FOOD STANDARDS Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

Short summary: Labelling of plant-based protein products and dairy alternatives

Cataloguing data

This publication (and any material sourced from it) should be attributed as: FSANZ 2024, *Summary report - Labelling of plant-based protein products and dairy alternatives*, Food Standards Australia New Zealand, Canberra, Australia and Wellington, New Zealand. CC BY 4.0.

This publication is available at agriculture.gov.au/agriculture-land/farm-food-drought/food/plant-based-alternative-product-labelling.

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Acknowledgements

The authors thank survey participants for their input and teams at DAFF and FSANZ for supporting the development of the report.

Acknowledgement of Country

We acknowledge the continuous connection of First Nations Traditional Owners and Custodians to the lands, seas and waters of Australia. We recognise their care for and cultivation of Country. We pay respect to Elders past and present, and recognise their knowledge and contribution to the productivity, innovation and sustainability of Australia's agriculture, fisheries and forestry industries.

Executive Summary

Over a number of years, concerns have been raised by meat and dairy industries in Australia that the labelling and presentation of plant-based protein and dairy alternatives may be misleading to consumers as to the ingredient content (that is, whether they were plant or animal based) or nutritional similarity of these products compared to animal-based counterparts. The issue was considered by the Food Regulation Standing Committee in 2018 and the Senate Rural and Regional Affairs and Transport Legislation Committee in 2022, with both bodies noting a lack of independent, peer-reviewed research.

Food Standards Australia New Zealand (FSANZ) was commissioned by the Department of Agriculture, Fisheries and Forestry to undertake consumer and market research to build the evidence-base to inform policy considerations around plant-based protein and dairy alternative product labelling. FSANZ is an Independent Statutory Authority with expertise in undertaking research on consumer attitudes, perceptions, and behaviours regarding food.

The project consisted of:

- A literature review of existing evidence on the effect of meat and dairy terminology, utility terms, and animal imagery on consumers' understanding of plant-based protein and dairy alternatives.
- A market survey of on-package labels for plant-based and alternative products; and
- A consumer survey, using a representative sample of Australian consumers, to understand the extent to which Australian consumers are confused or misled about the ingredient content of plant-based protein and dairy alternative products.

The research was undertaken in phases, such that the literature review and market survey informed the design of the consumer survey. This ensured that the study targeted evidence gaps in the current knowledge base and reflected labelling practices that were currently occurring in the market.

The literature review identified 16 documents, reporting 17 unique studies. These studies were primarily grey literature, which often did not contain sufficient methodological detail to ascertain risk of bias. All peer reviewed literature was undertaken outside of Australia, which limits its generalisability to the Australian context.

Overall, 2 studies suggested that up to 25% of Australian consumers may be confused by plant-based protein labelling currently on the market. However, methodological issues reduce confidence in the findings, and the studies did not investigate the cause of the confusion. International studies that used an experimental design suggest it is animal imagery, rather than meat terminology, that confuses consumers.

The evidence identified by the literature review was less clear on the prevalence of consumer confusion in respect of plant-based dairy alternatives. The limited evidence available suggested that the vast majority of consumers correctly understand the ingredient content (that is, whether they were plant or animal based) of these products. International studies once again suggested that it may be animal imagery, rather than dairy terminology, that causes any confusion.

The market survey collected product image and label information for a total of 610 plant-based products from selected Australian supermarkets and health food stores in the ACT, Coles and Woolworths online retail websites, and online manufacturers' websites. This included 230 plant-based protein products, 148 plant-based cheeses, 165 plant-based milks, 63 plant-based yoghurts, and 4 plant-based eggs.

Data was captured on a range of different front-of-pack labelling elements, including meat/dairy terminology, ingredient qualifiers (e.g. 'plant-based', 'vegan', 'meat-free'), animal depictions, and health and nutrition claims.

The consumer survey was designed to test the effect of different labelling elements on consumer understanding using a high quality, randomised controlled trial with a large, representative sample of Australian consumers. This methodology filled a research gap identified by the literature review, as it enabled testing not only whether consumers were confused, but also what parts of the label may be causing any confusion. The label elements chosen for testing were animal imagery, meat/dairy terminology and the size and location of ingredient qualifiers, both on their own and in combinations of 2 (i.e. animal image with meat/dairy terminology). These elements were chosen as they represented areas of particular concern to some industry stakeholders (meat/dairy terminology, animal imagery); had been identified in the literature review as a potential source of confusion (e.g. animal imagery); were found to be prevalent in the market survey (meat/dairy terminology, ingredient qualifiers); and/or are addressed in voluntary labelling guidelines (meat/dairy terminology, animal imagery, ingredient qualifiers).

The consumer survey found that consumers are generally able to accurately identify the ingredient content of plant-based protein products and dairy alternatives, find it easy to do so, are confident in their understanding of how the product is intended to be used, and do not believe they are nutritionally similar to an animal product counterpart.

The only labelling type that was found to slightly decrease consumer accuracy in identifying ingredient content was specific to plant-based dairy alternatives and was the combination of animal imagery with an ingredient qualifier that is separate to the name of the food. The market survey found that this combination of labelling elements was present on 0% of plant-based protein products, 6.8% of plant-based cheeses, 0% of plant-based milks, and 0% of plant-based yoghurts.

Although consumers were able to accurately identify the ingredient content of plant-based products, 2 combinations of labelling elements decreased consumers' *perceived* ease of doing so. These were: animal imagery + an ingredient qualifier separate to the name of the food (for both plant-based protein and dairy alternative products) and animal imagery + ingredient qualifier smaller than the name of the food (for plant-based dairy alternatives). The market survey did not capture the number of products where the ingredient qualifier was smaller than the name of the food. However, it did capture where the ingredient qualifier was smaller than the largest meat or dairy term used on the package. Only 2.2% of plant-based protein products, 0% of plant-based eggs, 6.7% of plant-based cheeses, 0% of plant-based milks, and 0% of plant-based yoghurts had an animal image and an ingredient qualifier that was smaller than the largest meat or dairy term used on the package.

Some labelling elements decreased consumers' confidence in their understanding of how plant-based dairy alternatives were intended to be used or consumed. These were: animal imagery on its

own, animal imagery + ingredient qualifier separate from the name of the food, animal imagery + ingredient qualifier smaller than the name of the food, and ingredient qualifier both separate and smaller than the name of the food. The market survey found that 8.8% of plant-based cheeses, 0% of plant-based milks, and 4.8% of plant-based yoghurts have a label with an image of a dairy animal. 20.9% of plant-based cheeses had an ingredient qualifier that was not co-located with the name of the food and was smaller than the largest dairy term used on the package, compared with 4.2% of plant-based milks, and 0% of plant-based yoghurt.

Meat/dairy terminology was not found to affect participants' understanding of the ingredient content of the products, either alone or in combination with any other labelling element.

No labelling element was found to affect participants' perceptions of the nutritional similarity of the plant-based products with an animal product counterpart, which were generally perceived as nutritionally 'somewhat different' (while animal products were perceived as 'somewhat similar' to another animal product).

Overall, of the labelling elements tested, the package of research suggests that consumers are generally not confused by plant-based product labelling and do not perceive it as nutritionally similar to an animal product counterpart. Although 1 combination of labelling elements had an impact on consumer accuracy in product ingredient identification, this effect was small and did not cause consumers to perceive the products as being animal-based. Some labelling elements had an impact on ease of ingredient identification and/or confidence in a products' intended use; however, these labelling elements are not commonly used in the marketplace.

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Glossary

Term	Definition
Animal imagery	On-label depiction of an animal relevant to the product the plant-based alternative is imitating. For example – cow for beef or milk.
Claims	Health, nutrient or comparative claims on food labels. For example – high protein; no artificial colours or flavours; as much protein as [product].
DAFF	Department of Agriculture, Fisheries and Forestry.
FSANZ	Food Standards Australia New Zealand.
Ingredient Qualifier	Terms used to identify that a product is plant-based. For example – 'meat-free', 'plant-based', 'oat milk'.
Plant-based protein alternative	Plant-based products that have undergone a high level of processing, that aim to imitate the flavour and/or texture of meat. This includes imitations of chicken, beef, mince or processed meat like nuggets.
Plant-based dairy alternative	Plant-based products that have undergone a high level of processing, aimed to imitate the flavour and/or texture of milk, cheese or yoghurt.
Meat and dairy terminology	Common terms that describe characteristics such as flavour and texture in relation to an animal-based product. Meat examples – meat, chicken, pork, beef, prawn. Dairy examples – milk, cheese, yoghurt.
RCT	Randomised controlled trial.
Utility term	Description of the format of the product, including how it is processed or is intended to be used. For example – nuggets, tenders, mince.

Introduction

Food Standards Australia New Zealand (FSANZ) was commissioned by the Department of Agriculture, Fisheries and Forestry (DAFF) to undertake consumer research to build the evidence-base to inform policy considerations around plant-based protein and dairy alternative product labelling. The project consists of:

- A literature review of existing evidence on the effect of meat and dairy terminology, utility terms, and animal imagery on consumers' understanding of plant-based meat and dairy alternatives
- A market survey of on-package labels for plant-based protein and dairy alternative products; and
- A consumer survey, using a representative sample of Australian consumers, to understand the extent to which Australian consumers are confused or misled about the ingredient content of plant-based and alternative products.

Literature review

Research questions

The literature review addressed the following research questions:

1) How does the use of meat or dairy terminology (e.g. 'meat', 'beef', or 'chicken'), utility terms (e.g. 'burger', 'patties', or 'sausage') and/or animal imagery on plant-based protein or dairy alternatives affect consumer understanding of the ingredient content of the product (i.e. being meat, plant-based, or a mixture)?

Subcomponents of the research question were as follows:

a) To what extent does the use of these terms and/or imagery confuse or mislead consumers about the ingredient content of the product?

b) To what extent does the use of these terms and/or imagery support consumers' understanding of the product's intended flavour, texture, and/or use?

c) To what extent do ingredient qualifiers (e.g. 'meat-free', 'plant-based', 'oat' milk) reduce any confusion about the ingredient content of the product?

d) Are there any differences in the effect of terminology and/or imagery according to demographic characteristics (e.g. age, gender, level of education, level of literacy, language used at home)?

Literature search strategy and review criteria

Search strategy

Literature identified for this review was obtained from the following sources:

- Consumer evidence submitted to the Senate Standing Committee on Rural and Region Affairs and Transport Legislation's Inquiry on the Definitions of meat and other animal products.
- Results from a literature search undertaken by the University of Adelaide in 2023,
- Searching online databases for peer-reviewed studies published since 2023 (i.e. since the literature search undertaken by the University of Adelaide).

- A Google Scholar search for literature published since 2023, first 100 hits.
- A Google search for grey literature around plant-based labelling, first 100 hits; and
- Hand-searching the reference lists and citing studies from included literature.

Inclusion criteria

The review included all studies that addressed the research question. No restrictions were placed on the year of publication, study type (e.g. experiments, surveys, focus groups), participant characteristics (e.g. age, geographic location), or specific outcome measures.

Both peer-reviewed publications as well as grey literature (e.g. unpublished theses, research produced by governmental agencies and non-government organisations, including industry stakeholders) were included.

Exclusion criteria

The review excluded all sources that do not include original empirical data (such as narrative review articles, opinion papers, discussion papers, and media articles).

The review excluded studies that looked at plant-based protein and dairy alternatives in countries that predominantly use languages other than English due to the uncertainties that differing languages would introduce around the meaning of specific terminology.

The review excluded studies that did not address the research question, such as studies that solely examined: consumers' preferences or expectations around labelling terminology; consumers' perceptions, acceptance, attitudes, motivations, or willingness to consume plant-based protein and dairy alternatives; consumer understandings of nutritional similarity of plant-based protein and dairy alternatives with their conventional counterparts; and consumers' sensory experiences of plant-based protein or dairy alternatives, among others (see full literature review report for full exclusion criteria).

Study characteristics

A total of 16 documents (reporting 17 unique studies) were identified for inclusion in the literature review. Of these, 5 studies were peer-reviewed, experimental studies and twelve were grey literature, primarily market research commissioned by industry stakeholders (from both traditional meat/dairy and plant-based alternative industries).

Due to the short timeframes available for this literature review, a formal quality assessment of each included study was not undertaken. However, the risk of bias of each study was taken into account narratively by examining the study's strengths and limitations. If 2 studies provided inconsistent findings, then overall conclusions were based on the higher quality study (based on risk of bias and/or generalisability of the results to the Australian context).

Study design was a particularly important consideration, as it determines what conclusions are able to be made on the basis of the study. Experimental studies (e.g. randomised controlled trials) are able to determine whether a cause-effect relation exists between an intervention (such as a particular labelling element) and an outcome (such as consumer confusion). In contrast, cross-sectional surveys are able to provide self-report data and correlations, however, are not able to determine whether any specific factor causes a particular outcome. Given that the research question

focuses on the effect of meat terminology, utility terminology, and animal images on consumer confusion, experimental studies provide the highest level of evidence available. Studies may still be subject to risk of bias regardless of their design, and any factors that may impact risk of bias have been narratively noted for each study reviewed.

Key findings

This section summaries the key findings of the literature review. Refer to the Literature review report for the findings in full.

Overall, the available evidence suggests that up to 25% of Australian consumers may be confused by plant-based protein labelling currently available on the market. International studies that used an experimental design suggest that it is animal imagery, rather than meat terminology, that confuses consumers, however it is unclear whether these findings can be generalised to the Australian context.

There is less clear evidence available around the prevalence of consumer confusion in respect of plant-based dairy alternatives. However, the limited evidence available suggests that the vast majority of consumers correctly understand these products. Similar to the findings for plant-based protein products, the weight of international studies that used an experimental design suggest that it is animal imagery, rather than dairy terminology, that causes confusion.

A key focus for future research would be filling the evidence gaps in the Australian context by determining the effect that meat terminology, dairy terminology, and animal imagery each independently have on Australian consumers' level of understanding of plant-based protein and dairy alternatives through a high quality randomised controlled trial.

Meat and plant-based meat alternatives

- Two Australian studies found that 75–80% of consumers are able to accurately identify plant-based protein products based on the front-of-pack labelling currently used on the market. Four surveys found that only around 6–12% of Australian consumers report having mistakenly purchased a plant-based protein product.
- Three experimental studies undertaken in the USA found that the use of meat terminology on plant-based protein products did not adversely impact consumer understanding of the ingredient content of the product. Two studies found that it instead supported consumers' understanding of the intended flavour of the product. There is no evidence available on whether the use of meat terminology supports consumer understanding of the product's intended use.
- One experimental study in the USA found that animal imagery slightly decreases consumer understanding of the ingredient content of plant-based protein products and increases length of time spent assessing it. This is supported by 2 Australian studies in which 36–45% of participants identified animal imagery on plant-based protein products as a source of confusion.
- There is very little evidence available on the demographics of consumers who are more likely to mistake plant-based protein products for animal meat products. One cross-sectional study of Australian consumers found that those who mistook at least 1 plant-based protein product in a 6 product categorisation exercise were more likely to have 1 or more of the following

characteristics: being male, aged 65+ years, an empty nester, speak a language other than English with family/friends, and/or have a household income of $40k or below.

Dairy and plant-based dairy alternatives

- There was limited evidence available on Australian consumers' ability to accurately identify plant-based dairy alternatives. Two studies undertaken in Australia indicated that the vast majority of consumers (up to 93%) understand the ingredient content of plant-based milks. However, as there was no methodological information provided it is not possible to be confident in this finding.
- Two studies (1 US and 1 that did not report country of residence) found that around 70–94% of consumers understand that plant-based milks do not contain cow's milk. This compares favourably to consumer understanding of traditional cow's milk products, which were correctly understood by 64%–90% of consumers.
- Across 3 peer-reviewed experimental studies, there was either no significant effect or only a small effect of dairy terminology on consumer understanding of the ingredient content of plant-based dairy alternatives.
- Two experimental studies (US and UK) found that the use of dairy terminology on plant-based dairy alternatives enhanced consumers' understanding of the intended use of the products. One study found that it also significantly improved consumers' reported understanding of the intended flavour of the product.
- One experimental study in the USA found that animal imagery slightly decreases consumers' understanding of the ingredient content of plant-based milk and increases the length of time consumers spend assessing it.
- One study undertaken in the USA found that people who consumed both dairy and plant-based milk alternatives were more likely to associate plant-based milks with dairy milk than people who did not consume both types of products.

Limitations

The body of evidence was primarily comprised of grey literature, particularly market research undertaken by industry stakeholders, which did not always contain sufficient methodological information to ascertain risk of bias. However, there were some areas of consistency across studies that used similar methodologies, which provides some level of confidence in these findings. Where conclusions have been based solely upon these types of studies, it has been noted in the report.

All peer-reviewed literature was undertaken outside of Australia or New Zealand, primarily in the United States of America. There is some evidence, where similar types of unpublished cross-sectional surveys were conducted in Australia and the United States, that consumer understandings of plant-based protein and dairy alternatives may differ between these 2 countries (i.e. US studies appear to evidence a higher degree of confusion). This may be due to external factors such as different regulatory contexts or the prevalence of plant-based protein and dairy alternatives available in each marketplace. Caution should therefore be applied in generalising the findings of any of these studies to the Australian context.

Market survey

Purpose of market survey

FSANZ undertook a market scan to collect product image and label information for plant-based protein and dairy alternative products available in Australian retail stores. The information collected was used to inform the design of the consumer survey.

Data collection methodology

The methodology used to collect product images and label information is summarised in the following sections.

Scope

All plant-based protein and dairy alternative products that have undergone a high level of processing, aimed to imitate the flavour and/or texture of meat, fish, eggs or dairy products were considered in-scope. This included:

- fresh and frozen plant-based protein products such as plant-based chicken, beef, mince, processed meat imitations and plant-based seafood
- fresh and shelf stable plant-based milk
- plant-based cheese
- plant-based yoghurt
- plant-based eggs.

Out-of-scope products included:

- plant-based whole foods such as lentils, legumes, seeds and nuts
- common vegan and vegetarian products such as tofu, tempeh and falafels
- novel products produced using new and innovative technologies such as cell cultured meat and precision fermented dairy.

Data collection process

An initial scan of retailer and manufacturer websites was undertaken to determine a list of brands and products currently available to Australian consumers. The list was used to inform the data collection process and to ensure a reasonable number of products were captured in the market scan.

Product images and label information were sourced from selected Australian supermarket and health food stores in the Australian Capital Territory (ACT) and online retailer and manufacturer websites.

In-store collection

In-store data collection was undertaken by FSANZ between late-April and late-May 2024 from the following stores located in the ACT:

- Woolworths – Majura Park and Woden
- Coles – Dickson and Woden
- Aldi – Majura Park

- Supabarn – Red Hill, Casey and Kingston
- IGA – Ainslie and Nicholls
- The Spence Grocer
- SupaExpress – Campbell
- Health stores – Go Vita Woden, Healthy Life Gungahlin and Mountain Creek Wholefoods Griffith

All sides of the products packaging containing information were photographed using FSANZ's custom built Vision App. The location of the product category within each store, relative to their protein or dairy equivalent was also captured.

Product images were uploaded to Peruse and checked to ensure all images were uploaded properly and that all sides of the packaging were clearly visible and legible to enable full data collection. Missing photos or blurry images were re-captured.

This process resulted in the collection of images for 447 products.

Online scan

Where a product from the original list could not be found in-store, images were collected from retailer and/or manufacturer websites where possible.

Products were included if there was at least 1 current clearly visible image of the front of the products packaging available. However, all sides of the packaging containing information were captured where available.

This process resulted in the collection of images for 163 products.

Data collation

Front-of-pack information from each product was manually entered into 2 templates. One for plant-based proteins (including eggs), and 1 for plant-based dairy alternatives (milk, cheese and yoghurts).

The key labelling characteristics captured in each template included:

- summary product information such as product category, brand, name and product type
- meat and dairy terminology
- ingredient qualifiers
- location and size of meat and dairy terminology and qualifiers
- claims
- animal imagery including type of image and size

Summary of product data collected

A summary of the products collected are provided. For further information see Market survey report.

The market survey collected data for 610 plant-based protein, egg and dairy alternative products. 73% of product data were collected through in-store collections and 27% of product data were collected through online scans (see Table 1).

Table 1 Number of products by product category and where product information was collected

Product category	Brands n=[a]	Number of products: In-store	Number of Products: On-line	Total number of products
Plant-based protein	39	147	83	230
Plant-based eggs	4	2	2	4
Plant-based cheese	24	103	45	148
Plant-based milk	32	143	22	165
Plant-based yoghurt	7	52	11	63
Total	106	447	163	610

[a] some brands have products in more than 1 product category

Of the 610 products collected, 230 were categorised as plant-based proteins, 4 as plant-based eggs, 148 as plant-based cheeses, 165 as plant-based milks and 63 as plant-based yoghurts (see Figure 1). Plant-based proteins were further categorised by type due to the variation of products available in the category as shown in Figure 2.

Figure 1 Breakdown of products by category

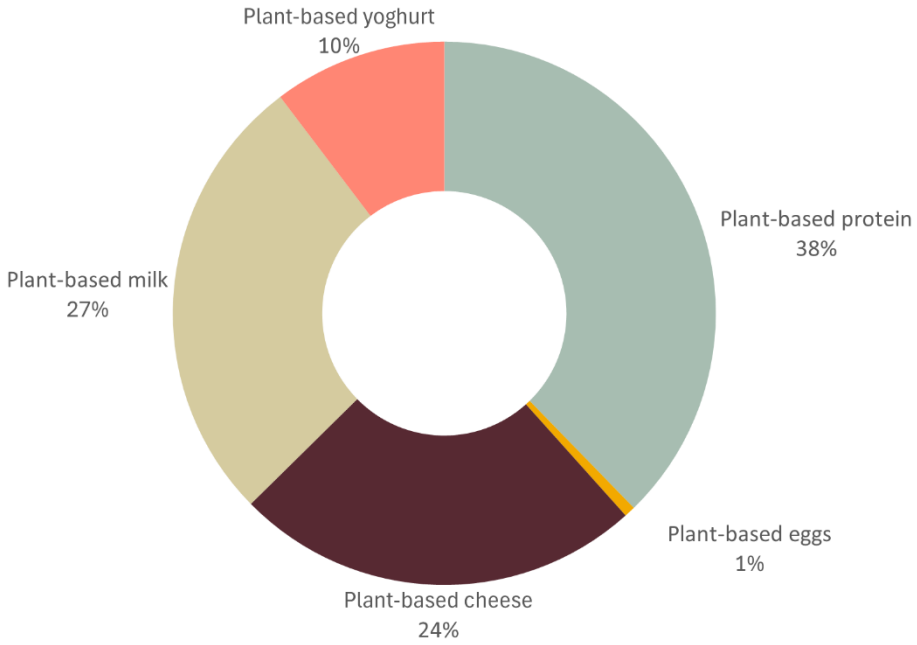
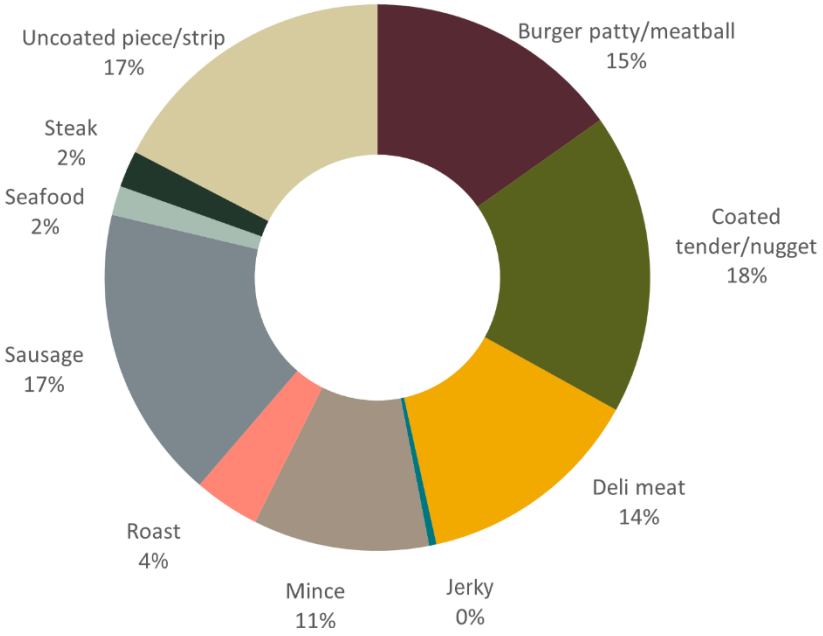


Figure 2 Breakdown of plant-based proteins by type



Summary of key labelling characteristics

A summary of the products' key labelling characteristics are provided. For further information see Market survey report.

Meat and dairy terminology

93.9% (216) of plant-based proteins used a utility term (e.g. sausage, burger) to describe the product format. 60.4% (139) of plant-based protein products used at least 1 meat term, while 92.8% (349) of plant-based dairy alternative products used at least 1 dairy term. This includes at least 1 of the following: common meat/dairy term, specific meat/dairy term, meat/dairy term with suffix or mis-spelt word.

Common terms were the most frequently used terms across all product categories (see Table 2). Mis-spelt words (e.g. chick'n) were most commonly associated with plant-based protein products, while specific terminology (e.g. cheddar, Greek) were most commonly associated with plant-based dairy alternative products. The use of terms with a suffix were consistent across the plant-based protein and dairy alternative categories.

Table 2 Summary of meat and dairy terminology on plant-based products by product category

Category	Products n	Utility term n (%)	Meat or dairy term n (%)	Common term n (%)	Specific term n (%)	Term with suffix n (%)	Mis-spelt word n (%)
Plant-based proteins	230	216 (93.9)	139 (60.4)	79 (34.3)	1 (0.4)	30 (13.0)	43 (18.7)
Plant-based eggs	4	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Category	Products n	Utility term n (%)	Meat or dairy term n (%)	Common term n (%)	Specific term n (%)	Term with suffix n (%)	Mis-spelt word n (%)
Plant-based dairy alternatives	376	na	349 (92.8)	291 (77.4)	91 (24.2)	54 (14.4)	16 (4.3)
• Plant-based cheese	148	na	138 (93.2)	94 (63.5)	79 (53.4)	44 (29.7)	10 (6.8)
• Plant-based milk	165	na	148 (89.7)	136 (82.4)	0 (0.0)	8 (4.8)	6 (3.6)
• Plant-based yoghurt	63	na	63 (100)	63 (100)	12 (19.0)	2 (3.2)	0 (0.0)

Ingredient qualifiers

All products used at least 1 ingredient qualifier. The most common qualifiers used on plant-based protein products were ‘plant-based’ (164), ‘vegan’ (114) and ‘meat-free’ (53). While the most common qualifiers found on plant-based dairy alternative products were ‘dairy free’ (151), ‘plant-based’ (104) and ‘vegan’ (101), However, some variation was seen between the different plant-based dairy alternative categories (see Table 3)

Table 3 Summary of qualifiers on plant-based products by product category

Category	Products (n)	Proportion (%)	Most common qualifier terms
Plant-based proteins	230	100	plant-based (164), vegan (114), meat-free (53), vegetarian (45)
Plant-based eggs	4	100	plant-based (2), vegan (2), egg-free (2)
Plant-based dairy alternatives	376	100	dairy free (151), plant based (104), vegan (101)
• Plant-based cheese	148	100	dairy free (95), plant based (77), vegan (73), cashew (32)
• Plant-based milk	165	100	oat (56), almond (56), soy (31)
• Plant-based yoghurt	63	100	dairy free (54), coconut (43), plant based (23)

Location and size of meat and dairy terms and qualifiers

Meat and dairy terms were most commonly located with the product name. While the most common qualifier location varied between the product name and general packaging depending on the product category.

Table 4 Location of meat and dairy terminology on plant-based products by product category

Product category	Products using utility or meat/dairy terms (n)	Brand n (%)	General packaging n (%)	Name n (%)
Plant based protein	225	30 (13.3)	71 (31.6)	222 (98.7)
Plant based egg	4	0 (0.0)	2 (50.0)	4 (100.0)
Plant-based dairy alternatives	349	28 (8.0)	76 (21.8)	280 (80.2)
• Plant-based cheese	138	21 (15.2)	34 (24.6)	109 (79.0)
• Plant-based milk	148	7 (4.7)	40 (27.0)	110 (74.3)
• Plant-based yoghurt	63	0 (0.0)	2 (3.2)	61 (96.8)

Table 5 Location of qualifiers on plant-based products by product category

Product category	Products using qualifiers (n)	Brand n (%)	General packaging n (%)	Name n (%)
Plant based protein	230	127 (55.2)	147 (63.9)	196 (85.2)
Plant based egg	4	1 (25.0)	4 (100.0)	3 (75.0)
Plant-based dairy alternatives	376	77 (20.5)	264 (70.2)	303 (80.6)
• Plant-based cheese	148	64 (43.2)	110 (74.3)	84 (56.8)
• Plant-based milk	165	13 (7.9)	102 (61.8)	156 (94.5)
• Plant-based yoghurt	63	0 (0.0)	52 (82.5)	63 (100.0)

66.1% of plant-based proteins had a meat or utility term that was larger than the largest qualifier. While 18.9% of plant-based dairy alternatives had a dairy term that was larger than the largest qualifier.

Animal imagery

4.1% or 25 products contained animal depictions. If present, plant-based proteins typically contained cow (5), chicken (3) and fish (1) imagery, while all plant-based cheese and yoghurt contained cow imagery (16). No animal depictions were found on plant-based eggs or plant-based milk. All images were in the form of icons, rather than realistic depictions.

Table 6 Summary of animal depictions on plant-based products by category

Category	Total products (n)	Products (n)	Proportion (%)	Type of image
Plant-based protein	230	9	3.9	Icon
Plant-based eggs	4	0	0	n/a
Plant-based dairy alternatives	376	16	4.3	Icon
• Plant-based cheese	148	13	8.8	Icon
• Plant-based milk	165	0	0	n/a
• Plant-based yoghurt	63	3	4.8	Icon
Summary - All categories	610	25	4.1	Icon

Claims

408 or 66.9% or products used at least 1 health or nutrition claim. 78.3% of plant-based proteins used at least 1 claim, with protein related claims being the most common type of claim. While 59.8% of plant-based dairy alternative products used at least 1 claim with dairy free and gluten free being the most common type of claims used.

Comparative health claims were found on 4 plant-based milks.

Table 7 Summary of health and nutrition claims on plant-based products by product category

Product category	Total products (n)	Products with health and nutrition claims n (%)	Most common claims
Plant-based protein	230	180 (78.3)	protein per serve (52), no artificial colours and flavours (39), high in protein (31)
Plant-based eggs	4	4 (100.0)	source of protein (2)
Plant-based dairy alternatives	376	224 (59.8)	dairy free (103), gluten free (57)
• Plant-based cheese	148	66 (44.6)	dairy free (44), gluten free (37) and vegan friendly (17)
• Plant-based milk	165	95 (57.6)	no added sugar (20), high in calcium (19) and source of protein (10).
• Plant-based yoghurt	63	63 (100.0)	dairy free (54), gluten free (15), source of calcium (12) and protein per serve (11)
Total	610	408 (66.9)	

Limitations

The market scan only represents products available at a point in time, with products expected to turn over regularly.

The market scan is also unlikely to include all plant-based protein and dairy alternative products available to Australian consumers as not all food outlets have been assessed. However, some of the limitations of undertaking an in-store scan have been overcome by supplementing with on-line data.

Conclusion

The market survey provides a point in time understanding of the plant-based protein and plant-based dairy alternative products available in retail stores in the ACT as well as online and their key front-of-pack labelling characteristics. The results were used to inform the design of the consumer research, including choice of labelling elements tested and development of mock product images.

Consumer survey

FSANZ undertook a consumer survey to examine how different labelling elements on the front-of-pack labelling of plant-based protein and dairy alternative products affect consumers' perceptions and understanding.

The full research is available in the consumer research report. A brief overview of the research questions, methodology, key findings, and limitations is outlined.

Research questions

This study sought to answer the following research questions:

1) Do any of the labelling elements (when controlling for demographic/baseline characteristics) tested (meat/dairy terminology, animal imagery, size and location of ingredient qualifiers, plus any combination of 2 of these elements) significantly affect:
    a) consumers' ability to accurately identify the ingredient content (that is, whether they were plant or animal based) of plant-based protein products and/or dairy alternatives.
    b) the length of time consumers take to assess the ingredient content.
    c) consumers' perceived ease of identifying the ingredient content.
    d) consumers' confidence in their understanding of the product's intended use; and
    e) the extent to which consumers think the product is nutritionally similar to its conventional counterpart?
2) Do labelling effects differ based on the type of plant-based product (i.e. plant-based protein products vs plant-based dairy alternatives)?
3) What are consumers' motivations for consuming plant-based protein products and plant-based dairy alternatives?

Controlling for baseline measures statistically removes an effect that any baseline characteristics may have.

Scope

The following labelling elements were tested in the survey, both on their own and in combinations of 2 of them:

- Meat/dairy terminology (e.g. 'beef', 'chicken', 'milk')

- Animal imagery (e.g. depictions of a cow or chicken)
- Location of ingredient qualifier in relation to the name of the food
- Size of ingredient qualifier in relation to the name of the food

These labelling elements were included in the study because they:

- Represent elements of particular concern to industry stakeholders (meat/dairy terminology, animal imagery).
- Have been identified in the literature review as a potential source of confusion (e.g. animal imagery).
- Were found to be prevalent in the market survey (meat/dairy terminology, ingredient qualifiers) (see section above); and/or
- Are addressed in voluntary industry guidelines (meat/dairy terminology, animal imagery, ingredient qualifiers).

Methods

The study surveyed a nationally representative sample of 2,946 Australian consumers between 9 and 19 September 2024. Respondents were eligible to participate if they were at least 18 years of age and were not currently employed in the animal meat, animal dairy, plant-based protein product or plant-based dairy alternatives industries. The sample was nationally representative based on the interlocking quotas of age, gender, and location, according to the 2021 ABS Census. Soft quotas were also used for Aboriginal and Torres Strait Islander participants in Australia (approximately 3.2%), reflecting census proportions.

The study consisted of an online randomised controlled trial (RCT) with a 12 (label type) x 2 (food category: meat vs dairy) mixed design. Participants were randomly allocated to 1 of 12 different groups, each of which viewed a different type of label on a total of 8 products across 2 types of food categories (4 x plant-based protein and 4 x plant-based dairy alternatives).

There were 2 control groups. The plant-based control group viewed labels that did not contain any meat/dairy terminology or animal imagery and had an ingredient qualifier the same size and in the same location as the name of the food. The animal-based control group viewed labels that had both meat/dairy terminology and animal imagery. The other 10 groups viewed plant-based products with labels that had 1 or a combination of 2 of the labelling elements outlined in the scope.

All participants viewed and rated the 8 different product images according to:

- The extent to which they think the product contains plant- or animal-based meat/dairy.
- How easy/hard they found it to answer the previous question.
- How confident they are that they understand the intended use of the product; and
- How similar or different they think the product is nutritionally compared to a conventional counterpart.

RCTs are considered to be the ‘gold standard’ for determining cause-and-effect. This design enables us to identify the effect that different parts of the label (i.e. animal imagery, meat/dairy terminology,

size and location of ingredient qualifiers) have on consumer perceptions and understanding. It also fills an identified gap in the existing evidence. The literature review found that no RCTs have been undertaken in the Australian context. The surveys that have been undertaken in Australia to date were only able to provide correlational, not causal, findings, and were not able to distinguish the different parts of the label that may be having an effect on consumer understanding.

Key findings

Overall, the research findings indicate that consumers can generally accurately identify the ingredient content of plant-based protein products and dairy alternatives, are confident in the intended use of these products, and do not believe they are nutritionally similar to an animal product counterpart.

The key findings by outcome measure are outlined briefly. Refer to the consumer research report for the finding in full.

Identification of ingredient content

Participants were generally accurate in identifying the ingredient content of the products (that is, whether they were plant or animal based). Participants who saw plant-based products on average rated them as 'Mostly' or '100%' plant-based, while participants who saw the animal-based products on average rated them as 'Mostly' or '100%' animal meat/dairy.

One group (who saw animal imagery + ingredient qualifier separate from the name of the food) were slightly worse at accurately rating the ingredient content of plant-based dairy alternatives compared to the plant-based control group. However, this was not to the extent that the products were mis-identified as animal-based.

Length of time to identify product ingredient content

Participants spent between 7.8 – 9.6 seconds to identify the product ingredient content of all products.

One group (who saw animal imagery + ingredient qualifier separate from the name of the food) took slightly longer to identify the ingredient content of plant-based dairy alternatives compared to the plant-based control group.

There were no statistically significant differences in length of time spent assessing the ingredient content between the animal product control group and any other group.

Ease of identifying product ingredient content

Participants generally found it reasonably easy to identify the ingredient content of the products, with participants on average finding it 'Somewhat easy'.

One group (who saw animal imagery + ingredient qualifier separate from the name of the food) found it slightly harder to rate both plant-based protein products and dairy alternatives than the plant-based control group. This group was the only 1 that rated the task below 'Somewhat easy'.

In addition, 1 other group (who saw animal imagery + ingredient qualifier smaller than the name of the food) found it slightly harder to identify ingredient content of plant-based dairy alternatives than the plant-based control group.

Confidence in understanding the product's intended use

Participants were generally confident in their understanding of how the product is intended to be used or consumed, with participants on average describing themselves as 'Somewhat confident'.

Four groups had less confidence in their understanding of the use of plant-based dairy alternatives than the animal product control but were still overall confident in their understanding of the products' intended use. These groups saw labels with:

- Animal image
- Animal image with ingredient qualifier separate from the name of the food
- Animal image with ingredient qualifier smaller than the name of the food
- Ingredient qualifier separate from and smaller than the name of the food

Perceptions of nutritional similarity

Participants who were allocated to a plant-based labelling group (Group 1 -11) generally perceived the plant-based products as being 'Somewhat different' to an animal product. In comparison, participants who were allocated to the animal product control group perceived the animal products as being 'Somewhat similar' to an animal product.

There were no statistically significant differences between the plant-based control group and any other plant-based group, while all plant-based groups significantly differed from the animal product control group.

This indicates that the tested labelling elements had no impact on participants' perceptions of the nutritional similarity of plant-based products compared to a conventional animal product counterpart. It also indicates that, on average, participants view plant-based products as different in nutritional content compared to an animal product counterpart

Motivations for consuming plant-based products

Respondents who indicated that they consume plant-based protein products (n = 501) and/or plant-based dairy alternatives (n = 885) at least several times a month were asked to indicate their agreement with a series of statements beginning with 'I choose to eat plant-based meat/dairy alternatives because…'.

The top 3 motivations for consuming plant-based protein products and dairy alternatives were the same for both food categories, although not in the same order (see Table 8).

Table 8 Top 3 motivations for consuming plant-based protein and dairy products

Plant-based protein products (n = 501)	Plant-based dairy alternatives (n = 885)
1. It is better for animal welfare	1. I like the taste and/or texture
2. It is better for the environment	2. It is better for animal welfare
3. I like the taste and/or texture	3. It is better for the environment

The least strong motivations for consuming plant-based protein products and dairy alternatives were the same in nature and order (see Table 9)

Table 9 Bottom 3 motivations for consuming plant-based protein products and dairy alternatives

Plant-based protein products (n = 501)	Plant-based dairy alternatives (n = 885)
9. It is cost effective	9. It is cost effective
10. I have a medical reason (e.g. meat allergy)	10. I have a medical reason (e.g. lactose intolerance)
11. I have a cultural/religious reason	11. I have a cultural/religious reason

Strengths and limitations

Both the strengths and limitations of this study need to be taken into consideration when interpreting the findings of this study. The large sample size ensured there was sufficient power to detect small effects and allowed detection of any between group differences for a large number (10) of combinations of labelling elements. The sample was nationally representative of the Australian population according to ABS census data, by age, gender and State/Territory, and there was representation of several different dietary patterns and regions (metro and regional) within the sample. However, the non-response rate of potential survey respondents is unknown.

RCT's are considered to be the 'gold standard' research design for determining cause-and-effect and allowed isolation of the effect that different parts of the label had on rates of consumer confusion. This design filled an identified gap in the existing evidence as no RCTs have been undertaken in the Australian context previously. This design adds rich detail to the current evident base.

It is important to note that this study does not replicate a real world setting where potential product identification mistakes, regardless of the type of product, may occur. For example, the placement of the product within the supermarket, environmental distractions and product advertisement are examples in a real-world environment that may affect product identification and choice. However, these affect all products and are not specific to plant-based products.

Participants in this study were also not provided with the nutritional information panel for these products. Nutrition information panels provide consumers with information about the quantity of energy and other nutrients to enable them to make informed food choices. However, the aim of this research was to examine the effect of different front-of-pack labelling elements on potential confusion. This is consistent with other research on this topic, however it means that consumer confusion of the product content may be inflated in this study as participants were not provided with further ingredient content information that would be available in a real-world setting, such as the ingredient list.

Finally, it is unknown if participants' reported confidence in intended use of plant-based alternatives in this study translates to actual objective knowledge.