



Dairy's role in a healthy, sustainable dietary pattern

Achieving a healthy, sustainable dietary pattern

This relies on a balance between nutrition and the environment but also social, cultural and economic aspects.

Too often, sustainability considerations are distilled down to greenhouse gas emissions alone without a full appreciation of the entire impact of food production – from the farm to the table and beyond.

The Australian dairy industry requires land, water and animals and employs people to provide human nutrition. We recognise our impact and have been redefining our position in the global food chain.

Australian dairy promises to provide nutritious food for a healthier world

To do this, we have made sustainability commitments to our people, the health and wellbeing of the community, our animals and the environment.

The Australian Dairy Industry Sustainability Framework includes goals and targets to 2030, driving innovation and continuous improvement.

To bring together the latest evidence for the role of dairy foods in a healthy and sustainable diet, **Dairy Australia commissioned independent researchers** to review the literature on two separate occasions, in 2019 and 2021. This document summarises the findings.

Our sustainability COMMITMENTS



Enhancing economic viability and livelihoods



Improving wellbeing of people



Providing best care for all our animals



Reducing environmental impact

Key findings and themes of change between reviews



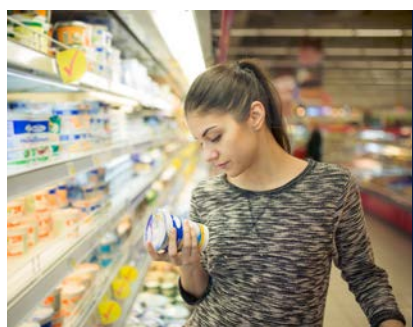
Environment

- Considerations around the environmental impact of foods are expanding beyond greenhouse gas (GHG) emissions to metrics around water, land, deforestation and biodiversity.

- All food production has an impact on the environment, however different foods have varying impacts, depending on which environmental metric you are considering.
- While changing our dietary behaviours could result in some environmental impact reduction, it's the food production system where opportunity to reduce impact is greatest.

As of 2020:

- **Dairy manufacturing GHGs** are **down 27%** since 2010/11.
- **94%** of dairy farms implement practices to **reduce GHGs**.
- **93%** of waste from dairy manufacturers is **diverted from landfill**.



Nutrition

- Healthy diet discussions interweave sustainability considerations more regularly and go beyond analysis of nutrient content or health outcomes to include benefits for the planet.
- Australian research revealed that high nutritional quality, low emissions diets typically featured milk, cheese and yoghurt as a key constituent.

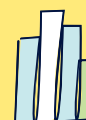
- Dairy delivers many benefits to a plant-based diet and consuming recommended amounts of milk, cheese and yoghurt contributes to:
 - Nutritional adequacy and better diet quality
 - Reduced risk of chronic diseases
 - Lower healthcare costs
 - Nutrient security.



Economics and society

- Economics and society feature in the literature more frequently in the context of sustainable diets.
- The current Australian Dietary Guidelines recommended diet (which includes milk, cheese and yoghurt) is more affordable than the typical Australian diet (containing higher amounts of discretionary or junk foods than recommended).

- Recommending a one size fits all diet does not consider cultural and humanitarian aspects of sustainability or food affordability.
- The ability to buy locally produced dairy foods in Australia ensures money goes back into regional communities and families through income and job creation within and beyond the dairy industry.



Did you know **37,400 people** are directly employed by the Australian dairy industry?

It is clear from the evidence that milk, cheese and yoghurt play an important role in healthy dietary patterns, with the dairy sector contributing positively to all domains of sustainability.

Achieving multiple dietary goals concurrently can be difficult, however eating more in line with Australian Dietary Guidelines will help contribute to a lower impact, higher quality diet.

Looking beyond individual food choices and dietary patterns, transformation of food production systems represents a real opportunity to make healthy, sustainable choices easy and accessible. Australian dairy is leading the way.

For references and more information on dairy's role in a healthy, sustainable diet visit dairy.com.au/sustainable-diets. To learn more about the Australian Dairy Sustainability Framework visit dairy.com.au/sustainability-framework.

Setting the scene

Sustainability is defined by the United Nations as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'.¹

The threat of climate change, an increasing human population, along with industrial and economic development, has prompted governments, researchers, policy makers, companies and individuals to reflect on current practices.

Agriculture and food production systems are at the forefront of considerations, and like other industries, food systems require transformational change to be more sustainable, and not jeopardise quality of life for future generations.

The Paris Agreement on climate change and the **Sustainable Development Goals (SDGs)** help guide the path and set international targets to achieve a sustainable future. Transforming food systems to deliver healthy, sustainable diets will contribute to the achievement of the SDGs at country level, especially:

- No Poverty (Goal 1)
- Zero Hunger (Goal 2)
- Good Health and Well-Being (Goal 3)
- Quality Education (Goal 4)

- Gender Equality (Goal 5)
- Responsible Consumption and Production (Goal 12)
- Climate Action (Goal 13).

The Food and Agriculture Organization (FAO) definition of sustainable diets includes the following domains – environment, health, economics and society.² Sustainable diets not only have low environmental impact but also are healthy, affordable, and acceptable to society.

The dairy sector is discussed in the literature in the context of all the domains of sustainability and has been identified as playing a role in each. **The Australian Dairy Industry Sustainability Framework** sets out the industry's promise to provide nutritious food for a healthier world and pledges four key commitments to the environment, people and communities, animals and human health and nutrition.³

The Sustainability Framework includes goals and targets to 2030 showing how our industry intends to be a leader in sustainable practices and an integral part of the national and global effort to address the world's biggest sustainability challenges.

¹ United Nations. Sustainability. Available: <https://www.un.org/en/academic-impact/sustainability>

² United Nations. Sustainability. Available: <https://www.un.org/en/academic-impact/sustainability>.

³ Australian Dairy Sustainability Framework. Our Dairy Promise 2021. Available: <https://www.sustainabledairyoz.com.au/our-dairy-promise>.



Environment



Measuring the environmental impact of a dietary pattern is a complex science and can be measured along multiple matrices using many different methods, inputs and data from different countries.

Emissions

Greenhouse gas (GHG) emissions are drivers of climate change. Agriculture accounts for approximately 15% of Australia's total GHG emissions (Figure 1). Australian dairy contributes **2% of total national emissions** pre-and-post farmgate with methane from cows making up most on-farm emissions (57%).

Australian dairy has a target to reduce emissions intensity by 30% by 2030 on 2015 levels to help meet the Paris ambition of keeping warming below 2 degrees and preferably 1.5 degrees, and help minimise climate change.

As of 2020, 94% of Australian dairy farms are implementing strategies to reduce emissions and manufacturing GHGs are down 27% since 2010/11.⁴

See more at dairy.com.au/30ways.

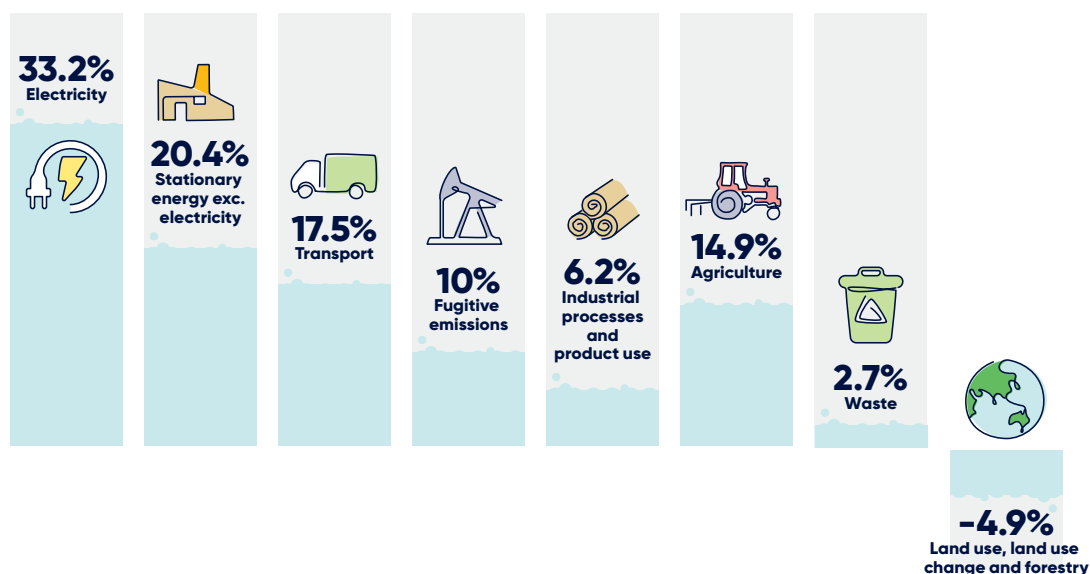
Environment beyond emissions

While GHG emissions are important to consider in sustainable food systems, other environmental metrics are equally important. The literature increasingly cites metrics related to cropland and water footprint, eutrophication and biodiversity.⁵

All food production has an impact on the environment, however different foods have varying impacts, depending on which environmental metric you are considering. For example, when it comes to dairy, Australian research shows that the dairy food group makes one of the smallest contributions of all the food groups to the cropland footprint of Australian adult diets, comparable to fruit, and only vegetables come in lower⁶ (Figure 2).

Commentators often suggest that large reductions in environmental impact are possible through dietary change. However, research has demonstrated only modest reductions can be achieved through diet and there are environmental trade-offs. To achieve healthy diets within planetary or environmental boundaries in Australia, the greater share of impact reduction may need to occur in the food production system.⁷ This is essentially referring to changes in production, processing, packaging and distribution to ultimately deliver lower impact foods.

Figure 1: Share of total emissions, by sector, for the year to March 2021



Adapted from Department of Industry, Science, Energy and Resources. Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2021. Canberra: Commonwealth of Australia; 2021.

Fugitive emissions are emission losses associated with industries producing natural gas, oil and coal.

4 Australian Dairy Industry Council. Australian Dairy Industry Sustainability Report. Available: <https://www.sustainabledairyoz.com.au/>.

5 Ritchie H and Roser M. Environmental impacts of food production. June 2020. Available: <https://ourworldindata.org/environmental-impacts-of-food>.

6 Ridoutt B, Anastasiou K, Baird D, Garcia JN, Hendrie G. Cropland footprints of Australian dietary choices. *Nutrients*. 2020 May;12(5):1212.

7 Ridoutt G, Baird D, Hendrie GA. Diets within planetary boundaries: What is the potential of dietary change alone? *Sustain Prod Consum*. 2021;28:802-810.

Measuring environmental impact is complex

Adding to the complexity is the difference in how researchers measure the environmental impact of foods, and the high variability even within one type of metric.

Most methodologies are context specific, meaning results of one analysis often cannot be extrapolated to other countries or industries. This is a major challenge for policy makers, to consolidate, interpret, and implement data that delivers evidence-based policy outcomes.

Dairy innovation driving improvements

The Australian dairy industry is engaged in cutting-edge research and innovation focused on improving land management, increasing water use efficiency, reducing waste and decreasing GHG emissions.

Some highlights include:

- Animal vaccines are being investigated as a strategy for reducing methane production by targeting microbes that produce methane.
- Genetic selection may be a permanently effective strategy to reduce methane production in dairy cows. Australian dairy is investing in research into genetic variation to breed cows that produce lower levels of methane.
- Dairy farmers are ensuring native vegetation or shelter belts are included on their farms to protect plant and animal biodiversity and optimise carbon absorption by trees.
- Dairy companies are exploring and already using alternative packaging for milk, including the use of glass bottles that are returnable and refillable, meaning tonnes of plastic is being diverted from landfill and recycling systems.

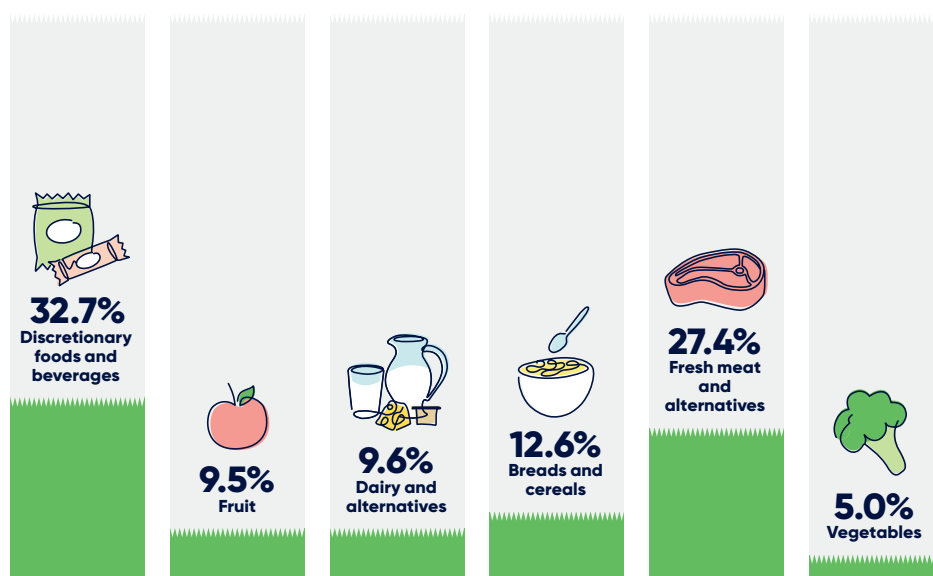
Definitions

Cropland scarcity footprint

is an environmental metric that considers the impact of food production based on how much land is needed to produce certain foods against the planetary boundary of each individual and the dietary contribution of each food. This is expressed as m².yr-e/kg.

Planetary boundaries are the absolute environmental limits for natural resource use and emissions that need to be respected to avoid major and potentially irreversible earth system change. There remains ongoing debate about how these planetary boundaries should be defined and what are the specific thresholds.^{8,9}

Figure 2: Cropland scarcity footprint by food group (%dietary contribution)*



* Food groups are as defined by the Australian Dietary Guidelines. Adapted from Ridoutt B et al. Cropland footprints of Australian dietary choices. *Nutrients*. 2020 May;12(5):1212.

What you need to know

- The environmental impact of a food goes beyond GHG emissions.
- Different foods have different impacts on different environmental metrics.
- While changing our dietary behaviours could result in some environmental impact reduction, it's the food production system where opportunity to reduce impact is greatest.
- Australian dairy has goals and targets to 2030 to reduce environmental impact across the supply chain.
- As of 2020, Australian dairy has seen a significant reduction in GHG emissions by dairy companies and an increase in manufacturers diverting waste from landfill. At the same time, most dairy farmers are implementing practices to reduce emissions.

8 Steffen W, Richardson K, Rockström J, Cornell S, Fetzer I, Bennett E et al. Planetary boundaries: Guiding human development on a changing planet. *Science*. 2015;347(6223).

9 Rockström J, Steffen W, Noone K, Persson Å, Chapin F, Lambin E et al. Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society*. 2009;14(2).

Health



Healthy diet discussions interweave sustainability considerations more regularly and go beyond analysis of nutrient content or health outcomes to include benefits for the planet.

A key driver for this is the fact diet behaviours have changed significantly over the past few decades and are likely to continue adapting in an environment of increasing change.

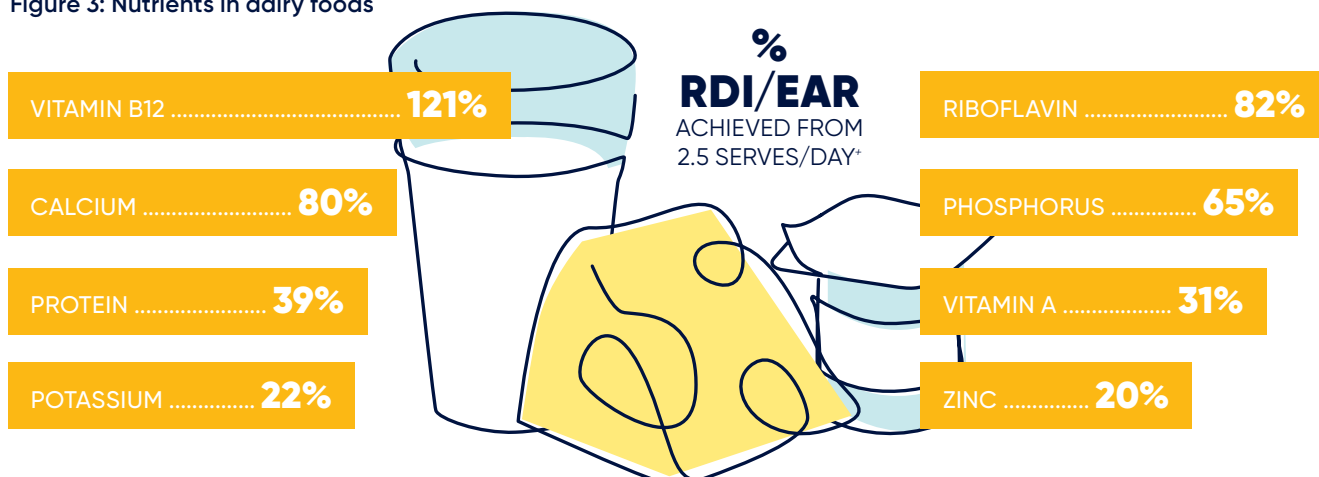
A dietary pattern needs to be healthy to be sustainable and dairy has a prominent role to play in diet quality, nutrient security, reduced risk of chronic disease and lower healthcare costs.^{10,11}

Dairy's contribution to nutrition and good health

Milk, cheese and yoghurt are recommended as one of the five food groups in the Australian Dietary Guidelines. These dairy foods are packed with nutrients (Figure 3) important for human health and are associated with positive health outcomes including a reduced risk of heart disease, stroke, high blood pressure and type 2 diabetes, and are not linked to an increase in weight or risk of obesity.¹² These health benefits are being attributed to the unique dairy matrix which is described as the nutrients, bioactive compounds and the physical structure of dairy which together exert a health effect.¹³

For more information on the dairy matrix, visit dairy.com.au/dairymatrix.

Figure 3: Nutrients in dairy foods



* Based on FSANZ Australian Food Composition Database. Serves based on Australian Dietary Guidelines recommended intake of 2.5 serves; 1 cup regular fat milk, 200g regular fat yoghurt, 20g regular fat cheddar cheese. RDI for 18-50 year old male used to calculate percentages. RDI: Recommended Dietary Intake. EAR: Estimated Average Requirement.

Balancing nutrition and environment

Many initiatives are in place to plot health considerations for dietary patterns against environmental impact to make holistic recommendations for a healthy, sustainable dietary pattern.

For example:

- The World Index for Sustainability and Health (WISH) seeks to measure diet quality and environmental sustainability in one scoring system. The authors applied WISH to a sample of urban Vietnamese diets and found that adequate amounts of all five food groups are required for a sustainable dietary pattern that is protective for human health.¹⁴
- Other researchers have taken the approach of analysing protein quality of various foods against environmental impact, finding that milk and yoghurt fare better than cheese when analysing protein quality versus environmental impact.¹⁵

Research shows that following recommended dietary guidelines can greatly reduce the environmental impact of typical diets. More specifically:

- Australian research shows discretionary or junk foods contribute to excess energy intake and excess diet-related emissions. Reducing discretionary food intake and eating more from the five food groups addresses excess energy and food overconsumption as well as diet quality.¹⁶

10 Drewnowski A, Finley J, Hess JM, Ingram J, Miller G, Peters C. Toward healthy diets from sustainable food systems. *Curr Dev Nutr*. 2020 Jun;4(6):nzaa083.
 11 Ridoutt BG, Baird D, Hendrie GA. The role of dairy foods in lower greenhouse gas emission and higher diet quality dietary patterns. *Eur J Nutr*. 2021 Feb;60(1):275-85.
 12 National Health and Medical Research Council. Australian Dietary Guidelines, Canberra: Commonwealth of Australia; 2013.
 13 Thorning TK et al. Whole dairy matrix or single nutrients in assessment of health effects: current evidence and knowledge gaps. *Am J Clin Nutr* 2017;105:1-13.

14 Trijsburg L, Talsma EF, Crispim SP, Garrett J, Kennedy G, de Vries JH, Brouwer ID. Method for the development of wish, a globally applicable index for healthy diets from sustainable food systems. *Nutrients*. 2021 Jan;13(1):93.
 15 Katz DL, Doughty KN, Geagan K, Jenkins DA, Gardner CD. Perspective: The public health case for modernizing the definition of protein quality. *Adv Nutr*. 2019 Sep 1;10(5):755-64.
 16 Hendrie GA, Baird D, Ridoutt B, Hadjikakou M, Noakes M. Overconsumption of energy and excessive discretionary food intake inflates dietary greenhouse gas emissions in Australia. *Nutrients*. 2016 Nov;8(11):690.

- Key research analysing Australian diets plotted the quality of diets based on nutritional adequacy against dietary impact on emissions. Ridoutt *et al.* found that high-quality low emission diets typically featured dairy as a key constituent and had >40% lower GHG emissions compared to low-quality, high emissions diets.¹⁷
- International research shows a healthy diet with a higher proportion of energy from fruit and dairy instead of a diet high in meat, fish, poultry and eggs, and breads, cereals, pasta can supply all recommended nutrients while reducing water use.¹⁸
- A Swedish study examining dairy's contribution to good nutrition that also considered sustainability shows that a slight increase in dairy is required to achieve optimal nutrition.¹⁹

Dairy's role in plant-based and other dietary patterns

Dairy delivers many benefits to a plant-based dietary pattern. It is a convenient, affordable (see 'Economics and Society' section) and accessible way to improve the nutrient adequacy of a diet rich in plant foods. It also maximises the chance of eating in a way that is both healthy and sustainable.²⁰

Considering other healthy, sustainable dietary patterns:

- The Mediterranean Diet (MD) is associated with improved health outcomes for individuals and has been analysed for its merits towards sustainability initiatives. A revised MD pyramid has been presented with sustainability and environmental aspects which recognises dairy foods as an 'every day' food.²¹ The MD places particular emphasis on fermented dairy foods such as yoghurt and cheese.²²
- US modelling also shows adding a serve of milk to existing recommended US dietary patterns could result in health benefits.²³

What you need to know

- The dairy matrix helps explain the unique health benefits of milk, cheese and yoghurt.
- Dairy is a convenient, affordable and accessible source of nutrition in a diet also rich in plant foods.
- Reducing intake of discretionary or junk foods and increasing five food group foods, including dairy foods, will help to reduce population dietary greenhouse gas emissions, while improving diet quality.

Economics and society

Sustainable diets research typically focuses on health and the environment, however the economic and social dimensions of sustainable diets and food systems should not be forgotten.²⁴

The economic domain refers to the profitability and commercial viability of the system and its ability to sustain and support the livelihoods of those involved in its production.²⁵

The social domain of sustainable diets is often less well recognised and incorporates social equity of food access and social wellbeing, food choice behaviours, food systems ethics, affordability and socio-ecological systems.²⁶

Consumer's definitions of sustainability are evolving.

Survey respondents from an independent study showed consumers are most focused on these top four areas for sustainable foods.²⁷

Figure 4: Consumers definitions of sustainability



17 Ridoutt BG, Baird D, Hendrie GA. The role of dairy foods in lower greenhouse gas emission and higher diet quality dietary patterns. *Eur J Nutr.* 2021 Feb;60(1):275–85.

18 Sobhani SR, Rezazadeh A, Omidvar N, Eini-Zinab H. Healthy diet: a step toward a sustainable diet by reducing water footprint. *J Sci Food Agric.* 2019 Jun;99(8):3769–75.

19 Chen C, Chaudhary A, Mathys A. Dietary change scenarios and implications for environmental, nutrition, human health and economic dimensions of food sustainability. *Nutrients.* 2019 Apr;11(4):856.

20 Fresán U and Sobaté J. Vegetarian Diets: Planetary Health and Its Alignment with Human Health. *Advances in nutrition.* 2019 Nov 1;10(Suppl_4):S380–S388.

21 Serra-Majem L, Tomaino L, Dernini S, Berry EM, Lairon D, Ngo de la Cruz J, Bach-Faig A, Donini LM, Medina FX, Belahsen R, Piscopo S. Updating the mediterranean diet pyramid towards sustainability: Focus on environmental concerns. *Int J Environ Res Public Health.* 2020 Jan;17(23):8758.

22 Trajkovska Petkoska A, Trajkovska-Broach A. Mediterranean diet: a nutrient-packed diet and a healthy lifestyle for a sustainable world. *J Sci Food Agric.* 2021 May;101(7):2627–33.

23 Reinhardt SL, Boehm R, Blackstone NT, El-Abbadi NH, McNally Brandow JS, Taylor SF, DeLonge MS. Systematic review of dietary patterns and sustainability in the United States. *Adv Nutr.* 2020 Jul 1;11(4):1016–31.

24 Nicholls J, Drewnowski A. Toward Sociocultural Indicators of Sustainable Healthy Diets. *Sustainability.* 2021; 13(13):7226.

25 Nguyen H. Sustainable Food Systems Concept and Framework. 1st ed. Rome: FAO; 2018.

26 Nguyen H. Sustainable Food Systems Concept and Framework. 1st ed. Rome: FAO; 2018.

27 Schiano AN, Harwood WS, Gerard PD, Drake MA. Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. *Journal Dairy Sci.* 2020 Dec 1;103(12):11228–43.

Economy



Economic benefits of dairy

The ability to buy locally produced dairy foods in Australia ensures money goes back into local communities and families through income and job creation within and beyond the dairy industry.

There are over **37,400 Australians directly employed in the dairy sector**²⁸ which offers employment opportunities across a wide range of skill levels.

Women have a role to play right across the dairy supply chain and contribute to building a stronger, more sustainable future for our industry. In 2020/21, 33% of the dairy processing industry's workforce was women and the wage gaps in dairy processing was well below that across all other industries.²⁹

Dairy is affordable

Affordability is a key component of sustainable diets and of sustainable food systems. It is a relative concept that encompasses the market price of a food in relation to other household expenses and household income.³⁰ Commentary around the affordability of proposed healthy, sustainable diets includes:

- Analysis of the EAT-Lancet reference diet which has an emphasis on plant-based foods revealed that this way of eating is not affordable for all.³¹
- Another study found families in Queensland in the lowest income quintile would have to spend 40–48% of their weekly wage on groceries in order to eat a plant-based diet, compared to 33–44% when consuming a typical diet (containing higher amounts of discretionary foods than recommended). The current Australian Dietary Guidelines recommended diet (which includes dairy foods) is 20% more affordable than the typical diet.³²

Values and culture

Food choices involve value judgments and deliberate choices as well as rules and routines that are closely linked to food behaviours.³³

Cultural and humanitarian aspects of sustainability should also be considered, with certain cultures eating animal foods as part of a traditional diet.

Aligning definitions and knowledge

There is much confusion around consumer perceptions of sustainable foods, particularly dairy and plant-based products. Health professionals have also been identified as having gaps in sustainable food systems knowledge, application and resources. A review found that although healthcare professionals understand the importance of sustainability, they require further support to enable their involvement.³⁴

It is important to consolidate understanding of sustainability into one united definition to work collectively towards sustainability goals and for industries to align sustainability initiatives to consumer expectations.³⁵

The Australian Dairy Sustainability Framework has revised its scope over time to reflect expectations from stakeholders. The goals and targets within the Framework are reviewed periodically to demonstrate our industry's maturity and commitment to sustainability. This is informed by materiality reviews which define and prioritise the sustainability issues material to the dairy industry.

What you need to know

- Australian dairy generates income and job creation for local communities.
- The current Australian Dietary Guidelines recommended diet (which includes milk, cheese and yoghurt) is more affordable than the typical Australian diet (containing higher amounts of discretionary foods than recommended).

- Culture and values play a significant part in people's food choices and the reality of the sustainability of diets within populations.
- Education is key for consumers and health audiences alike to ensure a collective ambition around sustainability can be achieved.

²⁸Number derived from a three-yearly median state level figures from ABS Labor Force Statistics, May 2021 Quarter publication: split on the basis of milk production within states.

²⁹Deloitte Access Economics 2021. Economic and Broader Contribution of the Australian Dairy Processing Industry Australian Dairy Products Federation.

³⁰Drewnowski A. Analysing the affordability of the EAT-Lancet Diet. *Lancet Glob Health*. 2020 Jan;8(1):e6–e7.

³¹Hirvonen K, Bai Y, Headey D, Masters W. Affordability of the EAT-Lancet reference diet: a global analysis. *Lancet Glob Health*. 2020 Jan;8(1):e59–e66.

³²Lee A, Patay D, Herron L, Parnell, Harrison E, Lewis M. Affordability of current, and healthy, more equitable, sustainable diets by area of socioeconomic disadvantage and remoteness in Queensland: insights into food choice. *Int J Equity Health*. 2021 Jun 30;20(1):153.

³³FAO and WHO 2019. Sustainable healthy diets – Guiding principles. Rome. Available: <https://www.fao.org/3/ca6640en/ca6640en.pdf>.

³⁴Guillaumie L, Boiral O, Baghdadli A, Mercille G. Integrating sustainable nutrition into health-related institutions: a systematic review of the literature. *Can J Public Health*. 2020 Dec;111(6):845–861

³⁵Schiano AN, Harwood WS, Gerard PD, Drake MA. Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. *J Dairy Sci*. 2020 Dec 1;103(12):1228–43.



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Acknowledgement

Dairy Australia acknowledges the contribution made to this publication by the Commonwealth government through its provision of matching payments under Dairy Australia's Statutory Funding Agreement.

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ISBN 978-1-922529-38-1