



Dairy's role in a plant-based dietary pattern

While plant-based dietary patterns are very much on-trend, they aren't anything new. The current interest in sustainability and climate change, along with health and animal welfare, are key drivers behind the latest focus on plant-based dietary patterns and plant sources of protein.

Milk protein is considered a complete protein (containing all the essential amino acids our bodies need). Many plant sources of protein such as cereals, nuts, and seeds are considered lower quality, incomplete sources of proteins because they are low in one or more, or lack one or more, of the essential amino acids.^{1,2}

Key messages

- 'Plant-based dietary pattern' is an umbrella term for a variety of dietary patterns that emphasise foods derived from plants including **omnivore**, **flexitarian**, **vegetarian** and **vegan** eating styles.
- Extensively studied plant-based dietary patterns e.g. **the Mediterranean and DASH diets** emphasise whole and minimally processed plant foods and include milk, cheese and yoghurt and support positive health outcomes.
- Including nutrient-rich milk, cheese and yoghurt not only enhances the nutritional adequacy of a plant-based dietary pattern but adds to its taste, variety and enjoyment.

Our sustainability **COMMITMENTS**



Enhancing economic viability and livelihoods



Improving wellbeing of people



Providing best care for all our animals



Reducing environmental impact

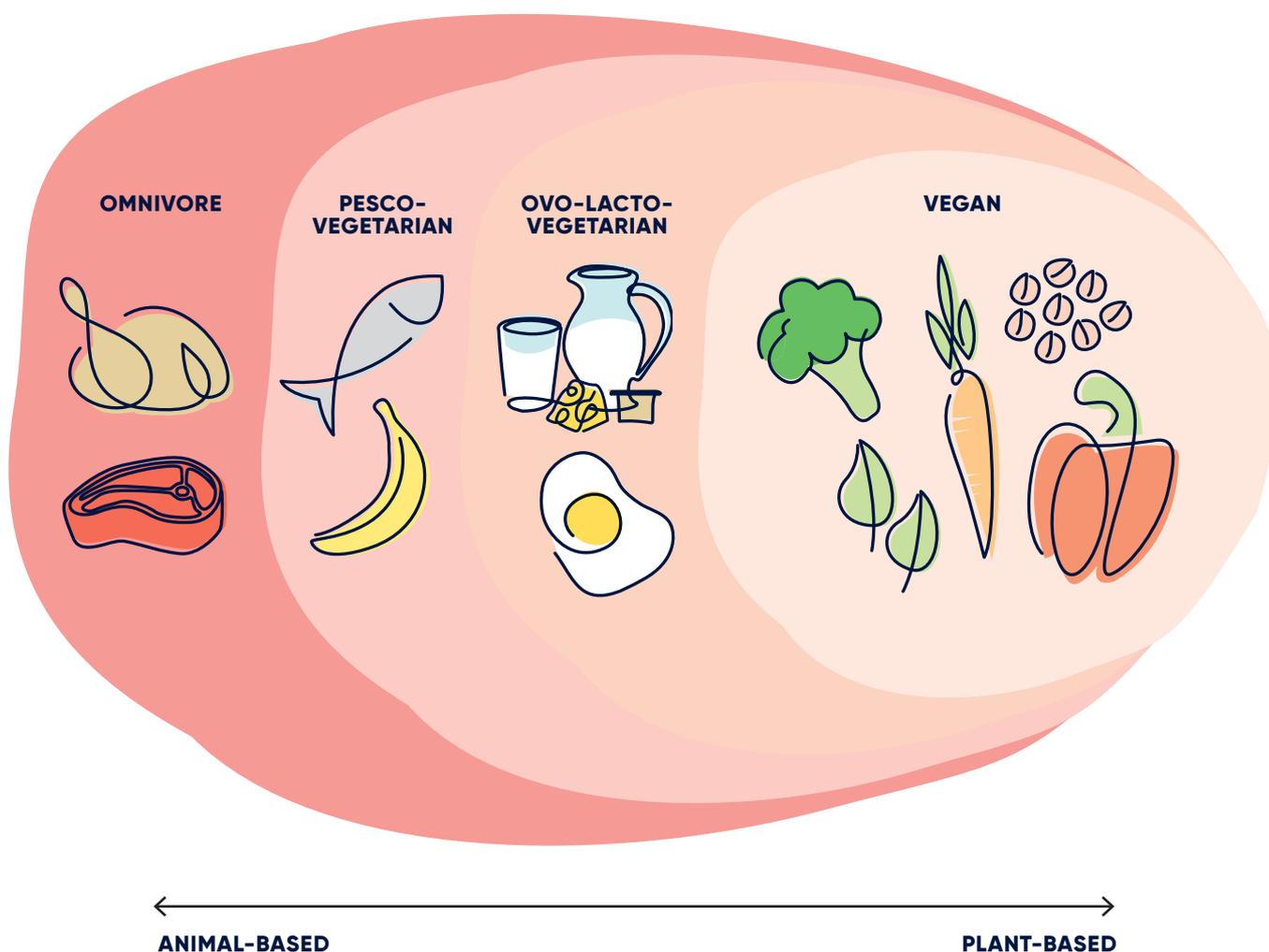
1 Rutherford SM, Fanning AC, Miller BJ, Moughan PJ. Protein digestibility-corrected amino acid scores and digestible indispensable amino acid scores differentially describe protein quality in growing male rats. *J Nutr.* 2015;145(2):372-379.

2 Phillips SM. Current concepts and unresolved questions in dietary protein requirements and supplements in adults. *Front Nutr.* 2017;4(13):1-10.

What you need to know

- Consumer confusion exists around what a 'plant-based dietary pattern' is, with many assuming it's a plant-only or vegan dietary pattern.
- Current Australian and international dietary guidelines recommend a plant-based dietary pattern.³
- 'Plant-based' dietary messaging needs to be more nuanced, contextualised and consistent.
- The 'plant-based' label on packaged food and beverage products confers **health and sustainability halos** and risks steering consumers towards less healthy food choices.
- Consumers looking to transition to a nutritionally balanced plant-based dietary pattern would benefit from more practical guidance on how to do so, in a way that fits their lifestyle and budget.

THE SPECTRUM OF PLANT-BASED DIETARY PATTERNS



A plant-based dietary pattern does not necessarily exclude all animal origin foods, rather emphasis is placed on the ascendancy of plant foods such as fruit, vegetables, wholegrains, legumes, nuts and seeds in the overall diet.⁴

³ Food and Agriculture Organization. Food-based dietary guidelines. Available: [fao.org/nutrition/education/food-based-dietary-guidelines](https://www.fao.org/nutrition/education/food-based-dietary-guidelines).

⁴ Medawar E, Huhn S, Villringer A, Veronica Witte A. The effects of plant-based diets on the body and the brain: a systematic review. *Transl Psychiatry*. 2019;9(226):1-17.



WHO Europe (2021)⁵ reviewed the evidence on plant-based dietary patterns using the definition

"Plant-based diets constitute a diverse range of dietary patterns that emphasize foods derived from plant sources coupled with lower consumption or exclusion of animal products. Vegetarian diets form a subset of plant-based diets, which may exclude the consumption of some or all forms of animal foods."

What is a plant-based dietary pattern?

The term 'plant-based dietary pattern' doesn't refer to a single dietary pattern, but a spectrum of dietary patterns with a bias toward plant foods. A plant-based dietary pattern isn't necessarily a plant-only dietary pattern. It's a flexible eating pattern that can include animal-sourced food including nutrient-dense dairy foods such as milk, cheese and yoghurt.

Characteristics of dietary patterns that emphasise the consumption of plant foods (Salas-Salvado et al).⁶

Foods		
DASH diet (Dietary Approaches to Stop Hypertension)	Emphasises fruits, vegetables, and low-fat dairy products, and includes whole grains, poultry, fish, and nuts. Reduced consumption of saturated fat, red meat, sweets, and sodium.	
Macrobiotic diet	Emphasises locally grown whole-grain cereals, pulses (legumes), vegetables, seaweed, fermented soy products, and fruit, combined into meals according to the ancient Chinese principle of balance known as yin and yang.	
Mediterranean diet	Characterised by a high intake of olive oil as the principal source of dietary fat, fruit, nuts, vegetables, and cereals; a moderate intake of fish and poultry; a low intake of dairy products, red meat, processed meats, and sweets; and a moderate intake of wine with meals.	
Pescatarian diet	Plant-based diet including fish or other seafood, but not the flesh of other animals.	
Vegan diet	Plant-based diet avoiding all animal foods such as meat (including fish, shellfish, and insects), dairy, eggs, and honey, as well as products such as leather, and those that are tested on animals.	
Vegetarian diet	Plant-based diet avoiding all animal flesh-based foods and animal-derived products. Some modified versions allow eggs (ovo), dairy products (lacto), or a combination of both.	

5 World Health Organization. Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence. 2021. Available: apps.who.int/iris/handle/10665/349086.

6 Salas-Salvado J, Becerra-Tomás N, Papandreou C, Bulló M. Dietary patterns emphasizing the consumption of plant foods in the management of type 2 diabetes: a narrative review. *Adv Nutr.* 2019;10(S4):S320–S331.

Plant-based dietary patterns – what do consumers think?

The term plant-based dietary pattern can be quite ambiguous. Many consumers incorrectly believe plant-based dietary patterns are plant-only dietary patterns. One Australian survey of consumers and nutrition professionals found that 55% of respondents believed a plant-based dietary pattern to be a vegan dietary pattern.⁷

Food companies are leveraging the **health and sustainability 'halos'** conferred by the 'plant-based' label, driving growth in sales of plant protein, plant-based meat and dairy alternative product categories (many of which are highly processed). A recent consumer survey found that 1 in 2 Australian consumers believe packaged foods labelled 'plant-based' are healthy.

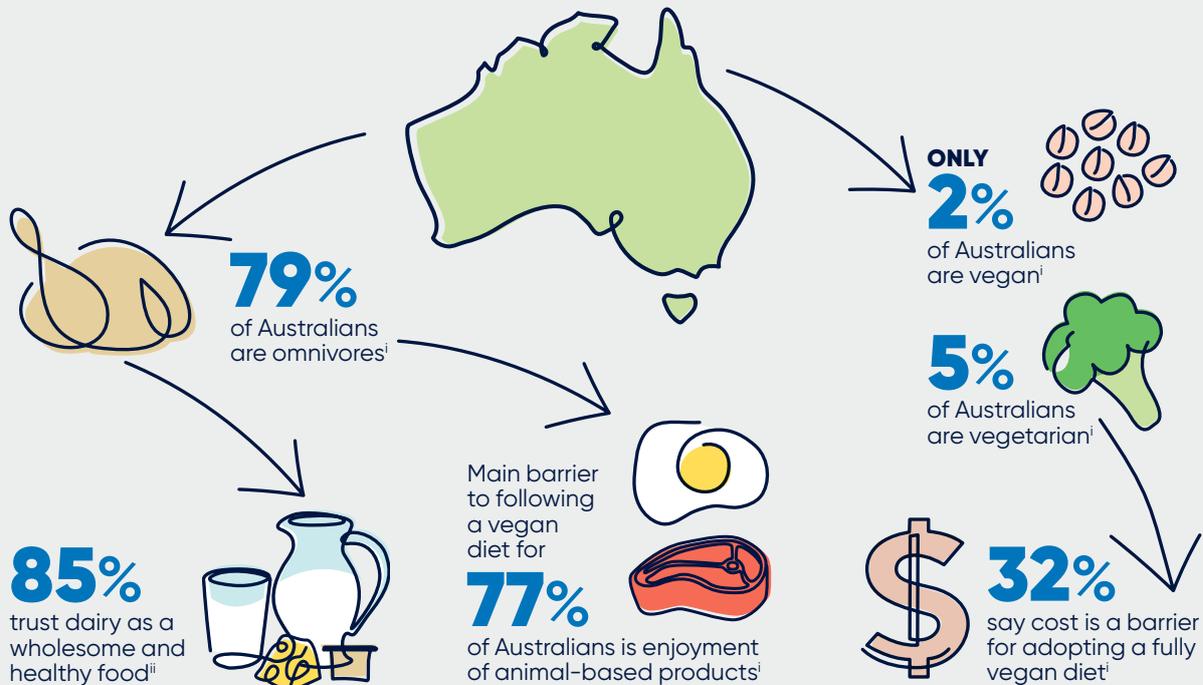
Consistent with this, the key reason Australian consumers claim to purchase plant-based beverages/dairy alternatives, is the belief that they are healthier.⁸

Plant-based beverages

A survey of **plant-based beverages** available in Australia⁹ reported that many products struggle to replicate the unique nutrient package dairy offers, with a large variation in nutritional quality particularly in protein, vitamin A, riboflavin, cobalamin, iodine and zinc content. For vulnerable population groups, substituting milk with these plant-based beverages could compromise intakes of some bone-health promoting nutrients, including protein, calcium and zinc. Dairy Australia has prepared a detailed overview of how cow's milk stacks up against plant-based beverage offerings from an ingredient, nutritional composition, health and environmental sustainability perspective.¹⁰ Learn more about how cow's milk compares to plant-based beverages at **Healthy Sustainable Diets – Dairy Australia**.

Milk is a nutrient-dense food and naturally contains a rich package of nutrients, in a unique food matrix that is well absorbed by the body. In comparison, the nutritional composition of plant-based beverages varies considerably, often vitamins and minerals are added through fortification and in smaller amounts with uncertainty around what's absorbed by the body. Only soy milk contains protein that provides all the essential amino acids that milk naturally does, but in lesser amounts.

Key insights from Australians about plant-based eating



i. CHOICE. CHOICE Consumer Pulse Survey, March 2021. ii. Lewers Research. Dairy Australia Trust Tracker 2020.

7 F Estell M, Hughes J, Grafenauer S. Plant protein and plant-based meat alternatives: Consumer and nutrition professional attitudes and perceptions. Sustainability. 2021;13(3):1478-1496.

8 Lewers Research. Dairy Australia Trust Tracker. 2020.

9 Zhang YY, Hughes J, Grafenauer S. Got Mylk? The emerging role of Australian plant-based milk alternatives as a cow's milk substitute. Nutrients. 2020;12(5):1254-1272.

10 Dairy Australia. How does cow's milk compare to plant-based beverages?. Available: cdn-prod.dairyaustralia.com.au/-/media/dairy/files/health-resources/dairy_and_plant-basedbeverages.pdf?rev=133c97648c2745e5bc0fead6ae406090&hash=CB39B11F7EB896A8F5C87C1140F4B381.



What does the evidence tell us about plant-based dietary patterns and health outcomes?

Research interest in plant-based dietary patterns has increased exponentially in the last decade. Although not always labelled as plant-based, a number of extensively studied plant-based dietary patterns, e.g. the Mediterranean and DASH diets, emphasize whole plant foods such as whole grains, vegetables, fruits, nuts and legumes, and also include milk, cheese and yoghurt. These dietary patterns are associated with many positive health outcomes, including a reduced risk of heart disease, stroke, high blood pressure and type 2 diabetes.^{11,12}

Dietary modelling scenarios^{13,14,15} show the inclusion of nutrient-dense dairy foods – milk, cheese and yoghurt – in a plant-based dietary pattern increases the likelihood of it being nutritionally adequate.



Not all plant foods have the same nutritional benefits. A number of approaches to assessing the quality of and/or adherence to a plant-based dietary pattern are described in the literature.^{16,17} With the exception of soy products, there is limited evidence to support any equivalence nutritionally of plant-based alternatives to dairy.

11 R Salas-Salvadó J, Becerra-Tomás N, Papandreou C, Bulló M. Dietary patterns emphasizing the consumption of plant foods in the management of type 2 diabetes: a narrative review. *Adv Nutr.* 2019;10(S4):S320–S331.

12 Harland J, and Garton L. An update of the evidence relating to plant-based diets and cardiovascular disease, type 2 diabetes and overweight. *Nutr Bull.* 2016;41(4):323–338.

13 Cifelli CJ, Houchins JA, Demmer E, Fulgoni VL. Increasing plant based foods or dairy foods differentially affects nutrient intakes: Dietary scenarios using NHANES 2007–2010. *Nutrients.* 2016;8(7):422–435.

14 Demmer E, Cifelli CJ, Houchins JA, Fulgoni VL. The impact of doubling dairy or plant-based foods on consumption of nutrients of concern and proper bone health for adolescent females. *Public Health Nutr.* 2017;20(5):824–831.

15 Houchins JA, Cifelli CJ, Demmer E, Fulgoni VL III. Diet modelling in older Americans: The impact of increasing plant-based foods or dairy products on protein intake. *J Nutr Health Aging.* 2017;21(6):673–680.

16 Zhu R, Fogelholm M, Poppitt SD, Silvestre MP, Möller G, Huttunen-Lenz M, Stratton G, Sundvall J, Råman L, Jalo E, Taylor MA, Macdonald IA, Handjiev S, Handjieva-Darlenska T, Alfredo Martinez J, Muirhead R, Brand-Miller J, Raben A. Adherence to a plant-based diet and consumption of specific plant foods—associations with 3-year weight-loss maintenance and cardiometabolic risk factors: A secondary analysis of the preview intervention study. *Nutrients.* 2021;13(11):3916–3929.

17 Satija A, Bhupathiraju SN, Spiegelman D, Chiuve SE, Manson JE, Willett W, Rexrode KM, Rimm EB, Hu FB. Healthful and unhealthful plant-based diets and the risk of coronary heart disease in US adults. *J Am Coll Cardiol.* 2017;70(4):411–22.

Dietary guidelines and plant-based dietary patterns

Australian dietary guidelines

Dietary guidelines encouraging plant-based eating aren't new: "Our guidelines have emphasised the need for more plant foods, including vegetables, legumes, nuts, seeds and grains (as whole grains rather than refined grain products) since the first set was released in 1981."¹⁸

Applying the WHO definition of a plant-based dietary pattern¹⁹, current Australian and international dietary guidelines²⁰ promote a plant-based dietary pattern. While the wording of this guidance varies considerably, increasing emphasis is placed on the importance of whole plant foods, plant sources of protein and the need to limit or reduce animal foods, especially red and processed meat.

There is limited and inconsistent guidance in international dietary guidelines on plant-based beverages. More broadly, current dietary guidance is not reflective of the diverse range of plant-based food and beverage offerings available today.

Evidence gaps

- In the scientific literature, the term 'plant-based dietary pattern' is not used consistently or contextualised which makes interpreting and translating research findings challenging.²¹
- There are significant knowledge gaps in the nutrition composition and bioavailability as well as health attributes of plant-based meat, dairy and egg substitutes. There is also a shortage of long-term evidence about the health outcomes and the broader sustainability impact of these plant-based alternatives.
- According to an analysis of plant-based beverages available in the US "many plant-based foods and beverages, especially those containing blended and reformulated proteins, fall into the NOVA category of ultra-processed foods."²²
- There is a growing body of evidence suggesting consumption of ultra-processed foods (UPF) could be associated with poorer health outcomes. Guidance around UPFs is of increasing relevance given the evidence showing those following vegan/vegetarian dietary patterns have higher intakes of plant-based alternative foods and consequently UPFs.²³

18 Forbes M and Stanton R. More than one good reason for eating mainly plant foods. Available: theconversation.com/more-than-one-good-reason-for-eating-mainly-plant-foods-38378.

19 World Health Organization. Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence. 2021. Available: apps.who.int/iris/handle/10665/349086.

20 Food and Agriculture Organization. Food-based dietary guidelines. Available: fao.org/nutrition/education/food-based-dietary-guidelines.

21 Storz, M.A. What makes a plant-based diet? A review of current concepts and proposal for a standardized plant-based dietary intervention checklist. *Eur J Clin Nutr.* 2021;1–12.

22 Drewnowski A. Perspective: Identifying ultra-processed plant-based milk alternatives in the USDA branded food products database. *Adv Nutr.* 2021;12(6):2068–2075.

23 Gehring J, Touvier M, Baudry J, Julia C, Buscail C, Srour B, Hercberg S, Péneau S, Kesse-Guyot E, Allès B. Consumption of ultra-processed foods by pescovegetarians, vegetarians, and vegans: associations with duration and age at diet initiation. *J Nutr.* 2021;151(1):120–131.

Supporting the transition to healthy plant-based dietary patterns

Eating more whole plant foods has merits for health. However, when consumed in the form of highly processed plant-based alternative foods it is unlikely to improve the nutritional value of a diet and is potentially environmentally inferior. As a result, generic 'plant-based' messaging may contribute to poor food choices and unintended nutritional consequences.

WHO Europe in their 2021²⁴ review of the evidence on plant-based dietary patterns and their impact on health, sustainability and the environment suggest:

"It may be helpful to focus on incremental transitions towards plant-based diets by adopting plant-forward eating, in which meat is not necessarily excluded but is not the central feature of the meal."

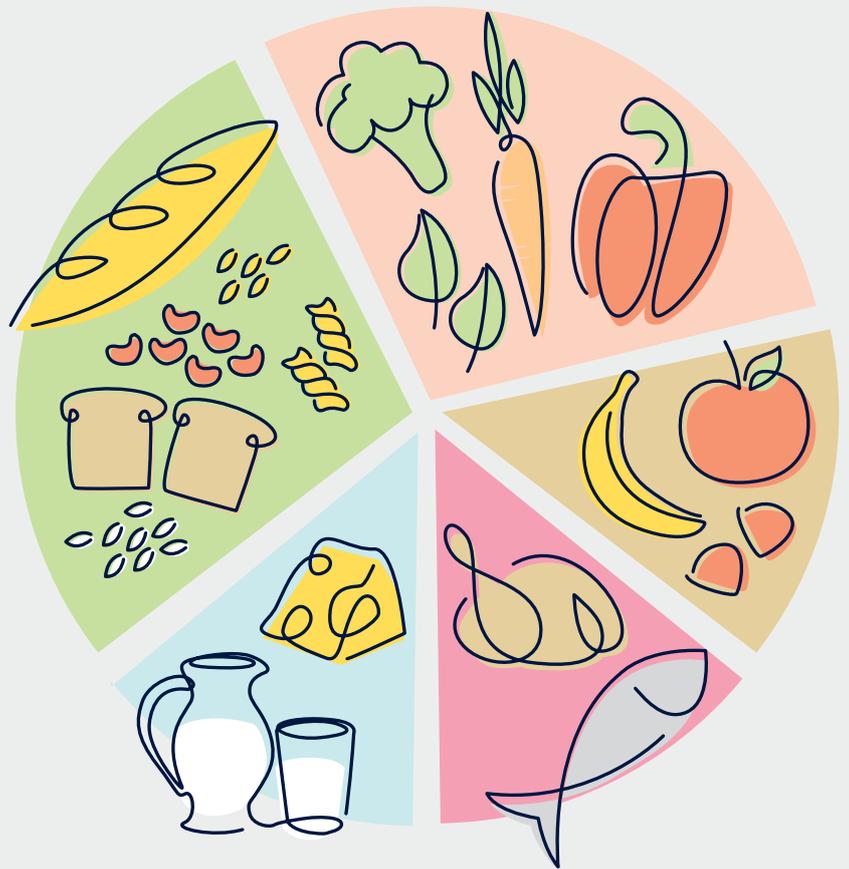
²⁴World Health Organization. Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence. 2021. Available: apps.who.int/iris/handle/10665/349086.

Practical advice is needed to help consumers transition to a nutritionally balanced plant-based diet i.e. increasing consumers' confidence to identify, prepare and enjoy a variety of nutrient-dense foods to achieve a healthy plant-based dietary pattern. Including milk, cheese and yoghurt not only enhances the nutritional adequacy of a plant-based diet but adds to its taste, variety and enjoyment.

Recommendations

- Eating a variety of nutrient-rich foods in line with the Australian Dietary Guidelines, which includes milk, cheese and yoghurt, will naturally result in a nutritionally balanced plant-based dietary pattern.
- Education and practical guidance are needed to better support consumers to achieve and enjoy a plant-based dietary pattern e.g. improving food literacy, meal planning and culinary skills.





Glossary of terms

Dairy food matrix – Foods consist of a large number of different nutrients and components that sit within complex physical structures. The ‘Food Matrix’ describes food in terms of both its physical structure, its nutrient content and how these interact together. Milk, cheese and yoghurt each have distinct food matrices in terms of their nutrient composition and structure which is known as the dairy food matrix.

The DASH diet – (Dietary Approaches to Stop Hypertension) is a plant-based dietary pattern that emphasizes fruits, vegetables, and low-fat dairy products, and includes whole grains, poultry, fish, and nuts. Low in saturated fat, red meat, sweets, and sodium, it’s widely recommended for the prevention and management of hypertension.

Dietary patterns are defined as the quantities, proportions, variety, or combination of different foods, drinks, and nutrients in diets, and the frequency with which they are habitually consumed.

Flexitarian – The ‘flexitarian’ dietary pattern, a combination of the words ‘flexible’ and ‘vegetarian’. It’s a style of eating that encourages eating mostly plant foods while allowing meat and other animal products in moderation. It’s more flexible than fully vegetarian or vegan dietary patterns.

Health halo – this is a term used to describe when consumers overestimate the overall healthfulness of a food (in this instance), based on one narrow attribute.

The Mediterranean diet is a plant-based dietary pattern, characterised by an abundance of vegetables, fruits, nuts, legumes, seeds and fish, with liberal use of olive oil, a moderate amount of dairy foods, and a low amount of red meat.

Omnivore diet is a dietary pattern that includes foods and drinks of both animal and plant origin.

Plant-based beverage is a term that refers to dairy alternatives²⁵ as described by the Australian Dietary Guidelines.

Sustainable diet – Dairy Australia aligns its definition of a healthy, sustainable diet to the FAO/WHO definition and guiding principles; sustainable diets take into account the long-term impacts of the foods we choose to eat and produce. They not only have low environmental impact but also are healthy, affordable, and acceptable to society, considering our health, the health of communities and the health of the planet.

Sustainability halo is a term that describes when consumers overestimate how sustainable something is (a food in this case), based on one narrow attribute e.g. ‘plant-based’ label.

Ultra-processed food (UPF) – Practically all food is processed in some way. The NOVA food classification system²⁶ classifies all foods into four groups based on how the food is processed and its ingredients. One of these groups, termed ultra-processed foods, is made up of snacks, drinks, ready-meals, and many other product types formulated mostly or entirely from substances extracted from foods or derived from food constituents. The three other NOVA food groups are unprocessed or minimally processed foods, processed culinary ingredients, and processed foods.

Vegan diet – is a plant-only dietary pattern which avoids all animal foods e.g. meat (including fish, shellfish, and insects), dairy, eggs, and honey, as well as products such as leather, and those that are tested on animals.

Vegetarian diet – is a plant-based dietary pattern that generally excludes all animal flesh and animal-derived products. Some modified versions allow animal-sourced foods e.g. dairy and eggs (lacto-ovo vegetarian), eggs only (ovo vegetarian) and dairy only (lacto vegetarian).

25 National Health and Medical Research Council. Eat for Health. eatforhealth.gov.au/food-essentials/five-food-groups/milk-yoghurt-cheese-and-or-their-alternatives-mostly-reduced-fat.

26 Monteiro C.A, Cannon G, Lawrence M, Costa Louzada M.L, Machado, P. Ultra-processed foods, diet quality and human health. Available: fao.org/3/ca5644en/ca5644en.pdf.





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