



Australian Government

Food and Beverage

National Manufacturing Priority
road map



Food and Beverage National Manufacturing Priority road map



Our vision

By 2030 we will double the value of Australia's Food and Beverage manufacturing through a focus on smart food and beverage manufacturing; innovative foods and beverages; and food safety, origin and traceability systems.

Our growth opportunities

Smart food and beverage manufacturing for consumer-driven products	Innovative foods and beverages	Food safety, origin and traceability systems to enhance quality and assurance required in domestic and international markets
<p>Responsive, fast and agile food and beverage processing and packaging to improve competitiveness and create distinctive value propositions for customers, such as:</p> <ul style="list-style-type: none">• automation of continuous and batch control systems, inspection and line control systems• robotics, including high speed palletising machinery and soft robotic technology• monitoring systems for temperature, humidity and pressure, sanitisation verification.	<p>Develop innovative foods and beverages that incorporate diverse attributes to meet changing consumer needs and demands both domestically and overseas, such as:</p> <ul style="list-style-type: none">• food and beverages for improved health and wellbeing and enhanced nutritional value• products for convenience and premium offerings such as ready to eat, pre-portioned meals• high value add food and beverage products, such as new and enhanced proteins, including fortified breakfast cereals, antioxidant rich breads, soy and other food and beverage alternatives.	<p>Increasing Australia's output of safe, healthy and sustainably produced foods by adopting new solutions to increase value differentiation of our food and beverage products in domestic and export markets, such as:</p> <ul style="list-style-type: none">• standardised digital labelling to provide customers (retailers and consumers) with instant information about origin of foods and production methods such as the use of QR codes on packed meat which can be read with smart technology to confirm traits such as certified organic and free-range• blockchain technologies to securely capture and store information on origin and food safety (handling, preparation and storage) for high value add foods.

Our goals

2 YEARS

5 YEARS

10 YEARS

Increasing use of smart manufacturing, and the onshoring of commercialisation and manufacturing activities to improve processing and packaging through co-investments in translation, integration and collaboration.

Manufacturers are collaborating and using smart manufacturing to respond to new and emerging food and beverage opportunities, consumer trends and market demands.

Food and beverage manufacturing value has doubled, cementing Australia's reputation as 'world-best' supplier and manufacturer of premium, safe and authentic food.

Unlocking our opportunities—the first two years

FOCUS: Lifting food and beverage manufacturing capability, boosting translation, integration and collaboration. Identifying new opportunities to invest in smart manufacturing, research and boost skills and technology across the sector.

Invest in technology to build the foundations of smart food and beverage manufacturing	Advance skills across the food and beverage manufacturing sector	Invest in manufacturers digitalising their product information
Closer collaboration between industry, government and research	Better understanding of emerging market opportunities	Path from idea conception to commercialisation is accessible and achievable for industry

Contents

1. The Modern Manufacturing Strategy	iv
Focusing on areas of advantage	1
2. Why food and beverage manufacturing?	4
What is food and beverage manufacturing?	4
Industry structure: understanding the current food and beverage sector	6
Leveraging existing strengths	8
Meeting future needs	9
Barriers to scale	9
3. Vision: food and beverage manufacturing	11
4. Growth opportunities	11
Key areas of opportunity	12
Building on the Australian Government's priorities	17
5. Enablers	19
Access to more diversified markets including export and online	20
Enhanced supply chain resilience	20
6. Goals	21
7. Making it happen	24
8. Benchmarks of success	27
9. Engagement and partnerships	27
International best practice	27
Collaboration	28
Appendix A	30
The road map development process	30
Building on existing findings	30

1. The Modern Manufacturing Strategy

The Australian Government is manufacturing a new future for our nation. Manufacturing is critical to a modern Australian economy—a key part of almost every supply chain that adds significant value to all sectors. The *Modern Manufacturing Strategy* (MMS) is led by industry, for industry, to help our **manufacturers scale-up**, become **more competitive** and build more **resilient supply chains**. The Australian Government will be a strategic investor in this, notably through the 6 National Manufacturing Priority sectors. Prioritising these sectors will drive productivity and create jobs for Australians, both now and for generations to come.

On 1 October 2020, the Australian Government announced a \$1.5 billion investment in the MMS to help Australian manufacturers be more competitive, resilient and build scale in the global market. The 6 key areas of focus are:



Resources Technology & Critical Minerals Processing



Food & Beverage



Medical Products



Recycling & Clean Energy



Defence



Space

Through the MMS, the Government wants to support projects from industry that will transform manufacturing in Australia. The Food and Beverage National Manufacturing Priority road map will help inform investment decisions that both Government and industry make across the next 10 years to support projects that will:

- harness and grow the sector's strengths and advantages
- provide innovative solutions to overcome constraints that limit value creation and that may prevent the sector achieving its full potential
- transform the sector by growing a high-value, reputable and dynamic food and beverage manufacturing industry.

The MMS outlines the whole-of-government agenda to help grow Australian manufacturing and ensures our manufacturers can harness global opportunities and achieve scale and competitiveness. It is built on 4 pillars (**Figure 1**).

Figure 1: Overview of the Government's Modern Manufacturing Strategy (4 pillars)

Australia's Modern Manufacturing Strategy			
GETTING THE ECONOMIC CONDITIONS RIGHT FOR BUSINESS <ul style="list-style-type: none"> Helping restore business confidence and recovery through the JobMaker plan Delivering lower energy costs Building management capability Getting our tax settings right Tackling red tape Improve our industrial relations system 	MAKING SCIENCE AND TECHNOLOGY WORK FOR INDUSTRY <ul style="list-style-type: none"> Aligning research and innovation capabilities and programs to priority areas Unlocking investment proposals through the Manufacturing Modernisation Fund round two Backing digital transformation 	FOCUSING ON AREAS OF ADVANTAGE <ul style="list-style-type: none"> Setting National Manufacturing Priorities and developing road maps for action Backing projects with wide reaching impacts through the Modern Manufacturing Initiative 	BUILDING NATIONAL RESILIENCE FOR A STRONGER ECONOMY <ul style="list-style-type: none"> Making supply chains more resilient to external shocks including through a Supply Chain Resilience Initiative Supporting global market diversification

Focusing on areas of advantage

The third pillar of the Strategy is to set National Manufacturing Priorities, develop road maps for action, and back projects through the Modern Manufacturing Initiative (MMI) which support the transformation of manufacturing in these sectors.

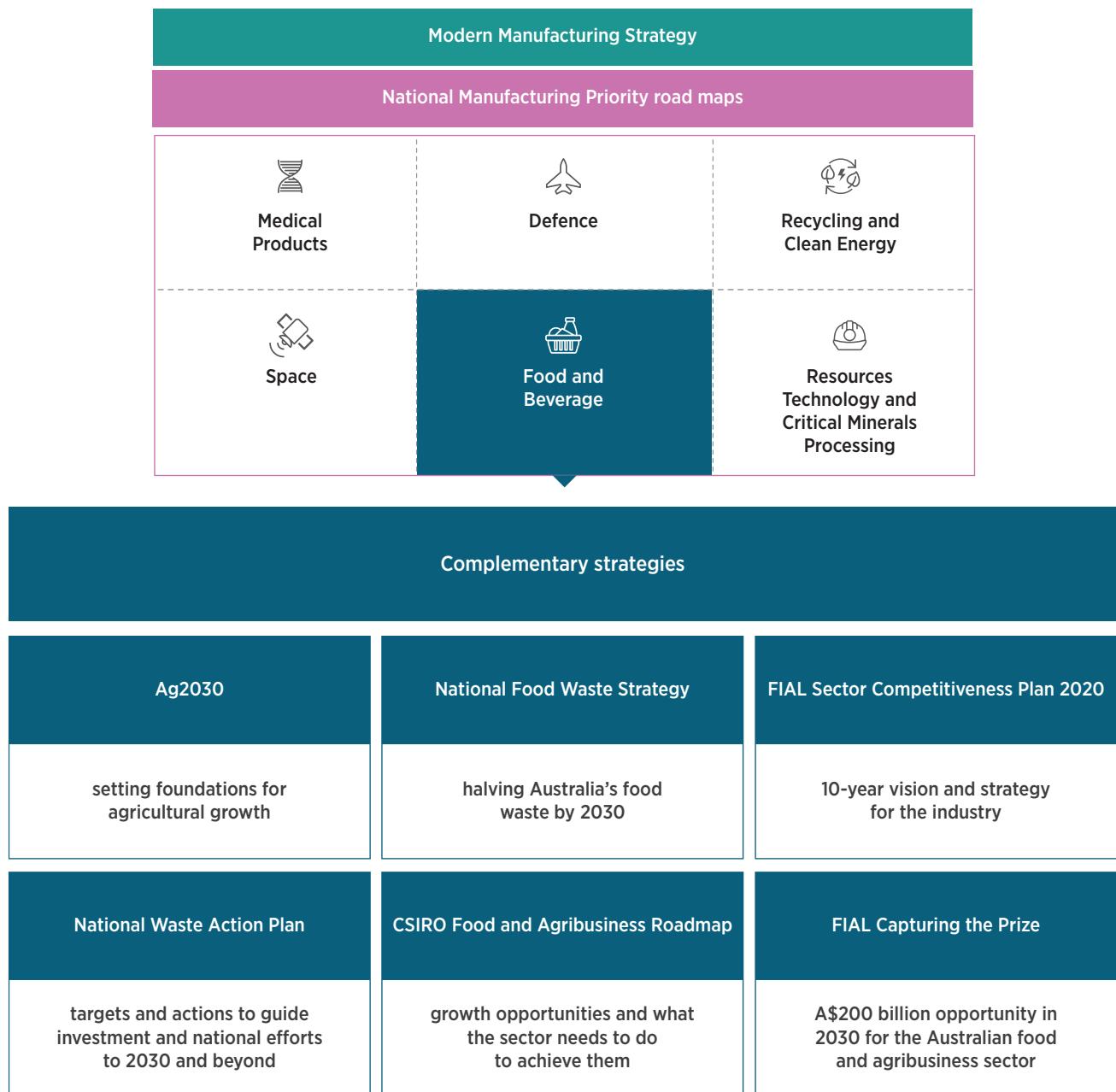
Road maps are being developed with industry to set out plans for both industry and Government to strengthen Australia's manufacturing capability. The road maps have been led by industry taskforces to identify and set a future vision for priority areas with clear goals, opportunities and actions over the next 2, 5 and 10 years.

The road maps are designed to be dynamic. As the MMS is implemented, we will continue to work with industry to ensure the road map evolves over its life. This will take account of emerging opportunities and actions to support the sector to scale-up, become increasingly competitive and for businesses to integrate their commercial solutions with global supply chains and markets. See [Appendix A](#) for more details on the road map process.

The MMI aims to support manufacturers to more quickly bring their products to market and invest to scale their manufacturing operations in Australia. The road map will support industry to overcome late stage commercialisation barriers and help government identify high impact projects. The role of the MMI complements other government programs to support the development of the food and beverage manufacturing sector.

This road map will assist manufacturers to bring food and beverage products to market which complement these initiatives and deliver economic value and jobs for Australia ([Figure 2](#)).

Figure 2: Food and Beverage related strategies



Other pillars of the Strategy

The MMS includes 3 other pillars which will also be important to focusing government investments to support the competitiveness and scale of Australian manufacturing.

Getting the economic conditions right (pillar 1)

The Australian Government is getting the economic conditions right for manufacturers, paving the way for growth and improved competitiveness in all sectors. Manufacturers need a pipeline of skilled workers as they transform and scale. The Government is investing \$7 billion this financial year to keep apprentices in jobs, to help jobseekers re-skill and to promote vocational training. Reforms to higher education will boost the number of graduates in areas of employment growth, including in STEM. These policies are creating the jobs of the future and a pipeline of skilled workers to support new and emerging industries, including in manufacturing.

A gas-fired recovery will ensure Australian gas is working for businesses and manufacturers, with a 13-point plan and \$49.8 million investment to unlock supply. This complements the Government's initiatives to reduce electricity prices, boost liquid fuels security and invest in low emissions energy technology through Australia's Technology Investment Roadmap.

The Government is harnessing opportunities from emerging technologies and building business digital capability, including growing Australian business' cyber security resilience. Work to implement a Simplified Trade System will support Australia's exporters and importers to invest and grow local jobs by making it easier for businesses to integrate into global supply chains.

Businesses are more likely to grow and attract investment when there are fewer barriers and they feel supported by a thriving business environment. That's why the Government is committed to getting the economic conditions right and creating collaborative environments which encourage the domestic and international market to invest; and partner with business, research organisations and state and territory governments.

The Government is focused on making and sustaining jobs through the JobMaker scheme. Our temporary full expensing of eligible depreciable assets and temporary loss carry back refundable tax offset measures will unlock investment and expand the productive capacity of the nation.

Making science and technology work for industry (pillar 2)

Australia's science, research and innovation capabilities are critical enablers of transformation in manufacturing. There is clearly an opportunity to find ways to improve the uptake of technology, processes and practices, and digital operations by manufacturers. These enablers support business competitiveness and will have positive spill-overs across our economy.

This work will focus our industry, science and technology investments, including through the work of the CSIRO, to support our National Manufacturing Priorities. This will help our manufacturers supercharge their operations and harness emerging opportunities.

It will also complement Government actions to harness opportunities from emerging technologies, build business digital capability and grow the cyber security resilience of Australian business.

Building national resilience for a stronger economy (pillar 4)

The Supply Chain Resilience Initiative will strengthen Australia's ability to access critical necessities, part of positioning Australia to respond to future supply chain disruptions to make us stronger and more resilient. It will build on government and industry efforts to rapidly address critical supply issues revealed during supply chain disruptions due to COVID-19.

2. Why food and beverage manufacturing?

Australia has an international reputation for producing premium, safe and high-quality products. Close proximity to Asian markets and a reputation as a trusted exporter of premium goods has led to the food and beverage sector becoming the largest manufacturing sector for the Australian economy.¹ Successful high value food and beverage manufacturing projects can also build better return for our farmers, and for our agriculture producers. The sector's strong economic contribution and employment is supported by Australia's high quality agricultural produce and production capabilities. It demonstrated resilience throughout the COVID-19 pandemic by being agile and through access to cutting-edge research and innovation expertise.

With the world's population projected to reach 9.8 billion by 2050, there is increasing opportunity for Australia's food and beverage manufacturers to access new consumers and markets by leveraging the sector's reputation and capability.² This road map outlines industry-led actions to increase food and beverage manufacturing activity over the next 10 years, with a focus on growing Australia's on-shore manufacturing capacity, capabilities and expertise.

What is food and beverage manufacturing?

For the purposes of this road map, food and beverage manufacturing covers businesses that undertake various stages of processing to transform agricultural produce into food and drink products. This includes processes ranging from basic preparation, preservation and packaging of raw ingredients, through to elaborately transformed foods and beverages. However, food and beverage manufacturing excludes food service retailing businesses and unprocessed food commodities.

The food and beverage manufacturing sector is made up of subsectors which are as diverse as the range of foods and drinks we consume on a daily basis. Firms within the sector undertake a wide variety of value adding activities, using agricultural inputs to produce food for consumption. Many of the firms interact as part of a complex integrated supply chain, in which agricultural inputs go through a series of processing stages before being suitable for distribution to consumers. For example, food manufacturing encompasses flour mills, which process wheat that is subsequently used by other food manufacturers in the production of bread and other baked goods. The sector also includes firms that process livestock to produce meat, which is directed both to consumers to be cooked at home, and also into other food manufacturing businesses that prepare ready to eat meals.

At a high level, the subsectors that make up food and beverage manufacturing include:

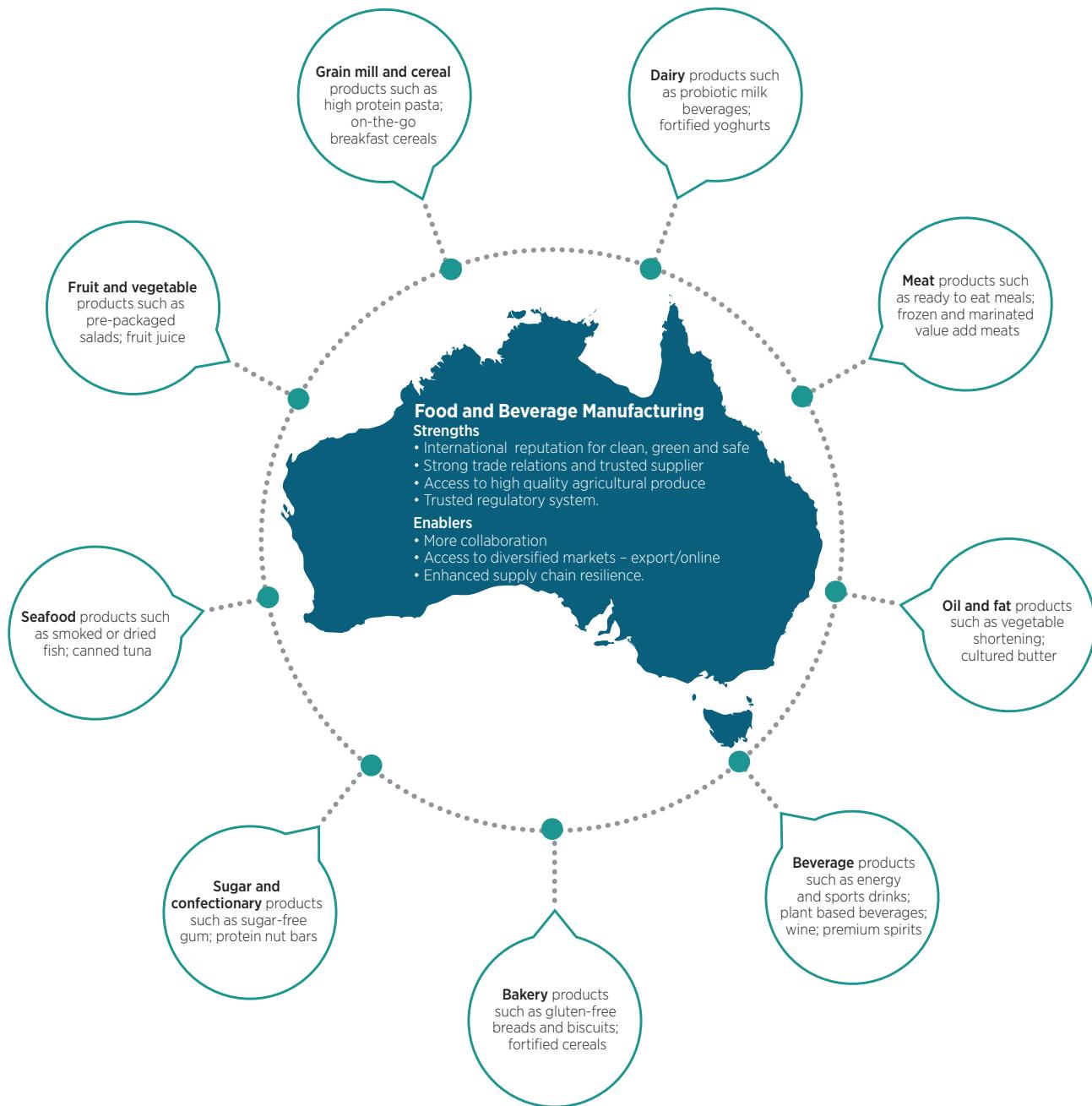
- meat processing and meat product manufacturing
- seafood processing
- dairy product manufacturing
- fruit and vegetable processing
- oil and fat manufacturing
- grain mill and cereal product manufacturing
- bakery product manufacturing
- sugar and confectionary manufacturing
- beverage manufacturing.

1 Australian Food and Grocery Council (AFGC) 2019, [State of the Industry Report 2019](#), December.

2 Food Innovation Australia Limited 2020, [Sector Competitiveness Plan 2020](#).

Some examples of value add products manufactured in Australia within these subsectors are at **Figure 3**.

Figure 3: Examples of food and beverage products manufactured in Australia by subsector



The food and beverage sector's potential growth will rely on its ability to manufacture locally and export more high value goods to overseas markets which meet consumer and market demand. There are opportunities to bring food and beverage manufacturers including small to medium enterprises (SMEs) together to invest in research, translate this into commercial applications, and manage the development of new products for existing and emerging markets. While these activities may be out of reach of a single business, collectively through collaboration they may achieve the critical mass to pursue opportunities and share the benefits. This includes collaboration with the agriculture sector.

Feeding directly into food and beverage manufacturing is the Australian agriculture, fisheries and forestry sector. This sector aims to achieve \$100 billion in farm gate output by 2030. Through delivering [Ag2030](#), the Australian Government is setting the foundation for the agricultural sector to grow, ensuring Australian agricultural producers receive maximum returns for their hard work and are supported by vibrant rural and regional communities. Developing this road map is a key deliverable of Ag2030 to help grow on-shore manufacturing options and capabilities; improve supply chains and increase demand for farm produce; and provide a clearer pathway to help producers earn a premium for what they produce.

This road map has been developed to support the Australian Government achieve its priorities, including Ag2030, focusing on the food and beverage manufacturing industry. Importantly, the road map will, for example:

- guide future Government and industry investment in food and beverage manufacturing projects
- identify key areas for investment to grow the local food and beverage manufacturing sector
- support Australia to develop an innovative, sustainable and globally recognised food and beverage manufacturing sector.

Industry structure: understanding the current food and beverage sector

In 2019-20, the food and beverage manufacturing sector generated \$28.4 billion in gross value added,³ consisted of 14,400 businesses,⁴ and employed over 229,000 people.⁵ In 2018-19, food and beverage manufacturing reported \$112.7 billion total income.⁶ As the largest single manufacturing sector, food and beverage accounts for 27.9% of total manufacturing turnover.⁷

As shown in [Figure 4](#), the food and beverage sector manufactures a diverse range of products, broken down by subsector turnover. In 2018-19, meat and meat product manufacturing, beverage manufacturing and dairy product manufacturing accounted for 57% of the sector's manufacturing turnover. These 3 subsectors are where Australia has a manufacturing advantage. For example the dairy industry has advanced its manufacturing capability into highly transformed product categories, establishing a foothold in the international market for high-quality milk powder products, such as infant formula.

Australia has vibrant and highly successful beverage manufacturing subsectors. Australia's wine industry is world-renown, and recent years have seen rapid expansion within the brewing industry with the proliferation of successful small-scale boutique beer and cider breweries. Australia's craft spirit industry has also been highly successful, with Tasmanian whisky establishing a global following.

As consumer and market needs continue to change, there are increasing opportunities for companies across all the food and beverage manufacturing subsectors to produce highly tailored and individualised food products. They can appeal to specific tastes, nutritional needs and avoid allergens.

3 Australian Bureau of Statistics (ABS), [Australian System of National Accounts](#)

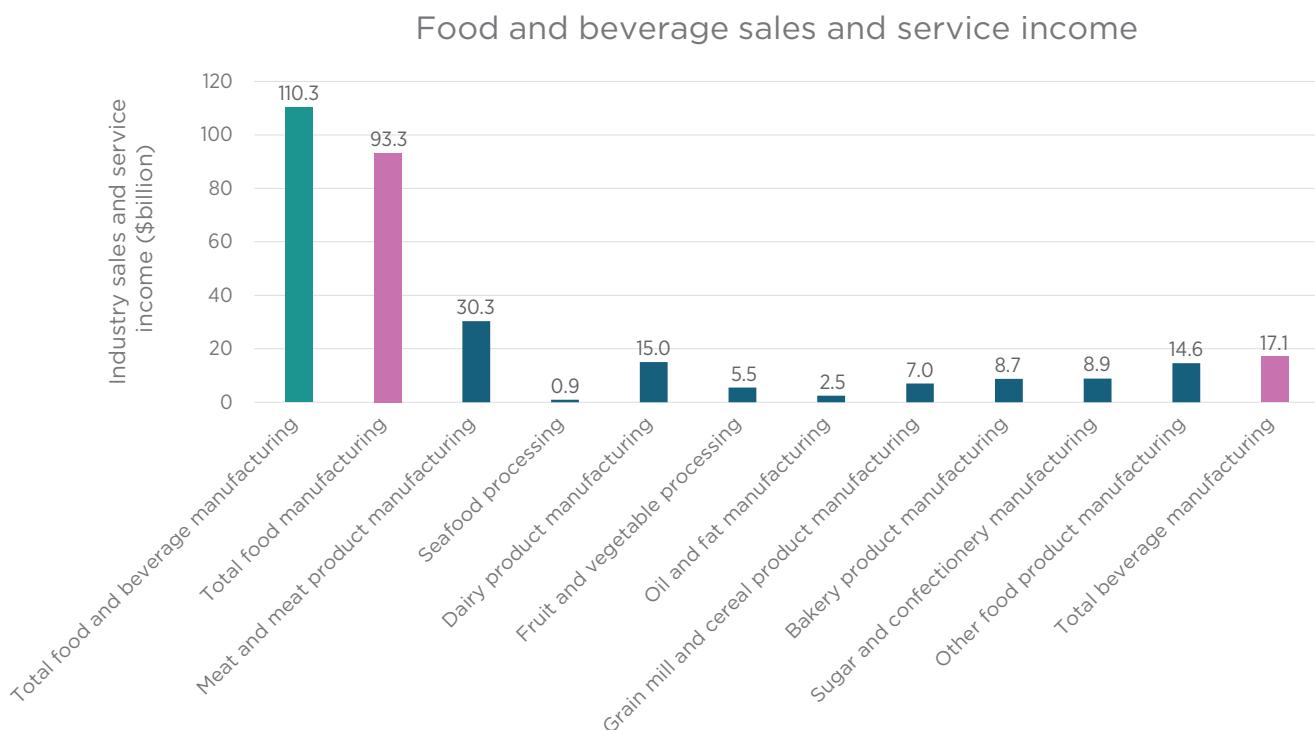
4 ABS [Catalogue 8165.0](#) Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019

5 ABS Labour Force, Australia, Detailed, Quarterly, May 2020

6 ABS [Catalogue 8155.0](#) Australian Industry by Subdivision

7 AFGC 2019, [State of the Industry Report 2019](#), December

Figure 4: Food and beverage manufacturing subsector by sales and service income 2018-19⁸



Food and beverage manufacturers are spread across Australia's states and territories, with many larger organisations operating in regional communities. They enjoy a positive relationship with regional communities by providing direct employment and helping boost and sustain local economies.⁹ With this existing scale, success, and geographic coverage, the food and beverage sector is well placed to deliver long-term transformational outcomes for the Australian economy.

Structurally, Australia's food and beverage manufacturing sector is unique as it is mostly made up of SMEs, with 37% (5,248 businesses) non-employing, and 50% (7,001 businesses) employing between one and 19 staff. Alongside this is over 100 different subsectors servicing consumer and market demand. The larger enterprises employing over 20 staff account for 13% (1,795 businesses) of the sector.¹⁰

It is estimated 5% of businesses that earn over \$10 million are responsible for 54% of the industry's turnover.¹¹ The majority of these larger organisations are multinational companies that continue to choose Australia as one of their bases for manufacturing operations. For example, Nestlé, Mars Wrigley and Coca-Cola Amatil have manufacturing facilities in Australia. These organisations play an important role in the success of the sector, as they bring the capital and capability to achieve scale in their operations, and in doing so bring jobs and economic stimulus to Australia. They also undertake their own research and investment on a global basis and provide that to local affiliates in Australia as appropriate. Over the next decade, it will be important to modernise and retain these larger organisations, many of whom will help build industry scale.

Inputs which feed into food and beverage manufacturing are derived from Australia's high quality and reliable agriculture, fisheries and forestry sector. This includes a range of crop and livestock products. The gross value of agricultural, fisheries and forestry production has increased by 7% in the past 20 years in real terms (adjusted for consumer price inflation), from approximately \$62 billion in 2000-01 to \$67 billion in 2019-20.¹² In 2019-20, the agricultural sector accounted for 11% of goods and services exports.¹³

8 ABS Catalogue 8155.0 Australian Industry by Subdivision.

9 AFGC 2019, *State of the Industry Report 2019*, December.

10 ABS, Catalogue 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2020.

11 ABS analysis by EQ Economics via the AFGC 2021.

12 Department of Agriculture, Water and the Environment 2021, *Snapshot of Australian Agriculture 2020*, February.

13 Department of Agriculture, Water and the Environment 2021, *Snapshot of Australian Agriculture 2020*, February.

In 2017-18, food and beverage exports were \$33.2 billion, representing 8.7% of all Australian merchandise exports.¹⁴ Exports have grown in recent years and there is the potential for further export growth in already strong industries such as meat, dairy and wine; but also in other opportunities as identified by Food Innovation Australia Limited (FIAL)¹⁵ and CSIRO.¹⁶ Over the coming decades, trade—both domestic and export—will continue to be an important driver for continued growth.

In terms of research and innovation, in 2017-18, Business Expenditure on Research and Development for food and beverage manufacturers was approximately \$490 million.¹⁷ The majority of Research and Development (R&D) undertaken in food and beverage is by the larger enterprises. Compared to other manufacturing sectors, food and beverage R&D is relatively low. It accounts for only 11% of expenditure within the manufacturing industry, despite being the largest employer within the manufacturing sectors.¹⁸ Increasing business level spending on R&D within food and beverage manufacturing is expected to increase opportunities to commercialise innovation. It will also enhance Australia's international competitiveness in delivering novel products that appeal to consumers' changing needs.

[FIAL's Sector Competitiveness Plan 2020](#) identified two categories of how businesses in the food and beverage sector perceive growth:

- 'Businesses of Today' referring to those that are generally less growth-oriented, maintain market share and don't tend to be involved in overseas markets. As a result, they tend to rely heavily on downstream processors or exporters to manage access to supply chains and markets.
- 'Businesses of Tomorrow' referring to those actively pursuing new markets and are more likely to take risks in doing so. They tend to be directly connected to their end markets and invest to build their skills and knowledge.

With these categories in mind, FIAL found in food and agribusiness, Businesses of Today are dominating the landscape in Australia. This creates a challenge for the sector to enable collaboration and encourage growth. The sector has potential to seek opportunities and innovate to shift from Businesses of Today to Businesses of Tomorrow.¹⁹

The food and beverage manufacturing industry is agile and well positioned to embrace new and emerging technologies and future trends. Through government and industry investment, together we can remain competitive and meet evolving consumer and market demands.

Leveraging existing strengths

Australia's food and beverage sector has a reputation for being clean, green and safe. This is due to access to high-quality inputs from domestic agricultural producers, supported by strong food production regulations.

Maintaining Australia's competitive and comparative advantage will require food and beverage manufacturers to understand global consumer preferences and trends in dietary patterns. Food businesses are innovating to meet consumer needs, while meeting rigorous standards of food safety; and they will need to be supported by a flexible regulatory environment. They will also need to be supported by smart and emerging technologies. These technologies can help enhance and customise products based on consumer preferences, improve traceability, and transparency across the food supply chain.

Australia's strengths and areas of competitive advantage and strategic interest for food and beverage manufacturing include:

- an international reputation for clean, green and safe food and beverage products
- strong trade relations through close proximity to emerging markets and reputation as trusted supplier
- access to high quality and reliable agricultural produce through competitive and advanced agriculture sector
- our trusted regulatory system.

¹⁴ ABS International Trade in Goods and Services, Australia, 2019-20.

¹⁵ FIAL is the Food and Agribusiness Growth Centre under the Australian Government Industry Growth Centres Initiative. Through part of an industry-led process the Industry Growth Centres Initiative aims to drive innovation, productivity and competitiveness.

¹⁶ Food Innovation Australia Limited (FIAL) 2020, [Capturing the Prize: The A\\$200 billion opportunity in 2030 for the Australian food and agribusiness sector](#), Oct; CSIRO 2017, [Food and Agribusiness – A Roadmap for unlocking value adding growth and opportunities for Australia](#), July.

¹⁷ Note that this figure does not include industry levies paid by firms, which go towards research and development undertaken by industry organisations on behalf of firms.

¹⁸ ABS, [Catalogue 8104.0](#) Research and Development, Businesses, Australia 2017-18.

¹⁹ Food Innovation Australia Limited 2020, [Sector Competitiveness Plan 2020](#).

Meeting future needs

A thriving, modern food and beverage manufacturing sector is essential to ensuring Australia's ongoing resilience in the face of future disruptions.

To achieve this, the sector must optimise its modern manufacturing capabilities and create more value added products that meet consumer and market demand. The sector will need to undertake transformative innovation to meet best-practice production standards. This includes adopting smart technologies, traceability, and transactional and compliance solutions. By adopting these technologies manufacturers will become more competitive and move up the smile curve.²⁰

Value adding can come in many different formats. For example, it can include improved packaging to ensure short shelf-life products get to the end consumer intact, or the development of new strains of barley to improve the shelf life of beer. It can involve transformation of base-level products into premium and ready to eat meals that are more convenient for consumers. Value can also be added through developing a reputation for quality and safety and through marketing and branding by businesses.²¹

The sector will also need:

- to adopt, adapt and develop smart and emerging technologies
- higher levels of skill to implement and operate new technologies
- increased investment to deliver more sustainable production and packaging
- better access to and sharing of food and beverage sector data
- increased investment into food and beverage manufacturing, both from greater domestic investment and foreign investment
- continued opportunities to export new and emerging value added products across the supply chain and improved opportunities to diversify markets
- better collaboration across the agriculture sector, the food and beverage manufacturing sector, research and government.

Barriers to scale

In its current state, some of the key barriers to food and beverage manufacturing achieving scale are:

- technology and data sharing due to the high cost of adopting smart technologies
- inconsistent availability of data
- lack of data and information sharing
- underutilisation of domestic inputs
- lack of collaboration and integration due to integration gaps within industry and global supply chains
- low rates of industry collaboration and coordination.

Technology and data sharing

In Australia, supply chains and manufacturing processes are increasingly being digitised. Feedback from industry stakeholders is the high costs of adopting smart technologies is a barrier to scaling. Technology can provide firms with:

- real-time insights into their supply chains
- decision support through Artificial Intelligence (AI)
- data analytics for proactive decisions
- the ability to adjust manufacturing in real-time through the use of Internet of Things (IoT), technologies and automation.²²

This is particularly important when shocks—such as the COVID-19 pandemic—occur. Employing Industry 4.0 principles and adopting new technology also presents opportunities to reimagine the way the food and beverage sector operates in Australia and help to enable greater innovation and manufacturing onshore. Successful adoption could increase productivity, lower costs and improve Australia's competitiveness in domestic and export markets.

In terms of data, industry stakeholders have listed the inconsistent availability of data and lack of sharing between suppliers and retailers as difficulties in helping the supply chain understand requirements and consumer tastes. With many SMEs who produce for local and niche markets, these businesses often lack access to market intelligence and information channels to understand potential emerging smart technologies which could transform their manufacturing processes.

²⁰ The smile curve is a visual representation of value added along a production cycle. The curve demonstrates the greatest value along the cycle is from early stage research and development and post-production activities. Source: Office of the Chief Economist 2018, [Industry Insights: Globalising Australia](#), June.

²¹ Business Council of Australia 2015, [Building Australia's Comparative Advantages: A 21st Century AgriFood Sector](#), December.

²² KPMG 2020, [AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector](#), a report for the Food Agility CRC – Mission Food for Life, July.

Underutilisation of domestic inputs

Australia has a strong reputation for producing high quality and safe foods which drives domestic and international demand for Australian products. But Australia does not produce exports in isolation. For example, Australia's food and beverage manufacturing and agriculture sectors are both downstream and upstream of various industries in global value chains. Looking in particular at Australia's agricultural exports, these are underpinned by imports, with around 10% of total gross value of trade made up of foreign value added. That amounted to around US\$4 billion of foreign value in 2014.²³ The opportunity for the food and beverage sector is for better utilisation of Australian ingredients and agricultural inputs to manufacture higher value add products onshore that meet consumer and market demand. These premium goods, once exported, will attract higher margins for Australia's food and beverage producers and manufacturers.

Collaboration and integration

Industry integration has been raised during stakeholder consultation as a barrier to scale, given the diverse business types and large proportion of SMEs making up the sector. Feedback suggests components of the sector work in isolation from each other, often in the same market and across supply chains. This was reiterated by the Business Council of Australia who note there has often been an adversarial, rather than collaborative, relationship within the supply chain.²⁴ This leads to duplication of efforts, resources and undermines the opportunity for a collaborative environment, greater efficiency and productivity.

The food and beverage sector must look to how it can pool resources to make a collaborative model at a sufficiently large scale, and aligned with a long-term vision. For example, firms could collaborate through clusters to optimise their collective use of infrastructure such as manufacturing equipment and machinery, transport and other inputs. However, innovative approaches to operating must be managed within appropriate competition laws. If the food and beverage sector doesn't make smart investments, there is a risk firms will either reduce the scale of their operations or move offshore.

Improving industry integration and collaboration could help food and beverage manufacturers lift their engagement capabilities internationally. This has been cited during stakeholder consultations as another barrier to scale. FIAL notes as a leading food-exporting nation, Australian food and beverage manufacturers need to develop a clearer understanding of the global marketplace and the intricate machinations that control supply if it is to improve export growth.²⁵

To limit barriers to scale, the food and beverage sector must have the right skills and expertise to draw on. This could include aligning the tertiary education system output to industry needs, and providing the right incentives to potential workers to create high-paying, high-skilled Australian jobs. Innovation requires continued engagement internationally, as well as an ongoing commitment to open movement of talented people into and across Australia.

Collaboration across whole of government was also raised as a barrier. Policy responsibility for agriculture and food and beverage manufacturing are undertaken by different departments and jurisdictions. Stakeholder feedback suggests the proliferation of services can make it hard for some businesses to know where to start seeking assistance, commenting on the need for more integrated and coordinated public policy.

Stakeholders acknowledge the sector is supported by a strong food regulatory system, yet there are opportunities to improve its efficiency. This can be done by achieving greater consistency across each jurisdiction's application, and enhancing the regulatory system's ability to adapt to industry changes.

Government and industry need to work together to identify opportunities to scale-up Australia's food and beverage manufacturing capability and outputs. This can be achieved by working together to improve skills and expertise, investing strategically in projects that will transform the sector to become more sustainable and competitive, and by embracing new and emerging technologies.

23 Greenville 2019, [ABARES Insights: Snapshot of Australia's place in global agriculture and food value chains](#), September.

24 Business Council of Australia 2015, [Building Australia's Comparative Advantages: A 21st Century Agrifood Sector](#), December.

25 Food Innovation Australia Limited 2020, [Sector Competitiveness Plan 2020](#).

3. Vision: food and beverage manufacturing

By 2030 we will double the value of Australia's Food and Beverage manufacturing through a focus on smart food and beverage manufacturing; innovative foods and beverages; and food safety, origin and traceability systems.

Over the next decade, food and beverage supply chains are expected to become more complex. To achieve the proposed vision, Australia must focus on maximising market share, increasing collaboration and seizing emerging opportunities. For example, by manufacturing value added products and translating innovations into successfully commercialised products.

By 2030, Australia's response in times of crisis will be more sophisticated and supported by better regulatory system design. This will be achieved by having a better understanding of consumer preferences and expectations. It will also be supported by improved detection and risk mitigation around food safety, traceability and provenance.

The vision for the sector to become more agile, scalable and resilient will:

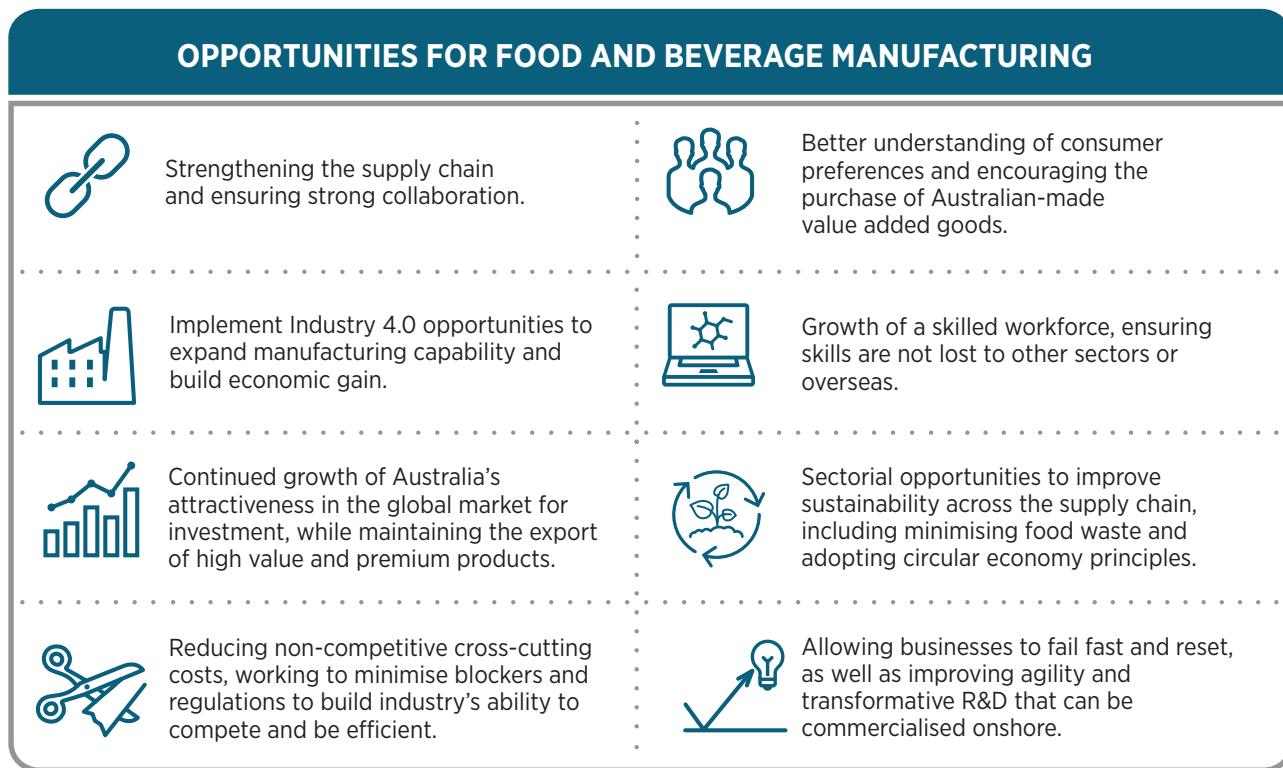
- build our onshore processing and packaging capability through the adoption of Industry 4.0 smart technologies such as automation, robotics, monitoring sensors and virtual systems
- grow the sector through modernisation and investments into new and emerging value added products such as health and wellness, convenience and premium food and beverages which meet changing consumer and market demand
- leverage and build on Australia's strengths in food quality, safety and provenance by adopting more data-driven technologies such as blockchain, barcoding and image recognition within agricultural and food production
- achieve scale by focusing on growth opportunity areas where Australia holds a competitive advantage
- foster collaboration across the sector so it can remain innovative and share knowledge and learnings to collectively grow.

4. Growth opportunities

Food and beverage manufacturing has every opportunity for growth. The sector will need to be market driven, less risk averse and responsive to consumer and global demand in order to keep pace with the opportunities presented by these changes. This road map recognises food and beverage manufacturers have been resilient throughout the COVID-19 pandemic with many pivoting their operations to supply retail products (for example fresh food and groceries) at short notice. Yet they still face economic and financial pressures due to rising costs, declining output prices and more international competition.

Broad growth opportunities for food and beverage manufacturing include (**Figure 5**):

Figure 5: Food and beverage manufacturing opportunities



Key areas of opportunity

Three broad areas of opportunity have been identified for food and beverage manufacturers. Informed by industry consultations, these opportunities will address the barriers and enable Australian food and beverage manufacturers to scale and meet consumer and market demand over the next decade. They are not mutually exclusive and strategic growth opportunities exist for manufacturers under each.

Smart food and beverage manufacturing for consumer-driven products	Innovative foods and beverages	Food safety, origin and traceability systems to enhance quality and assurance required in domestic and international markets
<p>Responsive, fast and agile food and beverage processing and packaging to improve competitiveness and create distinctive value propositions for customers, such as:</p> <ul style="list-style-type: none"> • automation of continuous and batch control systems, inspection and line control systems • robotics, including high speed palletising machinery and soft robotic technology • monitoring systems for temperature, humidity and pressure, sanitisation verification. 	<p>Develop innovative foods and beverages that incorporate diverse attributes to meet changing consumer needs and demands both domestically and overseas, such as:</p> <ul style="list-style-type: none"> • food and beverages for improved health and wellbeing and enhanced nutritional value • products for convenience and premium offerings such as ready to eat, pre-portioned meals • high value add food and beverage products, such as new and enhanced proteins, including fortified breakfast cereals, antioxidant rich breads, soy and other food and beverage alternatives. 	<p>Increasing Australia's output of safe, healthy and sustainably produced foods by adopting new solutions to increase value differentiation of our food and beverage products in domestic and export markets, such as:</p> <ul style="list-style-type: none"> • standardised digital labelling to provide customers (retailers and consumers) with instant information about origin of foods and production methods such as the use of QR codes on packed meat which can be read with smart technology to confirm traits such as certified organic and free-range • blockchain technologies to securely capture and store information on origin and food safety (handling, preparation and storage) for high value add foods.

Smart food and beverage manufacturing for consumer-driven products

Australian food and beverage is produced through a complex supply chain, connecting agricultural producers, processors, manufacturers, distributors and retailers. While complex, the system works effectively to maintain the food supply, both domestically and to export markets. Australia's food and beverage manufacturers have an opportunity to evolve the supply chain to be fast and agile in processing and packaging to improve competitiveness and create distinctive value propositions that are responsive to consumer and market demand.

For the purposes of this road map, smart manufacturing refers to the intensified application of advanced intelligence systems to enable rapid manufacturing of new products, dynamic response to product demand, and real-time optimisation of manufacturing production and supply-chain networks.²⁶

Responsive, fast and agile food and beverage processing and packaging

Progressive food and beverage businesses are adopting new smart technologies, advanced business processes and cutting-edge business models to create distinctive value propositions for customer-driven products. These are increasing their productivity; competitiveness; and transforming how food and beverages are manufactured, distributed and sold.²⁷

These improvements are enabling the production of more value added products, creating an imperative on the rest of the sector to do the same. Adoption of Industry 4.0 technologies will help to enable this transformative change across the sector. It will allow food and beverage manufacturers to better predict market trends, identify potential issues and create industry-specific solutions.

CSIRO's Data61 reports that Industry 4.0 has the potential to deliver \$315 billion in gross economic value to the Australian economy over the next decade.²⁸ There are many aspects to Industry 4.0 smart technologies. These include automated and digital technologies; data analytics; and machine learning to improve productivity, innovation, speed to market, and to meet consumer expectations about product attributes. Manufacturing examples to support this opportunity could include:

- installing sensors or equipment monitoring systems (for example temperature, humidity and pressure systems, sanitisation verification systems) that indicate where productivity improvements can be made
- advancing automation (for example automation of continuous and batch control systems, and inspection and line control systems) to reduce errors and increase production
- installing virtual reality systems to visualise and test different options for business models and production processes
- improving food sorting and handling (for example high speed palletising machinery and soft robotic technology) which help businesses make better decisions about processing of various foods
- optimising supply chain management and product tracking to ensure transparency
- enhancing products (for example, packaging and processing technologies to extend the shelf life of foods), and customising products based on consumer preferences
- supporting changes to packaging formats and the need to install new packaging equipment or lines necessary to meet the National Packaging Targets
- reducing food waste by better forecasting and predicting sales.

Industry 4.0 may also provide opportunities for increased onshore processing, particularly for agricultural produce for which limited or no onshore value adding is currently undertaken. This will not only assist the farming sector move produce up the value chain, but could also open up export opportunities for these value added goods.

Innovative foods and beverages

Increasingly, consumers are seeking diverse characteristics in their food. Some consumers have specific medical dietary requirements requiring the inclusion or exclusion of specific foods, while others are actively choosing healthier options. To capitalise on this opportunity, food and beverage manufacturers can pivot towards products which meet these changing consumer needs. There are a number of other benefits expected for consumers to support health and wellbeing, in addition to quality and stability such as convenience, safety, sustainability and shelf life.

Food and beverages for improved health and wellbeing, and enhanced nutritional value

Demand for health and wellbeing foods and beverages is expected to grow due to changing consumer preferences and dietary patterns. For example, consumers are looking for alternatives to traditional diets high in energy and fat, to more heart-healthy eating approaches. This is supported by FIAL research which identified health and wellness as a growth opportunity area offering

²⁶ Smart Manufacturing Leadership Coalition 2011, Implementing 21st Century Smart Manufacturing Workshop Summary Report, Control Global, June.

²⁷ NSW Government 2019, NSW food and beverage manufacturing industry development strategy, Department of Industry.

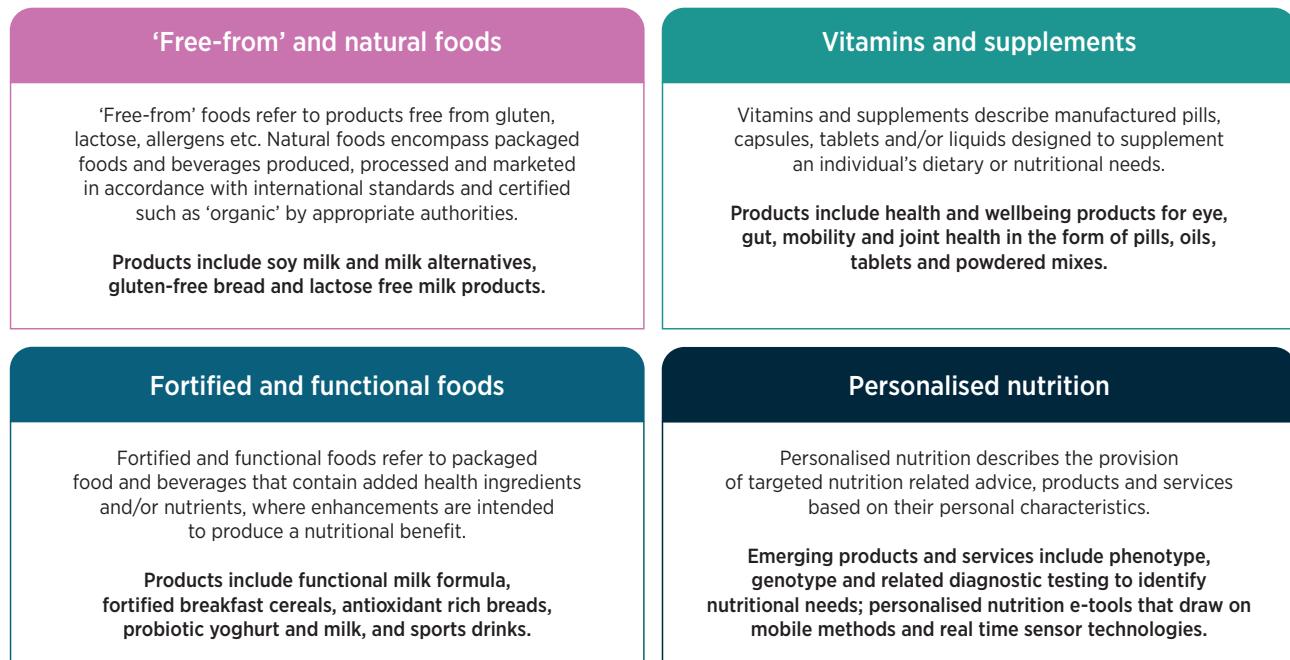
²⁸ AlphaBeta 2018, [Digital Innovation: Australia's \\$315B Opportunity](#), CSIRO Data61, September.

value added potential of \$45 billion by 2030.²⁹ This opportunity presents benefits for both the manufacturer and the consumer. The manufacturer can increase the breadth of consumers who can consume their products. The consumer will enjoy a more diverse range of food suited to their individual needs.

The CSIRO have identified 4 areas of opportunity under health and wellbeing. These include:

- 'free-from' and natural foods
- vitamins and supplements
- fortified and functional foods
- personalised nutrition.

Figure 6: Health and Wellness Opportunities³⁰



Examples of manufacturing to support this opportunity could include:

- technologies to create textures and structures enhancing nutrients and bioavailability, such as development of grains fortified with vitamins and minerals
- technologies to create fermented foods that could improve gastrointestinal tract function.

Products for convenience and premium offerings

In recent years, there has been a growing consumer demand for higher quality and more convenient food and beverage products. To meet this demand and maximise opportunities, the food and beverage sector must look to manufacture products which capture these premium attributes.

CSIRO's Food and Agribusiness Roadmap highlights urbanised consumers are increasingly demanding quality convenient foods that require low preparation or can be eaten on-the-go. This is coupled with a move away from the traditional '3 square meals' and towards a higher number of smaller meals or snacks throughout the day.³¹ Examples of manufacturing which supports this opportunity could include:

- installing virtual reality systems to test product reformulation and understand how to change the production process to achieve desired product qualities, such as taste and consistency
- supporting innovation accelerators such as clusters or organisations that support collaboration and commercialisation of new innovations and technologies in manufacturing and packaging, such as a voucher system for SMEs to partner with research organisations, universities or large enterprises and use their facilities.

²⁹ FIAL 2020, [Capturing the Prize: The A\\$200 billion opportunity in 2030 for the Australian food and agribusiness sector](#), October.

³⁰ CSIRO 2019, [Growth opportunities for Australian food and agribusiness: Economic analysis and market sizing](#).

³¹ [Food and Agribusiness – A Roadmap for unlocking value adding growth and opportunities for Australia](#), July.

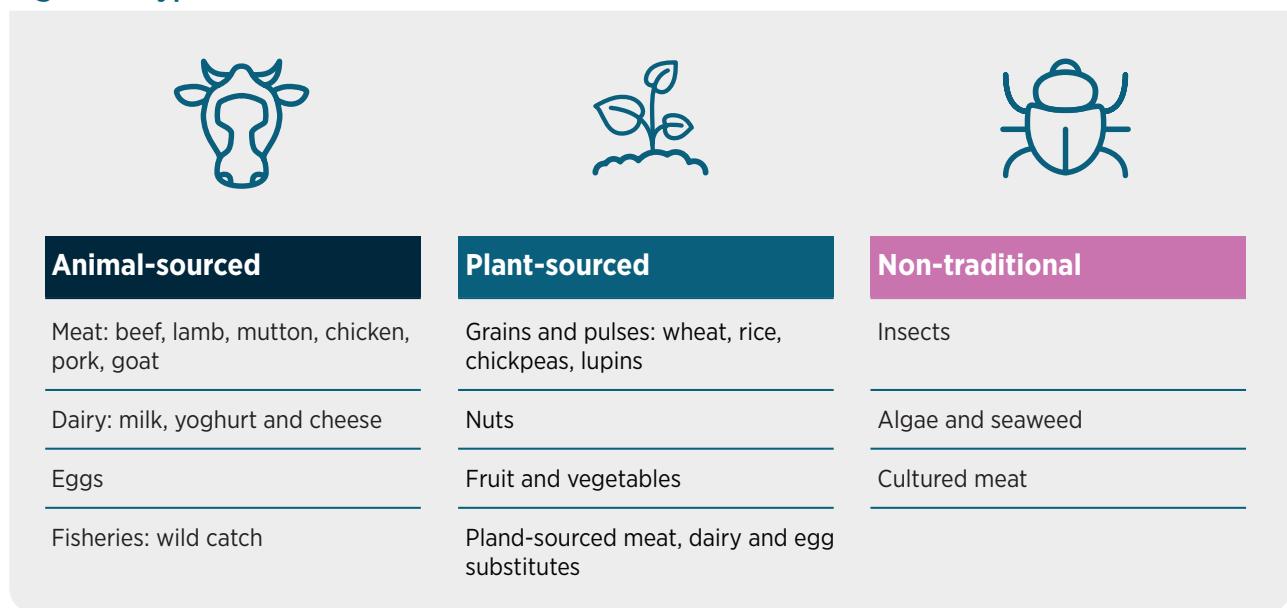
High value add food and beverage products such as new and enhanced proteins

As consumer demand for a diverse range of sustainably produced food products grows, the market opportunity for food and beverage manufacturers is for the creation of high value add products. These innovations can come through novel applications of existing manufacturing processes, or adoption of new production technologies.

Another example of the novel application of food processing technologies is the new and enhanced proteins market. The global population is estimated to reach 9.8 billion by 2050, driving the demand for protein.³² While traditional animal protein will continue to be a significant source, alternative sources may be needed to keep up with demand. Protein is an important requirement for a healthy diet, and there is room to create a diverse protein industry if manufacturers take a unified market approach.³³ As a major producer and exporter of protein, Australia's food industry is well placed to tap into this opportunity. It can develop novel, differentiated protein products derived from animal, plant and non-traditional sources (**Figure 7**).

Global meat consumption has increased by 58% over the 20 years to 2018, reaching 380 million tonnes. Population growth accounted for 54% of this increase, and per person consumption growth accounted for the remainder.³⁴ Global meat consumption between 2019 and 2024 is expected to rise, largely driven by population growth and rising incomes in developing countries.³⁵ This will present significant opportunities for Australia's primary producers and food manufacturers to meet this demand by selling premium products to new and existing export markets.

Figure 7: Types of Proteins³⁶



In October 2020, FIAL identified traditional and alternative proteins as a major opportunity for the economic growth of Australia's Food and Agribusiness sector.³⁷ Economic modelling suggests that under a moderate growth scenario, by 2030 Australia's plant-based protein market will generate an additional \$2.9 billion in domestic sales and create 6,000 manufacturing jobs.³⁸ This will also increase demand for the horticultural products and crops that are used to make these products.

Examples of manufacturing which supports this opportunity could include:

- supporting onshore processing facilities for alternative proteins—such as soy protein concentration plants—or supporting traditional industries to adopt more sustainable manufacturing practices
- supporting processing technologies to enable products with novel properties, such as 3D printing, high pressure processing, sonication, shockwave technology and pulsed electric fields
- supporting innovative projects and pilots that re-use or valorise food and beverage manufacturing by-products to create more value add products, including new packaging and processing technologies.

³² Food Innovation Australia Limited 2020, *Sector Competitiveness Plan 2020*.

³³ Admassu S et. al, 2020, *Landscape of Protein Production: Opportunities and challenges for Australian Agriculture*, Australian Farm Institute, February.

³⁴ ABARES 2019, *ABARES Agricultural Commodities: Global trends in meat consumption*, March.

³⁵ ABARES 2019, *ABARES Agricultural Commodities: Global trends in meat consumption*, March.

³⁶ CSIRO 2019, *Growth opportunities for Australian food and agribusiness: Economic analysis and market sizing*.

³⁷ Food Innovation Australia Limited (FIAL) 2020, *Capturing the Prize: The A\$200 billion opportunity in 2030 for the Australian food and agribusiness sector*, October.

³⁸ Lawrence, S. & King, T. 2019, *Meat the Alternative: Australia's \$3 Billion Dollar Opportunity*, Melbourne, Food Frontier.

Food safety, origin and traceability systems to enhance quality and assurance required in domestic and international markets

As Australia's food production supply chain becomes increasingly complex and interconnected, there is growing consumer demand for transparency about the origin of ingredients and products, and their environmental impact. The sector has broader digital potential to better meet consumer expectations if it can adopt new solutions to improve value differentiation of food and beverage products in domestic and export markets.

Adopting new solutions to increase value differentiation of our food and beverage products

Product quality, trust and security is critical to Australia's reputation as a supplier of clean, green and safe products, particularly in international markets. At the same time, there is growing consumer demand to know where products are sourced and their environmental impact. The adoption of new data-driven solutions can enable the sector to:

- validate sourcing and provenance claims
- meet consumer demand for transparency
- efficiently combat food fraud³⁹
- support smarter value chains.

Australia falls in the middle of OECD rankings on food traceability due to having a high quality or mandatory system for specific commodities such as livestock identification. [CSIRO's Food and Agribusiness Roadmap](#) also highlights the need to invest in both virtual and physical technologies that provide greater transparency around:

- product origin
- production inputs
- suppliers
- processing materials
- transport
- distribution.

Increased consumer interest in the origins of their food and beverages means ingredient provenance is becoming a key element in product storytelling from paddock to plate. For manufacturers this means using automation, the IoT and AI to access real-time tools and technologies such as blockchain which can gather and integrate information in an efficient way while maintaining security and privacy for the consumer. For the customer, this means being able to track a product across the entire supply chain in real-time and enable them to make informed purchasing decisions.

As food and beverage manufacturers start to automate their data collection and link their production processes through smart tools such as barcoding and image recognition technologies; more data will come online enabling greater connectivity with the end-customer. This will allow the manufacturer to gain access to data, insights and information they need to stay in compliance with regulatory requirements in real-time; and create a unique and personalised experience for the customer. Examples of manufacturing which supports this opportunity could include:

- implementing digital product information management systems, including the Electronic Product Information Form, to help transfer standardised digital information along supply chains
- implementing digitalised paddock-to-plate traceability systems, for example, blockchain technologies to securely capture and store information on origin and food safety (handling, preparation and storage) for high value add foods
- implementing digital labelling solutions to provide domestic and overseas customers (retailers and consumers) with instant information about origin of foods and production methods, for example, the use of QR codes on packed meat which can be read with smart technology to confirm traits such as certified organic and free-range.

The opportunities to employ digital labelling solutions for food have been considered in the recent past, through a report the Australian Government commissioned in 2017 that looked into that issue. The report found that at that stage, digitisation of food labelling was still emerging, and identified specific ways in which digital food labelling could, in the future, be leveraged to greatest effect for the benefit of consumers and industry.

A more digitalised food system will build on the [National Traceability Framework](#). This is a tool used to guide Australian agricultural industries and food producers, governments and related businesses in enhancing our traceability systems and promoting 'brand Australia' in our international markets. Modern, accurate and timely traceability systems can assist in providing additional assurances to customers of Australian agricultural products and our trading partners, while also producing a range of

³⁹ Defined as the sale of an inferior product represented as a more valuable one.

other benefits such as increasing our market share in international markets. In addition, adopting smart tech solutions to digitalise consumer information and product labelling could reduce manufacturing costs. Savings could then be reinvested back into the business.

The Australian Government also recognises the importance of providing Australian consumers with information about the country of origin of products offered for sale in Australia. Government reforms made to the Country of Origin Labelling (CoOL) scheme in 2016 now require all 'priority' food labels to clearly indicate whether a product was grown, produced or made in Australia or overseas, and the percentage of Australian ingredients it contains (unless wholly imported). Food grown, produced or made in Australia must also carry the standard mark consisting of the kangaroo in a triangle logo, bar chart and explanatory text statement, whilst non-priority foods require a country of origin text statement.

There are also a number of industry-led initiatives underway. For example, [Mission Food for Life](#), through the Food Agility Cooperative Research Centres (CRCs) is working with industry and research to co-invest in R&D. It aims to deliver new data-driven tools to support resilient businesses and communities, and build trusted supply chains via data and digital.

Building on the Australian Government's priorities

The Government has a number of existing policies and programs interacting and supporting the food and beverage manufacturing sector. This road map aligns with these initiatives and will help food and beverage manufacturers to lift capability, build scale and improve competitiveness.

Links with Australian Agriculture

A strong food and beverage manufacturing sector cannot be achieved in isolation. Australia will need to leverage its strength in agricultural production to enable food and beverage manufacturing to grow. The Australian Government seeks to grow the domestic agricultural sector through its [National Agricultural Innovation Agenda](#).

The Agenda seeks to improve the sector's readiness to adopt new technologies, build a digitally capable and equipped agriculture workforce and improve the use of data for decision making. This would include looking at opportunities to work with R&D corporations and other key players, as is being pursued through the Agenda. The Agenda also supports the delivery of Ag2030 under 5 reform pillars:

- strengthen ecosystem leadership
- improve the balance of funding and investment
- embed world-class industry-led innovation practices
- strengthen the regions
- create the next generation innovation platform.

Through Ag2030, the Australian Government is setting the foundations for agricultural growth. It will ensure Australian agricultural producers receive maximum returns for their hard work and are supported by vibrant rural and regional communities. Key Government actions relevant to the Food and Beverage road map include but are not limited to:

- delivery of a National Agricultural Innovation Agenda in 2021
- developing a National Agricultural Innovation Policy Statement and mission-oriented agricultural innovation priorities by mid-2021
- providing \$1.3 million to [Agricultural Innovation Australia](#) to drive a new cross-industry approach to agricultural innovation
- providing \$86 million over 4 years to deliver 8 Agricultural Adoption and Innovation Hubs (focused on local drought resilience research), through the Future Drought Fund by mid-2021
- developing a Digital Foundations for Agriculture Strategy that will set the foundations for widespread uptake of digital technologies across agriculture sectors by mid-2021
- working with the [Rural Research and Development Corporations \(RDCs\)](#) to deliver digital platforms that support uptake of innovation and commercialisation outcomes
- providing approximately \$300 million annually in government-matching contributions, to support eligible research and development activities for the agriculture industry
- delivering a National Agricultural Workforce Strategy for future workforce development and availability
- \$328 million to modernise Australia's export systems over 4 years, as part of the Government's deregulation agenda, which will help food and beverage manufacturers, particularly in dairy, with direct and indirect business costs.

Innovation drives productivity growth, sustainability and resilience. By moving towards a more advanced, innovative agricultural sector, Australia will set the foundations to help build a more technologically enabled food and beverage manufacturing sector.

Links with the Deregulation Agenda

The Australian Government is committed to a Deregulation Agenda where regulation is fit-for-purpose. Australia's food regulatory system must continue to remain robust and agile into the future to support a strong food and beverage manufacturing sector. To ensure this, the Government is undertaking a comprehensive review of the Food Standards Australia New Zealand Act 1991 (FSANZ Act) and the associated operations and responsibilities of Food Standards Australia New Zealand (FSANZ). The review considers the economic efficiency of regulation, recognising the food industry's importance to regional communities and Australia and New Zealand economies. The review has been operational since July 2020, with industry consultation on a Draft Regulatory Impact Statement due in mid-2021.

Links with food and packaging waste

The world's population is growing exponentially. With this growth, resources are expected to become scarcer. At the same time, consumer expectations on environmental and social license issues are becoming more demanding. Transitioning the food and beverage sector to a more environmentally and socially responsible manufacturing system will be key to meeting these challenges. FIAL has identified food loss and waste, and sustainable packaging as growth opportunity areas offering value added potential of \$18 billion and \$3 billion respectively by 2030.⁴⁰

Australia's food and beverage manufacturing sector can pursue growth, ensure sustainable resource use, and minimise environmental impacts by building on existing work including:

- [National Food Waste Strategy](#)
- [National Waste Policy 2018](#)
- [National Waste Action Plan 2019](#)
- [National Plastics Plan 2021](#).

Links to business investment attraction and exporting

There are a number of initiatives focused on assisting food and beverage manufacturers to grow their business. For example the [Australian Trade Commission](#) (Austrade) provides [services for export development](#) and to [attract investment to Australia](#).

The Australian Government is committed to making sure Australian manufacturers have access to both existing and new markets through Free Trade Agreement negotiations, technical bilateral market access negotiations, addressing non-tariff measures and building long-term strategic partnerships with key trading partners.

Within Ag2030, the Government has also committed to providing \$7 million over 4 years to support better traceability outcomes, through the [Modernising Agricultural Trade initiative](#). Initiatives such as these support the key growth opportunities outlined in this road map.

As this road map is implemented, experts from across departments and agencies including CSIRO, the Department of Agriculture, Water and the Environment, Austrade, FSANZ and AusIndustry will assist government and industry. They will provide expert advice to grow the local food and beverage manufacturing sector and to identify opportunities to access export markets and supply chains.

⁴⁰ FIAL 2020, [Capturing the Prize: The A\\$200 billion opportunity in 2030 for the Australian food and agribusiness sector](#), October.

5. Enablers

This road map identifies 3 broad areas of opportunity for food and beverage manufacturing that have been developed around the application of critical enablers. By realising these opportunities and unlocking the enablers of growth, food and beverage manufacturers will be positioned to pursue further growth opportunities onshore specific to their subsectors. Given the number and diversity of subsectors that make up the food and beverage manufacturing sector, this road map does not attempt to identify those opportunities.

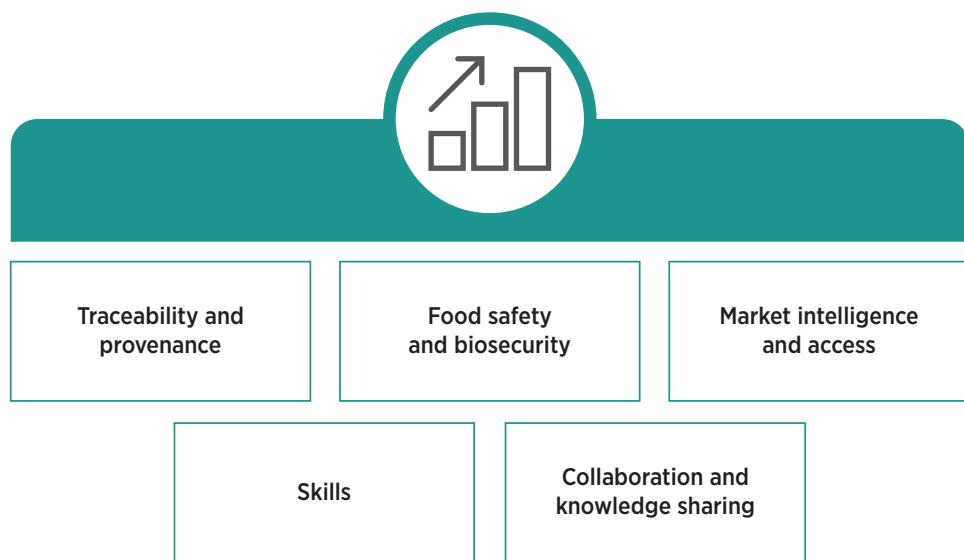
Collaboration is also seen as an important enabler in terms of positioning the broader food and beverage sector, and is discussed in further detail in **Section: 9. Engagement and Partnerships**.

Other additional enablers, which will help support the growth of food and beverage manufacturing include:

- access to more diversified markets including export and online
- enhanced supply chain resilience.

These enablers are supported through CSIRO's Food and Agribusiness Roadmap (**Figure 8**). CSIRO identifies 5 key growth enablers from industry consultation, each requiring a unique mix of science and technology investment, business action and ecosystem assistance.

Figure 8: CSIRO enablers of growth



Access to more diversified markets including export and online

The global food and beverage market is highly competitive and not all Australian food and beverage manufacturers enjoy the same level of export success. Industry feedback is many businesses do not explore growth opportunities outside traditional markets because they lack the expertise and knowledge to do so. Enabling these food and beverage businesses to explore these opportunities and take advantage of Australia's Free Trade Agreements (FTAs) is a potential growth opportunity for the sector.

Digital commerce technology is widespread and consumers are increasingly willing to shop online. This means there is potential for manufacturers to increase their customer base by developing direct-to-consumer trading platforms including in export markets. In addition to maximising their profitability, this allows manufacturers to capitalise on increasing consumer interest in shopping locally and buying 'from the source'. It also allows some producers to sell direct to consumers interested in foods that possess specific attributes. This could include particular processing methods and the presence or absence of certain ingredients, for example gluten free products.

Industry stakeholders have commented on the need to diversify Australia's export footprint following recent challenges faced by wine and barley exporters. By spreading the risk and considering a broad range of markets, stakeholders note future export shocks could be better managed. For industries such as wine, this could mean selling in both traditional and non-traditional markets and adoption of a direct-to-consumer trading platform. Through the [**Agri-Business Expansion Initiative**](#) the Australian Government is investing \$72.7 million to support Australian farmers, fishers, foresters, and other agri-food exporters to understand and mitigate risks in an increasingly uncertain trading environment.

Enhanced supply chain resilience

The COVID-19 pandemic had a significant impact on the Australian economy disrupting global supply chains, halting travel and migrations, and impacting the global and domestic workforce. A strong food and beverage supply chain will position Australia to respond to future supply chain disruptions. This will require Australia's food and beverage manufacturing supply chains to be mapped and analysed for vulnerabilities and opportunities to enhance strategic resilience.

The Australian Government through the \$107.2 million [**Supply Chain Resilience Initiative \(SCRI\)**](#) will strengthen Australia's ability to access critical necessities and build a practical and detailed understanding of vulnerabilities in Australia's access to critical products. This work will complement the Productivity Commission's review of supply chain vulnerabilities and their broader economic impacts.

6. Goals

Two, 5 and 10 year milestones for food and beverage manufacturing have been created that revolve around Australia's goal to double the value of the sector by 2030.

	Success at 2 years – by end of 2022	Success at 5 years – by end of 2025	Success at 10 years – by end of 2030
By 2030 we will double the value of Australia's Food and Beverage manufacturing through a focus on smart food and beverage manufacturing; innovative foods and beverages; and food safety, origin and traceability systems.			
Overarching	<ul style="list-style-type: none">Increasing use of smart manufacturing, and the onshoring of commercialisation and manufacturing activities to improve processing and packaging through co-investments in translation, integration and collaboration.The foundations for the application of Industry 4.0 technologies are being laid.Whole-of-Government responsibilities are coordinated and programs for food and beverage manufacturers are clear for industry to navigate.Government and industry have worked together to identify policy changes to achieve the vision.	<ul style="list-style-type: none">Manufacturers are collaborating and using smart manufacturing to respond to new and emerging food and beverage opportunities and consumer trends and market demands.The food and beverage sector is more cohesive with increased industry collaborations, including with Australia's agriculture sector.The sector has continued to improve its sustainability.Standardised digital information flows along supply chains.	<ul style="list-style-type: none">Food and beverage manufacturing value has doubled and exports increased.Food and beverage manufacturers are more agile, scalable and resilient to shocks.Australia's reputation established as a world best reliable supplier of premium, safe, authentic food and beverage products.Industry-led innovation intensity increased, non-competitive costs on industry minimised.Standardised digital information flows along supply chains and to consumers.

	Success at 2 years – by end of 2022	Success at 5 years – by end of 2025	Success at 10 years – by end of 2030
Smart food and beverage manufacturing for consumer-driven products	<ul style="list-style-type: none"> Increased onshoring of smart manufacturing technologies and capabilities to improve processing and packaging through increased automation and monitoring sensors, and the development of training programs to enhance industry's smart manufacturing skill base. The path from conceiving an innovative idea through to its commercialisation is more accessible and achievable for industry. The sector has increased investment in technologies that enable industry-led innovation including use of systems to improve productivity and efficiencies. 	<ul style="list-style-type: none"> Digitalised production equipment and predictive data analytics reduces utility costs and food waste, increases quality and safety, and improves competitiveness. Production facilities are more agile to innovate and renovate products to meet changing consumer and dietary needs and requirements. Digital systems leveraged to improve supply chain resilience, refine demand forecasting and adjust production scheduling. The sector has a highly skilled workforce that is agile and adaptive. Increased adoption of digital technologies by manufacturers. 	<ul style="list-style-type: none"> Increased agility and competitiveness of Australian manufacturing. Increased value of Australian food and beverage manufacturing, particularly in exports. A thriving, innovative ecosystem, with a sustained increase in R&D and number of business incubators.
Innovative foods and beverages	<ul style="list-style-type: none"> The sector has a better understanding of emerging market opportunities. Food and beverage manufacturers have access to affordable pilot plants to test new products and state of the art equipment. 	<ul style="list-style-type: none"> Access to large scale end-to-end production facilities for the sector. Sector is more forward looking and sustainable, including achievement of the National Packaging Targets and adoption of more circular economy manufacturing practices. Increased value adding of Australian agriculture, responding to local and global demand for high quality, safe products. An increased range of Australian developed and manufactured products that meet changing consumer needs, such as premium products. 	<ul style="list-style-type: none"> The sector remains competitive to evolving consumer demands with high value add food and beverage products and enhanced proteins.

	Success at 2 years – by end of 2022	Success at 5 years – by end of 2025	Success at 10 years – by end of 2030
Food safety, origin and traceability systems to enhance quality and assurance required in domestic and international markets	<ul style="list-style-type: none"> Manufacturers have digitised their product information, which underpins growth in online channels and is the first step in a digitised food system. 	<ul style="list-style-type: none"> The sector has adopted a standardised approach to data and information exchange across supply chains. Improved traceability across the value chain, from farm to manufacturer to consumer, underpinning provenance claims. Consumers have increased access to product information such as through mobile devices. Improved digital traceability from farm to manufacturer to consumer, underpinning provenance claims. 	<ul style="list-style-type: none"> Consumers have access to extended and personalised product information such as access to environmental impact and manufacturing processes. Value adding to Australian agriculture has increased onshore.

7. Making it happen

This road map focuses on growing manufacturing activities, capabilities and specialisations in the food and beverage manufacturing sector. By delivering on the vision and prioritising opportunities, Australia can help its food and beverage manufacturing sector build scale, and become more competitive and resilient. In line with the key areas of opportunity, the industry-led taskforce identified potential co-investments which could lift the ecosystem to achieve the vision over the lifespan of the MMS.

Key actions have been identified below in each of the growth area opportunities outlined in this road map, which will support Government and industry achieving its vision of doubling the value of Australia's food and beverage manufacturing sector by 2030.

Smart food and beverage manufacturing for consumer-driven products

Actions:

- Target co-investment to support food and beverage manufacturers' adoption of Industry 4.0 technologies, through pilots, asset replacement or upgrades.
- Industry and government will work together to encourage collaboration throughout logistic networks to enable efficiencies and reduced environmental impact.
- The Government will support businesses to reduce non-competitive cost pressures to allow businesses to free up capital to invest in industry-led innovation.
- Industry and government will invest in capability development such as industry upskills and cross-skills; and develop strategies which are agile and adaptive to market demand.

Industry consultation identified key barriers which limit the food and beverage sector's ability to be innovative and agile. These include non-competitive costs (such as energy usage), access to affordable testing facilities and access to capital. The taskforce also identified the importance of reducing non-competitive costs which do not contribute to business competitiveness. It was proposed that if non-competitive costs could be reduced, for example through advancing to Industry 4.0, these costs could be reinvested back into business innovation. These technologies will also help underpin innovation, for example through virtual reality and 3D printing that assist with prototyping and understanding the changes needed in production processes.

Industry consultations also highlighted that SMEs faced challenges accessing affordable facilities to test ideas and innovative new products. Making affordable, shared, end-to-end manufacturing facilities available would provide better access to knowledge, information and capital; building a firm's ability to innovate. For example, [RMIT University's Food Research and Innovation Centre](#), undertakes fundamental, applied and commercial research in partnership with industry. It offers a full range of services industry can access from product innovation, develop and scale-up solutions, shelf-life testing, packaging design and testing. Other similar examples include [Monash Food Innovation](#) and CSIRO's food manufacturing research and development pilot plants.

Innovative foods and beverages

Actions:

- Industry, government and research will support short and targeted research projects to encourage innovation and keep pace with changes in consumer demand.
- Industry, government and research to encourage more circular economy manufacturing practices across production to lead to a sustainable sector.
- Government and research to support awareness and adoption of technologies and new innovation processes that reduce risk and increase the pace of consumer led innovation.

Consumer demand for food and beverage products is changing rapidly, including with respect to health and wellness, sustainability and convenience. Taskforce and industry consultations identified research as vital to understanding consumer growth opportunities, especially for emerging sectors. For example, translational development and innovations activities could lead to quicker positive impact for the sector. These activities have a commercial focus with a shorter research timeframe, meaning the results are brought to market while there are still opportunities to reap commercial benefits. This in turn allows the sector to better deliver on what consumers want, and provide a competitive edge for emerging markets on a global scale.

An example could be adoption of circular economy principles throughout the food and beverage manufacturing process. This could include a variety of activities, including finding ways to re-use or increase the value of manufacturing by-products. Acknowledging that many organisations either have or are implementing strategies to support circular economy practices; continued incorporation across the whole sector will help manufacturers better understand how to minimise their carbon footprint and impact, and potentially turn waste streams into value added resources and products.

Circular economy practices also include the development of sustainable packaging, which can entail research, including into the stability and safety of new sustainable packaging, as well as changes to capital equipment such as moulds and packaging lines. Assisting food and beverage manufacturers to make these changes will also support the growth of the Recycling and Clean Energy priority area of the MMS.

Food safety, origin and traceability systems to enhance quality and assurance required in domestic and international markets

Actions:

- Industry, government and research will support short and targeted research projects to establish new capabilities to capture, manage and analyse data throughout the manufacturing process, providing industry with new insights and opportunities to optimise their manufacturing process.
- Industry and research will employ new technologies across industry that will together enable food to be traced through each stage of the value chain, providing verifiable information to consumers and manufacturers on the origin of food and its ingredients. For example, better provenance information to provide to the consumer and reduce food waste through better forecasting of sale predictions.
- Government will incentivise ‘industry-led’ standardisation of data systems with investment to support company level IT infrastructure investment needed to implement the new standards.
- Industry, government and research will share more data insights to facilitate greater digital insights.

Research is vital to keep pace with the fast moving sector and for understanding consumers, trends and growth opportunities. Stakeholder feedback suggests the research areas of traceability and digital information across the supply chain and to the consumer in particular are areas of opportunity. FIAL research reiterated this, noting digital technologies offer new opportunities to improve how food can be tracked across global supply chains.⁴¹

While Australia has well established practices for tracing food origins, this generally relies on record keeping by individual firms within the value chain. This serves an important purpose in food safety. Improving record management presents additional opportunities to appeal to increasing consumer interest in product origins and other attributes such as ethical and environmentally responsible sourcing. This was supported in the [Red Meat 2030](#) report, where provenance verification was seen as a way to maintain Australia’s competitive advantage and meet consumers’ growing demand for information about their food.

Industry stakeholders have identified that the high costs of changing labelling requirements hamper their business competitiveness. It was proposed that as customers uptake more smart technologies, there are benefits to having greater provision of digital information. For the business, this reduces costs as not all information is required on the physical pack. For the consumer, information is readily accessible at any time.

Stakeholders note there is a fragmented approach to consumer data and insights. It was suggested food and beverage manufacturers must use a data driven decision making approach. This means that when a business is undertaking innovation, it is directed by what the consumer wants, not just product improvement without an end-market in mind.

Beyond the 3 focus areas identified, there are opportunities to address the broader food and beverage ecosystem. These are fundamental to the sector achieving scale. They include:

- supporting industry to navigate food and beverage policy responsibilities across all Government levels by working to identify gaps in policy and access to existing industry support
- developing a framework to better support the manufacturing sector and improve cohesion for example through business-to-business collaboration on common opportunities across the value chain
- reviewing appropriate government settings to better support collaboration and reduce the regulatory burden for businesses
- undertaking industry-led research focusing on both domestic and international examples to identify gaps and opportunities for individual subsectors, and transferable best-practice policies for Australia.

⁴¹ FIAL 2020, [Capturing the Prize: The A\\$200 billion opportunity in 2030 for the Australian food and agribusiness sector](#), October.

8. Benchmarks of success

This road map focuses on creating transformative change in the sector to achieve growth in higher value activities. The expectation is to see the participants in the MMS growing jobs, exports and profits and expanding Australia's food and beverage manufacturing capabilities.

To measure our progress against the vision set out in the road map, the following will be monitored over 2, 5 and 10 year periods, dependent on data availability:

- number and value of jobs
- number of businesses in the food and beverage manufacturing sector
- increase in sectoral profitability
- growth in food and beverage exports
- increase in the number of new products brought to market
- investment in food and beverage manufacturing
- business expenditure on research and development.

As the sector evolves and begins value adding in new ways, it will develop new and innovative measures for identifying and capturing this activity. These new measures will build on traditional systems of classifying and capturing industry activities, such as Australia and New Zealand Standard Industrial Classification (ANZSIC) Codes. Measures will monitor the strength and linkages across the food and beverage manufacturing value chain.

9. Engagement and partnerships

International best practice

Achieving growth in domestic food and beverage manufacturing is not only reliant on manufacturing orientated actions but on broader actions which cut across the entire food and beverage ecosystem.

The Netherlands has one of the fastest growing food and beverage manufacturing sectors. It is backed by a range of complementary initiatives aimed at embedding a culture of collaboration, innovation and entrepreneurship within its golden triangle (business, science, government). A similar model is possible in Australia if all relevant parties within the food and beverage sector take a united whole-of-value chain approach.

Netherlands: private-public collaboration and innovation at a national scale

A key aspect of Netherland's success is the active clustering of complementary businesses and institutions, and a mindset to create solutions which can be scaled.⁴²

Netherlands Food Partnership (NFP)

Established in 2019, the NFP is a foundation endorsed and funded by the Netherlands Government to enable collaboration between relevant Dutch organisations and international partners. NFP supports 'coalitions' targeted at improving food security, healthy diets and sustainable agriculture. Support is provided for 'proof of concept' and to bring innovations to market.

Topsector Agri & Food

Topsector Agri & Food stimulates new knowledge and innovations by creating and financing research projects. Using a three-way governance partnership of business, Government and knowledge institutes; it establishes a network of key actors to drive collaboration and encourages public-private partnerships to get involved.

Top Institute Food and Nutrition (TiFN)

TiFN is a public-private partnership for multi-and interdisciplinary research in food and nutrition. Using a systems approach, scientists collaborate on projects ranging from fundamental, applied and valorisation research. Programs are funded by private and public sources, with public programs using funding schemes deployed by Topsector Agri & Food and others.

Foodvalley NL

Established in 2004, Foodvalley NL is an independent organisation that has been developing and strengthening the Foodvalley ecosystem; an international network of organisations that are jointly working on transitioning to a sustainable food system. Its role is to connect firms with business partners and research facilities, organise knowledge events, and to support and facilitate cooperation and knowledge sharing.

Another useful model for Australia is the European Union and the European Institute of innovation and Technology model of knowledge transfer at scale. Using [Knowledge and Innovation Communities](#) (KICs) the EU has created a pan-European network across the entire innovation chain reinforcing the journey from research to the market. KICs are set up as partnerships across businesses, research centres and universities to solve industry challenges. Using a consumer-centric approach, KICs seek to develop a food system that is more sustainable, innovative and trusted. It is focused on creating and scaling up, developing talents, encouraging development of innovative products and engaging the public. Drawing on the experiences of similar nations to Australia can help design better strategic approaches and build leading edge food and beverage manufacturing capabilities.

Collaboration

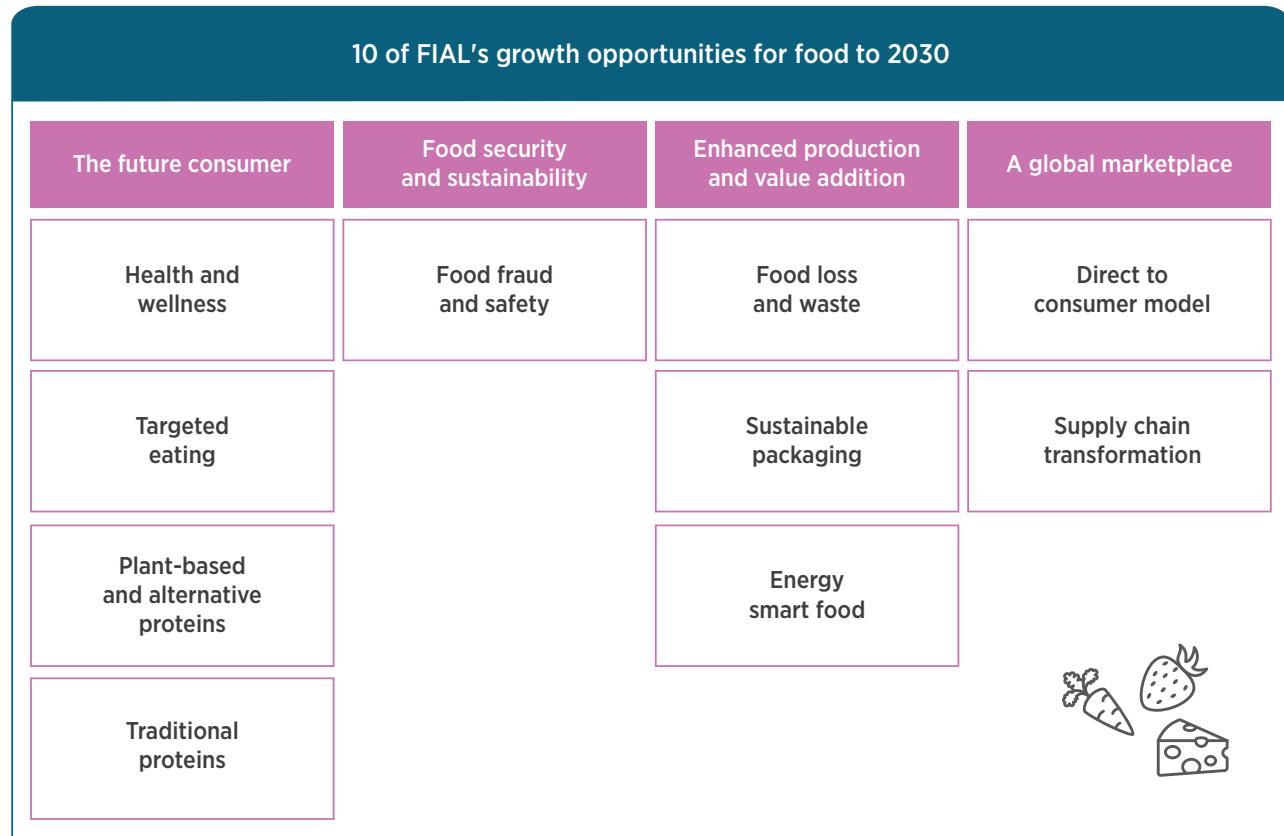
Collaboration is an important part of growing food and beverage manufacturing, and will be fundamental in helping the food and beverage sector achieve its vision. Industry consultations suggest a shared framework will be important to support better cohesion and better industry-to-industry and industry-to-research collaboration. Collaboration was also seen as a mechanism to potentially reduce non-competitive costs by sharing these costs across the partnership. Supporting greater levels of collaboration across all levels (government, businesses, industry experts and researchers) will ensure Australia:

- realises the benefits of innovation
- harnesses world-class research capabilities
- translates great ideas into commercial outcomes.

Long-term industry-led collaboration for the sector, is supported through Australian Government initiatives such as the [Cooperative Research Centres](#) (CRCs), the RDCs and through the Australian Government's 6 [Industry Growth Centres \(IGCs\)](#). FIAL, one of the IGCs, is working with the food and beverage sector through their Project 2030 to grow the share of Australian food in the global market. FIAL's report, [Capturing the Prize: The A\\$200 billion opportunity in 2030 for the Australian food and agribusiness sector](#) identifies 19 Growth Opportunities that will be critical in shaping the Food and Agribusiness sector over the next decade. Ten of these opportunities, relate directly to the opportunities captured in this road map (Figure 9).

42 KPMG 2018, [Going Dutch: Opportunities for the Australian agri-food sector](#), August.

Figure 9: FIAL's 10 related food growth opportunities



The Government knows businesses are more likely to grow and attract investment when they are supported by a thriving business environment. The Government is focusing its investment on partnerships and projects that will:

- create collaborative environments
- encourage the market to invest
- facilitate collaboration between business, research organisations and state and territory governments.

For example, food and beverage clustering is growing across Australia's regions, enabling firms to tap into knowledge and relationship ecosystems at a local level. The focus, applied research driven by market and consumer demand rather than supply pulled. Clustering has the additional benefit of building a region's capability, capacity and business confidence to innovate, invest and scale-up.

This road map focuses on how government and industry can collaborate to use science and technology as enablers to drive the pace of manufacturing growth in areas of advantage and support the food and beverage sector to make more products here in Australia. Through strong collaboration across industries and between government and the private sector, food and beverage manufacturers will leverage economies of scale, share knowledge and drive innovation.

Appendix A

The road map development process

On 1 October 2020, the Australian Government announced \$1.5 billion to be invested over the next 4 years in the Modern Manufacturing Strategy (MMS) to help Australian manufacturers become more competitive, resilient and build scale in the global market.

The centrepiece of the MMS is the \$1.3 billion Modern Manufacturing Initiative which will allow government to invest in projects within 6 National Manufacturing Priority areas. The 6 National Manufacturing Priority areas are:

	Resources Technology & Critical Minerals Processing
	Food & Beverage
	Medical Products
	Recycling & Clean Energy
	Defence
	Space

Road maps have been developed with industry to set out plans for both industry and Government to strengthen Australia's manufacturing capability. The road maps have been led by 6 industry taskforces to identify and set a future vision for the priority areas with clear goals, opportunities and actions over the next 2, 5 and 10 years.

Members of the industry taskforces were selected based on their expertise across the priority areas, and were supported by technical experts from the Commonwealth Science and Industrial Research Organisation (CSIRO), the Department of Agriculture, Water and the Environment, the Department of Industry, Science, Energy and Resources (the department) and Industry Innovation and Science Australia (IISA).

Taskforce deliberations focused on current and future issues, challenges and opportunities to identify actions businesses and government can undertake to support scale, competitiveness and resilience in food and beverage manufacturing in the next 10 years.

Government has also been working with industry beyond the taskforce to understand the needs of the food and beverage manufacturing sector. A public consultation process was held between 23 October 2020 and 9 November 2020 which received 340 responses, including 75 focused on food and beverage manufacturing.

Input on the key strengths, opportunities and solutions to grow manufacturing have been used to inform the road map. The road map was also informed by bilateral meetings with key stakeholders as well as research conducted by the department.

Building on existing findings

Recognising the valuable work already completed in this area, development of the road map also drew upon relevant strategies including but not limited to:

- [CSIRO Food and Agribusiness Roadmap \(July 2017\)](#) identifies major growth opportunities for Food and Agribusiness, and what this sector needs to do to achieve them.
- [Food Innovation Australia Limited \(FIAL\) – Sector Competitiveness Plan \(Feb 2020\)](#) outlines a 10 year vision and strategy for the Food and Agriculture sector, identifying the challenges and opportunities for the sector.

Copyright
© Commonwealth of Australia 2021
Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia.

Creative Commons licence



Attribution
CC BY

All material in this publication is licensed under a Creative Commons Attribution 4.0 International Licence, save for content supplied by third parties, logos, any material protected by trademark or otherwise noted in this publication, and the Commonwealth Coat of Arms.

Creative Commons Attribution 4.0 International Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from <https://creativecommons.org/licenses/by/4.0/>

The full licence terms are available from <https://creativecommons.org/licenses/by/4.0/legalcode>

Content contained herein should be attributed as National Manufacturing Priority road map, Australian Government, Department of Industry, Science, Energy and Resources.

Disclaimer

This Road Map is current as at the date of publication. This Road Map has been developed to provide an indication of possible opportunities to build manufacturing capability and scale in one of the six National Manufacturing Priority areas. The Road Map is designed to be dynamic and to evolve with industry and external forces such as economic trends. It does not indicate a commitment by the Australian Government to any particular course of action. The Australian Government, its officers, employees or agents disclaim any liability incurred as a result of any person relying on the information in the Road Map to the maximum extent permitted by law. Readers of this Road Map should make independent inquiries to confirm any information on which they intend to rely.

