fonterra Australia Pty Ltd (subsidiary of New Zealand cooperative of dairy farmers)• Bega Cheese Cooperative Ltd (Australian-owned and publicly listed manufacturer)• Warrnambool Cheese and Butter (subsidiary of Canadian dairy company Saputo)• Tatura Milk Industries Ltd (subsidiary of Bega Cheese)• Peters Food Group Ltd• Unilever Australia (Holdings) Pty Ltd (subsidiary of UK Unilever PLC)• Bulla Dairy Foods (Australian-owned company)• Bon Appetit Australia Pty Ltd• Norco Cooperative Ltd• Sara Lee Group (Australia) Pty Ltd (subsidiary of Canadian frozen food company McCain)• Weis Frozen Foods

⁴ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

⁵ Enterprises listed according to their relative market share or significance in the sector.

GEOGRAPHICAL LOCATION	While all Australian states have dairy product processing operations, Victoria contributes the largest share, followed by New South Wales, in national dairy product output. The processing establishments are generally located near dairy farms or areas with high concentration of dairy farming activities and water availability.
AUTOMATION AND DIGITALISATION	The level of automation varies depending on the type and scale of production. New process engineering practices and technologies are being integrated into dairy operations to develop new product attributes and ingredients and improve existing processes. Computerised systems are used to streamline administrative and managerial operations and to contribute to improved marketing and distribution systems.

SUB-SECTOR NAME	BAKERY PRODUCT MANUFACTURING
SCOPE OF WORK	The sector includes businesses involved in the production of all range of bread products, bread dough, cakes, pastries and other similar bakery products such as artisan breads and biscuits. Bakery producers operate from factory-based premises and non-factory-based locations such as retail bakeries, supermarket in-store bakeries and home-based businesses.
PRODUCERS	<p>The sector is characterised by a large number of small and medium-sized producers, with many producing from non-factory-based premises for local or niche markets. In 2016, there was a total of 5,852 businesses in the sector.⁶ There is a small number of large producers, yet they dominate the national bread and biscuits product output through the large number of sites operated across Australia. Often, these companies are multinational, and operate globally.</p> <p>Smaller producers, including those operating as franchisees, account for a larger number of businesses with smaller, individual and specialised output. Many specialise in niche areas as a means to differentiate themselves in the market, for example, artisanal baking.</p> <p>Major producers⁷</p> <ul style="list-style-type: none"> • Goodman Fielder Ltd (subsidiary of Singapore's Wilmar International and Hong Kong's First Pacific) • Patties Foods Ltd (Australian-owned company) • George Weston Foods (GWF) (a wholly-owned subsidiary of Associated British Foods PLC [ABF]) • Sara Lee Australia (subsidiary of Canadian frozen food company McCain)

⁶ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

⁷ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> • Arnott's Biscuits Holdings Pty Ltd (subsidiary of the US-based Campbell Soup Company Inc.) • Green's Foods Holdings Pty Ltd (Australian-owned company)
GEOGRAPHICAL LOCATION	Bread and bakery production occurs across all Australian states.
AUTOMATION AND DIGITALISATION	The level of automation and integration of digital technology vary depending on the scale of production. In large operations, bread production is a fully-mechanised process, with machines undertaking jobs from dough mixing to moulding and baking, as well as slicing and wrapping. Larger companies also use computer-based systems and software to achieve better inventory and production planning, and improved marketing and distribution systems.

SUB-SECTOR NAME	GRAIN PROCESSING, CEREAL AND PASTA MANUFACTURING
SCOPE OF WORK	The sector includes businesses that process grains, vegetables or plants into a range of flour and meal products (primary processing activity), and businesses that manufacture prepared cereal foods, fresh and dried pasta, and prepared baking mixes.
PRODUCERS	<p>In 2016, there were 94 grain processors in the sector, including three large businesses and smaller operators largely catering for niche and specialty products. Cereal and pasta manufacturing includes 259 businesses, both large multinational companies and small, local manufacturers and resellers.⁸ Smaller operators are usually specialist breakfast cereal and baking mix companies that concentrate on a specific range of products.</p> <p>Major producers⁹</p> <p>Grain processing:</p> <ul style="list-style-type: none"> • Manildra Milling Pty Ltd (Australian family-owned business) • Food Investments Pty Ltd (subsidiary of the UK-based Associated British Foods PLC) • Allied Mills Australia Pty Ltd (subsidiary of Australia's GrainCorp Ltd) <p>Cereal and pasta manufacturing:</p> <ul style="list-style-type: none"> • Kellogg Australia (subsidiary of the US-based Kellogg Company) • Australian Health & Nutrition Association Limited (AHNAL) (Australian-owned company – Sanitarium Health & Wellbeing is the trading name of AHNAL and New Zealand Health Association Ltd, both wholly-owned by the Seventh-day Adventist Church) • General Mills Australia (subsidiary of the US-based General Mills)

⁸ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

⁹ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> • Nestlé Australia Ltd (subsidiary of the Swiss Nestlé SA Company) • Clearlight Investments Pty Ltd (Australian-owned private company)
GEOGRAPHICAL LOCATION	Flour and grain product manufacturers are located in both metropolitan and country areas. Metropolitan manufacturers are located close to downstream markets, such as wholesalers and food manufacturing industries. In country areas, manufacturers are located in wheat-growing areas to be close to key inputs. Likewise, large cereal and pasta producers tend to have operations near key inputs to reduce transport costs. Although sector producers are spread across Australia, New South Wales and Victoria have the largest share.
AUTOMATION AND DIGITALISATION	The sector is characterised by the introduction of further automation of traditional processes and re-engineering or equipment design to increase efficiency and operating capacity. Other major developments relate to computerisation of processes and stocks, and improved packaging processes through adoption of automated equipment. Value-adding through the development of new products is a key driver of innovation in the sector.

SUB-SECTOR NAME	FRUIT AND VEGETABLE PROCESSING
SCOPE OF WORK	The sector represents businesses that process, bottle, can, preserve, quick-freeze and quick-dry fruit and vegetables, including dehydrated vegetable products, sauces, pickles and mixed meat and vegetable products.
PROCESSORS	<p>The sector comprises 575 businesses, with the majority being small and medium-sized operators including farmer cooperatives.¹⁰ The sector is also characterised by a high level of vertical integration, particularly in the fruit processing segment. Where vertical integration is limited, processors enter into supply contracts with growers, which gives them a level of control on management functions related to quantity and quality of supply. Processors with large-scale operations in the sector are generally multinational companies.</p> <p>Major processors¹¹</p> <ul style="list-style-type: none"> • Simplot Australia (Holdings) Pty Ltd (subsidiary of US-based J.R. Simplot Company) • SPC Ardmona (SPC) (subsidiary of Coca-Cola Amatil) • McCain Foods (Australia) Pty Ltd (subsidiary of Canadian McCain Corporation) • Heinz Wattie's Pty Ltd (subsidiary of US-based Heinz)

¹⁰ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

¹¹ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> One Harvest Pty Ltd (Australian, family-owned business based in Queensland)
GEOGRAPHICAL LOCATION	Production facilities are located in all Australian states, generally in areas with a high concentration of fruit and vegetable growers. New South Wales, Victoria and Queensland have the largest share of fruit and vegetable processors.
AUTOMATION AND DIGITALISATION	The sector, particularly in relation to larger processors, integrates automated processes and digital systems that provide efficient control of inventory and management of production processes, and improved marketing and distribution systems.

SUB-SECTOR NAME	SUGAR MANUFACTURING
SCOPE OF WORK	<p>The industry's major product is raw crystal sugar, which is sold to refineries both domestically and abroad. Approximately 95 per cent of the Australian sugar produced comes from Queensland, with the balance coming from northern New South Wales.</p> <p>The Australian sugarcane industry is one of Australia's largest rural industries, with sugarcane being Queensland's largest agricultural crop. Up to 35 million tonnes of sugarcane is crushed annually. This can produce up to 4.5 million tonnes of raw sugar, 1 million tonnes of molasses and 10 million tonnes of bagasse annually. Approximately 85 per cent of raw sugar is exported, generating up to \$2 billion in export earnings.</p>
PRODUCERS	<p>The sugar manufacturing sector is characterised by a small number of operators, which are a combination of publicly-owned entities, private companies and cooperatives. Large producers include Australian-owned companies and global operators with a high level of vertical integration.</p> <p>Major producers</p> <p>Sugar manufacturing:</p> <ul style="list-style-type: none"> Wilmar Sugar Australia Ltd and its subsidiaries Mackay Sugar Ltd (unlisted public company) MP Australia Holdings Pty Ltd (trading as MSF Sugar, subsidiary of Thai-based Mitr Phol Sugar Corp) Finasucre Investments (Australia) Pty Ltd (subsidiary of the Belgian sugar giant Societe Financiere des Sucres) Tully Sugar Ltd (wholly-owned subsidiary of Chinese agribusiness company COFCO) Isis Central Mill Sunshine Sugar

	<ul style="list-style-type: none"> • Sugar Australia
GEOGRAPHICAL LOCATION	Sugar processing facilities are located mainly along Australia's eastern coastline, from Mossman in far north Queensland to Grafton in northern New South Wales. There are approximately 4,400 cane-farming entities growing sugarcane on a total of 380,000 hectares annually, supplying 24 mills, owned by eight separate milling companies. Sugar refinery facilities operate from Port Melbourne in Victoria to Mackay in Queensland. Chocolate and confectionery producers are located in most Australian states, with the majority in metropolitan areas in New South Wales and Victoria.
AUTOMATION AND DIGITALISATION	Sugar manufacturing is characterised by extensive capital equipment; this capital equipment undergoes a renewal program in excess of \$300 million every year. New technology adoption in the sector has been limited; however, this has improved in recent times with the introduction of foreign ownership and new capital.

SUB-SECTOR NAME	CONFECTIONERY MANUFACTURING
SCOPE OF WORK	The sector consists of companies that manufacture confectionery, chocolate or cocoa products, with or without sugar.
PRODUCERS	<p>The chocolate and confectionery sector is represented by three large, globally-operated producers and about 330 small and medium-sized businesses.¹² Small producers have a significant role in small local and foreign markets and niche markets.</p> <p>Major producers¹³</p> <ul style="list-style-type: none"> • Mondelez Australia Holdings Pty Ltd (subsidiary of the US-based Mondelez International Inc.) • Nestlé Australia Ltd (subsidiary of Switzerland-based Nestlé SA) • Mars Australia Pty Ltd (subsidiary of US-based Mars Inc.) • Ferrero Australia Pty Ltd (subsidiary of Luxembourg-based Ferrero International SA)
GEOGRAPHICAL LOCATION	Chocolate and confectionery producers are located in most Australian states, with the majority in metropolitan areas in New South Wales and Victoria.
AUTOMATION AND DIGITALISATION	Chocolate and confectionery producers involve a high level of production automation and computer-controlled equipment for precise calibration and tolerances. Digital systems for improved supply chain arrangements, and better marketing and distribution systems, are also a driver of improvements in the sector.

¹² ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

¹³ Enterprises listed according to their relative market share or significance in the sector.

SUB-SECTOR NAME	SNACK FOOD MANUFACTURING
SCOPE OF WORK	The sector includes companies that manufacture dried fruit and nut bars, muesli bars, protein bars, mixed nuts, potato/corn chips, extruded snacks, popcorn, pretzels and other sweet and savoury snack products. The primary distribution channels are supermarkets, milk bars and convenience stores.
PRODUCERS	<p>The snack food sector is represented by large multinationals that specialise in snack food production, such as Frito-Lay, or that dedicate a small segment of their business to snack foods, like Nestlé Australia; major grocery supermarkets through their own private labels; and small-scale producers that specialise in niche, lower-volume products, with many entering the market in recent years.</p> <p>Major producers¹⁴</p> <ul style="list-style-type: none"> • Frito-Lay Australia Holdings Pty Ltd (subsidiary of US-based Frito-Lay Inc.) • Smith's Snackfood Company (subsidiary of the multinational corporation PepsiCo) • Snack Brands Limited (privately owned Australian snack food company) • Woolworths Ltd (private labels) • Aldi Stores Supermarkets Pty Ltd (private labels) • Wesfarmers Ltd (private labels) • Manassen Foods Australia Pty Ltd • Sakata Rice Snacks Australia Pty Ltd • Stuart Alexander & Co Pty Ltd • San Remo Macaroni Co Pty Ltd • Rice Growers Ltd • Menora Foods Pty Ltd • Nestlé Australia Ltd
GEOGRAPHICAL LOCATION	The majority of snack food establishments are located in metropolitan areas of Queensland, Victoria and New South Wales.
AUTOMATION AND DIGITALISATION	Many snack food producers benefit from the introduction of automated, computer-controlled equipment, which provides increased efficiency and, in many cases, improved product quality.

¹⁴ Enterprises listed according to their relative market share or significance in the sector.

SUB-SECTOR NAME	FUNCTIONAL FOOD AND BEVERAGE MANUFACTURING
SCOPE OF WORK	<p>The sector encompasses companies that manufacture foods and drinks, including fermented foods, fortified, enriched or enhanced with vitamins and nutraceutical components such as probiotics (micro-organisms that provide digestive benefits), omega-3 (fish oil) extracts, and nutrients found in plants (such as soy beans, blueberries or grapes) and algae/seaweeds.</p> <p>Examples of functional foods and drinks include fruit juice, bread and pasta fortified with vitamins and minerals, fermented cheeses, fermented fruit and vegetables, kombucha, margarine containing plant sterols, yoghurt with specific bacterial strains, health drinks, sports drinks and energy drinks.</p>
PRODUCERS	Food and beverage companies are the primary producers of functional food. Nutraceutical/ingredient extraction may be conducted in-house, or it may be outsourced to specialised suppliers dedicated to food ingredient technology research and product development.
AUTOMATION AND DIGITALISATION	Nutraceutical extraction involves specialised, sophisticated technologies. Research and development is often significant.

BEVERAGE MANUFACTURING

SUB-SECTOR NAME	SPIRIT MANUFACTURING
SCOPE OF WORK	<p>The sector includes businesses that ferment and distil grapes (including recovered material from wine production), sugarcane or sugar beet products (including cane juices, molasses and sugar), grain and ferments (yeast and yeast cultures) to produce spirit products such as food-grade ethanol, brandy, vodka, gin, whisky and liqueurs.</p>
PRODUCERS	<p>The sector includes approximately 50 spirit producers.¹⁵ The majority are non-employing or small producers that make boutique spirits, with many promoting themselves as tourism destinations.</p> <p>Major spirit distillers</p> <ul style="list-style-type: none"> • Carlton & United Breweries CUB (a subsidiary of AB InBev) • Bacardi Lion (joint venture of Bacardi and Lion) • Diageo Australia (foreign-owned public company, distributor of beer, spirits and a small portfolio of premium Champagne) • Beam Global Australia (subsidiary of the US-based Beam Inc.)

¹⁵ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

- Vok Beverages (independently owned and operated Australian alcoholic beverage company)
- Brown-Forman Australia (subsidiary of the US-based Brown-Forman spirit company)
- Suntory Australia (subsidiary of Japan-based Suntory Liquors Ltd)
- Campari Australia (subsidiary of Italy-based Gruppo Campari)
- Asahi Holdings (Australia) Pty Ltd (previously Independent Distillers, producer and distributor of a range of RTD products, spirits and craft beers)
- ONEBEV (independently owned Australian alcoholic beverage company)
- Coca-Cola Amatil Limited (CCA) (subsidiary of Beam Inc., distributor of a range of spirit, cider and RTD products)
- Lion Pty Ltd (subsidiary of Japanese Kirin Brewing Company, producer and distributor of a range of wine, cider and beer products)

GEOGRAPHICAL LOCATION

There are a number of spirit manufacturing enterprises in New South Wales, Queensland and Victoria. Tasmania has some world-recognised whisky distilleries, while Queensland and South Australia have some of the oldest and largest.

AUTOMATION AND DIGITALISATION

The sector, particularly in relation to larger processors, integrates automated processes and digital systems that provide economies of scale, better quality control, greater product consistency, efficient control of inventory, management of production processes, and improved marketing and distribution systems for spirit producers.

An area that spirit producers are tapping into is big data from their online presence, and use of this consumer data to aid social media for mass marketing.

SUB-SECTOR NAME	WINE MANUFACTURING
SCOPE OF WORK	<p>The sector includes businesses that ferment grapes into wine, fortified wine and wine-based alcoholic beverages. The sector also includes the production of cider from the fermentation of apples or pear and a range of other non-traditional cider flavours. These products are sold in bulk, bottles or casks in domestic and export markets.</p> <p>In 2015, the Australian wine industry exported 789 million litres of wine, generating \$2.11 billion for the Australian economy.¹⁶ Domestically, wine sales totalled \$2.78 billion in 2014–2015.¹⁷</p>

¹⁶ Wine Australia 2015, *Wine Export Approval Report*, Moving Annual Total (MAT) to December 2014.

¹⁷ Wine Australia 2016, *State of Australia Wine*, March 2016.

An additional stream in this sector is the recovery of waste materials from the wine industry, including marc (the solid remains of wine grapes after pressing of the grapes), and transforming the waste into value-added products, such as grape alcohol, chemical additives for wine, tannins, grape juice and various agricultural and horticultural products including stock feed, mulch, soil conditioner and organic fertiliser.

PRODUCERS

The sector comprises 1,902 wine businesses, including a few large producers, several medium-sized businesses and many small, family-owned businesses.

Major wine producers

- Accolade Wines Holdings Australia Pty Ltd (private equity ownership, Australian Wine producer, largest winery in the southern hemisphere)
- Casella Wines Pty Ltd (Australia's largest family-owned winery, also a distributor of craft beer)
- Treasury Wine Estates Ltd (TWE) (Australian-owned producer and distributor of wine with global operations)
- Pernod Ricard Pacific Holding Pty Ltd (subsidiary of France-based spirits and wine giant Pernod Ricard SA)
- Australian Vintage Limited (AVL)
- Kingston Estate Wines
- De Bortoli Wines

GEOGRAPHICAL LOCATION

Wine production facilities are located at or near vineyards in all Australian states, with concentrations in regions like the Barossa Valley, McLaren Vale, Clare Valley, Riverland, Coonawarra, Eden Valley and Adelaide Hills in South Australia; Sunraysia, Yarra Valley, Mornington Peninsula, Heathcote, Western District, Rutherglen and Beechworth in Victoria; the Hunter Valley, Great Dividing Range, Orange, Forbes, and Griffith in New South Wales; and Margaret River, Frankland River, Mount Barker and Swan Valley in Western Australia.

AUTOMATION AND DIGITALISATION

Technological change in the industry is driven by automation for cost reduction, product consistency and environmental sustainability. Producers employ sensor technology to monitor grape growing and vine conditions, machines to harvest crops, mechanical presses to crush grapes, and computer-controlled winery operations such as tank temperature and filtration and fining processes. After ageing, the bottling and packaging process is able to be automated.

Another area of innovation is packaging and label design that allows producers to differentiate themselves from competitors and attract consumers. Producers are embracing recyclable packaging and experimenting with single-serve packaging in the form of pouches, cans and aseptic cartons.

Smaller boutique producers often have a rich heritage and produce unique wine that reflects the character of wines of their region. These producers, while innovative and dedicated, are generally not in a financial position to automate, but are often very active in the digital and/or social media space.

SUB-SECTOR NAME	BEER MANUFACTURING
SCOPE OF WORK	Businesses in this sector brew, package and distribute keg, bottled and canned beer in a range of varieties, such as ale, lager and stout. The basic ingredients include barley (sometimes wheat, rye or other grains), water, hops and yeast.
PRODUCERS	<p>The sector includes approximately 520 producers, the majority of which are small, privately-owned brewers producing premium beers. There are a few large, multinational companies that dominate the market. Independent brewers account for 3 per cent of the total beer production in Australia. In 2016, the independent brewing sector comprised approximately 380 businesses located across every Australian state and territory.^{18, 19} There are a few large, multinational companies that dominate the market.</p> <p>Major beer brewers and distributors</p> <ul style="list-style-type: none"> • Lion Pty Ltd (subsidiary of the Japanese Kirin Brewery Company Ltd) • Carlton & United Breweries CUB (a subsidiary of AB InBev, the world's largest brewer) • Coopers Brewery Ltd • Australian Beer Company (ABCo) (joint venture of the Coca-Cola Amatil and Casella) • Gage Roads Brewing Co. Ltd • Asahi Holdings (Australia) Pty Ltd
GEOGRAPHICAL LOCATION	Although the majority of industry establishments are concentrated in Victoria, New South Wales and Western Australia, operations can also be found in Queensland and South Australia, and a smaller number in Tasmania.
AUTOMATION AND DIGITALISATION	Computerisation is playing a major role in ensuring consistency in beverage products by monitoring ingredient flow and ensuring that these ingredients are mixed in correct quantities and at specified temperatures.

SUB-SECTOR NAME	SOFT DRINKS MANUFACTURING
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¹⁸ Independent Brewers Association, 2017, Independent Brewing Industry National Economic Evaluation

¹⁹ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

SCOPE OF WORK	The sector includes businesses that produce canned or bottled soft drinks (carbonated and non-carbonated), cordial, juice, syrup, sport drinks and energy drinks.
PRODUCERS	<p>The sector is dominated by a few large, multinational companies, but also contains 404 smaller, regionally-based operators.²⁰ Many of these operators produce private-label products and service niche market segments.</p> <p>Major producers and distributors²¹</p> <ul style="list-style-type: none"> • Coca-Cola Amatil (Australia) Ltd (CCA) (subsidiary of US-based Coca-Cola Amatil Ltd) • Asahi Holdings (Australia) Pty (subsidiary of the Japanese-based company) • Tru Blu Beverages (Australian-owned private company)
GEOGRAPHICAL LOCATION	Soft drink manufacturers have facilities all over Australia, with key sites in Sydney, Melbourne, Adelaide and Perth.
AUTOMATION AND DIGITALISATION	Soft drink manufacturing is characterised by extensive capital equipment, with the adoption of new technology in the sector being limited. Digital systems for improved supply chain arrangements, and better marketing and distribution systems are also adopted in the sector.

LIVESTOCK AND PET FEED MANUFACTURING

SUB-SECTOR NAME	LIVESTOCK AND PET FEED MANUFACTURING
SCOPE OF WORK	The sector includes businesses involved in the manufacture of stockfeed for animals and birds (including cereal meal, grain offal or crushed grain for use as fodder), and canned food for pets. Products are transported in bulk form to distribution centres across the country.
PRODUCERS	<p>In 2016, there were 289 businesses in the sector,²² with the majority being small operators. However, the stockfeed products market is dominated by a small number of large and medium producers. The level of vertical integration within the sector is relatively minor. Also, some of the major companies listed below are stockfeed or pet food divisions of global food and beverage corporations.</p> <p>Major producers²³</p> <ul style="list-style-type: none"> • Ridley Corporation Ltd (Australian-owned public company)

²⁰ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

²¹ Enterprises listed according to their relative market share or significance in the sector.

²² ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

²³ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> • Mars Australia Pty Ltd (subsidiary of US-based Mars Inc.) • Riverina (Australia) Pty Ltd (subsidiary of Japan-based Mitsubishi Corporation) • Ingham Holdings (subsidiary of US-based private equity firm TPG) • Nestlé Australia Ltd (subsidiary of Switzerland-based Nestlé SA) • Ricegrowers Ltd (Australian-owned public company)
GEOGRAPHICAL LOCATION	The majority of stockfeed and canned pet food production facilities are located across New South Wales, Queensland and Victoria, generally in rural or country areas and close to key inputs such as grain mills, cattle farms or meat processing plants. A few facilities are also located in Western Australia and South Australia.
AUTOMATION AND DIGITALISATION	The sector integrates high levels of automation and involves almost continuous operations. Processes and stock inventory and distribution are supported by computerised systems. Packaging also involves a variety of equipment, including collators, conveyors, spiral chutes, carton drops and automated case packers.

PHARMACEUTICAL AND NUTRACEUTICAL PRODUCT MANUFACTURING

SUB-SECTOR NAME	HUMAN PHARMACEUTICAL PRODUCT MANUFACTURING
SCOPE OF WORK	<p>The sector comprises businesses that manufacture medicinal and pharmaceutical products for human use, including medicines and chemical testing agents, blood serums and biotech products.</p> <p>Recent developments include booming export markets (mainly China), which have been a driver for improved company growth and opportunities.</p> <p>The sector includes organisations across a breadth of specialisations and manufacturing processes, with some being extremely specialised. The more complex the production tasks, the less reliance there is on generic, transferable production skills such as Good Manufacturing Practice (GMP), and more reliance on internal training on organisation-specific equipment.</p>
PRODUCERS	<p>The sector includes 360 producers,²⁴ including the following major producers, often multinational, pharmaceutical manufacturing companies that dominate the market.²⁵</p> <ul style="list-style-type: none"> • Pfizer Australia Holdings Pty Ltd (subsidiary of the US-based company Pfizer Inc.) • AstraZeneca Pty Ltd (subsidiary of the British-Swedish AstraZeneca PLC)

²⁴ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

²⁵ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> • GlaxoSmithKline Holdings Pty Ltd (GSK Australia) (subsidiary of the British GlaxoSmithKline PLC [GSK]) • Aspen Pharmacare Australia Pty Ltd (subsidiary of the South Africa-based company Aspen Pharmacare Holdings Ltd) • CSL Ltd (Australian-based, public company) • Alphapharm (subsidiary of the foreign-owned company Mylan) • Sanofi-Aventis Australia Pty Ltd (subsidiary of the French Sanofi-Aventis company)
GEOGRAPHICAL LOCATION	New South Wales and Victoria account for two-thirds of the business enterprises in this sector. Several businesses are also located in Queensland, Western Australia and South Australia, and a small number in Tasmania.
AUTOMATION AND DIGITALISATION	The operations used in the sector range from simple processes of mixing ingredients and packaging, to complex procedures involving the latest capital-intensive technology. The sector is evolving in line with various technological advancements. As the job task becomes more complex, there is greater focus on organisation-specific training and less on accredited training, especially with automation within the industry.

SUB-SECTOR NAME	COMPLEMENTARY MEDICINE MANUFACTURING
SCOPE OF WORK	<p>The sector comprises businesses that manufacture vitamins, mineral and dietary supplements, and herbal and homoeopathic medicines.</p> <p>Dietary supplements are products in form of liquid, capsule, powder or pill, which concentrate nutraceutical components derived from natural sources such as herbals, non-herbals and others.</p>
PRODUCERS	The sector includes a few highly specialised companies that produce their own branded dietary supplement products, such as Blackmores Ltd and Swisse Wellness Pty Ltd, and a number of small contract manufacturing businesses that produce a range of vitamins and supplements for pharmaceutical companies and consumers.
GEOGRAPHICAL LOCATION	Industry activity is concentrated in New South Wales, Victoria and Queensland to take advantage of the infrastructure provided and market size.
AUTOMATION AND DIGITALISATION	The equipment for extracting nutraceutical components can be specialised and based on sophisticated technologies. Other operations in the sector range from simple processes of mixing ingredients and packaging, to complex procedures involving advanced technology. The sector is evolving in line with various technological advancements. As the job task becomes

more complex, there is greater focus on organisation-specific training and less on accredited training, especially with automation within the industry.

SUB-SECTOR NAME	VETERINARY PHARMACEUTICAL MANUFACTURING
SCOPE OF WORK	This sector manufactures drugs, medicines, medicinal chemicals, vaccines, serums and other pharmaceutical products for veterinary use.
PRODUCERS	<p>The sector includes 71 producers.²⁶ There are a few large, multinational companies that dominate the market, several medium-sized businesses, and a larger number of small, family-owned producers.</p> <p>Major producers²⁷</p> <ul style="list-style-type: none"> • Zoetis (a global producer, spin-off from Pfizer) • Virbac Australia Pty Ltd (subsidiary of France-based Virbac) • Intervet Australia (MSD Animal Health Australia) (part of the US-based pharmaceutical giant Merck & Co Inc.) • Jurox Pty Ltd (family-owned and Australia-based company) • Bayer Australia Ltd (subsidiary of German-based Bayer company) • Bioproperties Pty Ltd (Australian-owned company) • Elanco Australia (A division of Eli Lilly and Company)
GEOGRAPHICAL LOCATION	The majority of industry establishments are concentrated in New South Wales, but there are also production facilities in Victoria and Queensland.
AUTOMATION AND DIGITALISATION	Veterinary pharmaceutical manufacturing generally involves complex processes using capital-intensive technology and equipment. The sector is evolving in line with various technological advancements. As the job task becomes more complex, there is greater focus on organisation-specific training and less on accredited training, especially with automation within the industry.

WHOLESALE AND RETAILING OF FOOD, BEVERAGE AND PHARMACEUTICAL PRODUCE

SUB-SECTOR NAME	WHOLESALE AND RETAILING
SCOPE OF WORK	This sector operates via two channels:

²⁶ ABS, 2017, Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.

²⁷ Enterprises listed according to their relative market share or significance in the sector.

	<ul style="list-style-type: none"> • retail and trade merchants • wholesalers, manufacturers, importers and exporters. <p>Wholesalers, manufacturers, importers and exporters sell, import and/or export large volumes of food, beverage and pharmaceutical produce, and distribute them through the retail sector or directly to the specialist industries.</p>
PLAYERS	<p>The sector is highly fragmented, comprising many geographically-focused wholesalers and a large number of retail points. Large supermarkets and retailers deal directly with manufacturers, reducing the need for an industry wholesaler.</p> <p>Some of the key wholesalers include:</p> <ul style="list-style-type: none"> • Sigma Healthcare • Symbion • NPD (National Pharmacies Distribution) • Australian Pharmaceutical Industries (API) Ltd • CH2 • National Pharmaceutical Services Association (NPSA) • DHL • World Courier • Toll
GEOGRAPHICAL LOCATION	Food, beverage and pharmaceutical merchants operate throughout Australia.
AUTOMATION AND DIGITALISATION	Manufacturers and merchants are increasingly reviewing the best ways of providing products, information and services to customers, and adapting to new methods of collaborative logistics (computerised inventory control systems, tracking and reporting technologies) and digital communication.

Relevant Stakeholders

The food, beverage and pharmaceutical industry sector is represented by about 55 peak organisations at a national and state level. These organisations include over 35 industry and industry sub-sector associations, about 10 industry services bodies including R&D, and a small number of professional associations, employee associations and regulatory bodies. There are also over 80 local wine region associations focused on the promotion of wine from their defined regions.

Table 1: Relative number of industry peak bodies

CATEGORY	NUMBER
Industry associations	7

Industry sub-sector associations	28
Industry services bodies	6
Industry R&D services bodies	4
Employee associations	3
Regulatory bodies	4
Industry standards bodies	1
Professional associations	2
Total	55

Table 2: Peak industry organisations

CATEGORIES – PEAK INDUSTRY ORGANISATIONS		GEOGRAPHICAL REPRESENTATION
INDUSTRY SECTOR ASSOCIATIONS		
Ai Group		NATIONAL
Australian Food and Grocery Council (AFGC)		NATIONAL
Food Technology Association of Australia		NATIONAL
Foodservice Industry Association		NATIONAL
Food and Beverage Importers Association		NATIONAL
Foodservice Suppliers Association Australia (FSAA)		NATIONAL
Food Industries Association of Queensland (FIAQ)		QLD
INDUSTRY SUB-SECTOR ASSOCIATIONS		
DAIRY		
Australian Dairy Products Federation (ADPF)		NATIONAL
Dairy Australia		NATIONAL
Dairy Industry Association of Australia Inc. (DIAA)		NATIONAL
National Centre for Dairy Education (NCDE)		NATIONAL
Tasmanian Dairy Industry Association		TAS

CATEGORIES – PEAK INDUSTRY ORGANISATIONS	GEOGRAPHICAL REPRESENTATION
Australian Specialist Cheesemakers' Association	NATIONAL
BAKERY	
Australian Society of Baking	NATIONAL
Baking Association of Australia	NATIONAL
National Baking Industry Association (NBIA)	NATIONAL
SUGAR	
Australian Sugar Industry Alliance	NATIONAL
Australian Sugar Milling Council	NATIONAL
SOFT DRINKS	
Australian Beverages Council	NATIONAL
BEER	
Independent Brewers Association	NATIONAL
Brewers Association of Australia and New Zealand	NATIONAL
Cider Australia	NATIONAL
WINE	
Australian Vignerons	NATIONAL
Winemakers' Federation of Australia	NATIONAL
NSW Wine Industry Association	NSW
Queensland Wine Industry Association	QLD
South Australian Wine Industry Association	SA
Wine Grape Council of South Australia	SA
Wine Victoria	VIC
Wines of WA	WA
SPIRITS	
Distilled Spirits Industry Council of Australia (DSICA)	NATIONAL

CATEGORIES – PEAK INDUSTRY ORGANISATIONS		GEOGRAPHICAL REPRESENTATION
Australian Distillers Association		NATIONAL
PHARMACEUTICAL		
Medicines Australia (MA)		NATIONAL
Generic and Biosimilar Medicines Association (GBMA)		NATIONAL
Complementary Medicines Australia		NATIONAL
Australian Self-Medication Industry Association		NATIONAL
AusBiotech		NATIONAL
INDUSTRY R&D SERVICES BODIES		
Sugar Research Australia (SRA)		NATIONAL
Sugar Research Institute		NATIONAL
Grape and Wine Research and Development Corporation (Wine Australia)		NATIONAL
Meat and Livestock Australia		NATIONAL
Grains Research and Development Corporation		NATIONAL
Australian Wine Research Institute		NATIONAL
EMPLOYEE REPRESENTATIVE ORGANISATIONS		
Australian Manufacturing Workers' Union		NATIONAL
Breweries and Bottleyards Employees' Industrial Union of Workers of Western Australia		WA
National Union of Workers		NATIONAL
INDUSTRY SERVICES BODIES		
Food Innovation Australia Limited (FIAL)		NATIONAL
The Allergen Bureau		NATIONAL
Medical Technology and Pharmaceuticals Growth Centre (MTPConnect)		NATIONAL
Nutrition Australia		NATIONAL

CATEGORIES – PEAK INDUSTRY ORGANISATIONS		GEOGRAPHICAL REPRESENTATION
Wine Grapes Marketing Board		NSW
Queensland Sugar Limited		QLD
Sugar Terminals Limited		QLD
Tasmanian Whisky Academy		TAS
Institute of Brewing and Distilling		INTERNATIONAL
INDUSTRY STANDARDS BODIES		
Food Standards Australia New Zealand		NATIONAL
Standards Australia		NATIONAL
PROFESSIONAL ASSOCIATIONS		
Australian Society of Sugarcane Technologists		NATIONAL
Australian Society of Viticulture and Oenology		NATIONAL
International Society for Pharmaceutical Engineering		INTERNATIONAL
Parenteral Drug Association		NATIONAL
REGULATORY BODIES		
Australian Grape and Wine Authority (Wine Australia)		NATIONAL
Pharmaceutical Benefits Advisory Committee (PBAC)		NATIONAL
Therapeutic Goods Administration		NATIONAL
Food Standards Australia and New Zealand		NATIONAL
Standards Australia		NATIONAL
ACT Health		ACT
Northern Territory Department of Health		NT
New South Wales Food Authority		NSW
VineHealth Australia		SA
Dairy Authority of South Australia		SA
South Australian Department of Health		SA

CATEGORIES – PEAK INDUSTRY ORGANISATIONS	GEOGRAPHICAL REPRESENTATION
Queensland Department of Health	QLD
Safe Food Production Queensland	QLD
Tasmanian Department of Health and Human Service	TAS
Dairy Food Safety Victoria	VIC
PrimeSafe	VIC
Victorian Department of Health and Human Services	VIC
Western Australian Department of Health	WA
Office of the Gene Technology Regulator	NATIONAL

Industry and Occupational Regulations and Standards

Industry Regulations and Standards

The Australian food, beverage and pharmaceutical industry operates under a high level of regulation.

Food Standards Australia New Zealand

All food and beverage manufacturing operations are subject to national standards and safety assurance systems enforced by Food Standards Australia New Zealand (FSANZ). The Food Standards Code (The Code) represents the uniform law governing Australian food and beverage production.

The Code describes appropriate labelling requirements, provides specific definitions of products, details the composition of products and permitted ingredients, and outlines approved processing methods.

All genetically modified (GM) foods intended for sale in Australia and New Zealand must also undergo a safety assessment by FSANZ. FSANZ will not approve a GM food unless it is deemed safe to eat.

Likewise, businesses manufacturing functional foods and drink must comply with all requirements under The Code that are relevant to content formulation and nutrition, health and related claims made on labels or in advertisements.

The industry is likely to be affected by further regulation changes related to country of origin labelling laws due to hepatitis outbreaks in February 2015. Under the proposed changes, manufacturers will need to explicitly state where ingredients have come from.

Food safety practices are also enforced by local councils and environmental health offices. These systems are applicable to local producers.

Producer's licence

A producer of liquor who wants to sell their product is required to hold a producer's licence or equivalent licence under the respective state/territory liquor licensing legislation.

Wine industry regulations

The wine industry has stand-alone regulations in relation to geographical terms, labels and exports under the *Australian Grape and Wine Authority Act 2013* and *Australian Grape and Wine Authority Regulations 1981*.

Industry/customer standards

The food and beverage manufacturing sector is also subject to many customer food standard requirements, including the Woolworths Quality Assurance (WQA) Standard, and international food safety standards, including the BRC Global Standard for Food Safety and the IFS International Food Safety Standard.

Australian Consumer Law

All nutrition content and health claims of functional food and drink products must be factually correct and substantiated through scientific research papers or clinical trials to avoid misleading consumers and breaching Australian Consumer Law.

Australian Packaging Covenant

Businesses signatory to the Australian Packaging Covenant, an agreement between government, industry and community groups, are obliged to find and fund solutions to address packaging sustainability issues.

Sugar industry regulations

In the past, the Queensland Government played a central role in forming industry policy and regulations in the sugar industry in relation to controlling price, sugarcane plantation areas, compulsory sale of all sugar to Queensland Sugar Limited (QSL) and mills' licence permits. In recent years, this sector has become more open and transparent. Early in 2014, QSL was removed as the only option for sugar milling companies to market their sugar. As a result, most major sugar companies decided to break ties with QSL from 2017, creating their own marketing and export channels. In response to cane grower concerns regarding changes to sugar marketing arrangements in Australia, a federal government-established taskforce released a report in 2015 recommending the creation and implementation of a mandatory code of conduct for the Australian sugar industry. Subsequently, the *Sugar Industry (Real Choice in Marketing) Amendment Act 2015* was passed in the Queensland Parliament, providing Queensland cane growers with the right to choose who sells and prices Grower Economic Interest (GEI) sugar, and permitting arbitration if required.²⁸

Excise compliance

The alcoholic beverage sector is subject to excise regulations that require producers to measure and sample the alcohol content of the product they produce to calculate the excise that is payable. A licence from the Australian Taxation Office (ATO) is required to distil alcoholic spirits in Australia. This licence imposes several obligations to ensure spirit products are kept secure, production is accounted, and excise duty is paid when due. The ATO requires significant and adequate records for all excisable products to show these obligations have been met.

Export licence

Wine producers and exporters have to obtain an export licence from the Australian Grape and Wine Authority (AGWA). The regulation of wine exports is primarily to ensure the quality of Australian products marketed overseas. AGWA also oversees labelling requirements for wine producers to ensure labels include the variety of grapes used and regional zones of production.

²⁸ QSL, 2016, 'Developments in the Queensland export sugar industry', <<http://www.qsl.com.au/developments-queensland-export-sugar-industry/fast-facts>>.

Advertising and packaging regulations

Alcohol beverage advertising and packaging also needs to be consistent with other applicable laws and codes, for example:

- federal competition and consumer legislation
- state/territory fair trading legislation
- Alcohol Beverages Advertising Code
- Australian Association of National Advertisers (AANA) Code of Ethics
- Commercial Television Industry Code of Practice
- Commercial Radio Code of Practice
- Outdoor Media Association Code of Ethics.

Environmental protection measures

Food and beverage manufacturers must adhere to national and state environment protection measures, as do all businesses; however, there are particular challenges in relation to the discharge of waste into waterways and chemical emissions in the air caused by fermentation reactions in production.

Pharmaceuticals regulations

Regulation of pharmaceuticals in Australia is overseen by the federal government in relation to the quality, safety, listing and pricing, patent protection, clinical trials, and efficacy of therapeutic goods supplied in Australia through the following:

- Therapeutic Goods Administration (TGA)
- Australian Register of Therapeutic Goods (ARTG)
- Advisory Committee on Prescription Medicines
- Good Manufacturing Practice (GMP)
- Advisory Committee on the Safety of Medicines
- Pharmaceutical Benefits Scheme (PBS)
- Pharmaceutical Benefits Advisory Committee (PBAC)
- IP Australia
- Medicine Australia
- Pharmaceutical Inspection Cooperation Scheme (PICS)

The advertising of therapeutic goods, including complementary medicines, is subject to the advertising requirements of the *Therapeutic Goods Act 1989*, which adopts the *Therapeutic Goods Advertising Code* (TGAC) and the supporting regulations, the *Competition and Consumer Act 2010* and other relevant laws.

The state governments play an important role in the control of pharmaceutical product distribution through their scheduling systems. The industry is also subject to self-regulation by Medicine Australia through an internationally recognised code of conduct.

Companies who export or have multinational operations are also subject to regulations of various countries and unions (such as the FDA in the USA and EMA in the European Union), along with other sovereign agencies, depending on location of exports or operations.

Complementary medicines regulations

Complementary medicines are regulated under the *Therapeutic Goods Act 1989*. In addition, the Australian Regulatory Guidelines for Complementary Medicines (ARGCM) provides detail on the regulation of complementary medicines and assists sponsors to meet their legislative obligations. Business will also need to consider whether their product needs to be listed or registered with the Therapeutic Goods Administration (TGA).

The TGA inspects manufacturers on an ongoing basis for compliance with good manufacturing practice and undertakes monitoring of safety, quality and efficacy of listed, registered and included therapeutic goods once they are on the market.

Therapeutic goods available on, and sold through, international websites are not regulated by the TGA.

Alcoholic product retail regulations

The retail sale of alcohol products is heavily regulated, requiring retailers and hospitality venues to obtain licences to sell alcohol within the hours stipulated and to develop and implement management plans to identify and control associated risks.

Regulated occupations in the industry

Regulated occupations have legal (or industry) requirements or restrictions to perform the work. Regulated occupations require a licence to practice from, or registration by, a professional association or occupational licensing authority.

There are some occupations specific to this industry sector that require licensing and/or registration before employment. The industry also employs a wide range of trade-licensed occupations, including electricians, plumbers and forklift operators.

Challenges and Opportunities in the Sector

The Australian food, beverage and pharmaceutical industry sector operates in a dynamic environment shaped by a range of policy frameworks (including international trade policies and biofuel policies), environmental challenges, and market factors such as food production, trade and food prices. The challenges and opportunities for growth that relate to these factors are discussed below.

GOVERNMENT POLICIES

Food manufacturing, along with the agriculture sector, is at the forefront of government policy agenda in Australia, prioritising it as a growth sector. Opportunities in the sector are provided by the increasing significance of global food security and higher food demand in expanding markets, such as those in the Asia-Pacific region. The Australian Government facilitates the sector's growth through a range of initiatives including the following:

- The Food and Agribusiness Industry Growth Centre – Food Innovation Australia Limited (FIAL)
- Agricultural Competitiveness White Paper
- MTP Connect.

Further global trade liberalisation through new Free Trade Agreements will enable increased 'tariff-free' access to a diverse range of overseas markets.

In addition, state governments have a focus on the agriculture and food sectors as critical contributors to local growth and export, leading to policies for state-based industry strategies and action plans.

The challenge for individual companies is to unlock commercial benefits from these government programs and agreements by becoming export ready, culturally literate and market savvy.

The food manufacturing sector can contribute alongside the forestry sector to the huge opportunity that Australia has to use renewable fuels in its energy sector. The sectors will benefit from clear government policies that support:

- hybrid systems based on production residues to deliver useful heat or electricity or gas for transportation and industrial heat
- subsidies to promote growth.

There is a need for a coherent energy policy as price rises for gas and electricity are undermining the competitiveness of the food and grocery manufacturing sector. The Australian Food and Grocery Council (AFGC) highlighted that '... Australian producers had little or no capacity to pass through higher utility costs'.²⁹ AFGC's then CEO, Gary Dawson, further stated, 'Food and grocery processing is the lifeblood of many regional economies and higher gas costs have a direct impact on the profitability and competitiveness of food companies. If a food processing plant shuts down, there is a direct flow-on effect to farmers supplying that plant when they lose their key customer'.³⁰

Similarly, the risks to the pharmaceutical manufacturing industry caused by unreliable energy sources that may result in loss of continuity of production can undermine the competitiveness of manufacturers in the global marketplace. There is a need for sustainable energy sources that reduce these risks.

For the pharmaceutical sector, there is ongoing work on changes to the regulation of therapeutic goods. The *Therapeutic Goods Amendment (2016 Measures No. 1) Bill 2016*, was passed in 2017 providing improvements in registration approval processes and listing times. This means that Australian patients can now get faster and earlier access to lifesaving, innovative medicines.

The TGA is currently undertaking reforms to the regulatory framework for complementary medicines. The reforms aim to improve the regulatory controls for complementary medicines manufactured, supplied and/or exported from Australia to increase consumer protection and stimulate business innovation.³¹

The federal government legalised the use of medicinal cannabis through the *Narcotic Drugs Amendment Bill 2016* and states and territories regulate its cultivation, with Victoria having already harvested its first cannabis crop for medicinal use by people with epilepsy. These regulatory set-ups offer new opportunities for agriculture and the manufacture of medicinal cannabis in Australia.

CLIMATE IMPACTS ON AGRICULTURAL CROP AND FOOD SUPPLY

²⁹ Australian Food & Grocery Council, 2014, 'Gas market reform and increased supply urgently needed to reduce damaging impacts of higher gas prices', viewed April 2017, <<http://www.afgc.org.au/2014/07/gas-market-reform-and-increased-supply-urgently-needed-to-reduce-damaging-impacts-of-higher-gas-prices/>>.

³⁰ Ibid

³¹ Therapeutic Goods Administration, 2017, 'Reforms to the regulatory framework for complementary medicines: assessment pathways', viewed April 2017, <<http://www.tga.gov.au/consultation/consultation-reforms-regulatory-framework-complementary-medicines-assessment-pathways>>.

The future of Australian food production, for many food categories, is reliant on the agricultural crop health and productivity where arable land and water resources become increasingly difficult constraints to crop production, and where the frequency and severity of climate variations may increase due to the effects of climate change.

There are opportunities for many food processing sectors to increase collaboration with breeders, horticultural and animal farms, and with research teams. This is to support decisions and develop more resilient crop varieties and large-scale farming systems for increased productivity, efficiency and optimisation of available resource utilisation.

MARKET AND TRADE

By 2050, the world's population is expected to reach 9.1 billion, 34 per cent higher than today. Global demand for food, feed and fibre is expected to grow by 70 per cent.³²

Australia is well located to take advantage of the opportunities provided by higher food consumption in the Asia-Pacific region in the future. However, there will be a need for a change to food production to fully capture these opportunities. At the industry level, this will require greater adaptation of our products to more diversified markets, and targeted marketing of different product qualities to market segments where there is the greatest potential for value-adding.

The global food trends include:³³

- demand for transparency in food labelling and clear definitions for 'natural' and 'nutritious' food
- increasing demand for new flavours, new fresh foods and nutritionally-enhanced 'superfoods'
- growing incomes in developing nations, where well-off individuals are prepared to pay a premium for quality food and ingredients created in clean environments
- a growing focus on healthier food options within Australia's and Asia's middle-classes, particularly on products that have reduced sugar, salt and fat, or are gluten-free
- increasingly health-conscious consumers interested in functional foods and complementary medicines as a way of managing health concerns such as weight and high cholesterol
- a growing market for fermented foods and non-alcoholic drinks
- growing interest in alternative ingredients such as macro-algae (seaweed), micro-algae (spirulina and chlorella) and insects as a form of protein
- growing interest in omega oils and mineral sources available in functional foods and complementary medicines
- growing importance of provenance and transparency for the Millennial generation (15–35 years) who are tech-savvy, experience-driven and less brand loyal than older consumers
- rapid growth in ready-to-eat meals because of non-traditional work patterns, changing family structures and declining importance of formal meal times
- repositioning and value-adding of traditional frozen foods (seafood and vegetables) to emphasise their superior nutritional content

³² FAO, 2009, 'How to Feed the World in 2050', viewed April 2017, <http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf>.

³³ Agrifood Skills Australia, 2015, *Environmental Scan 2015*.

- greater importance of minimising, reusing and recycling production waste
- a growing focus on preventing overconsumption – in food, alcohol and packaging.

In addition, growing demand from Asian consumers continues to generate substantial sales for Australian vitamins and dietary supplements. The sales are also supported by the strong brand equity of the leading Australian players. Likewise, the market for intrinsically healthy foods and functional foods is experiencing remarkable growth and consumer interest.

The medicinal cannabis market, supported by the new regulations, offers new opportunities in Australia. Medicinal cannabis is already a rapidly growing industry in Israel, the USA and Canada, and many global companies are now positioning themselves for entry in Australia. Thirty-five Australian companies have now been granted a licence to cultivate, produce or manufacture medicinal cannabis.³⁴

Key points on the industry's international trade

Australia is a net exporter of processed food and beverages. Exports of processed food and beverages, excluding meat and seafood sectors, increased by 7.8 per cent to \$25.9 billion in 2015–2016, with vegetables, fruits, nuts and beverages recording the highest growth. Imports increased by 13.1 per cent to \$13.6 billion.³⁵ Imported products with the highest aggregate value at a national level were flour mill and cereal food products. Australian wine exports grew at the strongest rate in more than a decade in 2015, partly due to the depreciation of Australian currency and the subsequent boost to global competitiveness. The value of Australian wine exports increased by 7.8 per cent, while the volume increased by 4.9 per cent.³⁶ Despite the strong export growth, the average value of Australian wine exports per litre increased by only 3 per cent from AU\$2.60 to AU\$2.67. This is consistent with the industry commentary that overseas markets remain fiercely competitive and the Australian dollar depreciation has not been a windfall for local producers as they try to build overseas sales.³⁷

Conversely, Australia has a high dependence on imported medicinal and pharmaceutical products, particularly active ingredients. Imports increased by 8.6 per cent to \$11.2 billion in 2016. Exports went up by 41 per cent to 3.4 billion in 2016 after a progressive drop during the previous years.³⁸ The pharmaceutical sector is moving to more competitive production processes, including automation and robotics as means of defining a competitive advantage in production, and supporting competition against international companies in both the domestic and export markets.

Many food and beverage manufacturing companies are engaged in exporting products directly from Australia or through an agent. A few are currently involved in other international relationships, such as importing goods or services or being involved in an international supply chain or outsourced part of their process. Many see opportunities and plan to expand overseas in the coming years. The most significant challenges for the manufacturing sector, including food and beverage, in doing business overseas includes:³⁹

- high domestic costs in Australia
- adverse exchange rate movements

³⁴ The Office of Drug Control, 16 April 2018, <https://www.odc.gov.au/summary-licences-granted> >.

³⁵ ABARES, Agricultural commodity statistics 2016.

³⁶ Wine Australia, 2015, *Wine Export Approval Report*.

³⁷ Winetitles Media, 2016, *Australian and New Zealand Wine Industry Directory 2016*, 34th annual edn.

³⁸ ABS International Trade in Goods and Services, Australia, Dec 2016 Cat No 5368.

³⁹ Austrade, 2016, 'Industry profile report: manufacturing', *Australia's International Business Survey*, viewed April 2017, <http://www.austrade.gov.au/ArticleDocuments/5729/AIBS2016_IR_Manufacturing.pdf.aspx>.

- increased international competition
- risk of financial or economic crisis in key overseas markets
- 'red tape' in Australia.

Additional challenges include:

- compliance and auditing costs related to international food safety standards and labelling requirements
- increased manufacturing competitiveness through production efficiency improvements, for example lean automation.

RESEARCH, INNOVATION AND APPLIED TECHNOLOGY

Technology is considered one of the greatest drivers of future growth in this sector. Many businesses in the food, beverage and pharmaceutical sector are adopting cloud technologies. This increases transparency and improves business models. These businesses are using data and analytics to improve decision-making related to consumer insight, brand and product management and pricing; focus on product innovations (including healthier or functional foods); and increased customer acquisition and alternative sales and distribution channels.

Industry is supporting specific research and innovation organisations seeking to maximise industry potentials. Two such organisations include:

- The Food Agility Cooperative Research Centre (CRC), with 54 signed partners across food, technology and research sectors supported by various governments, research providers, industry networks and regional development centres. The CRC will integrate the agile culture and processes of the digital economy through a whole-of-value-chain lens for fresh and processed food.⁴⁰
- The Australian Packaging Covenant Organisation, with the aim to change the culture of business to design more sustainable packaging and increase recycling rates. The covenant is an agreement between government and industry to find and fund solutions to address packaging sustainability issues.⁴¹

In pharmaceuticals and many other sectors, the introduction of automated processes through robotics is a means of creating a competitive advantage – as productivity and output increase, and employment costs decrease. This also allows for a more effective application of just-in-time (JIT) production principles and minimised stock holdings.

By using industrial robots, food processors can improve quality, achieve greater accuracy and precision, eliminate contamination, increase productivity, improve workplace safety and reduce risk of injury. Through advanced technology, such as new advanced visual inspection systems, the food processing industry can now address serious issues such as quality control, improved efficiency and productivity, worker safety, traceability and operating simplicity.

Breakthroughs continue in the R&D centres of both ingredient suppliers and equipment manufacturers. For food researchers, the objectives are to support the efficient and sustainable conversion of agricultural food materials into value-added ingredients and products.

⁴⁰ Food Agility, 2017, 'Overview', viewed April 2017, <<http://www.foodagility.com/overview>>.

⁴¹ Australian Packaging Covenant, 2017, 'About APC', viewed April 2017, <<http://www.packagingcovenant.org.au/pages/about-apc.html>>.

Emerging food processing technologies include innovative approaches such as:^{42,43}

- megasonic processing in the palm oil, olive, coconut and soybean industries
- gluten-free barley beer (BARLEYmax)
- long-chain omega-3 oil from canola
- ready-to-eat high pressure thermal processed (HPTP) meals
- advances in safe, high-quality stabilised fruits and vegetables
- emerging non-thermal separation technologies
- novel membrane technologies
- next-gen extrusion processing
- component separation using chromatography
- pasteurisation using pulsed electric fields
- sterilisation using cool plasma and high-pressure processing
- homogenisation and fortification using micro-fluidisation.

Emerging pharmaceutical manufacturing technologies include innovative approaches such as:

- biologics
- cell therapies
- assistive technologies
- regenerative medicine
- precision medicine and personalised care
- antimicrobial resistance.

The opportunities for sourcing healthy foods, nutritional components and functional food development are extensive in Australia. Further research into materials of relevance to Australia, such as those listed below, will be able to provide scientific evidence of health benefits, confirm usable food ingredients, and offer further opportunities in a competitive environment:⁴⁴

- bioactive honey
- whey protein powder
- freeze-dried young barley grass or other fruit/vegetable powders
- fish and shark-liver oil (EPA)
- herbs and spices derived from native plants that have proven health benefits.

⁴² Food & Beverage Industry News, 2016, 'CSIRO takes food manufacturing innovation to IFT16', viewed April 2017, <<https://foodmag.com.au/csiro-takes-food-manufacturing-innovation-to-ift16/>>.

⁴³ Department of Industry, Innovation, Science, Research and Tertiary Education, 2011, 'The potential role of enabling technologies in the future of the Australian food industry', viewed April 2017, <http://www.industry.gov.au/industry/IndustrySectors/nanotechnology/Publications/Documents/WorkshopReport_Food.pdf#page13>.

⁴⁴ Australian Trade Commission, 2016, 'Health and functional foods to Japan', viewed April 2017, <<http://www.austrade.gov.au/Australian/Export/Export-markets/Countries/Japan/Industries/Food-and-beverage-health-and-functional-foods>>.

There is also a substantial drive to enhance food and beverage packaging. Developments include barrier packaging, anti-microbial packaging, active packaging and smart packaging.

The Monash University-based Food Innovation Centre was funded by the Victorian Government in 2016 to provide food and fibre businesses with access to world-class product and packaging design and development services, sensory evaluation, consumer testing and visualisation. The centre also provides new insights into Chinese consumer needs, regulatory requirements and better access to platforms to fast-track export opportunities.⁴⁵ Likewise, RMIT Food Research and Innovation Centre received government funding in 2016 to serve as an incubation facility for small to medium-sized businesses, enabling them to test new product concepts, develop prototypes and turn their ideas into high value products and services.⁴⁶

In the pharmaceutical sector, the Centre for Commercialisation of Regenerative Medicine in Melbourne will focus on developing technology, supporting start-ups and accelerating the commercialisation of regenerative medicine technologies and cell-based therapies.⁴⁷

Challenges exist around the adoption/implementation of new technologies by food manufacturing firms, the commercialisation of food science and technology for food products, and consumer acceptance of 'designed' foods. Consumers indicate a preference for their views to be considered sufficiently early in the product development process. They also demand to be provided with enough information to be able to make safe and informed choices. However, there are examples of technologies, such as high-pressure pasteurisation, that have persevered through some initial resistance and are starting to have an impact on both the product development and plant operation sides of the food and beverage industry.

⁴⁵ Premier of Victoria, 2016, 'Food innovation centre opens new pathways to Asia', viewed April 2017, <<http://www.premier.vic.gov.au/food-innovation-centre-opens-new-pathways-to-asia/>>.

⁴⁶ Premier of Victoria, 2016, 'Innovation hub to grow Victoria's food and fibre', viewed April 2017, <<http://www.premier.vic.gov.au/innovation-hub-to-grow-victorias-food-and-fibre/>>.

⁴⁷ Premier of Victoria, 2016, 'Victorians to benefit from new regenerative medicine', viewed April 2017, <<http://www.premier.vic.gov.au/victorians-to-benefit-from-new-regenerative-medicine/>>.

A. EMPLOYMENT AND TRAINING

Employment Update

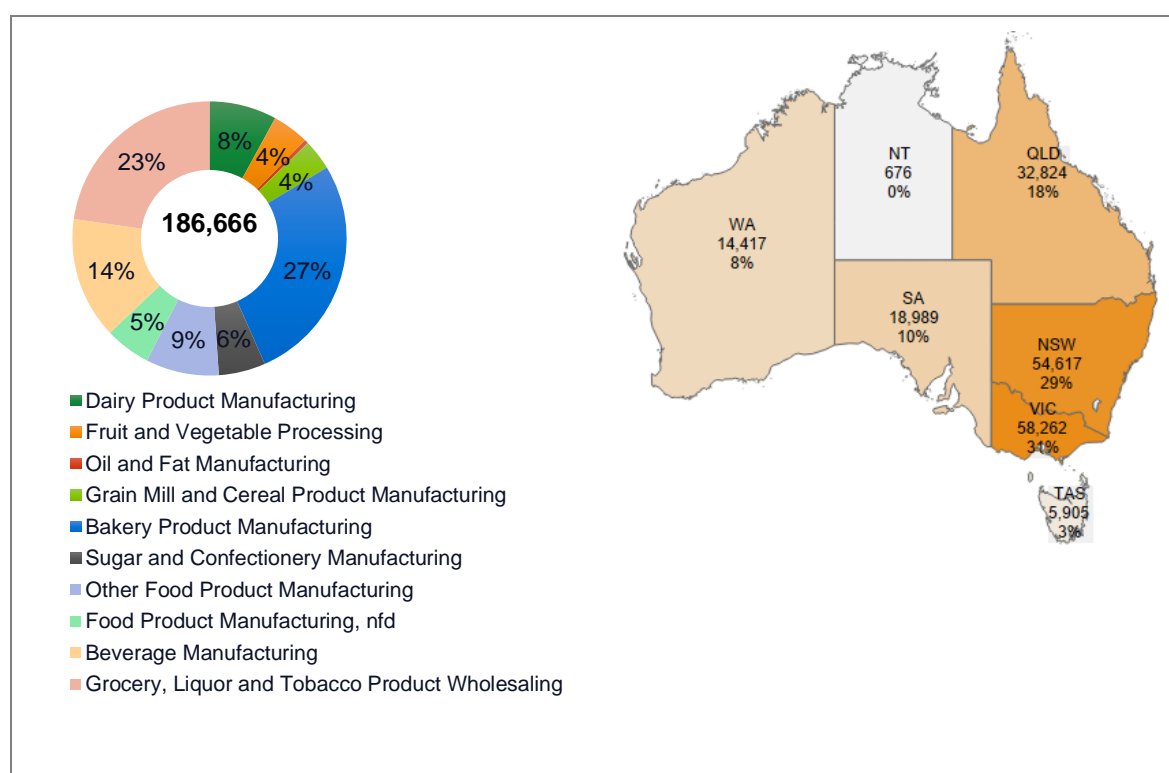
Food and Beverage Manufacturing and Wholesaling

Total and State Employment

According to census data, the Australian food and beverage manufacturing and wholesaling industry employed 186,666 people in 2016.^{48,49} This covers all food subsectors, except seafood processing and meat manufacturing, beverage manufacturing and related wholesaling activities. About 70 per cent of these people were employed full-time.

Manufacturing activities accounted for about three-quarters (77 per cent) of this industry's employment. The industry was concentrated in Victoria and New South Wales, providing 60 per cent of the industry employment.

Industry employment by subsectors and states and territories, 2016



Changes in Employment, 2006 to 2016

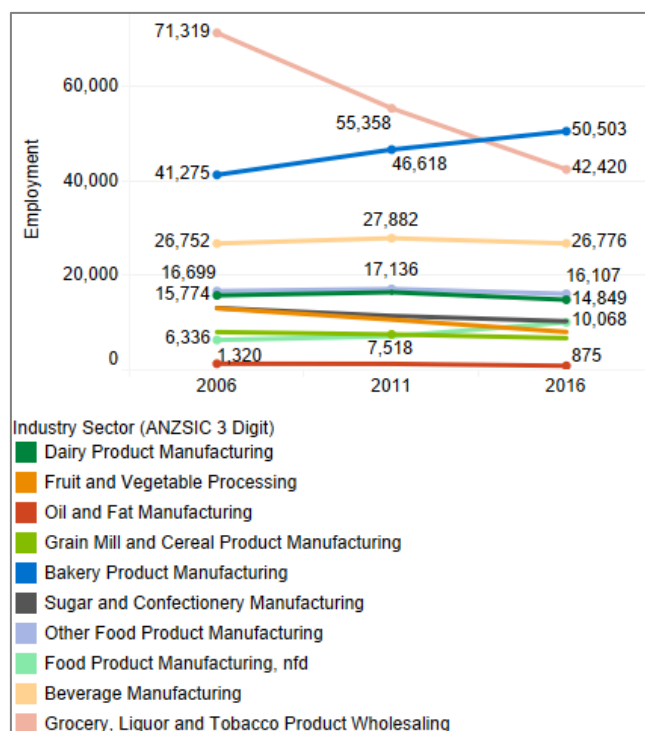
The food and beverage manufacturing and wholesaling industry experienced an overall decline in employment from 2006 to 2016. This decline was due to a significant employment fall (40 per cent) in the wholesaling sector, and additional workforce reductions in the fruit and vegetable processing, sugar and confectionary manufacturing, and grain mill and cereal product manufacturing sectors. A sub-sector analysis also shows that bakery product manufacturing went through positive

⁴⁸ All employment data in this report is sourced from the ABS Census datasets via the TableBuilder Pro product.

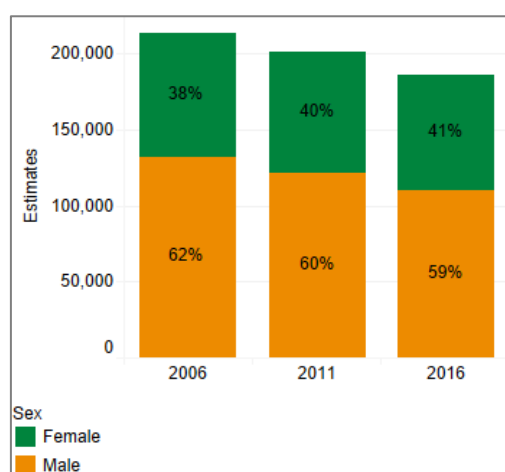
⁴⁹ National Census dataset system adjusts counts by a small number to maintain confidentiality of information. As a result, small inconsistencies can be noticed in this report between total industry employment and the sum of individual values of the data tables from Attachments.

employment growth (22 per cent) from 2006 to 2016. The employment levels in all other industry sub-sectors remained relatively stable.

Employment trends, 2006 - 2016



Industry employment by gender, 2006-2016



Gender Composition of the Workforce

This industry has a higher level of male employees than female. In 2016, women represented 41 per cent of industry's employees and men 59 per cent. Data also shows that the proportion of male and female participation changed slightly from 2006 to 2016, indicating a small increase (3 per cent) in the female workforce.

A sub-sector analysis indicates that bakery product manufacturing had the highest female participation (54 per cent) of all industry sub-sectors in 2016. The lowest level (32 per cent) was in

dairy product manufacturing, sugar and confectionary manufacturing, and grain mill and cereal product manufacturing.

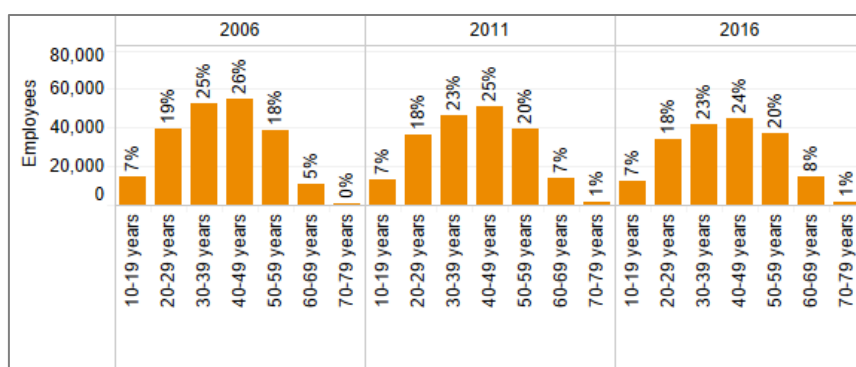
Age Levels of the Workforce

The industry workforce is ageing. The proportion of employees in each age group category over 50 years increased by up to 3 per cent in 2016, when compared with 2006.

Among all industry sub-sectors, bakery product manufacturing employed a high proportion of people in the age groups 10 to 19 years (18 per cent) and 20 to 29 years (22 per cent) and a lower proportion in the older age groups.

Tables 1 and 2 show industry employment in data tables and charts by industry subsectors, states and territories, gender age groups and occupations for the period 2006-2016.

Industry employment by age level, 2006-2016

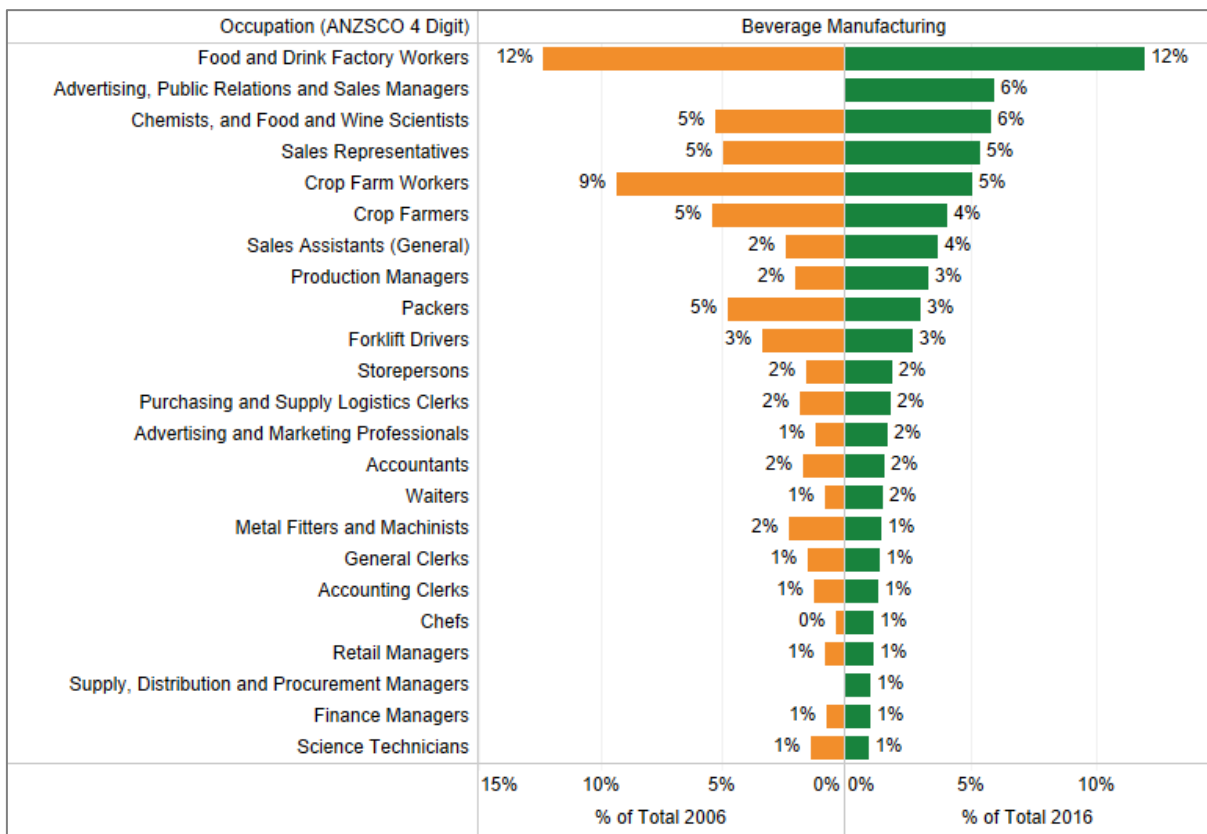
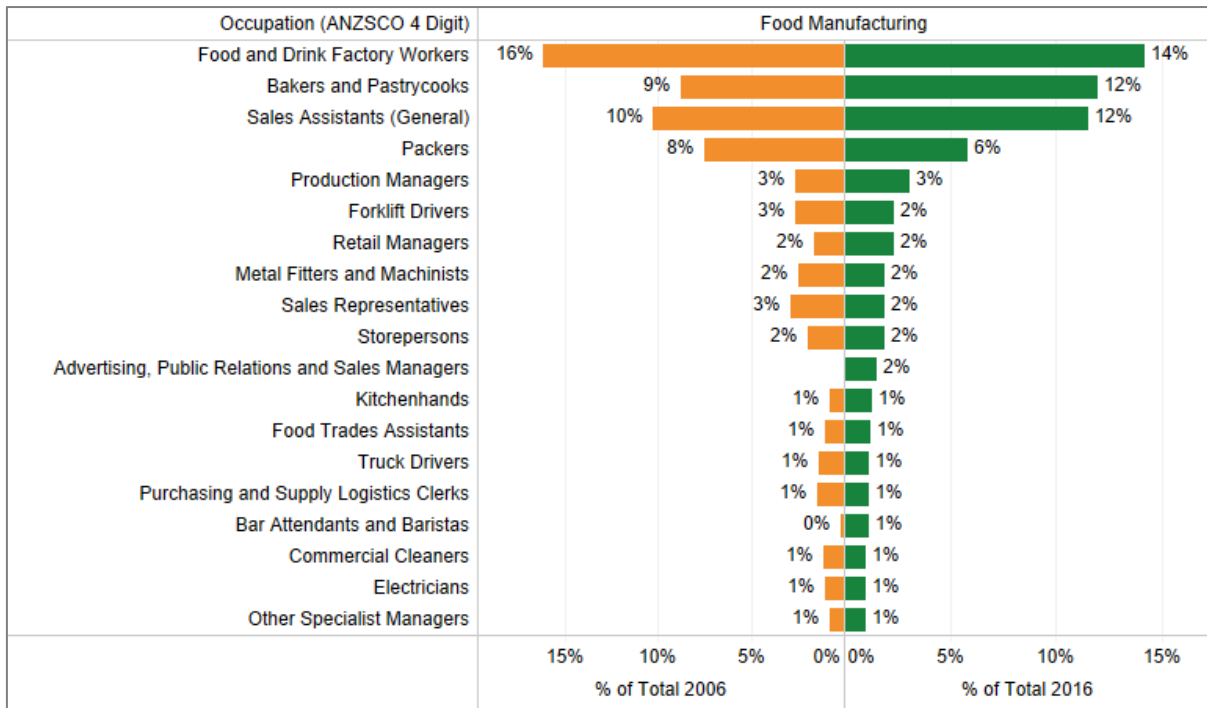


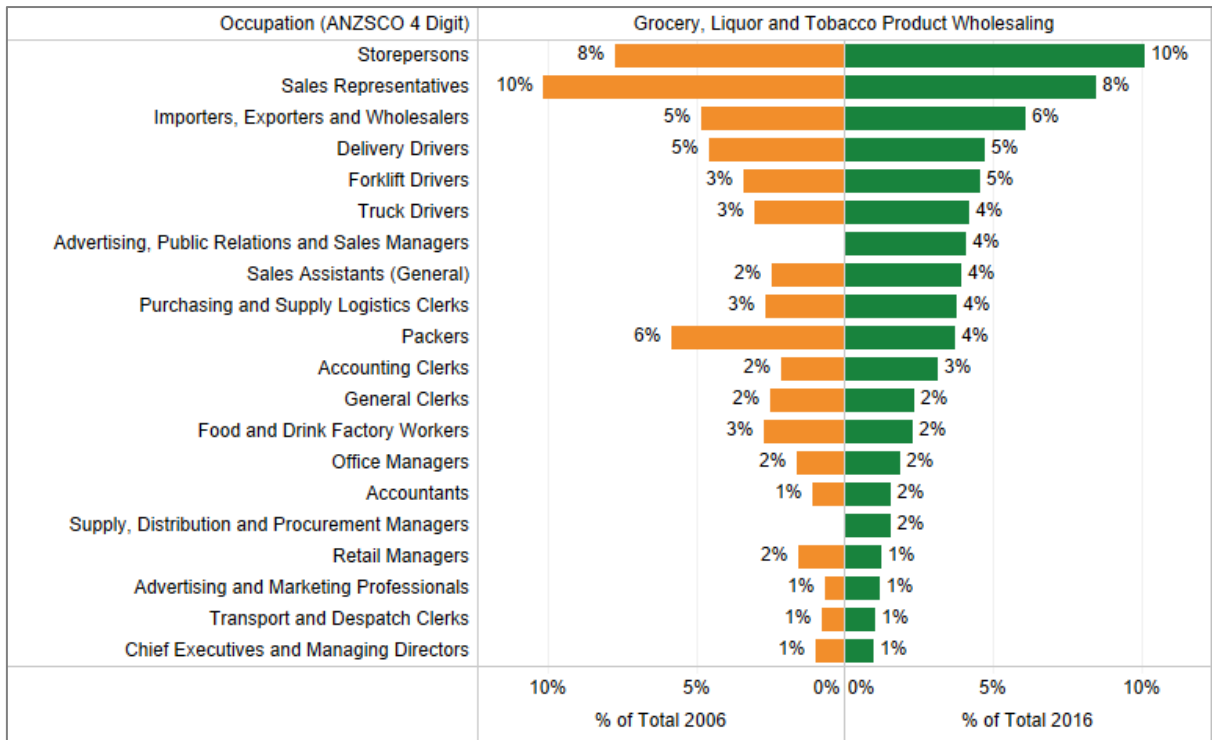
Changes in Occupation of Employment, 2006 to 2016

The most common occupation in the industry is food and drink factory workers. In 2016, people employed in this occupation represented 11 per cent of total industry employment.

Other top occupations include food and drink factory workers, sales assistants, bakers and pastrycooks, packers, sales representatives, storepersons and forklift drivers.

In terms of occupational dynamics, the proportion of people working as sales assistants increased by 2 per cent across industry subsectors including food, beverage and related wholesaling. The proportion of bakers and pastrycooks in the food manufacturing sector was also considerably higher in 2016 when compared with 2006. Conversely, the relative number of factory workers, crop farm workers and packers decreased from 2006 to 2016. All other occupations remained relatively stable over this period of time.





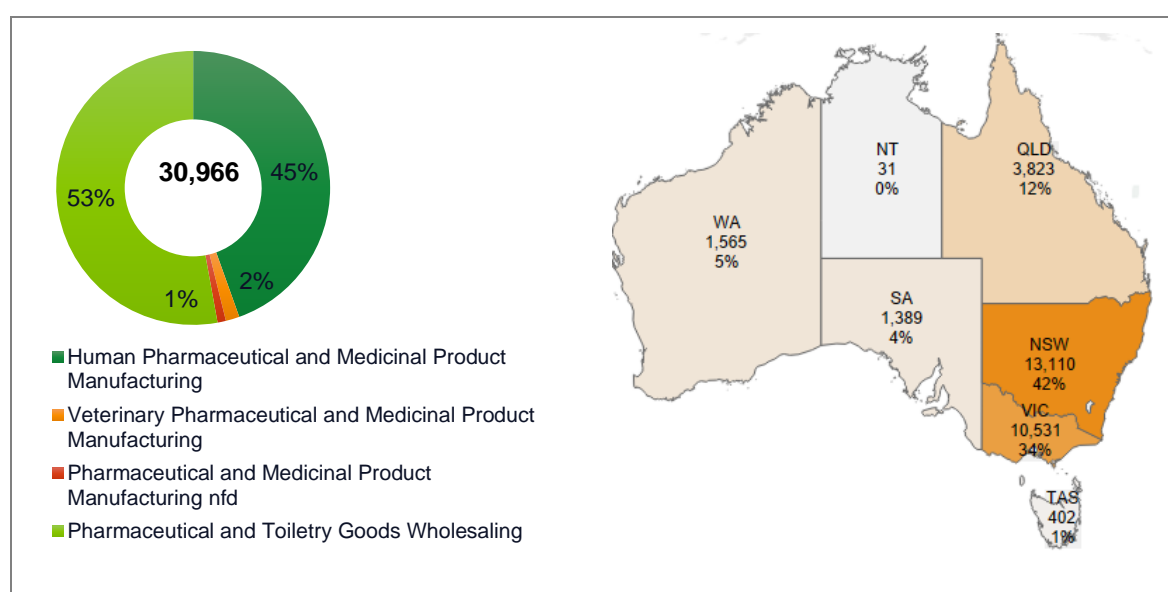
Pharmaceutical Manufacturing

Total Employment

According to census data, the Australian pharmaceutical manufacturing and wholesaling industry employed 30,966 people in 2016.⁵⁰ This covers human and veterinary pharmaceutical and medicinal product manufacturing and related wholesaling activities. About 80 per cent of these people were employed full-time.

Manufacturing activities provided just under half (47 per cent) of this industry's employment. The industry was concentrated in New South Wales and Victoria, providing 76 per cent of employment.

Industry employment by subsectors and states and territories, 2016

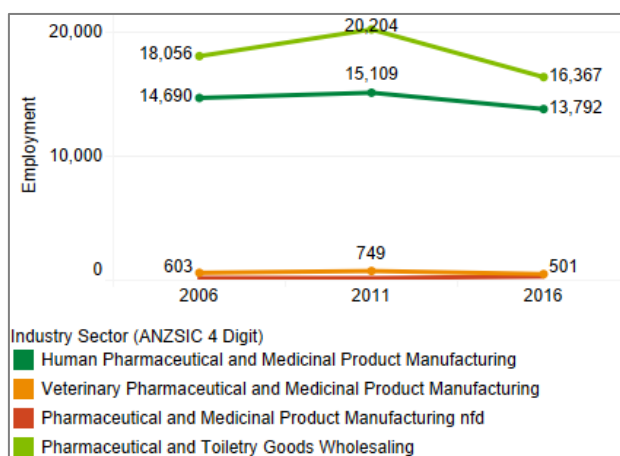


Changes in Employment, 2006 to 2016

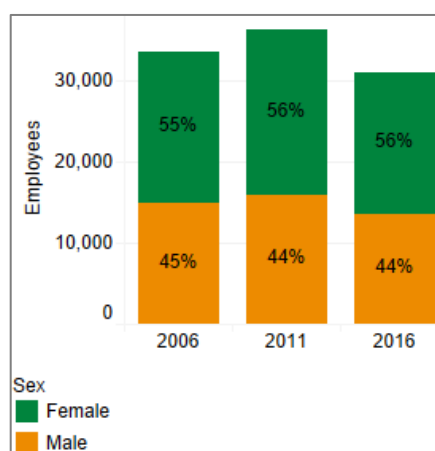
The pharmaceutical manufacturing and wholesaling industry experienced an overall decline in employment from 2006 to 2016. Analysis shows that all industry sub-sectors experienced positive employment growth from 2006 to 2011, however suffered a relatively significant decline in 2016. Employment for human pharmaceutical manufacturing dropped below the 2006 levels by 6 per cent, and for wholesaling by 9 per cent.

⁵⁰ All employment data in this report is sourced from the ABS Census datasets via the TableBuilder Pro product.

Employment trends, 2006-2016



Industry employment by gender, 2006-2016



Gender Composition of the Workforce

The pharmaceutical industry has relatively equal participation of male and female employees. In 2016, women represented 56 per cent of all employees, and men 44 per cent. Male and female participation remained relatively stable from 2006 to 2016.

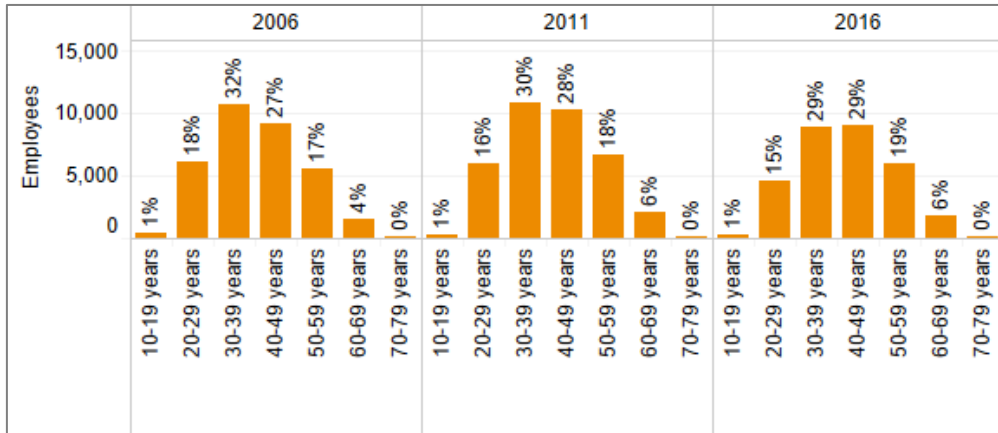
A sub-sector analysis indicates that pharmaceutical wholesaling had the highest female participation (61 per cent) of all industry sub-sectors in 2016. The lowest level was in veterinary pharmaceutical manufacturing (45 per cent), although this increased by 7 per cent when compared to the year 2006.

Age Levels of the Workforce

The industry workforce is ageing. The proportion of employees in each age group category over 50 years increased by up to 2 per cent in 2016, when compared with 2006.

Among the four industry sub-sectors, veterinary pharmaceutical manufacturing employed a lower proportion of people in the age groups 20 to 29 and 30 to 39 years, and a higher proportion in the older age groups.

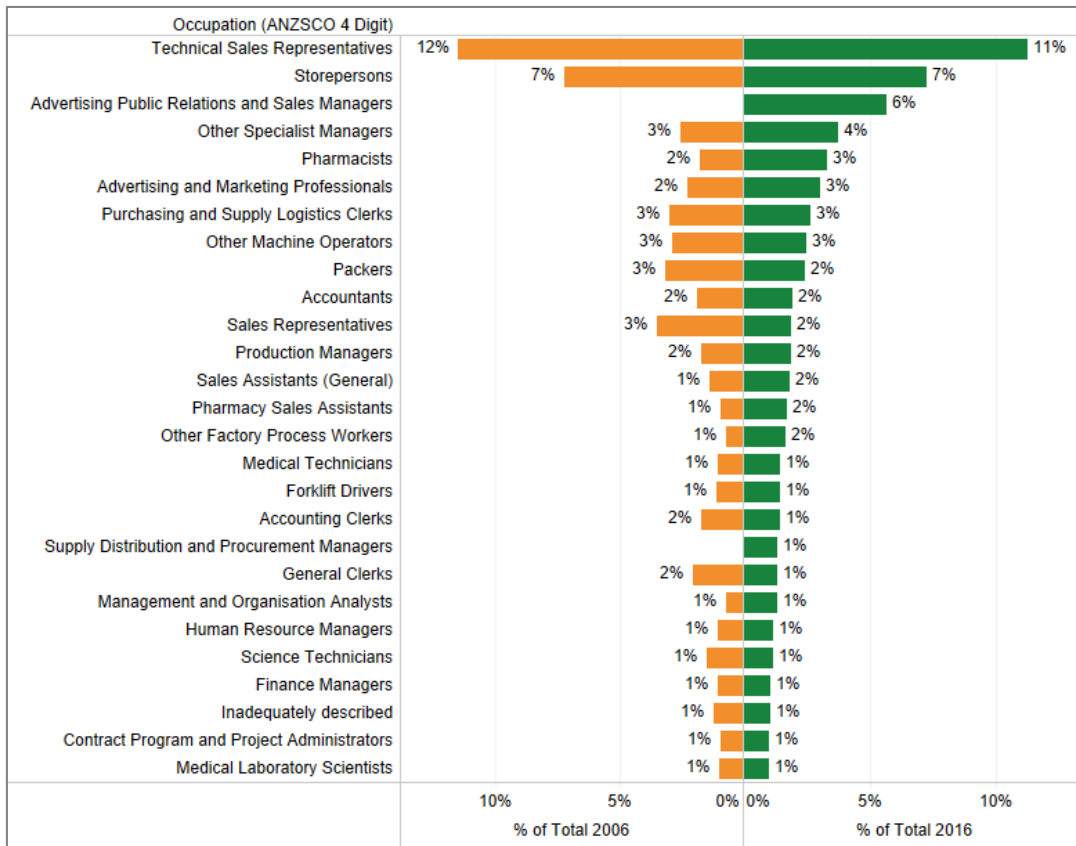
Industry employment by age level, 2006-2016



Changes in occupation of employment, 2006 to 2016

The most common occupation in the pharmaceutical industry is technical sales representatives. In 2016, people employed in this occupation represented 11 per cent of total industry employment.

Other top occupations include storepersons, advertising and sales managers, specialist managers, pharmacists, marketing professionals, logistics and supply chain officers, and machine operators.



Employment Outlook

The Department of Employment⁵¹ estimates that employment in the food, beverage and pharmaceutical industry will grow by 5 per cent over five years to 2022 (Table 1).

Table 1: Department of Employment Industry Projections – five years to May 2022⁵²

Industry Sector	Employment Level	Employment Projections		
	May 2017 ('000)	May 2022 ('000)	Growth ('000) (%)	
Food Product Manufacturing, nfd	22.4	24.0	1.6	7.2
Dairy Product Manufacturing	16.8	17.9	1.1	6.6
Fruit and Vegetable Processing	6.8	7.0	0.2	3.1
Oil and Fat Manufacturing	1.2	1.2	0.0	2.8
Grain Mill and Cereal Product Manufacturing	7.4	7.6	0.2	2.8
Bakery Product Manufacturing	58.5	59.0	0.5	0.8
Sugar and Confectionery Manufacturing	12.9	13.6	0.7	5.6
Other Food Product Manufacturing	12.6	13.4	0.9	7.0
Beverage Manufacturing	32.5	34.7	2.2	6.7
Pharmaceutical and Medicinal Product Manufacturing	23.5	26.2	2.7	11.6
Grocery, Liquor and Tobacco Product Wholesaling	64.7	68.1	3.4	5.3
Pharmaceutical and Toiletry Goods Wholesaling	18.6	17.9	-0.7	-3.8
Total	277.9	290.6	12.7	5

Training Update

Anticipating future skills needs in the food, beverage and pharmaceutical product industry is crucial to prepare for and meet the new demands of food sustainability and product markets in Australia.

Leading indicators of the current and future skills needs in the sector include:

⁵¹ Department's projections are based on the forecasts and projections set out in the Mid-Year Economic and Fiscal Outlook

⁵² Department of Employment, 2016, 'Industry Employment Projections – Five Years to May 2022', viewed December 2017, <<http://lmip.gov.au/default.aspx?LMIP/EmploymentProjections>>.

- trends and/or estimates of workforce supply, skill shortages, employment growth or growing occupations
- future changes in workplace and job design that are driven by innovation at the business and/or industry level as a result of economic, technological, social and environmental factors, as well as introduction of new policies and legislations.

This section identifies the priority skills needs in the food, beverage and pharmaceutical product manufacturing over the next four years (2018–2021) through an analysis of new and estimated future demands placed upon the industry. The section focuses on the skills needs that can benefit from improvement or development of national skills standards, as opposed to market adjustment mechanisms designed to balance the supply and demand for a skilled workforce.

The industry expects that the priority skills projects identified in this section will be undertaken over 2018 and 2019 so that the skills can be developed and available before 2021. Refer to *Attachment A – IRC Training Product Review Plan 2018–2021* for the proposed schedule of priority skills projects and units of competency to be checked for currency and possibly reviewed as part of the four-year cycle.

The 2018–2021 outlook for skills needs and priorities in the food, beverage and pharmaceutical product industry is shaped by a range of development trends and factors as outlined below.

Training Activity

Number of Training Providers

Currently, there are 746 registered training organisations with *FDF10 Food Processing Training Package* training components on their scope, servicing the food, beverage and pharmaceutical product manufacturing industry sector.⁵³

It is expected that these RTOs will upgrade to using the *FBP Food, Beverage and Pharmaceuticals Training Package* over the next twelve months.

Number of student enrolments

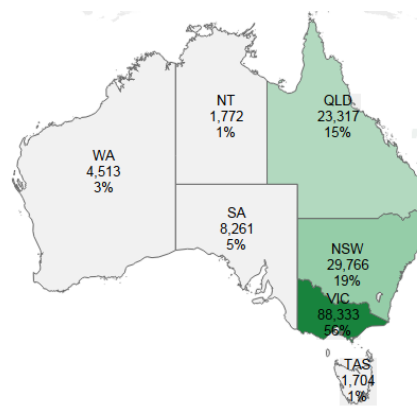
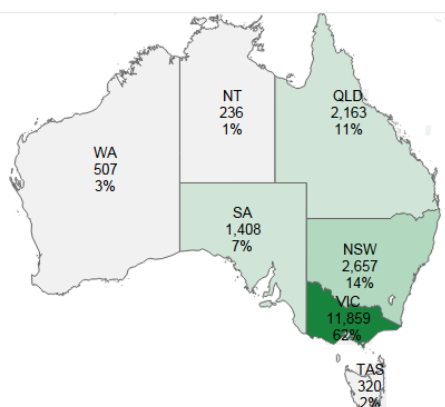
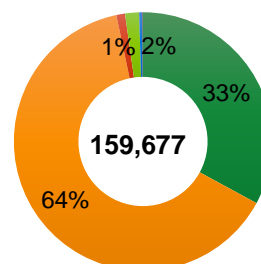
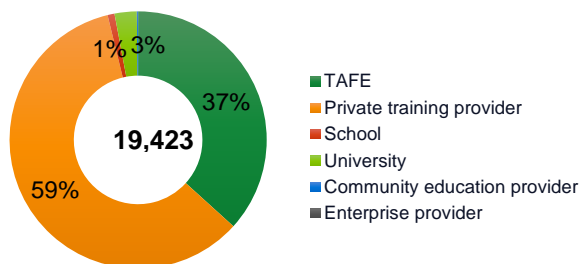
In 2016, there were 19,423 student enrolments in FDF qualifications and 159,677 student enrolments in FDF units of competency. Most students were attracted by private training providers and TAFE organisations in Victoria.⁵⁴

Student enrolments, 2016

FDF Qualifications	FDF Subjects*
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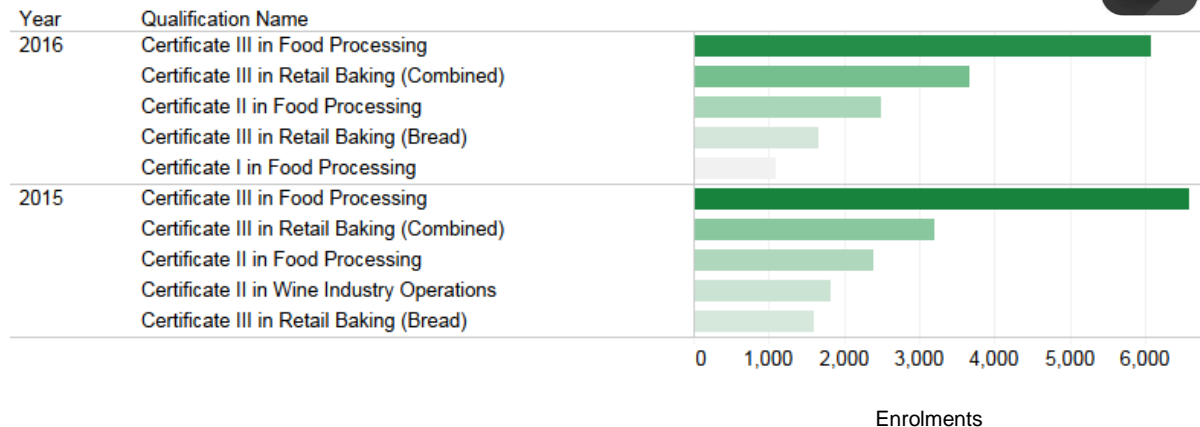
⁵³ training.gov.au

⁵⁴ All training data in this report is sourced from VOCSTATS



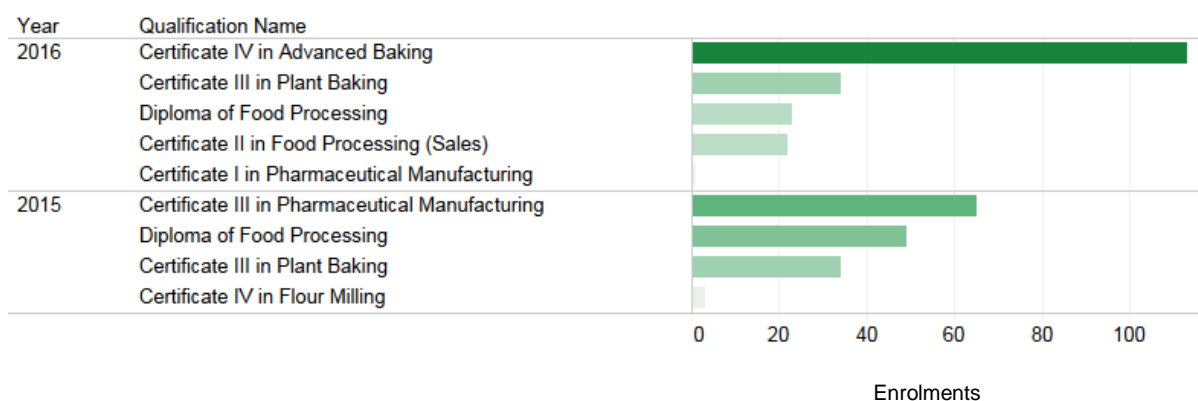
* Units of competency prefixed FDF.

Top 5 most popular qualifications



Least popular qualifications





Qualifications with no enrolments



Year	Qualification Name
2016	Certificate I in Sugar Milling Industry Operations
	Certificate I in Pharmaceutical Manufacturing
	Certificate II in Pharmaceutical Manufacturing
	Certificate II in Sugar Milling Industry Operations
	Certificate III Sugar Milling Industry Operations
	Certificate IV in Pharmaceutical Manufacturing
	Certificate IV in Flour Milling
	Diploma of Pharmaceutical Manufacturing

Qualification enrolments

Total VET enrolments in FDF qualifications declined by 3 per cent (or 676 enrolments) to 19,423 between 2014 and 2016. This includes enrolments from all types of providers and combines government-funded, apprentices, VET in schools and fee-for-service training from private and other training providers.

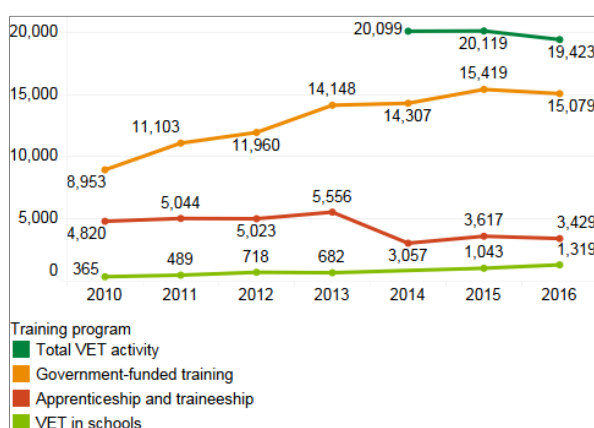
Apprenticeships and traineeships for food trade and non-trade occupations dropped by 45 per cent to 3,057 commencements in 2014, after a relatively steady period. Commencements improved slightly between 2014 and 2016.

Government-funded enrolments for FDF

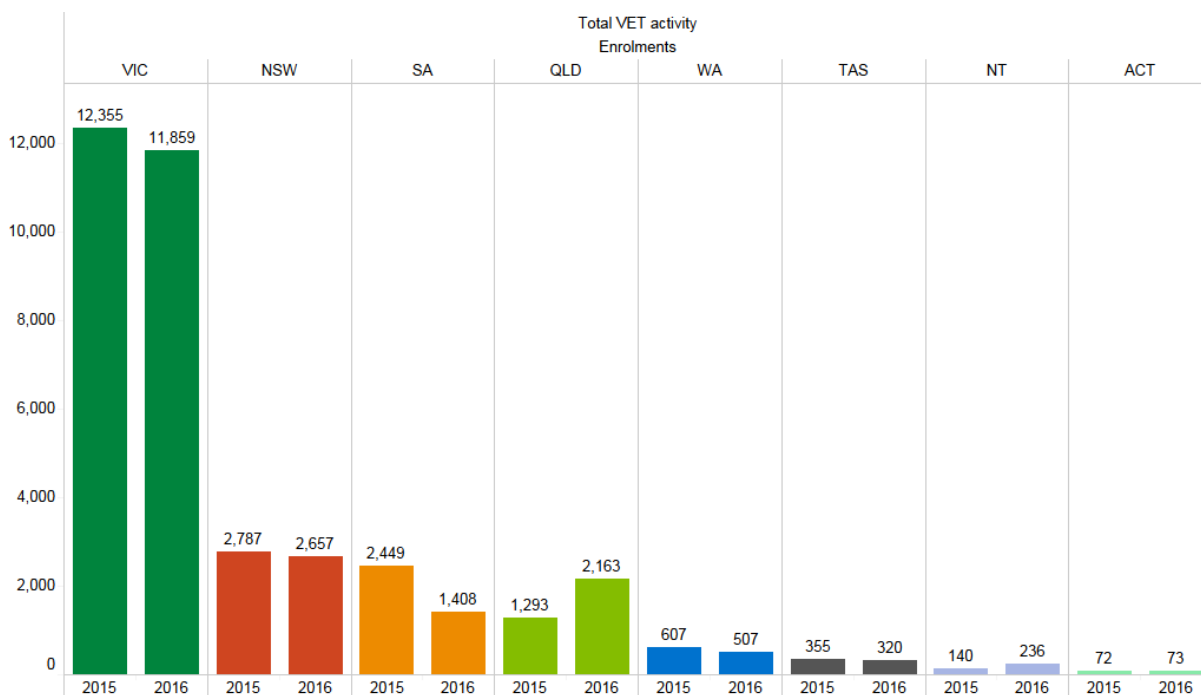
qualifications increased gradually from a low of 8,953 in 2010 to a high of 15,419 in 2015. This represents a 72 per cent increase in enrolments over 2010–2015. This growth was followed by a slight fall of 2 per cent (or 340 enrolments) to 15,079 in 2016.

VET in schools activity regarding FDF qualifications delivered to school students expanded by 261 per cent from 2010 to 2016, to a total of 1,319 enrolments.

Trends in enrolments for FDF qualifications, 2010–2016



State level comparison for total VET enrolments in FDF qualifications, 2015–2016*



* State/territory of training organisation. Uncategorised data for state/territories (reported as 'Not known') is not included.

This table also presents VET activity for the FDF qualifications in data tables by program type (total VET activity, apprenticeship and traineeship and government-funded training and VET in schools), training status (enrolments and completions), qualification names and state and territory for the period 2012–2016.

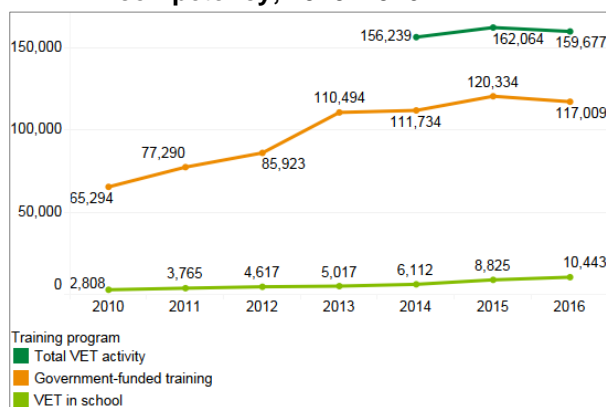
Subject Enrolments

Total VET enrolments for FDF subjects increased by 4 per cent (or 5,825 enrolments) from 2014 to 2015 and dropped slightly in 2016.

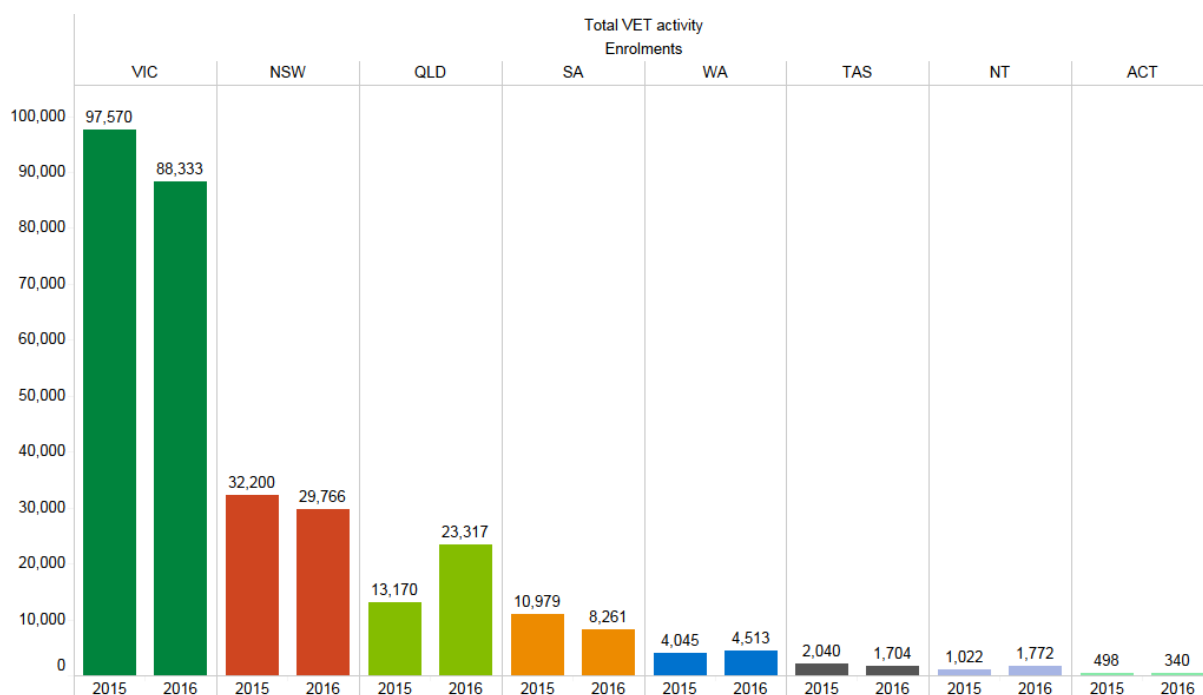
Government-funded enrolments expanded by 69 per cent (or 45,200 enrolments) from 2010 to 2013 and continued to rise gradually to a high of 120,337 in 2015. This growth was followed by a slight decline (3 per cent) reaching 117,009 enrolments in 2016.

VET in schools activity regarding FDF subjects delivered to school students increased gradually from a low of 2,808 enrolments in 2010 to 10,443 enrolments in 2016. This represents a 272 per cent increase in enrolments over 2010–2016.

Trends in enrolments for FDF units of competency, 2010–2016



State level comparison for total VET enrolments in FDF units of competency, 2015–2016*



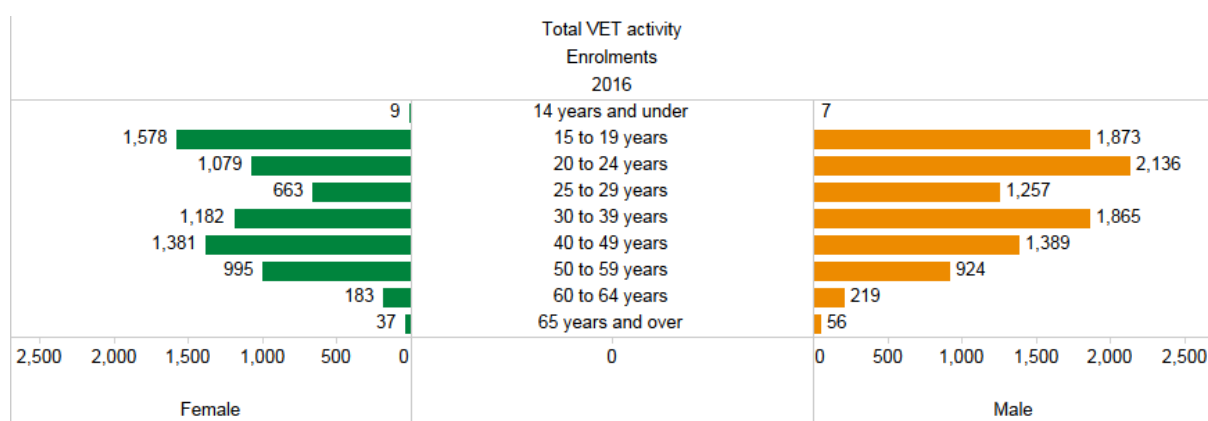
* State/territory of training organisation. Uncategorised data for state/territories (reported as 'Not known') is not included.

This table also presents VET activity for the FDF units of competency in data tables by program type (total VET activity, government-funded training and VET in schools), training status (enrolments and completions) and units of competency name for the period 2012–2016.

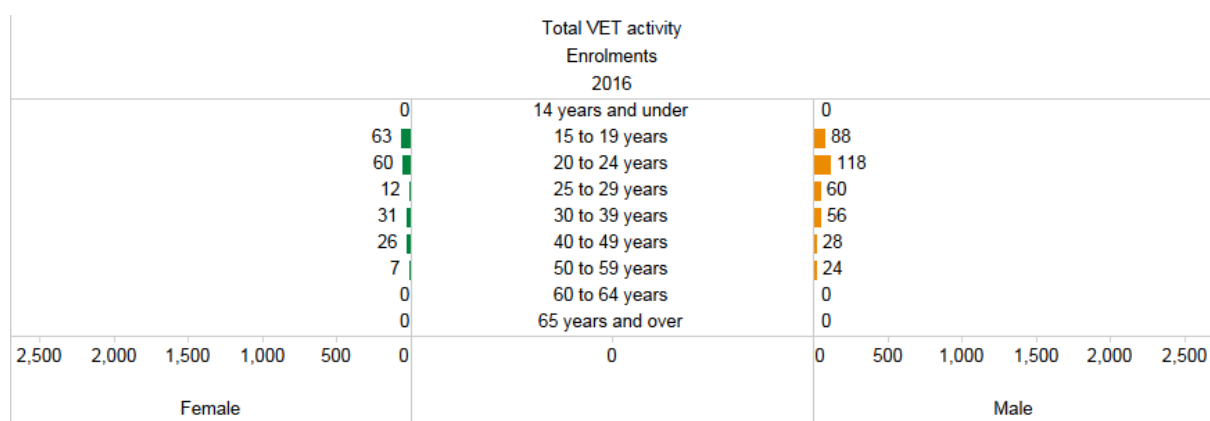
Student profile

- Total student cohort enrolled in FDF qualifications was represented by 58 per cent male and 42 per cent female in 2016. The highest proportion of students were in the age groups 15 to 19, 20 to 24 and 30 to 39 years. There was a small representation of Indigenous students (573). Over half of students lived in major cities and a quarter in inner regional Australia. A small proportion of students resided overseas.

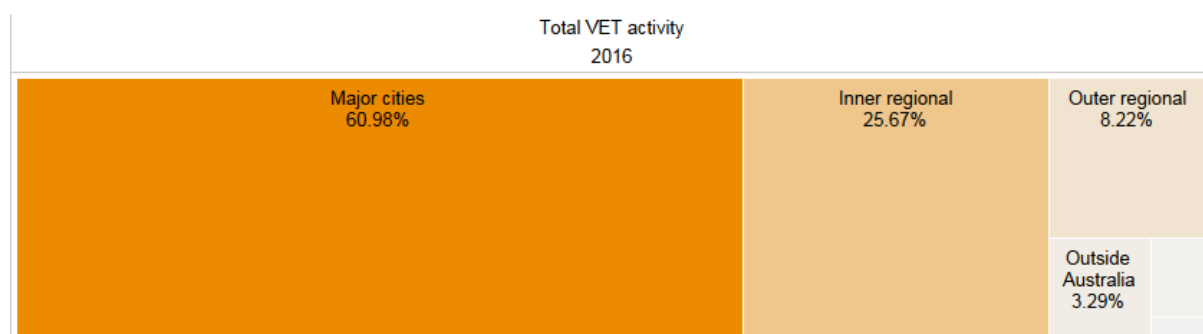
Student personal characteristics: GENDER AND AGE*



Student personal characteristics: **INDIGENOUS STATUS***



Student personal characteristics: **REMOTENESS***



* Uncategorised data (reported as 'Not known') is not included.

D. SKILLS OUTLOOK

This section identifies the priority skills needs in the food, beverage and pharmaceutical manufacturing industry over the next four years (2018-2021), as established by the Industry Reference Committees through an analysis of new and estimated future demands placed upon the industry.

The section focuses on the skills needs that can benefit from improvement or development of the national skills standards as opposed to skills shortages (positions difficult to fill). The latter is outside the scope of this report and are typically addressed through other mechanisms such as industries' workforce strategic plans and governments' market adjustment mechanisms, designed to balance the supply and demand for a skilled workforce.

Industry Priority Skills

The 2018-2021 outlook for skills needs and priorities in the food, beverage and pharmaceutical manufacturing industry is shaped by a range of development trends and factors, as outlined below. (Note: these are divided into two sections for each of the IRCs.)

PHARMACEUTICAL MANUFACTURING IRC

Priority Skill 1	Skill description
Bioprocessing Technologies	<p>The biotechnological sector in the Australian pharmaceutical manufacturing industry is expanding and attracting significant investment with further growth expected. This industry involves the manufacture of products from or via living organisms. Examples of such organisms include bacteria, yeast and mammalian cells. Primarily, industrial biotechnology deals with the manufacture of protein-based products. Working with these "large molecules" involves a more complex production process. This requires a specific set of skills and knowledge, and involves managing higher risks of product degradation, process variability, contamination and complex analytical techniques.</p> <p>Biotechnology is currently used in applied immunology, pharmaceutical therapies and diagnostic tests.</p> <p>The skills and knowledge required to work in this growing field include:</p> <ul style="list-style-type: none">• contamination control• cleanroom operations• recombinant DNA technology• cell culture manufacturing• aseptic and sterile manufacturing• purification processing• manufacturing execution systems• stainless steel and single use technology manufacturing

- data analytics, including Process Analytical Technology and Industry 4.0

Relevant occupations

- Manufacturing operators
- Plant operators
- Bioprocess technicians
- Quality assurance and quality control staff
- Research and development staff
- Fill finish/packaging operators
- Project managers
- Stock management and distribution staff

Drivers

- The biotechnological industry is a fast-growing sector within the pharmaceutical manufacturing industry. There is rapid growth in the numbers of people employed in this industry and the domestic and international markets are expanding.
- The availability of skills and talent in biotechnologies is seen by the industry as a key prerequisite for future competitiveness, investment and employment. Approximately half of the workforce required for this sector require skills addressed through the vocational education and training sector, including plant and machine operators, tradespeople and technicians.
- Given anticipated expansion, job openings are expected to arise within the biotech industry in Australia over the next few years. The skills and knowledge required in the workforce to meet these needs will need to align with this expansion.
- New entrants to the industry will need to develop new, relevant skills for working with biotechnologies. Existing employees will require upskilling and ongoing development of skills and knowledge.
- Stringent quality compliance and regulator demands, including international standards mean that the manufacture of biotech products requires a high level of training and awareness of the risks involved and standards required.
- Other factors driving the need for this review include global standards of product and process compliance, the expectations of innovation and operational excellence, and the pace of change in the pharmaceutical manufacturing sector.

Training package solutions

- 1 new qualification
- 1 new skill set
- 15 new units of competency
- Revision of 9 existing units of competency
- Assessment of AQF level for the new qualification

Impact

- Higher-skilled new entrants to the industry.
- A specific stream of study for people wishing to enter this field.
- Formalised upskilling program for existing staff.

Risks of not proceeding

Without sufficiently skilled biotech workers in Australia, the industry will need to:

- source skilled biotech workers from overseas
- rely on internal training programs to upskill and train employees, placing the responsibility for training for this industry onto the larger biotech producers
- source workers with tertiary qualifications (engineers, biochemists, microbiologists, pharmacists) to perform general production tasks.

Priority skill 1

Artisanal
cheesemaking

Skill description

This project addresses the inadequacies identified in the current qualifications available to a growing market of artisan cheese and other fermented dairy product makers seeking skills recognition and training for making cheeses using an increasingly diverse variety of raw products and methods.

The skills required in this industry that are not currently addressed in the Certificate III in Food Processing include:

- setting up and maintaining a functioning factory
- life cycle of fungi and bacteria
- fermentation-related biological processes
- creation of own recipes and tastes
- cheese grading
- cleaning options (including decreasing environmental impact)
- waste management
- processing different types of cheese

- working with different chemical compositions of raw milks from different species and seasons
- pasteurisation on a small scale (batch, continuous)
- recordkeeping and regulatory compliance
- traceability systems and monitoring
- diagnosing and troubleshooting problems with plant and equipment
- pathogen management
- recall processes
- maintain current knowledge of industry trends and product development
- affinage environments, tools and processes
- milk quality control and preparation
- microbiological processes for artisan and farmhouse cheesemakers.

Drivers

Artisan cheese is growing in popularity and small entrepreneurial businesses are flourishing and employing staff. Current qualifications and courses available in Australia do not address the complex skills required to safely process raw product and the various types of milks and cheeses that the current market demands.

Training package solutions

- 1 new qualification
- 19 new units of competency
- Revision of 17 existing units of competency
- Assessment of AQF level for the new qualification

Relevant occupations

- Cheesemakers
- Assistant cheesemakers
- Production managers – cheese
- Production technicians – cheese
- Production assistants – cheese

Impact

- Higher-skilled entrepreneurs setting up cheese manufacturing businesses.
- Higher-skilled new entrants to the industry.

- Cheesemakers will no longer need to go to Europe and America to learn about the more complex aspects of affinage (maturation) processes and biological processes involved in cheesemaking.
- A specific stream of study for people wishing to enter this field.
- It will create a formalised upskilling program for existing staff.
- Training organisations will be able to package qualifications with sufficient relevant units specifically for people entering the artisanal cheesemaking industry without having to provide training and assessment services on necessary topics.
- Graduates will achieve a qualification with a title that reflects their field of study.

Risks of not proceeding

- Increase in health risks due to poor knowledge of food safety when handling and processing different types of raw milk.
- Cheesemakers and their staff will continue to travel outside of Australia to gain the higher-level skills required for this industry.
- Due to the lack of options available and the cost of going to French or American cheese training institutions, many cheesemakers and their staff will remain unqualified.
- The qualification will continue to not reflect – in title and content – the skills needed for this industry.
- People will continue to be discouraged to enrol in a qualification that does not meet their needs and does not have a title that reflects their field of expertise.

Priority skill 2 Skill description

Brewing and distilling

Those working with beer, cider and a range of other alcoholic beverages need to be able to:

- produce safe spirit/beer of high quality
- operate, maintain and clean equipment, and all production (cooling, fermenting and distilling) systems
- produce consistent quality beverages
- create recipes to suit specific demographics
- alter and refine recipes to meet consumer needs
- create tasting notes
- produce a variety of styles
- explain the production process to others
- work autonomously

- manage a team to achieve suitable production and quality outcomes
- conduct pasteurisation on a small scale (batch, continuous)
- understand and operate keg, bottling and/or canning lines
- keep records and document excise information
- understand fluid transfer requirements
- demonstrate a good understanding of the international and domestic craft fermented beverage market
- understand, select and use relevant cleaning options (including managing environmental concerns)
- understand, select and use relevant waste management options
- understand, select and adopt relevant food safety systems
- Understand the compliance and business requirements of a small operation.

Relevant occupations:

- Brewer/distiller
- Master brewer
- Assistant brewer/distiller
- Packaging and bottling assistant
- Brewery/distillery production manager
- Brewery/distillery production assistant

Drivers

The increase in popularity of craft or artisan beer and distilled spirits has seen this industry expand.

Small breweries and distilleries have experienced substantial growth in production and employee numbers.

There were 46 new independent breweries established in 2017 and some existing craft breweries are partnering with larger producers to access infrastructure that will enable further growth.

Current training options are limited and are mostly operating outside of the Australian VET sector. Within the VET sector, the Certificate III in Food Processing does not sufficiently meet the multi-faceted skill needs of brewers and distillers and their staff in small to medium-sized breweries and distilleries.

Training package solutions

- 2 new qualifications
- 3 new skill sets
- 10 new units of competency

- Revision of 20 existing units of competency
- Assessment of AQF level for the new qualifications

Impact

- Higher skilled entrepreneurs setting up brewing and spirit distilling businesses.
- Higher-skilled new entrants to the industry.
- Brewers and distillers will no longer need to go overseas to learn about the more complex aspects of beer making, spirit distilling processes.
- This will create a specific stream of study for people wishing to enter this field.
- It will create a formalised upskilling program for existing staff.
- Training organisations will be able to package qualifications with sufficient relevant units specifically for people entering the brewing and spirit distilling industry without having to provide training and assessment services on necessary topics.
- Graduates will achieve a qualification with a title that reflects their field of study.
- This will encourage greater access to appropriate education in modern brewing techniques.
- This project will align the complexity of the brewing skills to an appropriate qualification and AQF level.
- It will increase the usage of a nationally-recognised qualification.

Risks of not proceeding

- Brewers and distillers will be unable to access education and training in the rapidly changing technologies used within the industry.
- Brewing and distilling companies will continue to source internationally-trained staff.
- The industry will need to access international training opportunities in lieu of suitable local options available.
- The emerging market for Australian facilities to attract international students will be halted.
- Increase in health risks due to poor knowledge of food safety when handling and processing beer and spirits.
- Brewers, distillers and their staff will continue to travel outside of Australia or to purchase international training courses and products to gain the higher-level skills required for this industry.
- Due to the lack of options available and the cost of accessing international training institutions, many operators of smaller breweries and their staff will remain unqualified.

- The qualification will continue to not reflect – in title and content – the skills needed for this industry.
- People will continue to be discouraged to enrol in a qualification that does not meet their needs and does not have a title that reflects their field of expertise.

Priority skill 3

Food and
beverage
fermentation

This project will identify and fill the gaps in current food processing qualifications to address food safety and manufacturing processes involved in the growing field of fermented food and beverage production.

Fermentation preserves food, enhances flavours and has health benefits – humans have been doing it for centuries. Fermentation is a transformative process in which microorganisms (bacteria, yeast and fungi) turn sugars into food acids, carbon dioxide and/or alcohol. Fermentation can occur naturally or by application of a commercially-produced starter culture.

The sector encompasses companies that manufacture bread, beer, cider, wine, ginger beer, mead, cheese, yoghurt, sauerkraut, vinegar and pickles. There are many more products increasing in popularity that may be less familiar:

- kefir is a cultured fermented beverage, made from milk, water or coconut milk
- kimchi is a staple Korean side dish, made from salted, spiced and fermented vegetables
- kombucha is an effervescent drink, fermented from sweetened black or green tea.

Skills and knowledge required for this industry include:

- understanding the nature and control of fermentation processes
- operation of technologically advanced fermenting and related tools and equipment
- understanding and application of good manufacturing practices, including equipment cleaning and sanitising
- understanding and application of micro-organisms involved in fermenting food
- cultivation and isolation of microorganisms relating to the fermentation process
- application of knowledge of yeast, bacterial and fungal fermentation processes
- application of food safety principles to the fermentation process
- conducting and interpreting tests of samples of fermented food and beverages
- working with living cultures and organisms.

Relevant occupations:

- Food processing technicians
- Manufacturing technicians
- Food processing operators
- Biotechnologists

Drivers

Due to low-cost entry to market and growing demand for functional fermented food and non-alcoholic fermented beverage products, small home-based and medium-sized businesses have started to appear in greater numbers.

Occupational standards are required to support the growth in industry and ensure consistent and safe products are produced.

The growing market for fermented foods and drinks is also being driven by a growing focus on healthier food options within Australia's and Asia's middle-classes, particularly on products that have beneficial effects on gut health and the growing awareness of fermented food and non-alcoholic fermented beverages in addressing digestive disorders.

Training package solutions

- 1 new qualification
- 3 skill sets
- 9 new units of competency
- Revision of 4 existing units of competency
- Assessment of AQF level for the new qualification

Impact

- Higher skilled entrepreneurs setting up food fermenting businesses.
- Higher-skilled new entrants to the industry.
- This will create a specific stream of study for people wishing to enter this field.
- It will create a formalised upskilling program for existing staff.
- Training organisations will be able to package qualifications with sufficient relevant units specifically for people wishing to enter the food fermentation industry without having to provide training and assessment services on necessary topics.
- Graduates will achieve a qualification with a title that reflects their field of study.
- This will encourage greater access to appropriate education in modern food fermentation techniques.
- This project will align the complexity of food fermentation skills to an appropriate qualification and AQF level.
- It will increase the usage of a nationally-recognised qualification.

Risks of not proceeding

- Food fermentation technicians and other people involved in fermenting foods will be unable to access education and training in the rapidly changing technologies used within the industry.
- Food fermentation companies will continue to source internationally-trained staff.
- The industry will need to access international training opportunities in lieu of suitable local options available.
- Increase in health risks due to poor knowledge of food safety when handling and processing different types of fermented food and non-alcoholic fermented beverages.
- Due to the lack of options available and the cost of accessing international training institutions, many food fermentation technicians will remain unqualified.
- The qualification will continue to not reflect – in title and content – the skills needed for this industry.
- People will continue to be discouraged to enrol in a qualification that does not meet their needs and does not have a title that reflects their field of expertise.

Industry Priority for Generic Skills

Industry Reference Committees were consulted on ranking the generic skills priorities for the industry from a list provided by the Department of Education and Training. **Error! Reference source not found.** below table outlines the advice received.

Table X: Industry generic skills ranking by priority

Rank	Generic Skill
1	Managerial / Leadership skills Ability to effectively communicate with all functional areas of the organisation. Ability to represent and develop tasks and work processes for desired outcomes. Ability to oversee processes, guide initiatives and steer employees toward achievement of goals.
2	Learning agility / Information literacy / Intellectual autonomy and self-management skills Ability to identify a need for information. Ability to identify, locate, evaluate, and effectively use and cite the information. Ability to discriminate and filter information for importance. Ability to do more with less. Ability to quickly develop a working knowledge of new systems to fulfil the expectations of a job. Ability to work without direct leadership and independently.
3	Technology use and application skills Ability to create and/or use of technical means understand their interrelation with life, society, and the environment. Ability to understand and apply scientific or industrial processes, inventions, methods etc. Ability to deal with increasing mechanisation and automation and computerisation. Ability to do work from mobile devices rather than from paper.
4	Science, Technology, Engineering and Maths (STEM) skills Sciences, mathematics and scientific literacy.
5	Language, Literacy and Numeracy (LLN) skills Foundation skills of literacy and numeracy.
6	Entrepreneurial skills

Rank	Generic Skill
	<p>Ability to take any idea, whether it be a product and service, and turn that concept into reality and not only bring it to market but make it a viable product and/or service.</p> <p>Ability to focus on the very next step to get closer to the ultimate goal.</p> <p>Ability to weather the ups and downs of any business.</p> <p>Ability to sell ideas, products or services to customers, investors or employees etc.</p>
7	<p>Data analysis skills</p> <p>Ability to translate vast amounts of data into abstract concepts and understand data-based reasoning.</p> <p>Ability to use data effectively to improve programs, processes and business outcomes.</p> <p>Ability to work with large amounts of data: facts, figures, number crunching, analysing results.</p>
8	<p>Communication / Collaboration including virtual collaboration/ Social intelligence skills</p> <p>Ability to understand and apply the principles of creating more value for customers with fewer resources (lean manufacturing) and collaborative skills.</p> <p>Ability to critically assess and develop content that uses new media forms and leverage these media for persuasive communications.</p> <p>Ability to connect with others deeply and directly, to sense and stimulate reactions and desired interactions.</p>
9	<p>Design mindset / Thinking critically / System thinking / Solving problems skills</p> <p>Ability to adapt products to rapidly shifting consumer tastes and trends.</p> <p>Ability to determine the deeper meaning or significance of what is being expressed via technology.</p> <p>Ability to understand how things that are regarded as systems influence one another within a complete entity, or larger system.</p> <p>Ability to think holistically.</p>
10	<p>Environmental and Sustainability skills</p> <p>Ability to focus on problem-solving and the development of applied solutions to environmental issues and resource pressures at local, national and international levels.</p>
11	<p>Customer service / Marketing skills</p> <p>Ability to interact with another human being, whether helping them find, choose or buy something.</p>

Rank	Generic Skill
	<p>Ability to supply customers' wants and needs both via face to face interactions or digital technology.</p> <p>Ability to manage online sales and marketing.</p> <p>Ability to understand and manage digital products.</p>
12	<p>Financial skills</p> <p>Ability to understand and apply core financial literacy concepts and metrics, streamlining processes such as budgeting, forecasting, and reporting, and stepping up compliance.</p> <p>Ability to manage costs and resources, and drive efficiency.</p>
13	<p>Other generic skills:</p>
	<p>Workplace Health and Safety</p>

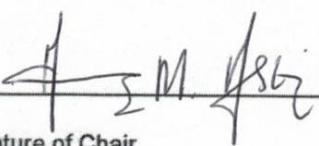
B. IRC SIGN-OFF

This IRC Skills Forecast and Proposed Schedule of Work was agreed as the result of a properly constituted IRC decision.

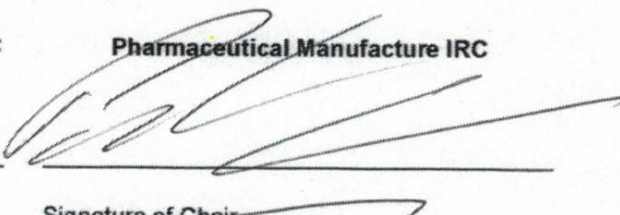
Signed for and on behalf of the two Industry Reference Committees by their appointed Chairs

Food, Beverage and Pharmaceutical IRC

Pharmaceutical Manufacture IRC



Signature of Chair



Signature of Chair

Anne M Astin

Paul MacLeman

Date: 26 April 2018

Date: 26 Apr 2018

ATTACHMENT A

IRC Training Product Review Plan 2018–2021 for the Food, Beverage and Pharmaceuticals Industry Sector

Relevant training package: *FBP Food Processing*

Contact details: Skills Impact Ltd, 559A Queensberry Street, North Melbourne, VIC, 3051

Date submitted to Department of Education and Training: 28 April 2018

2018–2019	
Bioprocessing technologies	This sector of the pharmaceutical manufacturing industry involves the manufacture of chemically processed drugs, and medicines that are manufactured in living organisms, such as bacteria, yeast and mammalian cells. This project will develop training package components to address the skills and knowledge needed to work with bioprocessing technologies.
Artisanal cheesemaking	This project addresses inadequacies identified in the current qualifications for a growing market of artisan cheesemakers seeking skills recognition and training for an increasingly diverse variety of raw products and methods. The skills required include managing the <i>affinage</i> process, working with complex molecular and biological processes, small-scale pasteurisation, developing new recipes, identifying and troubleshooting mistakes and problems, and setting up a functioning cheese factory.
Brewing and distilling	This project will identify and fill the gaps in current food processing qualifications to address the complex skills required for brewing beer and distilling spirits using a range of methods and products.
Food and beverage fermentation	This project will identify and fill the gaps in current food processing qualifications to address food safety and processes involved in the growing field of fermented food and non-alcoholic fermented beverage production.
2019–2020	

Automation/digitalisation in pharmaceutical, food and beverage manufacturing.	This project will address the need for skills and knowledge to operate and maintain increasingly complex and computerised equipment in manufacturing processes.
Pharmaceutical auditing and compliance skills	This project will address the increasing regulations and laws that govern pharmaceutical manufacture in Australia, and the skills required to administer, audit and monitor compliance.
Sustainability/energy consumption	This project will review all components of the FBP Training Package to ensure current sustainability practices and minimal energy consumption are being employed.
Traceability, supply chain management and food fraud	This project will review all components of the FBP Training Package to address current expectations of product traceability, supply chain management and mitigation of fraudulent practices.
2020–2022	
Innovation in product development and food packaging	This project will review all components of the FBP Training Package to identify where innovative practices in the development of new food products and food packaging can be addressed.
Work Health and Safety (WHS)	This project will review all components of the FBP Training Package to identify where safe and healthy work practices can be incorporated into tasks and work activities.
Strategic planning and management skills for the food, beverage and pharmaceutical industry	This project will review the components of the FBP Training Package that address management skills and consider importing relevant units from other packages to meet the needs of the food, beverage and pharmaceutical industry.
Online sales/customer service skills for the food processing industry	This project will review all components of the FBP Training Package that relate to sales and customer service, and consider importing relevant units from other training packages to meet the needs of the food processing industry.

ATTACHMENT B

Active IRC Projects for the Food, Beverage and Pharmaceuticals Industry Sector

Relevant training package: *FBP Food Processing*

Contact details: Skills Impact Ltd, 559A Queensberry Street, North Melbourne, VIC, 3051

Date submitted to Department of Education and Training: 27 April 2018

FOOD AND BEVERAGE IRC		
YEAR	PRIORITY SKILLS	QUALIFICATION CODE & NAME
2017	Wine Operations	Certificate II in Wine Industry Operations Certificate III in Wine Industry Operations
2017	Food Science and Technology	Certificate IV in Food Manufacturing Diploma of Food Science and Technology Diploma of Food Safety Auditing
2017	Food Processing Cross-Sector	Various units in the fields of: bottling and packaging, people planning and logistics, work health and safety, and technical fields.
2017	Pharmaceutical Manufacturing Standards	Certificate II in Pharmaceutical Manufacturing Certificate III in Pharmaceutical Manufacturing Certificate IV in Pharmaceutical Manufacturing

ATTACHMENT C

2018–2019 Project Details

Project title: BIOPROCESSING TECHNOLOGIES

Description

The biotechnological sector in the Australian pharmaceutical manufacturing industry is expanding and attracting significant investment, with further growth expected. This industry involves the manufacture of products from or via living organisms. Examples of such organisms include bacteria, yeast and mammalian cells. Primarily, industrial biotechnology deals with the manufacture of protein-based products. Working with these “large molecules” involves a more complex production process. This requires a specific set of skills and knowledge. It involves complex analytical techniques and managing higher risks of product degradation, process variability and contamination.

Biotechnology is currently used in applied immunology, pharmaceutical therapies and diagnostic tests.

The skills and knowledge required to work in this growing field include:

- contamination control
- cleanroom operations
- recombinant DNA technology
- cell culture manufacturing
- aseptic and sterile manufacturing
- purification processing
- manufacturing execution systems
- stainless steel and single use technology manufacturing
- data analytics, including process analytical technology and Industry 4.0.

Rationale

- With annual growth of around 7 per cent and an estimated international market value of AUD\$920 billion by 2025, the biotechnological industry is a fast-growing sector within the pharmaceutical manufacturing industry. There is rapid growth in the numbers of people employed in this industry through the expansion of both domestic and international markets.
- The availability of skills and talent in biotechnologies is seen by the industry as a key prerequisite for future competitiveness, investment and employment. Approximately half the workforce for this sector require skills addressed through the vocational education and training sector, including plant and machine operators, tradespeople and technicians.

- Given anticipated expansion, job openings are expected to arise within the biotech industry in Australia over the next few years. The skills and knowledge required in the workforce to meet these needs will need to align with this expansion.
- New entrants to the industry will need to develop new, relevant skills for working with biotechnologies. Existing employees will require upskilling and ongoing development of skills and knowledge.
- Stringent quality compliance and regulatory demands, including international standards, mean that the manufacture of biotech products requires a high level of training and awareness of the risks involved and standards required.
- Other factors driving the need for this review include global standards of product and process compliance, the expectations of innovation and operational excellence, and the pace of change in the pharmaceutical manufacturing sector.

Ministers' priorities addressed:

- Through the development of these training package components, more information about this industry's expectations of training delivery will be available to training providers to improve their delivery, and to consumers to enable better-informed choices.
- The training system will better support individuals to move more easily between the range of pharmaceutical processing industries, especially those using bioprocessing technologies.
- Improved efficiency of the training system will be gained through the development of units and qualifications that can be owned and used by multiple industry sectors, such as other pharmaceutical manufacturing industries.
- As this project is expected to consider the development of one or more new skill sets, it will foster greater recognition of skill sets within this industry.

Consultation plan

The Pharmaceutical Industry Reference Committee will support the progress of this review by sourcing key stakeholders involved in the biotechnical manufacturing industry to consult with Skills Impact when developing training package components, structuring the qualification and determining the skills required for the industry on a national level. The key stakeholder for this project is CSL Behring, which develops and manufactures plasma protein biotherapies.

The key stakeholder for this project is CSL Behring, which develops and manufactures plasma protein biotherapies. Additional stakeholders to consult during this project will include Seqirus (bioCSL) and BioMelbourne Network.

Proposed timelines:

- June – project planning and location booking

- July – subject matter expert meetings, research and functional analysis
- August – development of draft one documents
- September – public consultation – via website and workshops
- October – development of draft two documents
- November – TBA – second public consultation via website; targeted subject matter expert meetings
- December – final drafting of documents
- February – public validation via website
- February – finalisation of documents including case for endorsement
- April – proofreading of documents
- May – edit and equity review
- May – IRC case for endorsement approval to submit for quality assurance review
- May – quality assurance evaluation
- June – state/territory training authority review
- June – Industry Reference Committee final sign off
- June – submission to Australian Industries and Skills Committee

Scope of project

This project is expected to take approximately 12 months to complete, and will comprise:

- 1 new qualification
- 1 new skill set
- 15 new units of competency
- revision of 9 existing units of competency
- assessment of AQF level for the new qualification.

Qualification to be developed:

- Diploma in Bioprocessing Technologies.

Skill set to be developed:

- Bioprocessing Skill Set.

Units of competency to be developed:

- Manage the preparation of a cleanroom environment
- Manage cleanroom operations
- Work within complex manufacturing processes in the biological pharmaceutical field

- Identify and work with cell culture
- Prepare and maintain aseptic and sterile biological manufacturing processes and environments
- Manage upstream therapeutic cell manufacturing processes, isolate and cultivate cells, manage cell banking
- Manage cell culture expansion processes, include wave technology, bioreactors (batch and perfusion based)
- Harvest cells – including centrifugation and depth filtration
- Manage downstream therapeutic cell manufacturing processes – including chromatography, ultrafiltration, diafiltration, viral inactivation, viral filtration, precipitation methods
- Separate biomass (microbial cells)
- Disrupt cells to release product
- Process analytical technology and single use technology
- Manufacturing execution systems
- Industry 4.0 future manufacturing
- Lyophilisation of product during fill and finish.

Units of competency to be reviewed:

- FBPPHM4003 Facilitate contamination control
- FBPPHM3005 Operate a concentration process
- FBPPHM3006 Operate an extraction process
- FBPPHM3007 Operate a separation process using chromatography
- FBPPHM3011 Dispense pharmaceutical raw materials
- FBPPHM3014 Operate a liquid manufacturing process
- FBPPHM3016 Operate a sterilisation process using an autoclave
- FBPPHM3008 Operate an aseptic fill and seal process
- FBPPHM3009 Operate an aseptic form, fill and seal process.

Project title: ARTISANAL CHEESEMAKING

Description

This project addresses inadequacies identified in the current qualifications for a growing market of artisan cheese and other fermented dairy product makers seeking skills recognition and training for an increasingly diverse variety of raw products and methods.

The skills required in this industry that are not currently addressed in the Certificate III in Food Processing include:

- setting up and maintaining a functioning factory
- life cycle of fungi and bacteria
- fermentation-related biological processes
- creation of recipes and tastes
- cheese grading
- cleaning options (including decreasing environmental impact)
- waste management
- processing different types of cheese
- working with different chemical compositions of raw milks from different species and seasons
- pasteurisation on a small scale (batch, continuous)
- recordkeeping and regulatory compliance
- traceability systems and monitoring
- diagnosing and troubleshooting problems with plant and equipment
- pathogen management
- recall processes
- maintain current knowledge of industry trends and product development
- *affinage* environments, tools and processes
- milk quality control and preparation
- microbiological processes for artisan and farmhouse cheesemakers

Rationale

Artisan cheese is growing in popularity, and small entrepreneurial businesses are flourishing and employing staff. Current qualifications and courses available do not address the complex skills required to safely process raw product and the various types of milks and cheeses that the current market demands.

Ministers' priorities addressed:

- Through the development of these training package components, more information about this industry's expectations of training delivery will be available to training providers to improve their delivery, and to consumers to enable better-informed choices.
- The training system will better support individuals to move more easily between the range of cheese and dairy-related processing industries.
- Improved efficiency of the training system will be gained through the development of units that can be owned and used by multiple

industry sectors, such as other artisanal food manufacturing industries.

- As this project is expected to consider the development of one or more new skill sets, it will foster greater recognition of skill sets within this industry.

Consultation plan

Building on the relationships established during the research for this skills forecast report, Skills Impact will consult with key stakeholders in the execution of this project including, but not limited to:

- Australian Specialist Cheesemakers' Association
- Bega Cheese (represented on the Food, Beverage and Pharmaceutical IRC)
- Warrnambool Cheese and Butter Factory
- Tolpuddle Goat Cheese and Farm Foods
- Artisan Cheese Making Academy Australia (TAFE SA)
- Hindmarsh Valley Dairy
- Bruny Island Cheese and Beer Co.
- Grandvewe Cheeses and Distillery
- Shaw River Buffalo Cheese
- National Centre for Dairy Education
- Goulburn Ovens TAFE.

Proposed timelines:

- June – project planning and location booking
- July – subject matter expert meetings, research and functional analysis
- August – development of draft one documents
- September – public consultation – via website and workshops
- October – development of draft two documents
- November – TBA – second public consultation via website and targeted subject matter expert meetings
- December – final drafting of documents
- February – public validation via website
- February – finalisation of documents including case for endorsement
- April – proofreading of documents
- May – edit and equity review
- May – IRC case for endorsement approval to submit for quality assurance review

- May – quality assurance evaluation
- June – state/territory training authority review
- June – Industry Reference Committee final sign off
- June – submission to Australian Industries and Skills Committee

Scope of project

This project is expected to take approximately 10 months to complete, and will comprise:

- 1 new qualification
- 19 new units of competency
- revision of 17 existing units of competency
- assessment of AQF level for the new qualification.

Qualification to be developed:

- Certificate IV in Artisanal Cheesemaking.

Units of competency to be developed:

- Setting up and maintaining a functioning cheese factory
- Life cycle of fungi and bacteria
- Fermentation-related biological processes
- Creation of recipes and tastes
- Cheese grading
- Cleaning options (including decreasing environmental impact)
- Waste management
- Producing different types of cheese
- Working with different chemical compositions of raw milks from different species and seasons
- Pasteurisation on a small scale (batch, continuous)
- Recordkeeping and regulatory compliance
- Traceability systems and monitoring
- Diagnosing and troubleshooting problems with plant and equipment
- Pathogen management
- Recall processes
- Maintain current knowledge of industry trends and product development
- *Affinage* environments, tools and processes
- Milk quality control and preparation
- Microbiological processes for artisan and farmhouse cheesemakers

Units of competency to be reviewed:

- FDFCH4001A Carry out sampling and interpret tests for cheese production
- FBPCHE3001 Conduct cheesemaking operations

- FBPCHE3002 Carry out processes for a range of artisan cheeses
- FDFCH4004A Produce acid – heat coagulated cheese
- FBPDPR2001 Operate a butter churning process
- FBPDPR2003 Operate a curd production and cutting process
- FBPDPR2004 Operate a cooling and hardening process
- FBPDPR2005 Operate a cheese pressing and moulding process
- FBPDPR2006 Operate a fermentation process
- FDFST4021A Carry out sampling and testing of milk at receival
- FDFST5023A Implement and review the production of milk fat products
- FDFST5024A Implement and review the production of fermented dairy products and dairy desserts
- FDFST4022A Implement and review the preparation of milk for processing
- FBPOPR2043 Operate a homogenising process
- FDFCH4002A Produce acid-coagulated soft cheese
- FDFCH4003A Produce a range of rennet-coagulated cheeses
- FBPOPR2014 Participate in sensory analyses.

Project title: BREWING AND DISTILLING ALCOHOLIC BEVERAGES

Description

This project will identify and fill the gaps in current food processing qualifications to address the complex skills required for brewing beer and distilling spirits using a range of methods and products.

Those working with beer, cider and a range of other alcoholic beverages need to be able to:

- operate, maintain and clean brewing equipment, including packaging, heating and cooling systems
- create recipes to suit specific demographics
- alter and refine recipes
- create tasting notes
- produce a variety of styles
- explain the brewing process to others
- work autonomously
- manage a team to achieve suitable production and quality outcomes

- pasteurisation on a small scale (batch, continuous)
- understanding and operation of keg, bottling and/or canning lines
- keep records and document excise information
- demonstrate a good understanding of the international and domestic craft fermented beverage market
- understand, select and use relevant cleaning options (including managing environmental concerns)
- understand, select and use relevant waste management options
- understand, select and adopt relevant food safety systems.

Those working with the production of gin, whisky, brandy and other distilled alcoholic beverages need to be able to:

- operate, maintain and clean distilling equipment, including heating and cooling systems
- create recipes to suit specific demographics
- alter and refine recipes
- create tasting notes
- produce a variety of styles
- explain the distillation process to others
- understanding and operation of barrel maturation and bottling lines
- work autonomously
- manage a team to achieve suitable production and quality outcomes
- keep records and document excise information
- demonstrate a good understanding of the international and domestic spirits market
- understand, select and use relevant cleaning options (including managing environmental concerns)
- understand, select and use relevant waste management options
- understand, select and adopt relevant food safety systems.

Rationale

The increase in popularity of craft or artisan beer, cider and distilled spirits has seen this industry expand. Small breweries and distilleries have experienced substantial growth in production and employee numbers.

There were 46 new independent breweries established in 2017 and some existing craft breweries are partnering with larger producers to access infrastructure that will enable further growth.

Current training options are limited and are mostly operating outside of the Australian VET sector. Within the VET sector, the Certificate III in Food Processing does not sufficiently meet the multifaceted skill needs of brewers and brewer's assistants in small to medium-sized breweries.

Ministers' priorities addressed:

- Through the development of these training package components, more information about this industry's expectations of training delivery will be available to training providers to improve their delivery, and to consumers to enable better-informed choices.
- The training system will better support individuals to move more easily between the range of brewing and distilling operations.
- Improved efficiency of the training system will be gained through the development of units that can be owned and used by multiple industry sectors, such as wine and cider production and other artisanal food manufacturing industries.
- As this project is expected to consider the development of one or more new skill sets, it will foster greater recognition of skill sets within this industry.

Consultation plan

Building on the relationships established during the research for this skills forecast report, Skills Impact will consult with key stakeholders in the execution of this project, including, but not limited to:

- Lovedale Brewery
- Hope Estate Brewery
- Independent Brewers Association
- Foghorn Brewhouse
- Prancing Pony Brewery
- Coopers Brewery
- CUB (represented on the FBP IRC)
- TAFE SA
- TAFE NSW
- Institute of Brewing and Distilling
- Tasmanian Whisky Academy
- Moo Brew
- Bruny Island Cheese and Beer Co.
- Grandveve Cheese and Distillery
- FermenTasmania
- LionCo.

Proposed timelines:

- June – project planning and location booking
- July – subject matter expert meetings, research and functional analysis
- August – development of draft one documents
- September – public consultation – via website and workshops
- October – development of draft two documents
- November – TBA – second public consultation via website and targeted subject matter expert meetings
- December – final drafting of documents
- February – public validation via website
- February – finalisation of documents including case for endorsement
- April – proofreading of documents
- May – edit and equity review
- May – IRC case for endorsement approval to submit for quality assurance review
- May – quality assurance evaluation
- June – state/territory training authority review
- June – Industry Reference Committee final sign off
- June – submission to Australian Industries and Skills Committee

Scope of project

This project is expected to take approximately 10 months to complete, and will comprise:

- 2 new qualifications
- 3 new skill sets
- 10 new units of competency
- revision of 20 existing units of competency
- assessment of AQF level for the new qualifications.

Qualifications to be developed:

- Certificate IV in Brewing
- Certificate IV in Distilling Spirits>

Skill sets to be developed:

- Brewing beer
- Brewing cider
- Distilling spirits.

Units of competency to be developed:

- Operate, maintain and clean brewing equipment, cooling systems
- Create recipes to suit specific demographics
- Alter and refine recipes
- Create tasting notes
- Brew a wide variety of styles.
- Explain the brewing process to others
- Work autonomously
- Manage a team to achieve suitable production and quality outcomes.
- Keep records and document excise information.
- Demonstrate a good understanding of the international and domestic craft beer market.

Units of competency to be reviewed:

- FBPCEL3001 Perform second distillation (pot still brandy) operations
- FBPCEL3005 Perform rectification (continuous still) operations
- FBPCEL3006 Perform single column lees stripping (continuous still brandy) operations
- FBPCEL3007 Operate clarification by separation (centrifugation) process
- FBPCEL3008 Perform dual column distillation (continuous still brandy) operations
- FBPCEL3009 Perform first distillation (pot still brandy) operations
- FBPCEL3011 Handle and store spirits
- FDFCEL2019A Carry out transfer operations
- FDFOP2003A Clean equipment in place
- FDFOP2004A Clean and sanitise equipment
- FDFOP2013A Apply sampling procedures
- FDFOP2066A Operate a wort production process
- FDFOP2067A Operate a brewery fermentation process
- FDFOP2068A Operate a beer maturation process
- FDFOP2069A Operate a beer filtration process
- FDFOP2070A Operate a bright beer tank process
- FDFOP2071A Identify key stages and beer production equipment in a brewery

- FDFOP2072A Operate a beer filling process
- FDFOP2073A Operate a beer packaging process
- FDFOP2074A Prepare and monitor beer yeast propagation processes.

Project title: FOOD AND BEVERAGE FERMENTATION

Description

This project will identify and fill the gaps in current food processing qualifications to address food safety and manufacturing processes involved in the growing field of fermented food and beverage production.

Fermentation preserves food, enhances flavours and has health benefits – humans have been doing it for centuries. Fermentation is a transformative process in which microorganisms (bacteria, yeast and fungi) turn sugars into food acids, carbon dioxide and/or alcohol. Fermentation can occur naturally or by application of a commercially-produced starter culture.

The sector encompasses companies that manufacture bread, beer, cider, wine, ginger beer, mead, cheese, yoghurt, sauerkraut, vinegar and pickles. There are many more products increasing in popularity that may be less familiar:

- kefir is a cultured fermented beverage, made from milk, water or coconut milk
- kimchi is a staple Korean side dish, made from salted, spiced and fermented vegetables
- kombucha is an effervescent drink, fermented from sweetened black or green tea based on the skilled application of microbial fermentation.

Skills and knowledge required for this industry include:

- understanding the nature and control of fermentation processes
- operation of technologically advanced fermenting and related tools and equipment
- understanding and application of good manufacturing practices, including equipment cleaning and sanitising
- understanding and application of micro-organisms involved in fermenting food
- cultivation and isolation of microorganisms relating to the fermentation process
- application of knowledge of yeast, bacterial and fungal fermentation processes
- application of food safety principles to the fermentation process

	<ul style="list-style-type: none"> conducting and interpreting tests of samples of fermented food and beverages working with living cultures and organisms.
Rationale	<ul style="list-style-type: none"> Due to low-cost entry to market and growing demand for fermented food and beverage products, micro, small and medium-sized businesses have started to appear in greater numbers. Occupational standards are required to support the growth in industry and ensure the manufacture, distribution and sale of safe, wholesome and consistently high-quality products. The growing market for fermented foods and drinks is also being driven by a growing focus on healthier food options within Australia's and Asia's middle-classes, particularly on products that are reported to have beneficial effects on gut health, and the growing awareness of the potential of some fermented food and beverages in addressing digestive disorders.
Ministers' priorities addressed:	<ul style="list-style-type: none"> Through the development of these training package components, more information about this industry's expectations of training delivery will be available to training providers to improve their delivery, and to consumers to enable better-informed choices. The training system will better support individuals to move more easily between the range of cheese and dairy-related processing industries Improved efficiency of the training system will be gained through the development of units that can be owned and used by multiple industry sectors, such as other artisanal food manufacturing industries. As this project is expected to consider the development of one or more new skill sets, it will foster greater recognition of skill sets within this industry.
Consultation plan	<p>The Food, Beverage and Pharmaceutical IRC will support the progress of this review by sourcing key stakeholders involved in the food and beverage fermenting industry to consult with Skills Impact when developing training package components, structuring the qualification and determining the skills required for the industry on a national level.</p> <p>Key stakeholders to consult include:</p> <ul style="list-style-type: none"> FermenTasmania Food Innovation Australia. <p>Proposed timelines:</p> <ul style="list-style-type: none"> June – project planning and location booking July – subject matter expert meetings, research and functional analysis

- August – development of draft one documents
- September – public consultation – via website and workshops
- October – development of draft two documents
- November – TBA – second public consultation via website and targeted subject matter expert meetings
- December – final drafting of documents
- February – public validation via website
- February – finalisation of documents including case for endorsement
- April – proofreading of documents
- May – edit and equity review
- May – IRC case for endorsement approval to submit for quality assurance review
- May – quality assurance evaluation
- June – state/territory training authority review
- June – Industry Reference Committee final sign off
- June – submission to Australian Industries and Skills Committee

Scope of project

This project is expected to take approximately 10 months to complete, and will comprise:

- 1 new qualification
- 3 skill sets
- 9 new units of competency
- revision of 4 existing units of competency
- assessment of AQF level for the new qualification.

Qualifications to be developed:

- Certificate III in Food and Beverage Fermentation.

Skill sets to be developed:

- Fermenting vegetables
- Fermenting dairy products
- Fermenting beverages.

Units of competency to be developed:

- Implementing the nature and control of fermentation processes
- Operation of technologically advanced fermenting and related tools and equipment
- Handling fermentation micro-organisms

- Cultivating micro fermentation micro-organisms
- Isolating fermentation micro-organisms
- Fermenting using yeast, bacterial and fungal processes
- Application of food safety principles to the fermentation process
- Conducting and interpreting tests of samples of fermented food and beverages
- Working with living cultures and organisms.

Units of competency to be reviewed:

- FDFST5024A Implement and review the production of fermented dairy products and dairy desserts
- FBPCEL2002 Perform fermentation operations
- FBPBEV2001 Operate a deaeration, mixing and carbonation process
- FBPOPR2010 Work with temperature controlled stock.