Supplementary material: additional action areas

The main report presents a range of opportunities and R&D priorities. In addition to the focus areas and R&D priorities, consulted stakeholders identified a series of practical entry points for specific actions and these are detailed below. These range across the themes of policy levers; infrastructure; collaboration, engagement and education; business investment and incubation; and Aboriginal and Torres Strait Islander leadership/partnership. Different stakeholders from across food systems will have varying roles and responsibilities in driving or supporting the following suggested actions (Table 1).

Table 1: Stakeholders responsible across action areas

STAKEHOLDER(S)	THEMES				
	Policy levers	Infrastructure	Collaboration, engagement and education	Business investment and incubation	Aboriginal and Torres Strait Islander leadership/ partnership
Primary producers	○ Engaged	◑ Supporting	● Responsible	○ Engaged	● Responsible
Manufacturers	○ Engaged	◑ Supporting	● Responsible	○ Engaged	◑ Supporting
Retail	◑ Supporting	◑ Supporting	● Responsible	○ Engaged	◑ Supporting
Representative groups	◑ Supporting	◑ Supporting	● Responsible	◑ Supporting	● Responsible
Community/ community groups	◑ Supporting	○ Engaged	● Responsible	○ Engaged	● Responsible
Federal Government	● Responsible	● Responsible	● Responsible	◑ Supporting	● Responsible
State and local Government	● Responsible	● Responsible	● Responsible	● Responsible	● Responsible
Research community	○ Engaged	◑ Supporting	● Responsible	◑ Supporting	● Responsible

● Responsible   ◑ Supporting   ○ Engaged

Enabling equitable access to healthy and sustainable diets

1.1 Commence a regular national diet and nutrition survey

Governments have periodically undertaken dietary surveys,[1] however, there has not been a regular and dedicated nation-wide dietary and nutrition survey since 2011.[2] Governments could make ongoing commitments to regular national diet and nutrition surveys that enable the routine collection, analysis, interpretation, and reporting of data.[3] This data can be used to inform policy and regulation, measure the impact of initiatives, evaluate the uptake of the Australian Dietary Guidelines, and track Australia's progress against international targets. Data collection methods should also be consistent to allow comparison of trends over time and for inclusive and culturally sensitive representation.[4]

Theme(s): Collaboration, engagement, and education

1.2 Develop public education campaigns about Australia's food systems, their impacts on health, and provide information on updated dietary guidelines

Formal education systems at all levels (pre-school centres, schools, universities, technical training centres) provide entry points to address issues related to food and nutrition, health and the environment.[5] School-based food and nutrition education can assist school communities to achieve lasting improvements in food practices and knowledge.[6] Education may capture all facets of food systems, including nutrition, food preparation and sustainability, providing a further opportunity to improve public diets.

Updated Australian Dietary Guidelines are expected to be published in 2025.[7] Clear, consistent and inclusive information about the ADGs could be shared to the public, informed by learnings from past public health campaigns (e.g., COVID-19 vaccination uptake, anti-smoking campaigns).[8] This could be delivered in targeted strategies, prioritising vulnerable populations.[9]

Theme(s): Collaboration, engagement, and education

1.3 Review legislation and policies to improve food systems governance and health outcomes

Various mechanisms to improve food systems governance could be developed, including a centralised national food body to coordinate research and policy, a national food systems strategy to balance public and private interests, enshrining a Right to Food, and establishing clear accountability mechanisms.

Existing research and national strategies could be extended, streamlined, and implemented to improve food access and frame food as an essential service.[10] Impartial reviews of policies and strategies could improve health outcomes. The FSANZ Act and the National Nutrition Policy Framework, for example, are currently being reviewed and developed. Successful international policies could also be explored. For example, taxation and subsidisation can incentivise consumer purchasing and encourage product reformulation. GST exemptions for food exemplify successful taxation policy that governments should maintain. Other tools that have potential in the Australian market include sugar-sweetened beverage taxes, tools to incentivise manufacturers to use healthier ingredients, taxation of the sale and procurement of inexpensive high-calorie, low-nutrient foods, and incorporating greater volumes of nutritious foods into current institutional procurement practices.

Policies and regulations need to consider societal factors that affect dietary behaviours, such as the advertisement and promotion of unhealthy foods in public settings.[11] Local governing solutions (e.g., zoning and planning policy) can also be explored.[12] Regulations involving product unit pricing calculation and compliance[13], Health Star Rating calculations[14], nutrition labelling, and in-store healthy food displays could also be prioritised for review and consumer health impacts measured.

Theme(s): Policy levers

1.4 Broaden collaboration between community, governments, and industry

Widespread, multisector, multilevel collaborative action will be required to create sustainable, equitable food systems.[15] Collaborative efforts should involve vulnerable groups; create partnerships and collaborative ecosystems; promote best use of data, and incorporate new and traditional knowledge and technologies.

Greater systems thinking is required to overcome existing siloes and deliver a holistic systems-based approach. To do so, pathways need to include, and update, constraints and variables that capture human behaviours to minimise unintended effects (e.g., exacerbate food insecurity).[16] Collaboration is also vital for creating rigorous standards and strategies for mitigating food fraud and ensuring food safety, for example, building definitional consensus, protocols for fraud types and streamlining investments for testing and monitoring technologies.[17]

Theme(s): Collaboration, engagement, and education

1.5 Develop investment and incubation programs to grow self-determined Aboriginal and Torres Strait Islander food ventures

Investment and incubation programs can provide targeted support for community-owned and operated producers and distributors, enabling business growth. The creation of Aboriginal and Torres Strait Islander food networks could also be considered given the community benefits and knowledge preservation and sharing services they may provide.

Strategies for comprehensive, long-term support, and large-scale coordination need to be co-designed and reviewed with Aboriginal and Torres Strait Islander communities, local Aboriginal Community Controlled Organisations and Elders to ensure they meet community needs, maximise impact and prevent misconduct. Self-determined ventures must be Indigenous led. Actions to safeguard traditional cultural practices and norms and ensure ICIP and financial proprietary rights are retained by and for the benefits of these communities should be considered in program development.

Theme(s): Business, investment and incubation | Aboriginal and Torres Strait Islander leadership/ partnership

Reducing waste and improving circularity

2.1 Invest in technology solutions and facilitate their integration along food supply chains

Improved access to financing and investment across the food sector can enable the scaling and implementation of technology solutions. More specifically, this may involve introducing financial product lines in commercial and development banks focused on food loss and waste reduction technologies and programs;[18] designing 'pay-as-you-go' programs to make technologies affordable for SMEs;[19] incentivising adoption of postharvest technologies that reduce waste through taxation incentives or reduced unavoidable waste disposal fees; supporting SMEs connect with third-party manufacturers that can provide flexible and cost-effective waste reduction solutions (e.g., outsourcing of sustainable packaging design); and targeted investment commitments that incentivise operational improvements for SMEs that cannot afford large-scale technology investments.

Theme(s): Business, investment and incubation

2.2 Review food waste policy and legislative frameworks

Although Australia has a *National Food Waste Strategy* and *Roadmap* to halve food waste by 2030, policy levers that create barriers to reducing waste and food redistribution could be reviewed. The Food Recovery Hierarchy framework[20] could guide the development of policy solutions. These solutions could include mandating industry measurement and food loss and waste reporting; reviewing "Good Samaritan" liability laws that reduce or eliminate liability of businesses that donate food; and National Food Donation Tax Incentives that provide incentives for businesses to direct surplus to food relief.[21] They could also include policies to prevent waste-producing trading practices, such as unilateral or retroactive changes to contracts, industry rejection of 'aesthetically imperfect' products, and contract inflexibility that does not account for variability in demand and supply of food products. Lastly, they could include financial incentives for businesses to develop and adopt circular procurement practices.[22] Establishing an independent governance entity could help coordinate and monitor policy actions that reduce food systems waste.[23]

Theme(s): Policy levers

2.3 Build the scale, efficiency and accessibility of food rescue sector services

For the food rescue sector to deliver 10% of the 50% food waste reduction target set in the *National Food Waste Strategy*, it will need to increase its scale tenfold.[24] Building the food rescue sector into the current food value chain will help food systems ensure wasted or surplus food is recovered or rescued and used for human consumption.[25] Coordinated action through various activities is required to achieve this, including greater investment in infrastructure; improvements in service delivery supply chains and processes; robust sectoral data collection, monitoring and evaluation; and targeted education that changes industry and consumer perceptions of food waste and relief.[26]

Increasing support and enabling collaboration between governments, industry and leading food rescue organisations - where Foodbank, OzHarvest, SecondBite and Fareshare collectively account for 98% of the food volume rescued in Australia – is essential in building the scale and efficiency of the sector.[27] These collaborative networks could allow for the sharing of resources, food and data.

Theme(s): Infrastructure | Business, investment and incubation

2.4 Scale waste collection and recycling capabilities in Australia

Australia's recycling ability has been hampered by a decrease in plastic export opportunities and ageing local recycling infrastructure. The Australian waste sector is already undergoing a transition to improve resource recovery, increase the use of recycled material and better manage waste material flows and shift to renewable energy sources, highlighted by the $250 million Recycling Modernisation Fund, and over $1 billion of investment in recycling infrastructure.[28]

Further investment to diversify and increase the scale of the established waste disposal and recycling processes in Australia is needed. New infrastructure needs to be adaptable to innovations in sustainable and recyclable packaging materials. Increasing the optimisation and utilisation of recyclable materials is also needed to minimise the volume of materials intended for recycling but diverted landfill waste streams due to contamination or volume and processing limitations.

Theme(s): Infrastructure | Business, investment and incubation

2.5 Build public education campaigns about reducing food waste and plastic use

Behavioural science, advertising campaigns and education programs can empower consumers to view waste products through a lens of circularity and shift social norms to make "wasting food" an unacceptable behaviour. The programs can also encourage consumers to eat seasonally and purchase more locally produced food. A 'Food Waste Nationwide Consumer Behaviour Change Campaign Business Case' has been submitted to the Federal government and is currently under consideration.[29]

Expansive and effective campaigns will require collaboration between all levels of government (through consistent policy messaging and customised jurisdictional outreach), alongside industry (through corporate responsibility), retailers (who operate at the interface of consumer education with advertising and messaging) and food rescue organisations. These campaigns can also extend through to knowledge platforms that foster co-learning between researchers and industry participants, and that allow for horizontal dissemination of experience (e.g., farmer-to-farmer networks, communities of practice etc).

Theme(s): Collaboration, engagement, and education

2.6 Revisit date labels

Research indicates that date labels have the potential to influence consumer behaviour and preferences regarding food waste.[30] However, consumer confusion surrounding date labels is believed to be one of the main reasons why safe, edible food is still thrown away.[31] Current date labels (e.g., "use by," "best before," "sell by," "packaged on") are used variably by the industry and with little consistency or regulatory oversight. Reformed regulation to standardise food date labelling practices can reduce this confusion.[32]

A recent UK study has found that the removal of "best before" labels on produce would result in an annual household saving of £4 billion in food waste.[33] Large supermarkets in the UK - including Waitrose, M&S, Tesco and Morrisons - have announced they will remove these labels from fresh food products in 2022.[34]

Theme(s): Policy levers | Business, investment and incubation | Collaboration, engagement, and education

2.7 Invest in circular economy incubators and collaboration environments

Investments and incubation programs can be targeted in several ways to support innovation and accelerate the adoption of circularity methodologies. As seen across the Netherlands and Scandinavia, the development of multi-stakeholder, collaborative environments that emphasise sharing tools, resources and education can accelerate the implementation of circular practices across the value chain. [35] Governments and industry can create these incubation environments by investing in initiatives to connect industry, small and medium enterprises (SMEs), non-profits and social enterprise, as well as research and the public sector. For these initiatives to be successful, investments can commit to having pathways to sustainable funding or investment avenues (grants, loans or other financing options) to implement and scale the innovations that develop from these programs.

At a federal level, a government-led advisory body of experts, or Taskforce, could develop sector and cross-sector strategies and drive them forward. This may include identifying waste streams and synergies within Australia's food systems and connecting businesses; coordinating Federal and State policy and regulatory settings across cross-jurisdictional circular economies; and working alongside regulators to bring new products, produced from recycled waste streams to market.

Theme(s): Business, investment and incubation

Facilitating Australia's transition towards net zero emissions

3.1 Develop evidence-based agricultural and food manufacturing climate and sustainability metrics

Agriculture: Numerous existing industry sustainability frameworks support efforts to reduce emissions and improve land management practices across various parts of Australian agriculture. Stakeholders suggested that providing sector- and region-specific on-the-ground advice is necessary to support these efforts. Best practice sustainability and land management practices were noted as priority areas for improved outcomes.

Food manufacturing: Stakeholders also suggested that sustainability metrics for food manufacturers are needed to allow manufacturers to share common industry-level goals to work towards. These should be robust and informed by science. It was also suggested that industry specific guidelines (voluntary) for sustainability practices are appropriate in the first instance (e.g., the Australian Beef Sustainability Framework), and incentives for their use could be considered. Meanwhile, standards (non-voluntary) and disincentives were deemed appropriate over the longer term to reach 2050 net zero targets.

Theme(s): Policy levers | Collaboration, engagement, and education

3.2 Upgrade inefficient emissions intensive technologies and infrastructure across food systems

A lot of the infrastructure used throughout the food manufacturing and farming industries is ageing, which in most cases means that it is inefficient and emissions intensive. These industries are heavily comprised of SMEs, with limited ability to rapidly upgrade processing and operational equipment. Supporting the upgrade of this equipment will improve emissions intensity of foods, cut energy costs and improve productivity for food businesses.

Grants to help businesses adopt new technologies have previously been offered[36] and could continue to be considered, alongside continued research to support the development of more efficient novel technologies. Building Australian capability for manufacturing and supplying novel, efficient technologies and equipment can also help industry to reach scale and export capability. This may be supported by strategies such as the *Made in Victoria 2030: Manufacturing Statement*[37] and NSW's *Low Carbon Manufacturing Fund*[38], that prioritise advanced and sustainable product manufacturing.

Theme(s): Infrastructure | Business, investment and incubation | Policy levers

3.3 Make LCAs more accessible to businesses and the findings more accessible to consumers

LCAs are currently time consuming, costly and require significant expertise, and are often not accessible for SMEs. Subsided provision of LCAs may help make the tool more accessible across the food industry, however, careful consideration around commercial arrangements and the integrity of the process is required, and the methodology employed must be based upon rigorous science.

Theme(s): Policy levers

3.4 Encourage renewable energy integration into food production and manufacturing operations through targeted initiatives and incentives

While research continues to yield improvements in renewable energy technologies, the industry can further adopt technology to reduce emissions. While rising energy prices encourage businesses to adopt renewable energy technologies, and various grants and incentives are already available additional policy actions may further encourage uptake. These include providing more information to primary producers and manufacturers about the details of installation (e.g., general processes, approvals, timelines, approximate costs and payback periods tailored to various regions – and available grants). Arranging tours and demonstrations of installed renewable energy technologies on farms and in manufacturing operations could also be incorporated into industry event calendars.

Theme(s): Infrastructure | Policy levers | Collaboration, engagement, and education

3.5 Educate and empower consumers with information on sustainable food producers and foods

Consumers play a central role in promoting sustainable business models in the food industry, however, more the 50% of consumers require 'more information to help them make sustainable choices when they shop'.[39] In particular, greater industry and government collaboration is required to develop strategies that can clearly convey and set consumer expectations about the sustainability attributes (and associated costs and quality) of food products. Overcoming this barrier may divert consumer demand towards more sustainable producers, leading to lower GHG emissions.

Peak bodies may be able to coordinate marketing strategies across traditional and online media that include details about their industry's sustainability efforts.

Retailers could work with these peak bodies to present consumer-level information. In a business-to-business setting (when the consumers are schools, nursing homes, and corporations), peak bodies may be able to present and distribute detailed updates on their sustainability practices at industry events/seminars.

Theme(s): Collaboration, engagement, and education

3.6 Support agricultural and food SMEs to navigate emissions reduction pathways

Voluntary actions by Australian SMEs can achieve substantial emission reductions.[40] However, SMEs face heightened barriers that restrict the implementation of successful emissions reduction pathways; namely a lack of skills, knowledge, funding resources and time.[41] They may also face scale-related constraints, particularly in the context of deploying large-scale renewable energy systems. Despite this, SMEs are able to access a range of Federal and State Government grant programs that assist with the funding and financing of energy efficiency projects. Continuation and broader outreach regarding these programs is important.

Industry groups, across the entire value chain, can help SMEs leverage these programs by providing information about the availability and suitability of programs, alongside continuing to work with government to develop new support mechanisms for ongoing emissions reduction, especially around verification.

Theme(s): Collaboration, engagement, and education

3.7 Provide clarity around market mechanisms and business financing models that support sustainable land management, food manufacturing, distribution and retail

Clearer information around diverse market-based mechanisms can encourage greater participation. To facilitate this, governments and industry bodies can continue to develop more targeted programs that provide clarity around the proposed market mechanisms, guidance on how to access them and practical help around how to put this into operation. The Federal Governments' $20 million Carbon Farming Outreach Program, aimed at empowering carbon market participation and low emissions practices,[42] is an example of how this could be implemented. Farmers and land managers will have access to online training packages as well as 'on the ground' support from advisors.

Theme(s): Collaboration, engagement, and education

Aligning resilience with socioeconomic and environmental sustainability

4.1 Foster systemwide collaboration and knowledge sharing to identify priority supply chain weaknesses and solutions

There are a number of actions that may promote a culture of collaboration where data sharing is encouraged, and address consistency and data gap concerns. For example, developing databases that capture and aggregate a vast array of data (e.g., hydrology mapping and soil health) from across entire food systems for multi-use purposes;[43] implementing incentivisation initiatives to encourage measurement collection and reporting;[44] and improving digital literacy through skill-building programs and the provision of digital extension and advisory services.[45] Other examples include developing best practice measurement guidelines to improve the comparability of data;[46] and establishing data standards and governance frameworks.[47]

Strengthening cooperation between research institutes, industry and government structures is also needed to build consensus on the critical services required to build systemwide resilience and catalyse the necessary investments.[48] There are several avenues where communication channels could be strengthened, including farmer-to-farmer networks; Indigenous-land owner networks; direct producer-consumer networks; and cross-sectoral networks to address joint challenges. Continued efforts to investigate the potential of agrifood clusters can support participants to move beyond 'problem identification' to 'solution-focused' processes.

Both targeted governmental support and industry engagement is required to drive the formation and delivery of collaborative efforts.

Theme(s): Collaboration, engagement, and education

4.2 Strengthen the adoption of risk management strategies by industry

Industry and government activities can facilitate business-level adoption of risk management strategies and a resilience-focused culture. This may include developing and incentivising the use of decision support tools and scenario planning tools[49] and ensuring support measures are consistent with broader support policies and reach vulnerable socio-economic groups (and can be exited from if desired).[50] There is room to develop and deploy management platforms (e.g., early warning systems) and streamline communication channels that can provide businesses with simple, current information on potential opportunities and trade-offs associated with alternative revenue streams and financing models.

Theme(s): Business investment and incubation

4.3 Build transparent and diversified food supply chains to support the participation of new enterprises, including SMEs and Aboriginal and Torres Strait Islander food ventures

Mechanisms to support greater participation of new enterprises may include establishing new (and improving current) financial instruments to provide business owners with greater access to capital; establishing infrastructure investments linked to minimum-Australian-made content;[51] streamlining regulatory and compliance procedures; strengthening business support services and tools;[52] and improving land access for young farmers, SMEs, and community and Aboriginal and Torres Strait Islander groups.[53] There may also be opportunities to support SMEs in overcoming scale-related constraints through industry- and government-facilitated funding, clustering and coordination efforts.

Digital transformation, driven by cross-sector multi-level actions, will also be required to increase consumer trust and transparency in Australia's food systems' reliability (See Recommendation 4.7).

Theme(s): Business investment and incubation | Aboriginal and Torres Strait Islander leadership/ partnership

4.4 Explore place-based solutions to support rural and remote communities

Place-based solutions offer the opportunity for highly targeted, strategic approaches to improving resilience that align with the unique experience of a particular community and region; often addressing challenges in ways that sector-based approaches cannot. This recommendation sets out the need to examine the potential for place-based solutions and improve the line of sight from national-level planning through to state, territory and regional infrastructure and land-use planning.

Opportunities to bring government, industry and communities together to better understand and respond to shocks and stresses should be encouraged, with decision-making informed by research, evidence and ongoing consultation with communities and local leaders.[54] These efforts could be better supported by increased awareness of available tools, data and training that can inform land-use and strategic planning decisions. Improving land access for young small-scale farmers, restrictive planning controls and contradictions in land-sharing acceptance between industries (e.g., housing compared to agriculture) are potential priority areas. Solutions could also support the emergence of organic, bottom-up, community-led actions by expanding the number of currently available investment programs[55] for growing community agrifood businesses, and reviewing institutional procurement practices centre local, sustainable, healthy foods.

Theme(s): All

4.5 Incentivise agricultural practices and technologies for long-term environmental sustainability

Greater adoption of sustainable land management practices and climate-smart technology requires top-down support. The Centre for Food Policy has called out 45 actions to orient food systems towards environmental sustainability[56] that could be adapted to the Australian context. Further actions to facilitate uptake in Australia may include increasing investment in training and extension services[57] and incentivisation strategies that lower financial risks of trialling new farming practices and technologies. Financial institutions[58] and governments[59] have offered such programs in the past. These could continue and additional incentives considered (e.g., partial loan guarantees, first-loss capital reserves.[60]

There is also a need for continued research and scaling out of agroecological and sustainable farming practices in collaboration with Aboriginal and Torres Strait Islander peoples, and opportunities to embed Indigenous land management knowledges into infrastructure planning. Accreditation programs, designated roles for qualified Aboriginal and Torres Strait Islander people, and programs for Indigenous leadership may be potential avenues.[61]

Further, the UN Environmental Programme has identified several management options to reduce the risk of antimicrobial resistance (AMR) and the proliferation of harmful microorganisms.[62] High-level actions are outlined in Australia's National AMR Strategy.[63] CSIRO has also launched its Minimising AMR Mission.[64]

Theme(s): All

4.6 Invest in infrastructure and upskilling to bolster Australian capacity, including production, manufacturing and distribution capabilities

Hard infrastructure: To support the growth and modernisation of Australia's agrifood systems, several hard infrastructure developments may be required. This may include upgrading and establishing new processing and manufacturing capabilities to produce value-added food products and inputs,[65] and improving access to these facilities for small-scale businesses. These facilities may be co-located and take advantage of hub-based advantages as new industries begin to develop, or may be integrated on-farm for individual or shared community use. Further hard infrastructure developments are required, including well-maintained, streamlined transport networks with inbuilt redundancy;[66] physical assets required for digital transformation; and enabling infrastructure and equipment (e.g., workforce accommodation, cold chain storage, renewable energy assets).[67]

Soft infrastructure: There are several priority areas related to soft infrastructure needs, such as access to digital devices suited to a range of enterprises; digital and connectivity platforms (e.g., information collecting and storing networks, communication channels); accessible advisory services for all participants; financial tools to enable greater access to capital; and tailored disaster relief mechanisms, for example, index-based insurance schemes.[68]

Skill-building: Australia's Productivity Commission has identified a number of measures to reduce the barriers to upskilling and retraining Australian and overseas workers in the context of continued structural change and the advent of new technologies.[69] Additional sector-specific actions may include aligning educational and training curricula to sector needs and appropriately recognising emerging skills; incentivising courses that can fill predicted future skill gaps (and conducting the research to identify these gaps ahead of time);[70] continuing to develop and leverage training tools and credentials;[71] and encouraging practices that produce a multi-skilled, adaptive workforce (e.g. seasonal production and co-located operations).

All infrastructure developments could be optimised by leveraging local community knowledge and existing regional assets.

Theme(s): Infrastructure | Collaboration, engagement and education

4.7 Develop and deploy traceability technologies across the supply chain to allow for timely responses to threats

Investment in data traceability systems is required to gather the information needed to make informed risk management decisions. Establishing a highly digitalised and traceable system requires strong incentive models and robust strategies. For example, incentivisation and subsidies to gain buy-in (particularly where equipment costs will be incurred by businesses, or where data collection requires significant additional labour); advisory support services and digital literacy programs to address education and consistency gaps; standards for data collection and sharing; rigorous and updated biosecurity and food safety arrangements informed by science; and addressing underlying soft and hard infrastructure gaps.[72]

The Australian Government has announced a $68.4 million investment is offering new grant funding to support agricultural traceability.[73]

Theme(s): Policy lever

Increasing value and productivity

5.1 Attract and retain a robust, skilled labour force with the capabilities to keep pace with technological advancements

Underpinning this recommendation is the need to further investigate the factors that drive people to and away from the food sector and regional areas. Public and private investment into regional/rural agricultural communities could ensure they possess the infrastructure required for economic growth, supporting regional development and workforce retention. Facilitating the transfer of workers from alternative industries (e.g., students, casual service workers) into agribusinesses could support these efforts.[74] Investing into community capacity building may also enable communities to develop localised place-based solutions.

Training and education schemes are key enablers for the upskilling of future workers to ensure they can keep pace with future technologies (e.g., automation, robotics and value-added food processing), maintenance requirements (e.g., engineering, mechanics, and IT), and cutting-edge global standards. Tertiary education providers could ensure food and agricultural courses are offered and promoted, incentivised by government and industry bodies.

Where local talent is difficult to access, there is potential to attract international workforce expertise, particularly those engaged in emerging technological processes. This type of recruitment may require adequate incentives and an amenable migration and visa processing system which offers favourable pathways for migrant workers with specialised skills.

Theme(s): Collaboration, engagement and education | Business, investment and incubation

5.2 Streamline and simplify the export regulatory and compliance environments to increase business participation, particularly SMEs

Australian exporters currently face a confronting array of regulatory complexities. For instance, there are 17 FTAs in force with 29 countries, of both a bilateral and regional nature,[75] with the growth of agreements compounding the "red tape" burden for exporters.[76] Moreover, multiple regulatory agencies, manual and inconsistent data requirements, and a lack of consolidated information on trade requirements generates sizeable administrative cost burdens for businesses.[77]

The redevelopment of government IT systems is one potential avenue to address these challenges, providing a smooth digital interfacing between industry and agency platforms. The Australian Government has already undertaken reforms to streamline regulation and information, improve digital services, and undertake ICT modernisation.[78] Similarly, Austrade's Simplified Trade System agenda will include a comprehensive review of ICT systems affecting international trade and coordinate delivery of import and export digital services.[79]

Theme(s): Policy levers | Infrastructure

5.3 Identify and establish new overseas export markets

Australia can increase export values through targeted, differentiated, and value-added offerings to meet global demands, particularly from nearby Asian countries. This could be achieved by complementing Australia's traditional food commodity exports (e.g., bulk grain) with sophisticated manufactured goods and premium consumer products. Sustainability practices, shelf-life research, logistics and cold chain management development are enablers for creating new market access. Investigating new product designs that reflect cultural needs and changing consumer demands in overseas jurisdictions is also required.

Maintaining and enhancing Australia's reputation for clean, safe and natural food is vital to accessing new markets and preserving Australia's competitive advantage. Food fraud in export markets is a significant challenge to Australia's brand, creating growing impetus for authentication against the point of origin and verification of credentials.

As such, developing and adopting robust food credentials and traceability tools could bolster Australian exports in competitive overseas markets. The Victorian Government has invested $3.1 million over 2021-23 into trialling, testing and assessing digitalised traceability systems and technologies to build and protect agricultural exports.[80]

Theme(s): Business, investment and incubation | Collaboration, engagement and education

5.4 Identify and build strong relationships with comparable international markets to collaborate and share insights

Australia could draw on learnings from and collaborate with comparable economies that are also seeking to build a competitive advantage in global food markets and value chains. Sharing knowledge with international partners could enable Australian agribusinesses to maintain and enhance productivity and performance under challenging circumstances. For instance, new agricultural and manufacturing technologies, the development of novel food industries, or the uptake of new supply chain systems could all benefit from international lesson sharing. Additionally, many of the challenges that Australia's food systems will face (e.g., climate change, natural capital resilience issues, productivity issues) will also confront other countries.

A survey of global best practices for developing efficient and productive operations could guide dissemination of information. Global outreach may also include knowledge partnerships between international industry bodies, collaborative deals with international research bodies, and international business dialogues and summits. State-level investment and export promotion bodies with overseas offices can potentially encourage new collaborative relationships.[81] International business conferences could also enhance sectoral learning and generate greater levels of collaboration and innovation.

These activities could be conducted across the value chain and incorporate SMEs and food start-ups, not just the major players in Australian food systems.

Theme(s): Business, investment and incubation | Collaboration, engagement and education

5.5 More efficient use of food production inputs, particularly the use of Australia's natural capital

Australian businesses have the potential to produce foods and beverages with fewer inputs through the transition away from labour-intensive practices (e.g., automation) and innovative processes that use fewer resources (e.g. controlled cropping/production). It also includes sustainable intensification, where food production realises economies of scale and optimal cost advantage in a way that still sustains Australia's natural capital, and localised food system frameworks and practices (e.g., agroecology).[82]

Promising areas for resource-efficient manufacturing are novel manufacturing platforms. For example, biomanufacturing sustainable alternatives to animal proteins and agricultural chemicals.[83] These systems can realise improved operational efficiencies by reducing the demand for land, water, and other traditional farming inputs. Cheaper inputs can also be achieved across the supply chain by deploying renewable energy technologies and recirculating wastes as feedstocks in production processes. Regional hubs and co-located production and processing facilities could also be considered to reduce input expenditure.

National-wide natural capital data collection (e.g. water resources and soil quality) could also provide evidence-based guidance on enhancing efficient resource use.[84] For example, regionally based metrics on water required per kilogram of fresh produce.

> **Theme(s):** Business, investment and incubation | Collaboration, engagement and education | Infrastructure

5.6 Construct, scale up and upgrade production and processing infrastructure to meet increased production and market demands

Upgraded place-based infrastructure that is tailored to local needs could enhance the productive capacity of agribusinesses to generate and sell products more efficiently and sustainably. Specifically, small throughput food processing sites (e.g., abattoirs and grain mills) and local storage facilities could enhance community-level market participation. At a larger scale, the construction and scale-up of production facilities are necessary for food processing to achieve economies of scale, and fulfil costs associated with capital and operating expenses. New production platforms that enhance resource utilisation and are not constrained by land usage or water needs, are particularly salient areas for investigation.

Given the highly interdependent and data-driven nature of efficient production, processing, and logistics, there is a strong need for robust digital infrastructure, including high-speed and dependable internet access in less urban regions of Australia.[85]

> **Theme(s):** Business, investment and incubation | Collaboration, engagement and education | Infrastructure

5.7 Work with Aboriginal and Torres Strait Islander communities to build and scale self-determined Indigenous food ventures, identifying potential barriers and enablers

Building and scaling-up Indigenous food ventures will require a range of policy and commercial activities including the promotion of innovative foods produced by Aboriginal and Torres Strait Islander communities in domestic and international markets; investments in Indigenous-run agritourism ventures; and incorporating knowledges and practices into current organisational structures and production processes (e.g., sustainable traditional farming and land management practices, cooperative business models). Communications activities that convey the cultural meanings of traditional food products, through modes that respect ICIP, have also been suggested.

There is a need to address barriers that prevent Indigenous participation, including the need for advanced ICIP protections to encourage Aboriginal and Torres Strait Islander ownership of traditional foods within their cultural and community contexts, and revising regulatory and retail standards for traditional food products. The lack of resources (e.g., skills, capital, physical and digital infrastructure) is also a barrier to growth in regional and remote areas.

There are several enablers for growth, including technical/financial actions (e.g., rollout of digital/connectivity technologies), and community capacity building and skills development. Developing social and cultural metrics to embed greater respect for traditional foods and the promotion of community-centric business models with benefits returned to local communities were also discussed. All efforts should be co-designed with Aboriginal and Torres Strait Islander representatives or Indigenous led.

> **Theme(s):** All

References

1   Australian Bureau of Statistics (ABS) (2017-18) National Health Survey: First results. ABS. <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/national-health-survey-first-results/latest-release>

2   ABS (2011) Australian Health Survey: Nutrition First Results - Foods and Nutrients. ABS. <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/australian-health-survey-nutrition-first-results-foods-and-nutrients/latest-release>

3   Public Health Association Australia (PHAA) (2021) Food and Nutrition Monitoring and Surveillance in Australia: Policy Position Statement. PHAA, Canberra.

4   PHAA (2021) Food and Nutrition Monitoring and Surveillance in Australia: Policy Position Statement. PHAA, Canberra.

5   OzHarvest's FEAST program is an example program that takes a multidisciplinary approach to food education, encompassing food, health and environmental sustainability. OzHarvest (n.d.) FEAST Home <https://education.ozharvest.org/>

6   FAO (2020) School-based food and nutrition education – A white paper on the current state, principles, challenges and recommendations for low- and middle-income countries. FAO, Rome.

7   National Health and Medical Research Council (NHMRC) (n.d.) Anticipated timelines for the revision of the Australian Dietary Guidelines. <https://www.nhmrc.gov.au/health-advice/nutrition/australian-dietary-guidelines-review/timeline>

8   PHAA (2018) Top 10 public health successes over the last 20 years. PHAA Monograph Series No. 2, Canberra.

9   Australian Institute of Health and Welfare (AIWH) (2022) Health promotion and health protection. <https://www.aihw.gov.au/reports/australias-health/health-promotion>

10 Wood M et al. (2022) United Nations Food System Summit: CSIRO convened National Dialogue summary. Achieving healthy diets from sustainable food systems by 2030 – what key science, innovation and actions are needed in Australia? Brisbane: CSIRO. https://doi.org/10.25919/vhqx-db67; CSIRO (2021) United Nations Food System Summit: CSIRO Official Feedback Form. Achieving healthy diets from sustainable food systems by 2030 – what science, innovation, and actions are needed in Australia? <https://summitdialogues.org/dialogue/18887/official-feedback-18887-en.pdf?t=1623395800>

11 Food Systems Dashboard (n.d.) About Food Systems. <https://www.foodsystemsdashboard.org/information/about-food-systems>; Sacks G, Mann D (2022) Policies for tackling obesity and creating healthier food environments: scorecard and priority recommendations for the Australian Federal Government. Deakin University, Melbourne.; Looi et al. (2022) Price promotions offered by quick service restaurants in Australia: Analysis from an obesity prevention perspective. Public Health Nutrition 25(3), 513-527.

12 Haskell S (2021) Food Insecurity and Food Deserts: How are they Related?. Michigan State University.

13 FAO (2022) Ian Jarratt from the Queensland Consumers Association: "Consumer associations should be involved in decision-making about all aspects of the transformation of agrifood systems". < https://www.fao.org/right-to-food/news/news-detail/en/c/1539016/>

14 Dickie et al. (2020) Evaluating Nutrient-Based Indices against Food- and Diet-Based Indices to Assess the Health Potential of Foods: How Does the Australian Health Star Rating System Perform after Five Years? Nutrients 12(5), 1463.

15 Willett et al. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. The Lancet, 393(10170), 447-492.

16 Laderchi C, Kanbur R, Winters P (2022) Inclusion as a Key Goal in the Transformation of Food Systems. FSEC. <https://foodsystemeconomics.org/insights/inclusion-as-a-key-goal-in-the-transformation-of-food-systems-2/>

17 Smith et al. (2021) Product fraud: Impacts on Australian agriculture, fisheries and forestry industries. AgriFutures Australia.

18 Flanagan K, Robertson K, Hanson C (2019) Reducing Food Loss and Waste: Setting a Global Action Agenda. World Research Institute (WRI), Washington.

19 Flanagan K, Robertson K, Hanson C (2019) Reducing Food Loss and Waste: Setting a Global Action Agenda. WRI, Washington.

20 Australian Government (2017) National Food Waste Strategy: Halving Australia's food waste by 2030. Commonwealth of Australia.

21 Flanagan K, Robertson K, Hanson C (2019) Reducing Food Loss and Waste: Setting a Global Action Agenda. WRI, Washington.

22 Flanagan K, Robertson K, Hanson C (2019) Reducing Food Loss and Waste: Setting a Global Action Agenda. WRI, Washington.

23 Food Innovation Australia Limited (FIAL) (2019) A Roadmap for reducing Australia's food waste by half by 2030. FIAL.

24 Food Innovation Australia Limited (FIAL) (2019) A Roadmap for reducing Australia's food waste by half by 2030. FIAL.

25 FIAL, Stop Food Waste Australia, DCCEEW, FoodBank Australia, OzHarvest, SecondBite, FareShare (2021) Food Rescue Sector Action Plan 2021-2023. <https://www.stopfoodwaste.com.au/wp-content/uploads/2022/09/Food-Rescue-Sector-Action-Plan-Full-Report_Final-2.pdf>

26 FIAL, Stop Food Waste Australia, DCCEEW, FoodBank Australia, OzHarvest, SecondBite, FareShare (2021) Food Rescue Sector Action Plan 2021-2023. <https://www.stopfoodwaste.com.au/wp-content/uploads/2022/09/Food-Rescue-Sector-Action-Plan-Full-Report_Final-2.pdf>

27 Arcadis (2019) National Food Waste Baseline. <https://www.environment.gov.au/system/files/pages/25e36a8c-3a9c-487c-a9cb66ec15ba61d0/files/national-food-waste-baselinefinal-assessmen.pdf>

28 DCCEEW (2022) Investing in Australia's waste and recycling infrastructure. <https://www.dcceew.gov.au/environment/protection/waste/how-we-manage-waste/recycling-modernisation-fund>

29 Mitchell S (2022) Carrots, not sticks, can solve $37b food-waste problem. Australian Financial Review, 4 August.

30 Neff et al. (2019). Misunderstood food date labels and reported food discards: A survey of US consumer attitudes and behaviors. Waste management 86, 123-132.

31 Quigley and Watts Ltd (2014) The impact of food safety label elements on consumers. A literature review prepared for Food Standards Australia New Zealand. New Zealand, Wellington.

32 Waste and Resources Action Programme (WRAP) (n.d.) The issue with food waste. < https://wrap.org.uk/taking-action/citizen-behaviour-change/love-food-hate-waste>

33 WRAP (n.d.) Food date labelling and storage advice. <https://wrap.org.uk/taking-action/food-drink/actions/date-labelling>

34 Limb L (2022) Which European country is ditching best before dates in supermarkets and why? Euronews, 8 August.

35 Circular Regions (n.d.) Circular Oslo. <https://circularregions.org/region/oslo-region/>; Foodvalley NL (n.d.) About Us. <https://www.foodvalley.nl/>; Circular Friesland Association (n.d.) Our Story. <https://circulairfriesland.frl/en/>

36 Wilson T (2021) Grants to help food and beverage manufacturers cut energy costs. Ministerial Office of Industry, Energy and Emissions Reduction, 8 December 2021. <https://www.minister.industry.gov.au/ministers/wilson/media-releases/grants-help-food-and-beverage-manufacturers-cut-energy-costs>

37 Department of Jobs, Skills, Industry and Regions (2022) Manufacturing Statement. <https://djsir.vic.gov.au/made-in-victoria/manufacturing-statement>; NSW Climate and Energy Action (n.d.) High emitting industries. <https://www.energy.nsw.gov.au/business-and-industry/programs-grants-and-schemes/high-emitting-industries.

38 NSW Climate and Energy Action (n.d.) Developing renewable and low carbon manufacturing industries in NSW. < https://www.energy.nsw.gov.au/business-and-industry/programs-grants-and-schemes/developing-renewable-and-low-carbon-manufacturing>

39 Nijssen-Smith L, L'Huillier M (2021) Sustainability isn't what it used to be. EY, Oceania.

40 Meath C, Linnenluecke M, Griffiths A (2016) Barriers and motivators to the adoption of energy savings measures for small-and medium-sized enterprises (SMEs): the case of the ClimateSmart Business Cluster program. Journal of Cleaner Production 112, 3597-3604.

41 SME Climate Hub (2022) New data reveals two-thirds of surveyed small businesses concerned over navigating climate action. <https://smeclimatehub.org/new-survey-reveals-small-business-barriers-climate-action/>

42 DCCEEW (2022) Reducing agricultural and land sector emissions. <https://www.dcceew.gov.au/climate-change/emissions-reduction/agricultural-land-sectors>

43 ClimateWorks Australia (2019) Natural capital roadmap: A roadmap for enabling sustainable land use transitions through measurement and valuation of natural capital. ClimateWorks. Australia, Victoria.

44 ClimateWorks Australia (2019) Natural capital roadmap: A roadmap for enabling sustainable land use transitions through measurement and valuation of natural capital. ClimateWorks Australia, Victoria.

45 Department of Agriculture, Water and the Environment (DAWE) (2022) Digital Foundations for Agriculture Strategy: Driving the development and uptake of digital technologies in the Australian agriculture, fisheries and forestry industry. DAWE, Canberra.

46 ClimateWorks Australia (2019) Natural capital roadmap : A roadmap for enabling sustainable land use transitions through measurement and valuation of natural capital. ClimateWorks Australia, Victoria.

47 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

48 Organisation for Economic Co-Operation and Development (OECD) (2020) COVID-19 and the food and agriculture sector: Issues and policy responses. OECD Publishing.

49 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

50 OECD (2020) COVID-19 and the food and agriculture sector: Issues and policy responses. OECD Publishing.

51 The Australian Council of Trade Unions (2021) A future for Australian Manufacturing: Australian Council of Trade Unions submission to the Senate. <https://www.actu.org.au/media/1449787/d50-manufacturing-industry-inquiry-actu-submission-24sept2021.pdf>

52 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

53 Consultation; Hill et al (2013) Indigenous Land Management in Australia: Extent, scope, diversity, barriers and success factors. CSIRO, Cairns.; Calo et al. (2021). Achieving food system resilience requires challenging dominant land property regimes. Frontiers in Sustainable Food Systems 5, 683544.

54 Infrastructure Australia (2021) A Pathway to Infrastructure Resilience: Advisory Paper 1: Opportunities for systemic change. Infrastructure Australia.

55 Future Food Systems CRC (2021) Food, beverage and technology grant opportunities: an Australian round-up. <https://www.futurefoodsystems.com.au/recovery-grants-and-funding-across-australia/>

56 Caleffi S, Hawkes C, Walton S (2023) 45 actions to orient food systems towards environmental sustainability: co-benefits and trade-offs. Centre for Food Policy Research Brief. School of Health & Physiological Sciences. <https://researchcentres.city.ac.uk/__data/assets/pdf_file/0005/718646/8082_City-Food-42-Actions-Report_AW.pdf>

57 Barbosa Junior M, Pinheiro E, Sokulski C, Ramos Huarachi D, de Francisco A (2022) How to Identify Barriers to the Adoption of Sustainable Agriculture? A Study Based on a Multi-Criteria Model. Sustainability, 14. https://doi.org/10.3390/su142013277

58 Commonwealth Bank of Australia (2022) CommBank launches Agri Green Loan. <https://www.commbank.com.au/articles/newsroom/2022/08/Agri-Green-Loan.html>

59 DCCEEW (2022) National Landcare Program. <https://www.dcceew.gov.au/environment/land/landcare>; DAFF (2023) Australian Government investment in Landcare. <https://www.agriculture.gov.au/agriculture-land/farm-food-drought/natural-resources/landcare/national-landcare-program/australian-government-investment-in-landcare>

60 ClimateWorks Australia (2019) Natural capital roadmap: A roadmap for enabling sustainable land use transitions through measurement and valuation of natural capital. ClimateWorks Australia, Victoria.

61 Infrastructure Australia (2021) A Pathway to Infrastructure Resilience: Advisory Paper 1: Opportunities for systemic change. Infrastructure Australia.

62 United Nations Environment Programme (2023) Bracing for Superbugs: Strengthening environmental action in the One Health response to antimicrobial resistance. UN, Geneva.

63 Department of Health (2020) Australia's National Antimicrobial Resistance Strategy-2020 and Beyond. Commonwealth of Australia.

64 CSIRO (n.d.) Minimising Antimicrobial Resistance. <https://www.csiro.au/en/about/challenges-missions/Antimicrobial-resistance>

65 Stark K, Healey K, Gibbs N (2022) Farm powered: opportunities for regional communities in the renewable energy boom. Farmers for Climate Action.

66 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

67 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

68 University of Southern Queensland (n.d.) Helping farmers and agribusiness with a new and improved way forward. <https://www.unisq.edu.au/research/environmental-sciences/climate-insurance>

69 Productivity Commission (2017) Upskilling and Retraining, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 8. Commonwealth of Australia.

70 Department of Jobs, Precincts, and Regions (2022) Agriculture TAFE and Training Fund Guidelines. Agriculture Victoria. <https://business.vic.gov.au/__data/assets/pdf_file/0007/2098627/Agriculture-TAFE-and-Training-Fund-Guidelines.pdf>

71 Food Agility CRC (2020) AgriFood Supply Chain Resilience: Leveraging digital and data to enhance the resilience of Australia's AgriFood sector. Food Agility CRC.

72 World Economic Forum (WEF) (2019) Innovation with a Purpose: Improving Traceability in Food Value Chains through Technology Innovations. WEF, Geneva.; OECD (2020) COVID-19 and the food and agriculture sector: Issues and policy responses. OECD Publishing.

73 DAFF (2023) National traceability. <https://www.agriculture.gov.au/biosecurity-trade/market-access-trade/national-traceability>

74 OECD (2020) COVID-19 and the food and agriculture sector: Issues and policy responses. OECD Publishing.

75 Department of Foreign Affairs and Trade (DFAT) (n.d.) About free trade agreements (FTAs). <https://www.dfat.gov.au/trade/about-ftas/about-free-trade-agreements>

76 Parliament of Australia (2020) Trade transformation: Supporting Australia's export and investment opportunities. Joint Standing Committee on Trade and Investment Growth, May 2020. Commonwealth of Australia, Canberra.

77 Parliament of Australia (2020) Trade transformation: Supporting Australia's export and investment opportunities. Joint Standing Committee on Trade and Investment Growth, May 2020. Commonwealth of Australia, Canberra.

78 DAFF (2022) Transforming Australia's agricultural export services. <https://www.agriculture.gov.au/biosecurity-trade/market-access-trade/transforming-export-services>; DAFF (2022) Modernising agricultural trade. <https://www.agriculture.gov.au/biosecurity-trade/market-access-trade/modernising-trade>

79 Simplified Trade System Implementation Taskforce (n.d.) Overview: the Simplified Trade System. <https://www.austrade.gov.au/simplified-trade-system-what-is-the-simplified-trade-system> (accessed 8 May 2023).

80 Agriculture Victoria (n.d.) Research and development. <https://agriculture.vic.gov.au/export/traceability/traceability-research-and-development> (accessed 8 May 2023).

81 Investment NSW (n.d.) About Investment NSW. <https://www.investment.nsw.gov.au/about-investment-nsw/>; Department for Trade and Investment (n.d.) Talk to us. <https://export.sa.gov.au/connect#global-offices>

82 CSIRO (n.d.) Agroecology. <https://research.csiro.au/agroecology/>

83 CSIRO Futures (2021) A National Synthetic Biology Roadmap: Identifying commercial and economic opportunities for Australia. CSIRO, Canberra.

84 CSIRO (n.d.) Accounting for our environment. <https://www.csiro.au/en/research/natural-environment/natural-resources/Natural-capital-accounting/Accounting-for-our-environment>

85 CSIRO Futures (2022) Protein - A Roadmap for unlocking technology-led growth opportunities for Australia. CSIRO, Canberra.