2023 State of the Industry

AUSTRALIA'S PLANT-BASED MEAT INDUSTRY

foodfrontier™

Contents

Executive summary

Food Frontier's *2023 State of the Industry* reveals a maturing Australian plant-based meat industry. Despite experiencing fluctuations and obstacles such as macroeconomic challenges and slower than expected consumer uptake of plant-based meat products, a consistent growth trajectory remains evident.

Incorporating new economic data commissioned from Deloitte Access Economics and presenting unique Food Frontier insights informed by industry consultations and primary data analysis, this *2023 State of the Industry* report quantifies the economic contribution of the Australian plant-based meat industry in the 2023 financial year (FY23), and projects the economic contribution of the industry in the 2033 financial year (FY33).

Global updates

In the US, plant-based meat has been affected by lower retail sales across 2022 and 2023 and slower than expected consumer uptake. This is attributed to inflation and the cost-of-living crisis, which has impacted food products perceived as discretionary items. Additionally, the higher price point compared to conventional meat, coupled with products not meeting consumer expectations for taste and texture has reduced repeat purchase and led to a period of consolidation for the category.

While the more mature international plant-based meat markets in North America and Europe have stalled, the emerging markets in Latin America and Asia Pacific have continued to grow. Although the Australian plant-based meat industry is charting its own course, with potential to expand into nearby export markets to continue its growth trajectory, Australian manufacturers should continue to look to developed plant-based meat markets such as the US and EU for signals and learning opportunities.

Australian landscape 2023

The third report of its kind published by Food Frontier since 2019, the findings from this *2023 State of the Industry* report reveal an evolving and growing food manufacturing industry experiencing overall total sales growth, but uneven success across retail and foodservice sectors.

In FY23 the Australian plant-based meat market saw a total increase of 47% on FY20 sales, reaching $272.5m, with retail sales of $148.9m and foodservice sales of $123.6m. Despite a slight annual contraction in retail sales of -1.1%, plant-based meat sales in foodservice grew at a total compound average growth rate (CAGR) of 58.6%. Australia's plant-based meat manufacturing industry contributed 477 FTE jobs and $45.8m in value added to the economy.

Australia's export opportunity continues to grow, with five companies exporting plant-based meats in FY20 to nine in FY23. Australian plant-based meat manufacturers are now exporting to more than 20 different markets, with the majority of products going to countries in the Asia Pacific region.

Price barriers

While price remains a significant barrier for consumer uptake, Australian manufacturers have been making efforts to reduce prices. Food Frontier's price research revealed that in FY23 plant-based meats have an average price premium of 33% compared to conventional meat, down from a 49% price premium in FY20. Some formats have almost reached price parity with conventional meat products. Food Frontier's research also revealed that in the face of inflationary pressures, the average price of some plant-based meat formats has reduced since 2021, with mince, snacking and beef-style strip formats experiencing the biggest price reductions.

Agricultural opportunities

Food Frontier's consultations revealed that the agricultural opportunities offered by the plant-based meat manufacturing industry and the broader plant-based food industry, are largely untapped in Australia due to a lack of domestic plant protein processing infrastructure.

Expanded domestic production and increased availability of Australian grown plant protein ingredients offers new economic opportunities for Australian farmers to sell their commodity crops into value adding supply chains, with strong demand in both domestic plant-based food industries and in overseas export markets looking for high-quality and consistent plant protein products.

The agriculture sector is currently the largest indirect beneficiary of the economic activity generated from the plant-based meat industry, receiving a 21% share of the total value added and a 32% of total jobs in FY23. In 2033 Deloitte Access Economics predicts these values could be worth $96m and create 1,137 jobs with scope to increase further if agricultural potential is realised through increased domestic processing infrastructure.

Australia 2033

Food Frontier engaged Deloitte Access Economics to recalculate new 10-year scenario models to incorporate the macroeconomic impacts and slower consumer uptake, the FY23 business indicators of the Australian plant-based meat industry and projected scope for growth.

The market size for plant-based meat in Australia is now tipped to reach $1.65b in FY33, contributing more than half-a-billion dollars in value added to the Australian economy and supporting more than 6,000 jobs. The revised future value of the plant-based meat manufacturing industry in Australia has been scaled back from previous scenarios, which were developed in 2019 at a time of strong growth for the category, with heightened consumer interest, low interest rates and investor hype.

Path forward

A longer-term view from FY19 to FY23 demonstrates the Australian plant-based meat industry's growth over time and signals its continued prospects for sustained growth in years to come. Since FY19, total retail sales of plant-based meat have grown 41%, foodservice sales have grown 253% and the volume of plant-based meat produced in Australia has increased by 76%.

The industry must improve on three key elements of price, taste and texture, and improve on communicating its value proposition to customers to expand its consumer base. These are not insurmountable challenges and as this report demonstrates some manufacturers are making significant headway. Collaboration within the plant-based meat industry and across the entire food sector will be key to accelerating this process.

The prices of plant-based meat products are slowly reducing, particularly those manufactured in Australia, but must reduce further for widespread adoption. Support for industry collaboration on innovation and R&D could see new flavours, ingredients, or manufacturing techniques developed to improve on taste and texture. Crucially, investment in domestic processing infrastructure is required to unlock Australia's plant protein supply chain, adding value for Australian farmers and offering Australian plant-based meat manufacturers, as well as the broader plant-based food industry, improved access to high-quality and consistent ingredients.

Looking ahead health remains the biggest driver for consumer interest in plant-based meats and manufacturers are better communicating health benefits. Growth in foodservice has revealed there is still scope for further expansion across the industry beyond quick service restaurants (QSRs). This process can be accelerated with chef education and demand side drivers like menu design and messaging. Consumer awareness regarding the contribution of current food systems and personal dietary habits to climate change is currently low compared to international markets, improving this knowledge can further elevate the value proposition of plant-based meats.

Despite the challenges the industry has faced since FY20, the economic opportunity for plant-based meats and the broader plant-based food industry remains, as does the environmental, health and societal imperative to diversify protein supply with alternatives. Australia can still capture this opportunity but only if governments, investors, farmers, retailers, foodservice operators and food manufacturers collaborate to supercharge the growth of the Australian plant-based meat industry.

"The industry had an incredibly high hype cycle which has caused a whole bunch of problems because people had inflated expectations about what could actually be delivered. I would say I'm absolutely guilty of expecting things to happen quicker than they are playing out, but my belief in the scale of the opportunity is unwavering."

Phil Morle, Partner,
Main Sequence Ventures[1]

Source: vEEF.

Terms used frequently in this report are in the Glossary on page 63.

Authors:

This report was authored by Food Frontier, the independent think tank on alternative proteins in Australia and New Zealand, with economic contribution and modelling data from Deloitte Access Economics.

Learn more in About Food Frontier on page 75, and the report methodology on page 62.

food frontier™

Deloitte. Access Economics

Food Frontier acknowledges the Traditional Owners of the land on which we work, the Wurundjeri people of the Kulin nation. We pay our respects to Elders past and present.

Introduction

The case for protein diversification

As the global population continues towards 9.7 billion by 2050, demand for meat is projected to rise by 73%, driven by population growth and rising disposable incomes in developing countries, particularly within the Asia Pacific region.[2]

In the combined context of climate change, growing global food security and diet-related public health concerns, as well as ongoing disruptions to globally interconnected supply chains, it is evident that the food system requires greater transformation towards sustainability, resilience and health. There is no silver bullet for designing the successful transformation of our food system. However, many forward-thinking companies, governments, investors and food producers have already identified that protein diversification through alternative or complementary proteins will play a key role in food systems transformation; and that this presents a unique set of economic, health and environmental benefits.

Increasing the availability and consumer uptake of plant-based meats and plant-based proteins represents an immediate opportunity for protein diversification—in a way that is familiar and convenient for consumers. It is an opportunity which Australia has the natural capital to play a leading role in.

Australia's signature in early December 2023 on the *Emirates Declaration* on *Sustainable Agriculture, Resilient Food Systems and Climate action* at COP28, committed the country to integrating food into its climate plans by 2025.[3] At the same time, Australia signed the *COP28 UAE Declaration on Health and Climate Change*, recognising the urgency of climate change action as a health imperative, including by shifting to sustainable, healthy diets.[4]

To deliver on these international commitments, while maintaining Australia's status as a world leading producer and exporter of high-quality foods, requires support for the technologies and industries that can offer new ways for Australia to produce, distribute, and consume protein, in complement to Australia's existing protein industries.

In addition to the health and environmental outcomes this opportunity presents, an economic opportunity is also at hand—the Australian plant-based meat manufacturing industry could likely contribute half a billion dollars in value add, more than 6,000 jobs and reach a market value of $1.65b by 2033.

If Australia does not act quickly to back the industry, it is at risk of missing out on an early mover economic advantage and losing its ability to attract private investment to countries demonstrating greater leadership. Foreign governments, companies and consumers are driving global demand for a diversification of protein offerings, and nations with comparable agrifood, R&D and innovation strengths to Australia have already begun capitalising on this demand. Australia must not let this opportunity pass by.

Global and regional developments

Macroeconomic developments

FY23 saw economic pressures that surpassed those of the 2008 Global Financial Crisis,[5] creating immense uncertainty across many sectors, particularly food.

A combination of climate shocks and a global pandemic disrupted the production and distribution of food and energy, driving up costs for people and producers around the world throughout 2022.[6] Furthermore, the World Bank explained that Russia's invasion of Ukraine caused the "biggest shock to commodity markets since the 1970s",[7] with sanctions or supply restrictions on commodities such as crude oil, natural gas, wheat and fertiliser. With exports restricted, the price of energy, food and fertiliser soared, exacerbating food insecurity in low-income countries, contributing to the current global cost of living crisis, and slowing global economic growth.[8]

Although global food and energy prices have since fallen from their peak levels in mid-2022, domestic prices and the risks to food production remain elevated in many economies, with average food prices between 25 to 50% above pre-pandemic averages, according to the Food and Agriculture Organization (FAO) food price index[9] and the World Bank food price index respectively.[10]

Highlighted by the International Monetary Fund (IMF) in its 2023 October update, the global economy is recovering slowly from these blows,[11] factors which have continued to compound with the escalation of conflict in the Middle East.[12]

Global average inflation, having reached multi-decade highs in 2022 at 8.7%, moderated somewhat to 6.9% in 2023, with the IMF predicting inflation to soften further in 2024.[13] However underlying price pressures remain, especially for food producers.

As food manufacturers globally attempted to recover from the pandemic supply chain disruptions, in FY23 they faced rising commodity and input costs, energy costs, and labour costs as labour markets tightened and interest rates rose in an attempt by central banks to slow inflation.[14] There are early indications from the IMF that the cost-of-living crisis is beginning to ease around the world in 2024 with declining inflation and growth returning, but growth is predicted to be slower in the US and China.[15]

Plant-based meat sales

Inflation impacted consumer spend across all food categories, particularly in the 2022 and 2023 calendar years. GFI analysis of US retail sales data from SPINS shows that across both years, average price-per-unit increased across plant-based meat and animal-based meat categories, as well as total food.[16] Eight in 10 US consumers reported making changes to their shopping behaviour as a result of price increases.[17] Across 2023 and 2022, US data shows a decline in total food and beverage consumption, with unit sales down and dollar sales up across both years—consumers were buying less but spending more.[18]

In addition to price increases for a given category, inflation cut into consumer budgets and influenced consumers to trade down from existing premium categories; particularly impacting plant-based meats that generally remain more expensive per kilo compared to their conventional meat counterparts in most markets. Overall, the premium prices of plant-based meats present a barrier to reaching more consumers and with more frequency, particularly given consumers are increasingly conscious of prices in the current economic environment.[19]

In the US, plant-based meat sales in retail declined across 2022 and 2023, according to SPINS retail data analysed by the Good Food Institute (GFI).[20] In 2023, 15% of US households purchased plant-based meats, with a repeat purchase rate of 62%.[21] Despite the challenges of the past two years, a longer-term view can demonstrate how rapidly the plant-based meat category has developed over the past five years in the US. Plant-based meat dollar sales grew by 43% from 2019 to 2022.

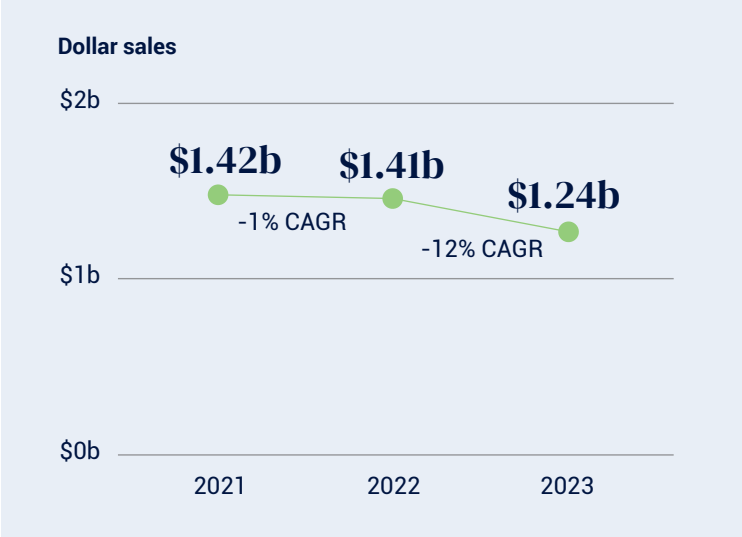
In the UK, Supermarket giant Tesco announced in March 2024 that its latest sales figures of plant-based meats indicate it is now seeing a 'second phase' of popularity for plant-based meat alternatives, after a decline in sales in 2023.[22]

According to GFI analysis of Euromonitor International data, global retail sales of plant-based meat across the 2022 and 2023 calendar years experienced slight increases year on year.[23,24] Growth was observed in Latin America and Asia Pacific, indicating that while more mature plant-based meat retail markets might be plateauing, the emerging plant-based meat markets are still experiencing growth as they expand their reach across new consumer segments.

Retail trends

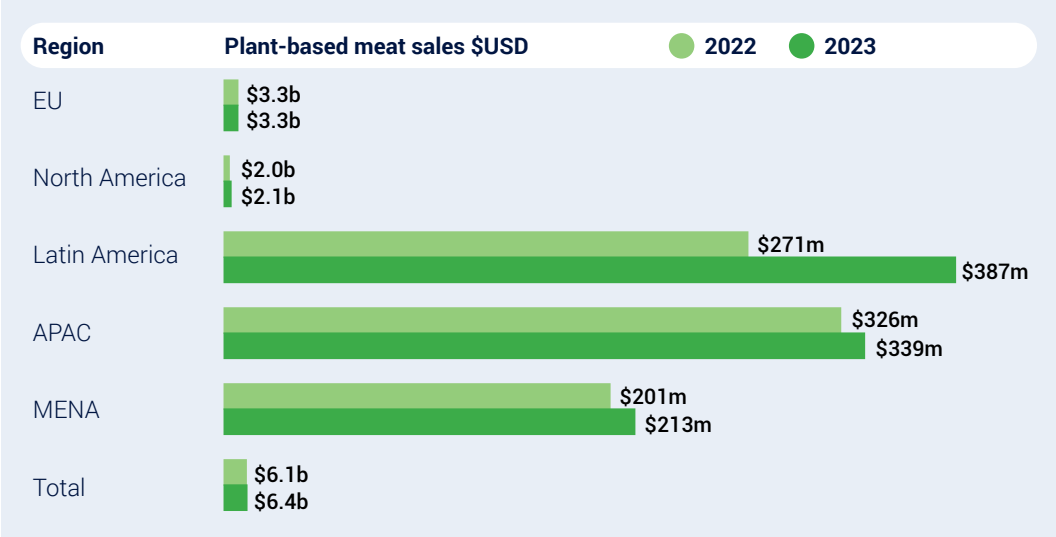
According to Mintel, 2022 saw a marked increase in the number of new frozen and ambient plant-based meat products launched in the US, while the number of new chilled product launches reduced compared to previous years.[25] Sales of frozen plant-based meat products also outperformed sales of chilled products in the same time period in the US,[26] perhaps in part due to the generally lower prices in frozen products compared to chilled. While chilled plant-based meats have previously been perceived by some consumers as higher quality than frozen or ambient products, the shift towards products that have a longer shelf life is preferred both by retailers who are looking to reduce potential wastage and by consumers looking for value.

Figure 1. Plant-based meat and seafood market US retail 2021-2023



Source: GFI analysis of SPINS US data 2023. Total market = SPINS Natural Supermarket Channel + SPINS Conventional Multi Outlet Channel + SPINS Convenience Channel (powered by Circana) | 52 Weeks Ending 12/3/2023.

Figure 2. Global plant-based meat retail sales estimates by region



Source: GFI analysis of Euromonitor International Limited, Staple Foods 2023, and GFI analysis of Euromonitor International Limited data 2022, meat and seafood substitutes, retail value RSP incl sales tax.

Kroger stores place plant-based meat and conventional meats next to each other, but separated with clear signage. Source: Plant Based Foods Association.

Prior to the pandemic, Tesco UK trialled placing plant-based meat products in a separated section within the chilled conventional meat aisle and observed an increase in the sales of plant-based meat with no impact on the sales of conventional meat, making the move permanent after the trial.[27] Kroger stores in the US ran a similar trial and observed an average sale increase of 23% when plant-based meat products were moved to the conventional meat aisle.[28] These findings encouraged retailers around the globe, including Australia, to permanently position chilled plant-based meat in conventional meat aisles by 2022. Research and further retail trials has demonstrated that the placement is most successful when plant-based and conventional meat products are ranged nearby or next to each other; but separated with appropriate aisle signage and dividers to distinguish each section.[29] [30]

With plant-based meat sales surging in food service through to 2023, the foodservice sector continues to present the biggest opportunity worldwide for plant-based meat brands to expand their reach into new markets and customer bases as consumers return to dining out in significant numbers.

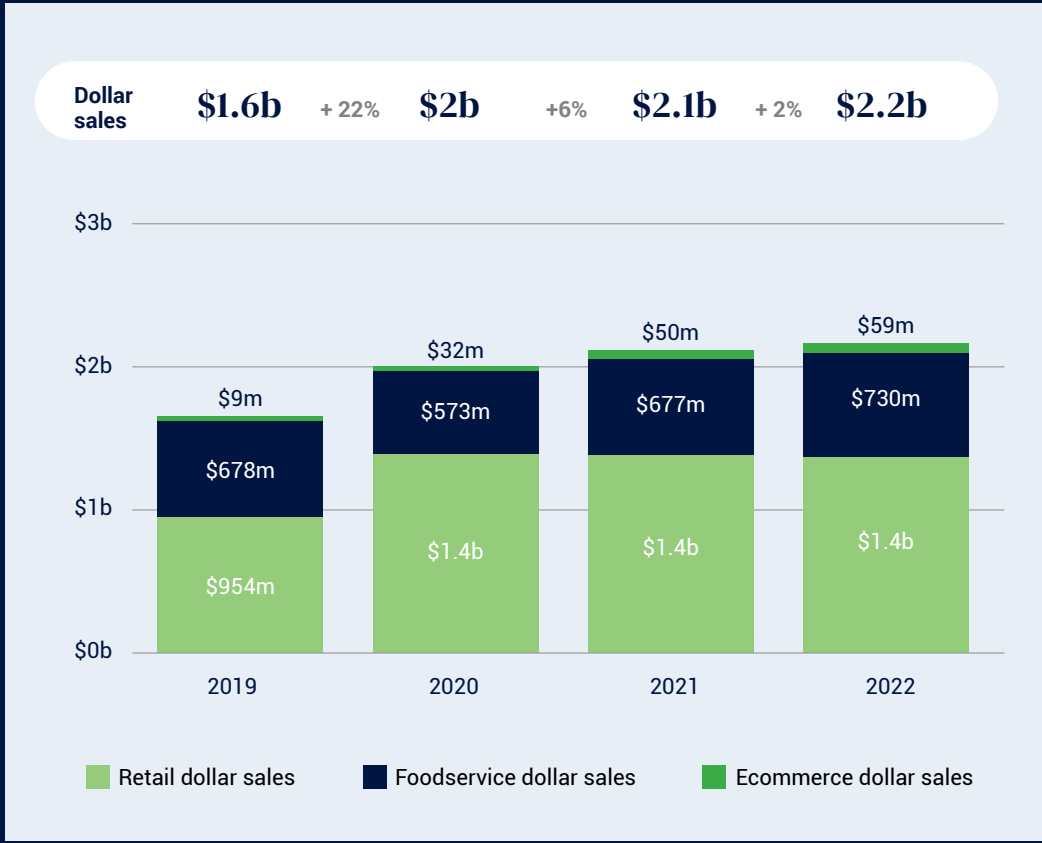
Foodservice

GFI analysis of Circana data demonstrated that while 2022 marked an important milestone in foodservice as plant-based protein dollar sales in the US recovered to their pre-pandemic heights, 2023 saw a slight decline in sales of -1%. Overall, plant-based protein sales by weight increased 22% on 2020 figures to 60 million pounds (27.2 million kilos), while plant-based protein dollar sales increased 25% to US$306m.[31]

According to GFI, around 10% of US consumers (33.5m people) purchased plant-based meat alternatives through foodservice in 2022, with the majority purchasing just once—presenting a major opportunity for the plant-based meat category to expand in the foodservice sector if products can appeal to even more consumers and turn them in to repeat customers.[32]

GFI found that products that aim to match the taste and texture of conventional meat are growing by dollar and volume sales in the US foodservice market, while sales of non-analogous products are declining—indicating consumers' desire for products that have the taste and texture of conventional meat.[33]

Figure 3. US plant-based meat dollar sales 2019 - 2022: retail, foodservice, ecommerce



While retail sales surged during lockdowns, foodservice sales now reflect steady growth as consumers return to eating out of home, with ecommerce presenting a growing channel for brands to explore direct-to-consumer sales. Sales in USD. Source: GFI analysis of Circana and SPINS US sales data, 2022.

Foodservice is critical for the success of plant-based meat, given the often-heightened experience of taste, a sense of novelty and enjoyment, and the element of expert preparation in restaurant environments. For established companies and start-ups, the food service sector—from premium restaurants and quick service chains to institutional catering—can allow plant-based meat companies to drive awareness, trial, and loyalty among consumers.[34]

As early adopters of plant-based meat products for several years, QSRs are continuing to lead the way globally in meeting customer demand for alternatives, with plant-based meat on the menu in the majority of QSR chains in Europe, North America and many countries in Asia Pacific (APAC).

Burger King has been ranked as the best major QSR globally for its high availability of plant-based alternatives,[35] it has partnerships with plant-based meat brand the Vegetarian Butcher in Europe, Middle East, North Africa, Latin America and China, Impossible Foods in the US, NotCo in Chile, and Australia's v2food in Australia, Thailand, the Philippines, New Zealand, South Korea and Japan. In August 2023, Burger King Germany reported that one in every five burgers it sells is plant-based, and in March 2024 announced that it was making the price of its plant-based meals cheaper than conventional meat meals to encourage consumer trials.[36] In April 2022, Burger King UK committed to making half of its menu meat-free by 2030—in part to meet its sustainability goals.[37]

Taco Bell US 2022 plant-based meat campaign. Source: Taco Bell.

McDonalds has offered the McPlant, featuring a patty co-developed with Beyond Meat, since 2021 in the UK, Germany, Netherlands, Austria and Portugal, with McDonalds UK rolling out a Double McPlant in January 2023 in response to positive customer feedback for the original McPlant burger,[38] and McDonalds Germany added McPlant Nuggets to the menu in all 1,400 German restaurants in February 2022.[39] Interestingly, the McPlant did not become a permanent menu item in the US after trials in 2022, with some analysts suggesting that its low take-up was due to competition from rivals like Burger King, which began offering plant-based meat to US customers in 2019.[40]

High end restaurants and top chefs have begun to embrace plant-based meat with celebrity chef Marco Pierre White adding Redefine Meat's whole-cut style 'steak' to the menu at his London restaurants in 2022.[41] In 2024 White launched an entirely plant-based menu at his UK restaurants, featuring Redefine Meat, to cater to what he called the ever-growing demand from customers, saying "the world needs to eat less meat, but the reality is that until now, plant-based meat products have not lived up to the quality and versatility required for our menus;" noting that in his view, the turning point had arrived.[42] In the US, Chunk Foods' whole-cut 'steak' made from soy and wheat protein, is available in vegan and conventional steakhouses Monster Vegan and Outback's respectively, and in fine dining at Charley's in Florida.[43]

Plant-based meat also gained pace in institutional foodservice settings such as education and healthcare. US-based Rebellyous Foods signed a distribution agreement with US public sector food supplier Vizient in November 2023, and by December 2023 its plant-based chicken was on the menu in cafeterias in more than 200 major school districts across the US.[44] Foodservice management companies Sodexo and Aramark have made commitments to increasing plant-based menu items available on US university and college campuses to at least 44% by 2025,[45] while Compass Group has introduced its Plant Forward strategy globally as part of its 2050 sustainability commitments.[46] In the UK, 650 academics signed an open letter in September 2023 calling on British universities to commit to 100% plant-based catering on campus in an effort to help address the climate crisis, which they likened to the existing divestment from fossil fuels which 101 UK universities have already committed to.[47]

The plant-based Redefine Tenderloin from Redefine Meat has landed on menus at upscale restaurants around the world. Source: Redefine Meat.

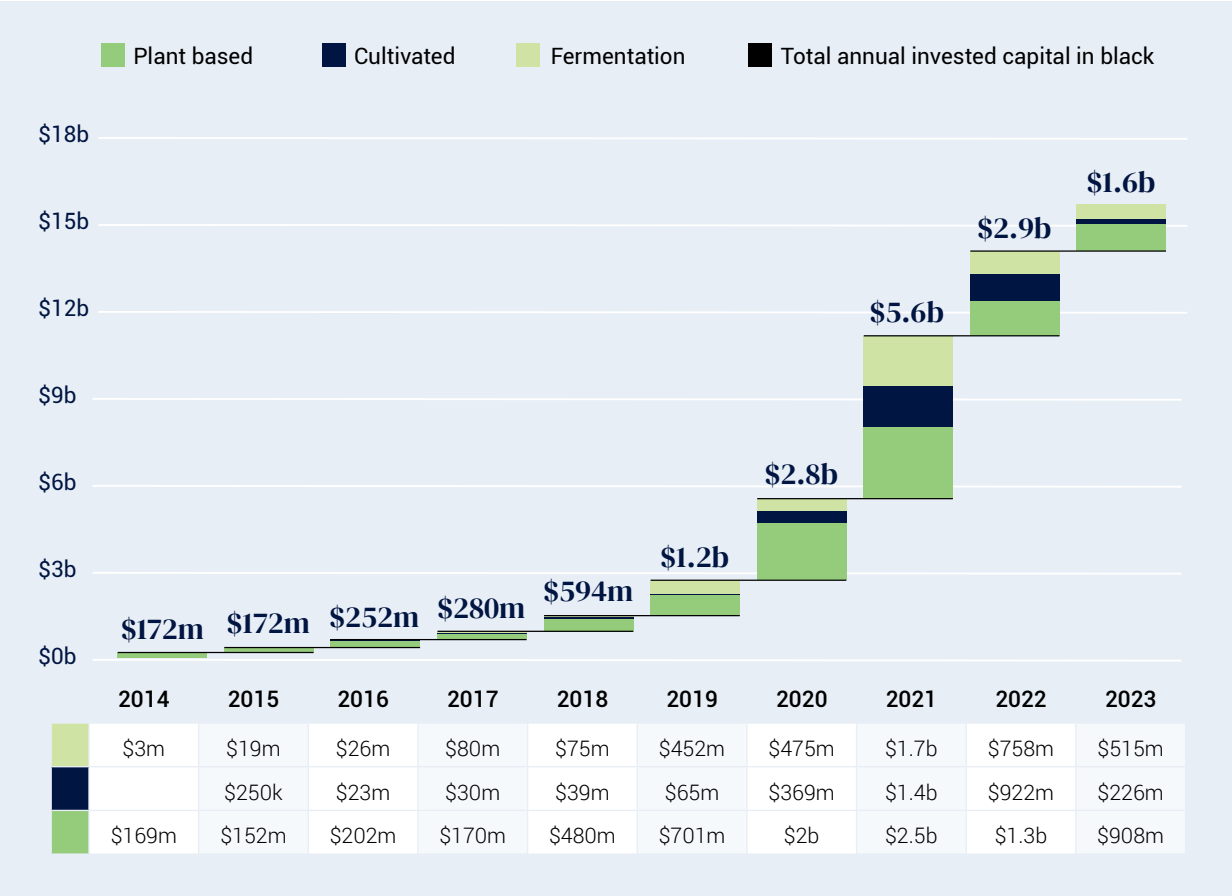
Advertisement for Green Rebel's AirAsia in-flight meal partnership. Source: Green Rebel.

Plant-based meat is fast becoming a menu feature across APAC too. Food Frontier's 2023 *Alternative Proteins and Asia* report found that foodservice presents the best entry point for international plant-based meat brands into markets such as China, Thailand, Singapore, South Korea and Japan, where partnerships with trusted foodservice outlets can help increase brand visibility and win consumer loyalty.[48] Plant-based meat can now be found across China in Starbucks, KFC, Burger King, McDonalds and Lawson convenience stores. A 2023 study from Peking University found that 85% of urban Chinese consumers have tried plant-based meat—31% tried them in foodservice settings.[49] In July 2023, Starbucks South Korea reported a surge in sales after launching three new plant-based meat dishes from local brand Better Meat, with 100,000 units sold in just two weeks.[50] In 2023 Indonesian-based Green Rebel secured partnerships and appeared on the menu at Nando's Singapore, Starbucks Malaysia and Air Asia flights through its foodservice arm Santan.[51]

Research is being undertaken in foodservice settings globally to understand and apply behavioural nudges to promote the uptake of plant-based meat on menus, such as highlighting plant-based dishes as 'meal of the day';[52] listing plant-based meat dishes ahead of conventional meat dishes on menus;[53] applying low emissions labels to plant-based meat dishes;[54] and employing accessible descriptors on menus like 'plant-based' in favour of terms shown to alienate some consumers, such as vegan or vegetarian.[55] In addition to supply-side innovations such as technological advances and improved product formulations, these demand-side innovations (like behavioural nudges) can further accelerate consumer uptake of plant-based products in foodservice settings.[56]

Global investments

Figure 4. Cumulative and annual alternative protein invested capital, by technology



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	$3m	$19m	$26m	$80m	$75m	$452m	$475m	$1.7b	$758m	$515m
		$250k	$23m	$30m	$39m	$65m	$369m	$1.4b	$922m	$226m
	$169m	$152m	$202m	$170m	$480m	$701m	$2b	$2.5b	$1.3b	$908m

Source: GFI analysis of data from Net Zero Insights, calendar years.[57]

Beyond the macroeconomic trends impacting the global economy and food manufacturing sectors, start-ups across the globe felt the impacts of reduced investment. The global highs of investment in plant-based meat companies in 2021, more recent interest rate hikes, concerns of a recession, falling valuations of previous market leaders and plateauing retail sales have all impacted deal flow into the plant-based meat industry.[58]

Financial year 2023 investment data

FY2023 plant-based meat
USD**$529m**

- 2022 second half $354m
- 2023 first half $175m

FY2023 cellular agriculture
USD**$1.003b**

- 2022 second half $586m
- 2023 first half $417m

Source: Alternative Proteins Global.

"Our team is taking the contrarian view: Investors must not write off alternative proteins but rather continue to carefully monitor the space this year while staying selective on investment opportunities as we approach the cusp of broader adoption."

Marcel Bens, Managing Partner and COO, Emil Capital Partners[69]

This was reflected in a slowing of investment in all alternative protein types globally in 2023, compared to 2022 and 2021. Data from GFI shows that global investment in plant-based companies (including plant-based dairy) was lower across 2023 compared to 2022 and 2021, however remained higher than pre-pandemic levels. Although investments in cellular agriculture companies (cultivated and fermentation) outpaced investments in plant-based companies in 2022, the trend reversed in 2023 with plant-based companies receiving more.

With the majority of funding coming from private sources, the wider alternative protein sector's reliance on private investment leaves it particularly vulnerable during periods of reduced deal flow, and the US Center for Strategic and International Studies and GFI have urged governments around the world to invest in plant-based meat technologies to accelerate research and development and eventual adoption.[59] Despite the headwinds faced by the industry and reduced growth expectations, analysts at Rabobank[60] and EY Parthenon[61] believe the category has strong long-term prospects and should not be dismissed by investors.

Despite the slowdown on funding, notable raises from international plant-based meat companies across 2022 and 2023 included:

January 2022
Chinese company Starfield
USD$100m[62]

February 2022
Singaporean company
Next Gen Foods
USD$100m[63]

September 2022
Swiss company Planted
USD$72m[64]

December 2022
Chilean company NotCo
USD$70m[65]

January 2023
Canadian company
No Meat Factory
USD$42m[66]

August 2023
Canadian company
Koncious Foods
USD$26m[67]

October 2023
French company Umiami
$USD35m[68]

Commercial developments

Consolidation

After 'unrealistically optimistic' growth expectations projected off the back of record sales in 2020,[70] the plant-based meat market in Europe and the US experienced an anticipated period of consolidation across 2022 and 2023 as companies grappled with inflation, the cost-of-living crisis, reduced capital flow and slower consumer uptake. There are some signs in early 2024 that the market is steadying, with sales appearing to increase again in the UK.

Buoyed by growing sales figures and a desire to capture a first-mover advantage, some companies rushed to market with products that fell short of consumer expectations, leading to poor experiences among those trialling early plant-based meat offerings. Underperforming products were delisted by supermarkets and their poor sales led retailers across the globe to reduce shelf space for the category.[71] Companies are now working to win back consumers whose perceptions of plant-based meats are tainted by earlier experiences.

Market leader Beyond Meat made headlines for declines in sales and revised growth projections in 2023.[72] The company appears to have moderated these losses in early 2024, after posting better than expected sales in Q4[73] and launching a new formulation of its Beyond Burger® in an attempt to appeal to health-conscious consumers.[74] Rival Impossible Foods claims to be in a strong cash position, investing in former Chobani executive Peter McGuiness as new CEO in 2022 to capitalise on Impossible's push into the foodservice sector. UK brand Heck cut its range from 10 to two SKUs, and multinational food company Nestlé removed its Garden Gourmet plant-based meat brand from the UK, followed by its Australian counterpart, Harvest Gourmet.[75]

Figures from the past five years show that the plant-based meat market has successfully established a solid base for further growth. The significant market growth witnessed in 2020 would have been challenging to maintain regardless of the ensuing global conditions adding to downward sales pressures. As brands re-evaluate their products and go-to-market strategies, the question remains as to whether a softening of the economic headwinds experienced in 2022 and 2023 will be sufficient to return the market to growth. With the economic environment still to stabilise, further corrections are likely to play out.

For some financially stronger companies, this has presented a fast-track to brand-building through mergers and acquisitions. In the UK, Meatless Farm was purchased by plant-based meat company The Vegan Food Group (formerly VFC) days after going into administration in June 2023. The Vegan Food Group called it a "golden opportunity" to merge the two brands. Meatless Farm products returned to UK supermarket shelves in August 2023,[76] and the Vegan Food Group acquired another UK plant-based food business in 2023 and has signalled its intent for further acquisitions in 2024.[77]

Co-founder of UK brand THIS, Andy Shovel, says that the consolidation of brands and the removal of underperforming products is not all bad news for consumers: "We're now at a stage where the sector is consolidating and poor-quality brands are coming out of the market, with more brands consumers can trust and shelves that are way easier to navigate."[78]

UK supermarket giant Tesco announced in March 2024 that its latest sales figures of plant-based meats indicate it is now seeing a 'second phase' of popularity for plant-based meat alternatives as flexitarians are looking to take control over what they eat, whilst continuing to reduce their meat intake.[79] The retailer explained that after the initial surge of consumer interest in the category, sales of plant-based meat products had increased by 20% and sales of plant-based fish products had increased 100% compared to the same period the year prior. According to Tesco plant-based category buyer Cate May, "Customers are starting to understand the versatility of plant-based ingredients and whole cuts and are creating a wide variety of meals such as tofu stir-fries, meat-free curries using chicken alternatives or beans and pulses, and classic steak and chips using plant-based steaks."[80] May attributed the increase in plant-based meat sales to increased consumer awareness of health considerations, saying "Awareness is also starting to increase around the health benefits of making some simple swaps in their diet, for example, to reduce saturated fat whilst maintaining strong levels of protein by increasing the number of plants and plant-based foods in their diets."

Price

Reaching price parity with conventional meat remains a key barrier to increased sales and widespread adoption for the plant-based meat category globally.

GFI analysis of US products in 2022 identified a price premium of 67% for plant-based meats compared to conventional meats.[81] According to global market research firm Mintel, 26% of consumers who don't eat plant-based proteins today say the products are too expensive,[82] while data from FMI shows that cost is a major barrier identified by almost a third of US consumers who stop buying plant-based meat.[83]

This sentiment was echoed in the findings of Food Frontier's *Alternative Proteins and Asia* report, which found that price was a key barrier for consumers in China, Thailand, Singapore and Japan, with South Korea the only market where animal meat is priced higher.[84]

Europe currently leads the way in achieving price parity with a deliberate strategy to reduce prices to increase consumer adoption. A 2022 Dutch survey found that on average plant-based meat products had reached price parity with conventional meat products—in part due to the sharp price increases for conventional meat from inflation.[85] In October 2023, Lidl supermarkets in Germany announced it was permanently making its own brand range of plant-based meat products the same price as conventional meat items, with Christoph Graf, Lidl Germany head of merchandising, saying: "we want to invite customers more to try out the plant-based alternatives—without the price being the decisive criterion."[86] The retailer also moved its all plant-based equivalents next to their conventional animal products,

Lidl Germany has permanently reduced the price of plant-based meat alternatives below that of conventional meat counterparts in a deliberate price strategy to increase consumer consumption. Source: Lidl.

after a successful earlier trial with the brand's four best-selling plant-based meat products saw sales of these products increase. Multiple European supermarket chains followed suit in the following weeks and months, dropping the prices of their private label plant-based meat products to match those of conventional meat: Germany's Kaufland and Aldi Süd (known as Aldi in Australia), Austria's BILLA and Lidl[87], Lidl Hungary, Lidl Denmark, Denmark's largest retailer Salling Group, and Netherland's Jumbo.[88]

Product development

Beyond price, the taste and texture of many plant-based meat products are still falling short of consumer expectations and remain a barrier to repeat purchase. According to Mintel, 53% of all consumers agree that plant-based meats should taste indistinguishable from conventional meat. Similarly, research from the Food Marketing Institute shows that perceived poor taste is the top reason why consumers haven't tried plant-based meat (51%), as well as taste being the top reason why consumers who have tried these products, haven't repurchased (46%).[89]

In 2022, Kerry carried out sensory research for plant-based meat burgers with consumers in the US, UK, Australia and Brazil. They found that flexitarians are more critical of plant-based meat products compared to vegan and vegetarian consumers, are unwilling to compromise on taste, and look for products that are as similar to conventional meat as possible.[90]

Companies around the world are focused on understanding how new technologies can help to meet consumer taste and texture expectations. Nestlé, DSM-Firmenich, Cargill and Unilever were identified as the top four companies filing for plant-based meat patents from August 2021 to August 2023, with a combined 674 applications.[91] Chilean plant-based company NotCo has been using its proprietary AI platform, Giuseppe, since 2021 to recreate conventional animal flavours

Revo Foods 3D printed plant-based salmon. Source: Revo Foods.

and products from a library of more than 300,000 plant ingredients. NotCo credits the technology with perfecting the formulation of its plant-based meat brand NotMeat, which features on the menu at hundreds of Starbucks and Burger King outlets across Chile and Argentina.[92]

Advances in manufacturing technology including high moisture extrusion have catalysed improvements in the texture of plant-based meat products, with some research indicating the process also offers improvements in nutritional profile.[93] Some companies are using 3D printing to help deliver on texture. Redefine meat, a plant-based meat company from Israel was the first to use cutting-edge 3D printing technology to produce whole-cut style steaks in November 2021, now available at restaurants in Israel, the UK and Europe;[94] while Austrian company Revo Foods launched its 3D printed whole-cut plant-based salmon style fillet in September 2023, making it the world's first 3D printed food available in supermarkets.[95]

Consumer trends

Research suggests that flexitarians are the biggest consumers of plant-based meat globally, followed by vegetarians and vegans.[96] Health remains the biggest driver for consumers to choose plant-based meat in almost all markets, including the US, UK, Europe, Australia and Latin America, while sustainability is the second most commonly stated motivator.[97 98 99] In Asia, Food Frontier's consumer research found that health is the top motivator across nearly all markets, such as China, Thailand, South Korea and Japan with the exception of Singaporean consumers who listed sustainability as the top driver, closely followed by health.[100]

Consumers' increasing desire for convenience products post-COVID has flowed into the plant-based meat category,[101] where sales of frozen plant-based meats now make up 63% of retail sales in the US.[102] This trend has also led to a rapid growth in ready meals as well as flavoured or crumbed products that consumers can quickly cook and serve.[103]

Some consumers are concerned about the processed nature of plant-based meats. Using the NOVA classification system, plant-based meats could reasonably be considered ultra-processed foods (UPFs) due to their use of protein isolates and concentrates, and manufacturing processes.[104] Food Marketing Institute data showed concerns over the nature of processing to be the fourth highest barrier to consumption of plant-based meats, a sentiment also echoed in Food Frontier's 2023 consumer research in China, Thailand, Singapore, South Korea and Japan.[105]

However, new research demonstrating that poor health outcomes are not uniquely associated to all types of UPF consumption (and are not observed to be associated with ultra-processed plant-based alternatives[106]) has supported some experts' concerns that the UPF classification is too broad. They believe the classification unnecessarily villainises a large range of ingredients and foods, suggesting that consideration must be given to the nutritional composition of products being consumed.[107]

Healthy products and clean label

The industry is innovating to appeal to health-conscious consumers by offering 'clean label' products and reducing ingredient lists. In 2021 Mintel found that 75% of US consumers were influenced about which plant-based meats they buy depending on ingredient content and 63% would like more plant-based meats to be made with whole foods.[108] Producers have responded with products made from ingredients such as mushrooms, as seen in Fable Food Co's Meaty Slow Braised Mushrooms (62% shiitake mushrooms), and oats, as seen in Gold & Green's Pulled Oats (20% oats and 20% pea protein).

GFI Europe has observed that European manufacturers looking to capture health-conscious consumers are focused on formulating products with reduced saturated fat and fortified with micronutrients such as vitamin B12 and iron.[109] Fortification comes with extra costs to manufacturers, which can be difficult to justify in an inflationary period. Fortification also increases the number of ingredients on the label, which is at odds with the aim of reducing ingredient lists and 'clean label' approaches. Swiss company Planted demonstrates that a balanced approach is achievable, with its original chicken-style pieces containing only five ingredients: water, pea protein, pea fibre, canola oil and vitamin B12.[110] Beyond Meat launched a new formulation of its Beyond Burger® in February 2024 to appeal to health-conscious consumers; improving the nutritional profile of the burger and introducing lentil and faba bean protein while simultaneously reducing its ingredient list to become Clean Label Certified.[111]

Beyond Meat's updated packaging on its new formulation burger, highlights the reduced saturated fat and protein per serve. Source: Beyond Meat.

Diversification of ingredients

Soy and wheat continue to dominate ingredient lists, particularly in the APAC region. Cost and availability, manufacturers familiarity with these established ingredients, and the high costs of R&D to develop novel ingredients continue to limit the innovation required to improve taste and texture. Nevertheless, ingredient companies and plant-based meat manufacturers are increasingly looking to diversify the sources of plant protein in their products.

Further to potential taste, function and/or nutrition improvements for consumers, increasing the diversity of plant protein ingredients has other benefits: it offers farmers new markets for value-adding under-utilised commodity or rotational crops; can help increase variety and address consumer aversion to the incumbent plant proteins; and reduces the risk of manufacturer overreliance on these crops.[112] Major agrifood suppliers including Cargill and ADM have been promoting their support for diversifying plant protein ingredient portfolios with options such as pea, faba, lentil and chickpea proteins.[113]

Localising formats and tastes

Food Frontier's 2023 *Alternative Proteins and Asia* report found that one of the key barriers to consumption of plant-based meat across China, Thailand, Singapore, South Korea and Japan was that plant-based meat alternatives don't fit with the dishes or cuisines that respondents prefer to cook; demonstrating the importance of localising formats and tastes based on consumer preferences.[114] While Western style products such as burger patties may be useful in QSRs, flexible formats like mince—which can be used in a range of Asian cuisines—or culturally familiar formats like luncheon meats or strips and chunks have wider appeal in these markets.[115]

In APAC, companies that are focused on delivering products that are suited to the diversity of Asian cuisines and tastes are experiencing success in the region. Indonesian-based Green Rebel has seen widespread success across Indonesia, the Philippines, South Korea, Malaysia and Singapore in both retail and foodservice, offering cultural favourites such as Beefless Rendang and Chick'n Satay.[116]

Bühler and Givaudan opened the Protein Innovation Centre in Singapore in May 2021 to help its customers develop plant-based meat products that suit Asian palates,[117] a move followed by French ingredient company Roquette in July 2023 with the opening of its Asia Pacific Innovation Centre, also in Singapore with similar aims.[118]

Government support

Worldwide, forward-thinking governments are taking action to promote growth in the domestic development, supply, consumption and export of plant-based ingredients and products, including plant-based meat alternatives. Recognising the valuable contribution these industries can make to economic, environmental, health, agricultural and food security agendas, an increasing list of national government have announced enabling strategies, policies and funding.

Canada, with a pulse industry comparable to Australia's,[119] is recognised as a plant protein global leader in part due to the government-backed, industry-run innovation supercluster, Protein Industries Canada (PIC). Through PIC, the country is pursuing a CA$25b by 2035 plant-based roadmap to become a sovereign food, feed and ingredients manufacturing powerhouse, backed by world leading crop, process, and product R&D.[120] Originally formed in 2018, in February 2023 the Canadian Government renewed its initial investment in PIC, committing a further CA$150m over five more years.[121] Canada also updated its national dietary guidelines in 2019 to recommend that, among protein foods, plant-based options are consumed the most often.[122]

China is pursuing the growth of its domestic plant protein industry in a bid to bolster domestic food security. President Xi Jinping used the 2022 'Two Sessions', China's most important political conference, to urge agricultural officials to pursue protein diversification, explicitly calling out alternative proteins as critical to securing the country's future food supply. Xi's speech followed the inclusion of a section on "creating future foods", including plant-based meats, beverages, and eggs, for the first time ever in China's Five-Year Agricultural Plan, released in January 2022.[123] These government signals to industry, as well as R&D funding support through avenues like the National Natural Science Foundation of China and Green Biological Manufacturing program, have helped to spur greater private investment into domestic plant-based meat companies.[124 125]

Germany, Denmark and South Korea announced national strategies between 2022 and 2023 to sustainably transform their domestic food systems, with domestic plant protein industries and promoting plant-based diets at the centre of their plans.[126 127 128]

Denmark's world-first *Action Plan for Plant-based Foods* followed the Danish government's 2021 announcements of €168m in funding to advance plant-based foods and the release of its climate-friendly, plant rich national dietary guidelines.[129 130]

The Budget Committee of the German Bundestag announced in November 2023 it had earmarked €38m in the 2024 federal budget for a sustainable protein transition, including a plant protein crop strategy and support for production and processing of plant proteins.[131]

In South Korea, along with a dedicated alternative food research support centre, efforts under its strategy will include working with public and private chefs to support domestic plant protein product adoption, including into foodservice and schools, as well as increasing exports.[132]

A spotlight on: Canada

Canada set itself on course to become the global plant-based leader it is today when government and industry came together in 2018 to establish Protein Industries Canada (PIC) under the Canadian Government's Global Innovation Clusters program.[133] PIC is one of Canada's five innovation superclusters designed to leverage the country's existing expertise and untapped industrial potential, in this case in the substantial pulse and grain production in the Prairies in Canada's West. PIC is pursuing a CA$25b roadmap in partnership with farmers, industry, investors and academia, to capture 10% of the world's plant-based food industry by 2035.[134] [135]

PIC was funded by an initial 2018 federal government investment of CA$150m over five years. It has since been working to build domestic capability through its technology, capacity building and artificial intelligence programs to foster company growth and facilitate industry partnerships, as well as through direct project investment.[136] From 2018 to 2023, PIC co-invested CA$173m into 55 plant-based projects spanning proof of concept, crop and ingredient R&D, technology scaling and commercial development. This period saw CA$304m in private investment leveraged, as well as a further CA$234m in follow-on investment, and 303 IP assets created.[137] [138]

In April 2021 PIC partnered with New School Foods and Live Proteins to produce a first-of-its kind whole muscle cut of plant-based salmon from locally grown and processed pulses.[139] Following the successful proof of concept, an additional CA$11.5m was collectively invested in the project in October 2023 to leverage the project partners' respective capabilities to scale-up production and work towards the commercialisation of a market-ready product that transforms from raw to cooked, by early 2025.[140]

PIC has also been actively building partnerships across the supply chain to help support companies to navigate the Canadian regulatory system and to address knowledge gaps related to regulatory modernisation in labelling, nomenclature and protein digestibility testing.[141] In partnership with Pulse Canada, the national association representing pulse growers, traders and processors,[142] Plant-Based Foods of Canada, the industry representative for plant-based food manufacturers, distributors and retailers,[143] and Loblaw Companies Ltd, a Canadian retailer encompassing corporate and franchise supermarkets,[144] PIC launched the Centre for Regulatory Research and Innovation (previously the Regulatory Centre of Excellence) in April 2022. Part two of this project commenced in November 2023 with an additional goal over the next five years of creating data that fosters an enabling domestic regulatory and policy environment.[145]

The Canadian Government renewed its funding for PIC in early 2023 for another five years through to 2028.[146] Canada's commitment to building the sector has also been demonstrated through the provision of federal financial support via other government programs and agencies like Agriculture and Agri-Food Canada's AgriInnovate, Farm Credit Canada and Export Development Canada, to companies across the plant-protein supply chain, including to plant-based meat and seafood manufacturers as well as major ingredient producers to increase domestic capacity.[147] [148] Invest in Canada, the Government's foreign investment attraction arm, has also actively promoted the sector to potential investors through the creation and promotion of detailed global and Canadian market analyses.[149] [150] [151]

Strong support for the sector has been showcased repeatedly at the ministerial level, normalising both its growth as a critical economic agrifood opportunity and highlighting increased plant-based food consumption as a health imperative.[152] [153] [154] In 2020, Prime Minister Justin Trudeau announced CA$100m in federal financing for a new pea and canola processing facility in Winnipeg,[155] stating: "As people around the world start eating more plant-based products, we have an opportunity to bring together Canadian innovation and Canadian crops, and a chance to create good, well-paying jobs… Standing up for hard-working farmers, creating good jobs, setting up Canada for success on the world stage—these are things that our government will always get behind."[156]

Clear government leadership coupled with progressive agrifood policies for plant-based proteins at both the federal and provincial levels,[157] [158] as well as enabling investments, have accelerated critical sectoral growth and attracted some of the world's leading multinational plant-protein companies to establish Canadian operations.[159] [160] For example, in November 2021 Roquette, a French global leader in plant-based ingredients, opened the world's largest pea protein processing plant in Portage la Prairie, Manitoba, one of Canada's major pea producing regions.[161] This CA$600m, 18,600 square meter facility has the capacity to process 125,000 tonnes of yellow peas per year, sourced from local farmers, and produces pea protein ingredients for food manufacturing and sports nutrition, along with food-grade starches and other products for both domestic and global customers.[162] The facility's construction provided 1,000 jobs, and upon opening, 120 ongoing operational jobs.[163] More than two years on, the facility has also stabilised the rates of pea farming in the province, increasing local crop production and economic value to farmers, simultaneously reducing their carbon footprint as a dual benefit.[164] [165]

Another example is Louis Dreyfus Company (LDC), a French multinational agricultural goods merchant and processor, which announced in February 2024 the construction of a new pea protein isolate production plant alongside its existing industrial complex in Yorkton, Saskatchewan. LDC's plans are part of the company's global growth strategy to diversify revenue through value added products and, in this case, capitalise on the growing demand for high-quality, nutritious, and sustainable plant-based protein alternatives made from Canadian crops.[166]

Australian landscape 2023

Macroeconomic landscape

Economic difficulties for manufacturers and consumers have resulted in an anticipated contraction in some areas of the Australian plant-based meat industry in FY23, including retail sales, economic contribution, employment, domestic production and investment.

In line with the rest of the world, Australian food manufacturers experienced record high operating and manufacturing costs from 2020 to 2023.

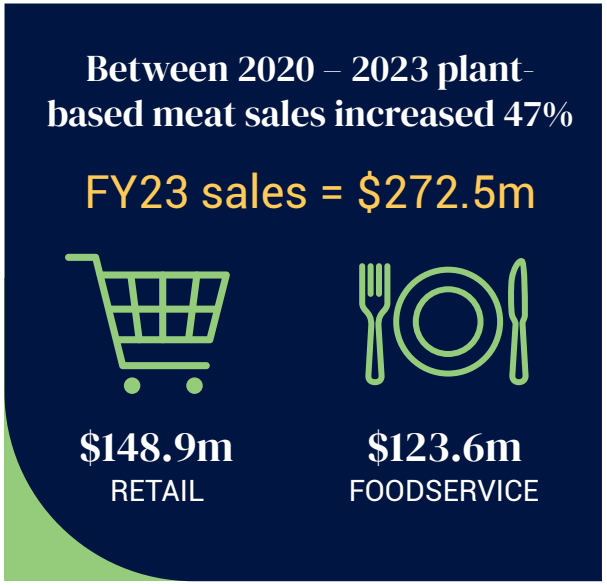
In August 2023, the Australian Food and Grocery Council (AFGC) emphasised that the financial pressures on the food and grocery manufacturing sector had remained high across the year, warning that the pressures manufacturers were facing in FY22 had now intensified in FY23 "to the point where the viability of some businesses could be at risk."[167] Two years earlier in 2021, the AFGC had highlighted the ongoing issue of declining investment in the food manufacturing sector due to weak profitability (the result of rising commodity and production costs) as well as declining sector productivity and international competitiveness due to a lack of investment in the latest production technologies.[168]

Across FY23, Australia experienced the highest levels of inflation observed in the last three decades.[169] For consumers, this meant real wages went backwards in comparison to inflation by -3.5% from 2021 to 2023.[170] [171] According to Deloitte's global Food Frugality Index, in 2023 Australian consumers were almost 20% more likely to be engaging in cost-saving behaviours on food and grocery spending than the global average.[172] The impacts of the macroeconomic conditions, inflation, reduced consumer spending and the subsequent impacts on Australian plant-based meat consumption and domestic industry profitability are explored further in this chapter.

Category performance and economic contribution

Commercial market

In FY23, $272.5m of plant-based meat was sold in Australia across retail and foodservice, a 47% total increase on FY20. Compared to FY20, in FY23 the plant-based meat industry experienced a slight contraction in retail sales (-1.1% CAGR), as well as domestic production, manufacturing revenue and employment. By contrast, it experienced growth in the value and volume of products exported, a major increase in wholesale foodservice sales (59% CAGR) and an overall increase in per-capita consumption of plant-based meat.



In FY23 $272.5m of plant-based meat was sold in Australia across retail and to foodservice operators. This represents a compound average growth rate (CAGR) of 13.8% since FY20, the last year that the size of the sector was estimated. Growth was driven by strong increased demand from the food service sector, which grew 59% per year from $31m to $123.6m in wholesale foodservice sales over this period.

Approximately 23 million plant-based meat products were purchased from retail outlets in FY23, totalling a value of $149m. Compared to FY20, retail sales contracted by an average of -1.1% annually and manufacturing sector revenue reduced -3.5% annually. In comparison, revenue in the broader food and grocery manufacturing sector grew an average of 4.9% per annum in the three years to June 2022, driven by strong growth in the beverages subsector.[173] Australia is estimated to have manufactured 2,205 tonnes of plant-based meat locally in FY23.

If adjusting the historic sales figures for the 7.4% average price increase observed in plant-based meat products from 2020-2023, the adjusted value of retail sales contracted -3.4%, and wholesale foodservice sales increased 54.8%, representing a total adjusted CAGR of 11.1% since 2020.

Annual per-capita consumption of plant-based meat increased 28% in total since FY20, from 280g to 360g in FY23, representing a 9.1% CAGR. Per-capita expenditure increased from $8.40 to $10.20.

Looking at the mid-term growth trends since Food Frontier published the first *State of the Industry* report in FY19, retail sales of plant-based meat have grown at a CAGR of 9%, wholesale foodservice sales at a CAGR of 37%, for a total consumer expenditure CAGR of 18% since FY19. Per capita consumption of plant-based meat has increased by a total of 71% since FY19, representing a CAGR of 14.4%.

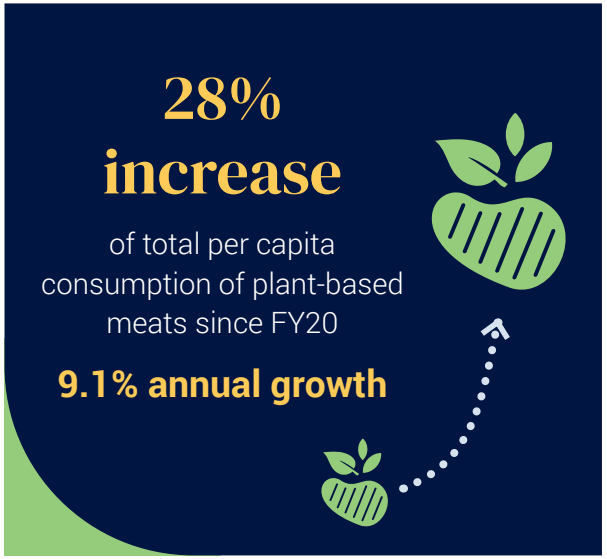


Figure 5. Australian plant-based meat market overview, FY19–FY23

	FY19	FY20	FY23	CAGR FY19 -FY23	CAGR FY20-FY23
Consumption ($m nominal)					
Retail	$105.2	$154.0	$148.9	9.1%	-1.1%
Foodservice	$35.0	$31.0	$123.6	37.1%	58.6%
Total	$140.2	$185.0	$272.5	18.1%	13.8%
Consumption ($m adjusted for current prices)*					
Retail	$113.0	$165.4	$148.9	7.1%	-3.4%
Foodservice	$37.6	$33.3	$123.6	34.7%	54.8%
Total	$150.6	$198.7	$272.5	16.0%	11.1%

Currency in AUD. Source: Deloitte Access Economics, IBISWorld, Quantium, Food Industry Foresight, Australian Bureau of Statistics.

The foodservice sales figure represents the foodservice sectors' wholesale spend on plant-based meat products from a manufacturer or distributor, and is not representative of consumer spend on plant-based meat products from foodservice outlets.

** Accounting for a 7.4% PBM price increase from FY20-FY23, as calculated by Food Frontier.*

Economic contribution

Deloitte Access Economics found that in FY23 the Australian plant-based meat manufacturing industry contributed $45.8m in value-added and 467 full-time equivalent jobs to the economy. This consisted of $9.7m of direct value-added, and $36.1m of indirect value-added.

Deloitte Access Economics identified an -8.4% reduction in the direct economic contribution from the plant-based meat industry relative to FY20; contributing $9.7m in direct value added, an approximate reduction of $1m. FY23 also saw a -4.4% reduction in direct and indirect employment relative to FY20. However, compared to figures from FY19, economic contribution was 53% higher and total employment was 75% higher in FY23.

There are several reasons for the reductions in FY23, beyond the difficult economic environment for food manufacturers in Australia. A slight contraction in domestic manufacturing occurred in the first half of 2023, which stemmed from difficulties in securing funding from private investors and government grant programs and the sharp increase in manufacturing and labour costs and reduced consumer expenditure. An example of this contraction is the closure of v2food's Wodonga manufacturing facility in early 2023, as the company rationalised part of its supply chain with a view to securing long term business sustainability.[174]

The reduction in economic contribution was also partly driven by the industry's negative gross operating surplus (GOS) of -$6.5m in FY23, which detracted from direct value added over the modelled period. A slightly larger negative GOS (-$7.2m) was also observed for the sector in FY20. A negative GOS is reflective of costs, such as labour and inputs, being higher than revenue in the short-term. This is not unexpected nor uncommon in companies and industries in the early stages of growth. Participants in an industry during its introduction and growth phases tend to be unprofitable because expenses are incurred to develop and market the offering while revenues are still low: for example, electric car and storage company Tesla took 17 years to return a profit. However, as the sector life cycle and becomes more mature, economies of scale are generally achieved, supply chains are established and companies become more profitable.

$45.8m in manufacturing value-add

467 full-time equivalent jobs

Opportunities for manufacturers, government and investors to expedite the scale-up process and support profitability are discussed in depth in the Path Forward chapter.

Indirect economic contribution

FY23, the industry indirectly contributed $36.1m to value added and supported a further 273 FTE jobs in Australia.

Outside of its own direct economic contribution through employment and wages, the plant-based meat industry indirectly supports economic activity in other sectors through demand for goods and services—in upstream sectors through its demand for and use of intermediate inputs, and in downstream sectors through the use of contract packaging, transport services, or professional services like marketing or consulting.

For example, an Australian plant-based meat manufacturer utilising Australian wheat as an ingredient, indirect economic value is created through the upstream activity (growing, harvesting, transporting, processing) required to source that input. Some companies use external businesses in their production process such as contract manufacturers or contract packers, where they either do not have the scale or infrastructure to vertically integrate these processes into their own businesses, again contributing indirect value to the economy.

The indirect value added from the various goods and services together is relatively higher than the value added directly generated by the manufacture of finished plant-based meat products. The relatively high indirect contribution of the plant-based meat manufacturing industry is also attributable to the low total GOS of the sector in FY23. This is likely another indicator of the early stage of growth the industry is in, with Australian plant-based meat manufacturers still relying heavily on external goods and service providers before they grow to the scale where they can internalise more of these operations.

Figure 6. Economic contribution of the Australian plant-based meat industry, FY19-FY23

	FY19	FY20	FY23	CAGR FY20-FY23
Value added ($m, nominal)				
Direct	5.0	10.8	9.7	-8.4%
Indirect	24.9	39.6	36.1	-8.0%
Total	29.9	50.4	45.8	-8.0%
Employment (FTEs)				
Direct	104.0	246.0	193.4	-6.0%
Indirect	161.0	301.0	273.3	-3.2%
Total	265.0	547.0	466.6	-4.4%

Currency in AUD. Source: Deloitte Access Economics.

Indirect value added and employment is primarily generated in the agriculture, manufacturing and professional services industries. Collectively, these three industries account for over half of the indirect value generated by the Australian plant-based meat industry. These three industries are also the major sources of indirect employment supported by the Australian plant-based meat industry with 60% of the indirect jobs (168 FTEs).

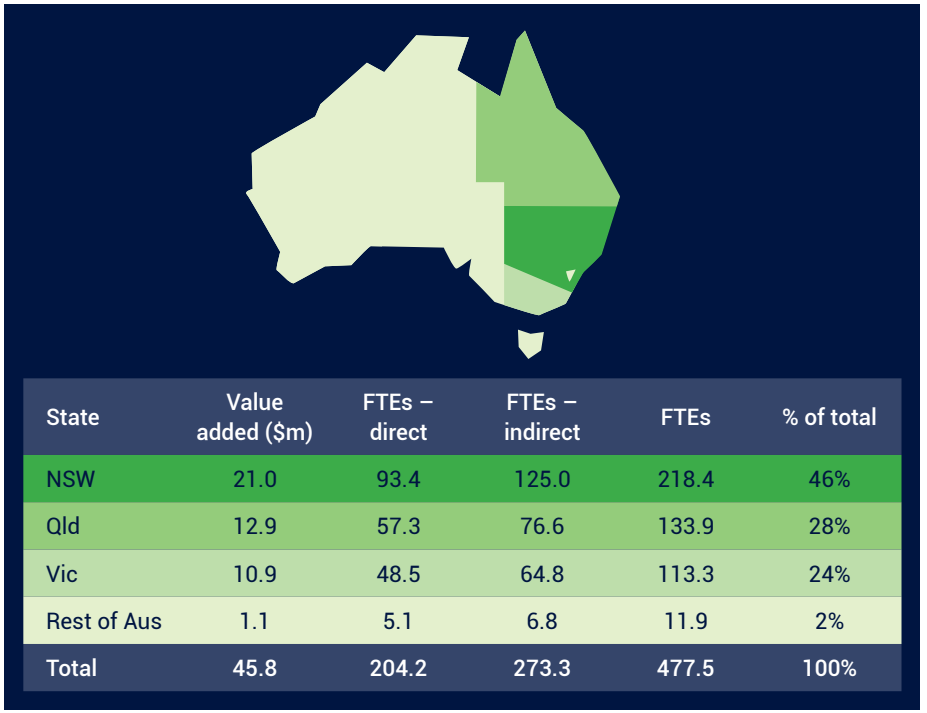
The highest share of indirect employment contribution from the plant-based meat industry is directed towards the agriculture sector, at 33% of total. Given the high share of both indirect employment and added value directed towards the agriculture sector, any increase in domestic plant protein processing capacity and production would see this indirect value and employment rise for the sector.

Figure 7. Indirect economic contribution of plant-based meat manufacturing in Australia by industry FY23

Industry value added	$m	Share of total indirect contribution (%)
Agriculture	$7.6	21.0%
Manufacturing	$6.6	18.2%
Professional, scientific and technical services	$5.3	14.6%
Transport, postal and warehousing	$3.5	9.7%
Financial and insurance services	$2.3	6.5%
Rental, hiring and real estate services	$2.3	6.3%
Other	$8.6	23.7%
Total	$36.1m	100%
Industry employment contributions	**FTE**	**Share of total indirect contribution (%)**
Agriculture	89.6	32.8%
Professional, scientific and technical services	40.1	14.7%
Manufacturing	38.7	14.2%
Transport, postal and warehousing	24.6	9.0%
Administrative and support services	19.1	7.0%
Other services	13.8	5.0%
Other	47.4	17.3%
Total	273	100%

Currency in AUD. Source: Deloitte Access Economics 2024.

Figure 8. Australian plant-based meat manufacturing economic contribution by state, FY23



State	Value added ($m)	FTEs – direct	FTEs – indirect	FTEs	% of total
NSW	21.0	93.4	125.0	218.4	46%
Qld	12.9	57.3	76.6	133.9	28%
Vic	10.9	48.5	64.8	113.3	24%
Rest of Aus	1.1	5.1	6.8	11.9	2%
Total	45.8	204.2	273.3	477.5	100%

Currency in AUD. Source: Deloitte Access Economics 2024.

States

The geographic growth of plant-based meat manufacturing continues to mirror areas of traditional food manufacturing mostly taking place in urban centres in the eastern states. Economic contribution is still concentrated on the east coast. Since FY20, Queensland has overtaken Victoria to receive the second largest share of value-added contribution and FTE. This is due to a number of new and expanded manufacturing facilities located in Queensland since economic analysis was last undertaken in FY20, as well as an increase in goods and services that are sourced from Queensland, particularly agricultural inputs. Only 3% of employment and value added is generated outside of the east coast states, indicating there is significant room for growth in other states and territories with the right policy settings and support.

"Asia will undoubtedly be one of the largest markets for alternative protein in the foreseeable future."

Ratchanida Veeratanabutrl, Thai Union[175]

Deloitte Access Economics modelling shows that the volume of exports grew to 142 tonnes in FY23, to a value of $4m at a CAGR of 14%. At the start of 2024 nine Australian plant-based meat manufacturers are exporting their products to more than 20 markets, with the majority of those markets in the Asia Pacific region. This is an increase from five manufacturers exporting in FY20.

Australia is a relatively small market with approximately 27 million people,[176] however it is well positioned on the doorstep to Asia, home to 4.5 billion people—60% of the world's population—with established and strong trading links in agriculture and food. With a growing middle class and disposable income, the Food and Agriculture Organization (FAO) predicts that the region will be a key driver behind the tipped 73% increase in global demand for meat by 2050.[177] For Australian plant-based meat manufacturers to scale faster and bring production costs down, exporting semi-finished and finished goods, IP and technology to Asia offers opportunities for growth.

Exports grew to 142 tonnes in FY23, to a value of $4m at a CAGR of 14%

Food Frontier's 2023 *Alternative Proteins and Asia* report found that Asia's growing demand for alternative proteins is a major opportunity for domestic plant-based meat manufacturers looking to grow their revenue.[178] In 2023 the Asian market for plant-based meat and mock meats was estimated to be worth US$4.32b, with the expectation of 33.27% CAGR, reaching US$13.63b by 2027. The largest market and strongest demand came from China where the meat substitutes market is expected to grow annually by 20%.[179]

With health concerns given as the first or second reason for consuming plant-based meats across the five Asian markets surveyed in *Alternative Proteins and Asia*, Australian plant-based meat manufacturers are well placed to trade on Australia's 'clean and green' provenance perception and reputation as a reliable trading partner of safe and quality produce.[180]

Figure 9. Australian exports

Exports	2019	2020	2023	CAGR
Value of exports ($m nominal)	NA	$2.7	$4.0	14.0%
Volume of exports (t)	NA	96	142	14.0%

Currency in AUD. Source: Deloitte Access Economics 2024.

Source: Harvest B.

A spotlight on: Domestic plant protein processing capacity

New infrastructure required to unlock Australia's potential

The most commonly used plant protein ingredients in plant-based meats, in Australia and globally, in descending order, are soy, wheat and pea, with various other pulse proteins also increasing in popularity. The potential to diversify and increase domestic manufacturing of plant protein ingredients presents Australian farmers with an economic opportunity to value-add to domestic grain and pulse production.

The production of plant-based meat products—as well as products in the wider plant-based foods sector—requires plant protein ingredients made from crops that, with the exception of soybean, are grown in Australia in high quantities. These crops include wheat, barley, oat and rice, and pulses such as pea, mung bean, chickpea, lupin, faba bean, lentil, and navy bean. There are also evolving opportunities in protein from hemp and canola crops. However, due to a lack of domestic plant protein processing capacity, these plant proteins aren't widely available as ingredients for use by Australian plant-based meat manufacturers and Australian food manufacturers generally.

Most plant-based meats require processed forms of plant-protein; key ingredients are generally a combination of textured vegetable protein (TVP) or textured plant protein (TPP), protein concentrate (40% to 79% protein) or protein isolate (80% protein and above) made from pulses such as soy and pea, or wheat and wheat gluten. Currently, most of Australia's high protein grains and legume crops that could be turned into these ingredients are instead sold on the global commodity market. As commodities these inputs command lower prices than if they were instead processed domestically, value added and directed into the plant-based food supply chain. The barrier to unlocking this value-add is Australia's lack of sufficient domestic processing facilities to meet existing domestic and international demand for plant protein ingredients, and the projected demand in years to come.

As the supply chain stands, some Australian plant-based meat manufacturers utilise Australian-grown plant proteins in specific product formulations, however many domestic plant-based meat manufacturers must rely on importing plant protein ingredients in the required formats. This is a significant bottleneck and supply chain risk in the Australian plant-based food sector. However, this bottleneck also presents a major untapped opportunity for the domestic transformation of agricultural products into ingredients that can be widely used in the plant protein supply chain for domestic use, but also for export of finished and semi-finished goods, as well as ingredients.

Source: Australian Plant Proteins.

Current processing facilities

At present, Australia has limited capacity to produce transformed plant protein ingredients. Processing is spread across three commercial-scale plant-protein fractionation facilities and companies: Australian Plant Proteins (APP), Unigrain and Integra Foods. There are also some smaller companies working with emerging crops lupin and hemp: Wide Open Agriculture, Eighth Day Foods and Hemp Harvests. Australia has one manufacturer of soy TVP, Ben Furney Flour Mills, using Australian grown soy. While wheat-gluten milling and supply chains have been well established Australia due to gluten's common application in other food categories like baking, noodles, cereals, snack foods and pet foods, there is one company producing wheat TVP, Harvest B.

The largest domestic plant protein company, APP, has been operating out of Horsham in Victoria since 2020 and produces faba, mung bean, yellow pea, yellow lentil and red lentil protein isolates through its patented fractionation process. APP has capacity to produce 1,100 tonnes of isolate powders a year[181] and is currently focusing on downstream ingredient and product development activities with its customers, as well as implementing solutions to upcycle by-products generated from its protein extraction process. APP's protein isolates are used in different product categories such as plant-based dairy products, and in some plant-based meat products produced in Australia.

Family milling business Unigrain began production at its new pulse protein facility outside of Ballarat in Victoria in 2023,[182] producing pea and faba protein concentrates through a dry fractionation process. Unigrain is also building an oat milk production facility in Victoria and is adding new processing capabilities to its existing facility in Wagin in Western Australia to produce oat flour for oat milks, production is expected to begin at both sites in late in 2024.[183]

Integra Foods was launched in May 2023 by parent company Australian Grain Exporters. Integra Foods diversifies its commodity grain export business to capture value through onshore processing to produce protein concentrate for domestic and export markets. Based outside of Adelaide in South Australia Integra Foods uses a dry fractionation process to produce a protein concentrate from South Australian faba beans. In February 2024 Integra Foods received a $500,000 grant from the South Australian Government to deliver a strategic export market development project to support the company's export goals.[184]

Pea crops at Agriculture Victoria's Horsham SmartFarm research facility.

What is the opportunity?

The industry estimates that Australia will need at least 10 processing facilities to meet the projected global demand for plant proteins and could support even more facilities with the right settings in place. The ideal location for these facilities would be across Australia's major grain and pulse growing regions, bringing with them regional development and economic and employment benefits. Demand for plant proteins is strong internationally as well as domestically, with a strong export market for high quality, Australian grown ingredients. Beyond applications in plant-based meats, plant proteins have uses in plant-based dairy products, sports nutrition, bakery goods, snacking products, health foods, cereals and more.

During Food Frontier's consultation with industry, almost every Australian plant-based meat manufacturer expressed a strong desire to purchase and use more Australian grown plant proteins in their products. Companies explained that Australian-grown plant proteins either aren't available in the required formats or at the required volume for their production purposes or can't compete on price with imported products coming from large scale factories in Asia, particularly China. Companies that are currently using soy as their major protein source also expressed a keen interest in utilising more Australian grown proteins, with some confirming they are undertaking research and development to determine how other locally grown protein crops could be utilised in future product formulations.

As highlighted by Deloitte Access Economics the agriculture sector is already the strongest beneficiary of indirect employment and value added from the activity of the Australian plant-based meat manufacturing industry. Any further increase in domestic plant processing capacity would see this indirect contribution rise even further for the agriculture sector.

It is worth putting Australia's opportunity into the context of global plant protein processing capacity. As explored in the Global Landscape chapter, many countries with considerable grain and pulse crop production have identified domestic manufacturing of plant protein ingredients as an economic opportunity and invested in the required processing infrastructure. Leveraging its high production of soybean and pea crops, in 2019, China owned the majority share of global processed soy protein supply and half the global processed pea protein supply.[185] Since then, countries with comparable pulse and grain production to Australia, like the US and Canada, have also increased investment in processing capacity to value-add to domestic crop production, including in peas and chickpeas.[186]

Australia is unlikely to compete globally on soy-based ingredients given limited local crop production and established, lower-cost manufacturing offshore. However, its existing capability in wheat, and high production volumes of other protein-rich grain and pulse crops and its established reputation for producing high-quality and protein ingredients thus far, positions it favourably to service the growing domestic and international demand for high-quality, traceable, diversified plant protein ingredients with varied nutritional, taste and textural functionality. The construction of plant protein processing facilities requires a high amount of capital expenditure, and likely requires public-private investment structures or multiple companies partnering to form a funding consortium to meet these costs.

Case study: Harvest B

Harvest B, a Sydney plant protein innovation startup, identified the huge potential for an Australian plant protein supply chain and set out to create one itself.

Harvest B Co-founder Kristi Riordan saw a flaw in the Australian supply chain when she noticed that although wheat accounts for 55% of Australia's cropland and has a significant flour milling infrastructure, Australia was lacking the ability to transform that wheat into other novel value-added ingredients. Riordan said, "Despite a strong heritage in agriculture, Australia produces a relatively low amount of value-added exports compared to peer countries such as New Zealand or Netherlands."

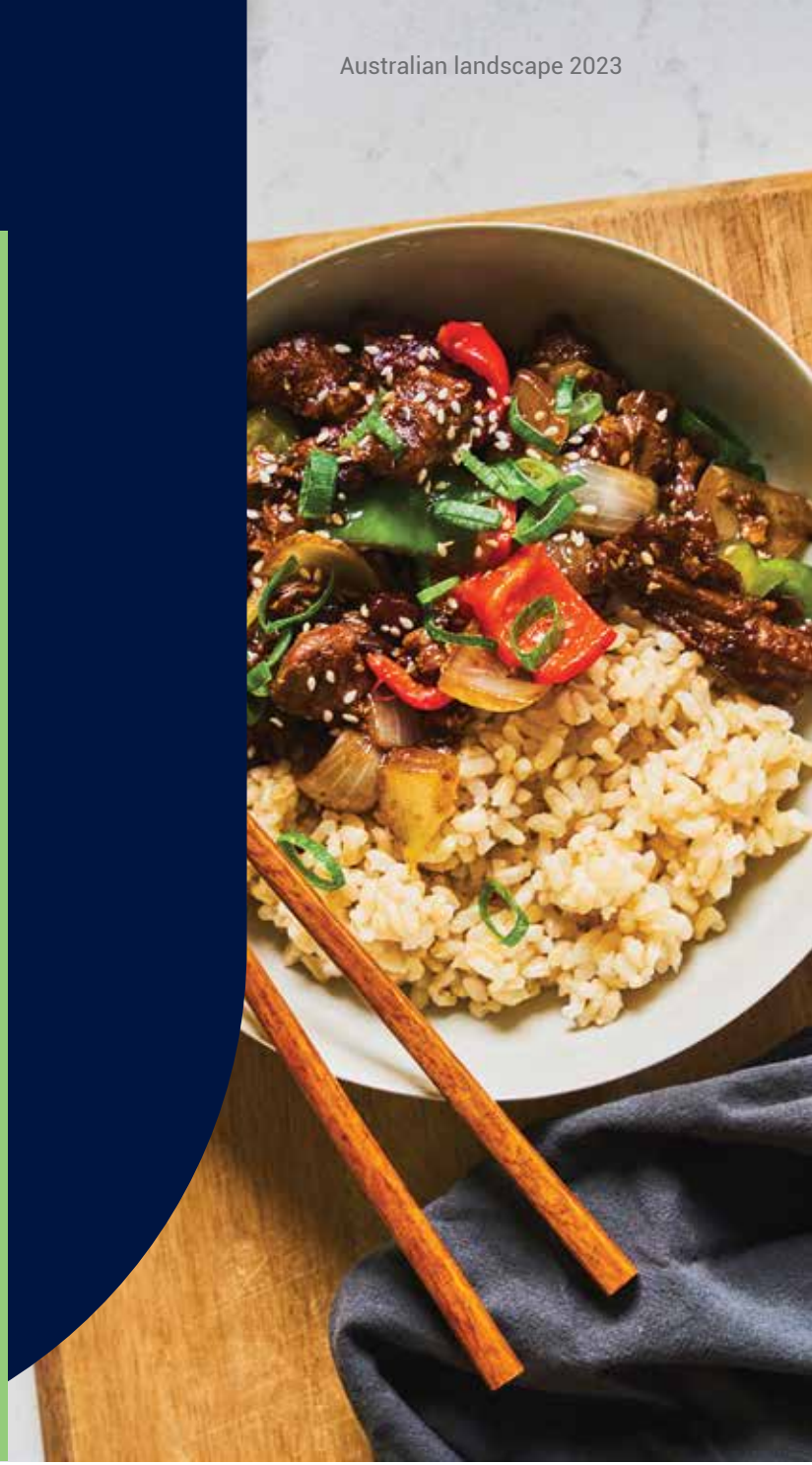
Riordan explains that for Australia to meet the broader opportunity in plant protein ingredients, innovation and collaboration is required across the supply chain. "There remain many areas across the supply chain from field to fork where innovation and commercialisation needs to advance. I believe we will start to see a stronger ecosystem develop where the expertise and infrastructure across the supply chain is better leveraged to meet market needs on taste, nutrition and cost."

At the company's processing and production facility in Western Sydney, the company now transforms sustainably grown Australian wheat into semi-finished ingredients for use in a wide variety of food categories, including plant-based meat. Products are mostly sold B2B, while some ambient flavoured plant-based meat products are sold to foodservice outlets or direct to the end consumer.

Since its founding, Harvest B has raised over $7.1m from backers such as Woolworth's venture capital arm, W23 Ventures, Aura Ventures, Mandalay Venture Partners, Alberts Impact Ventures as well as received a $1m grant from the Advanced Manufacturing Growth Centre (AMGC) Commercialisation Fund.[187] These investments have enabled the company to invest in infrastructure to establish its pilot production facility, as well as to undertake further R&D to identify other Australian crops that can successfully be used as high-quality protein ingredients.

For Harvest B, the $1m AMGC grant made private investors' capital more efficient, added credibility to the project and helped to connect the company with the wider industry. "The challenge in manufacturing is that it's not where venture capital has been putting its money for the last 20 years," said Riordan. "Government has a huge role to play in early ecosystem building to help create the right incentives for private capital to come in and support scale."[188]

Dr Jens Goennemann, Managing Director of the AMGC Advanced Manufacturing Growth Centre spoke to the value of investing in Harvest B's plant protein supply chain at the facility's official opening at the end of 2022: "This is everything that triggers our senses at the AMGC, adding value onshore to commodities not only to feed Australia, but feed the world and decarbonise it."[189]



Pictured: Harvest B's slow cooked diced beef Complementary Protein is 50% plant-based protein and 50% conventional beef. Source: Harvest B.

Investment

Echoing the funding slowdown seen globally in venture capital, including into emerging technologies such as alternative proteins, investment in the plant-based meat industry slowed from 2020 to 2023.

In Australia, US$14.3m was raised by plant-based meat companies in FY23 (AU$16.75m). Of this, the largest raise was by Fable Food Co, raising US$8.5m (AU$12.3m) in February 2023 to help fund its expansion plans in the UK and US, as well as research and new product development.[190]

Although this report covers FY23 specifically, Australian plant-based meat fund raising in previous calendar years is also shown below:

- 2020 **USD$55m**
- 2021 **USD$61.5m**
- 2022 **USD$19.2m**
- 2023 **USD$9.5m**

This funding slowdown is being experienced by almost every sector and in particular in early-stage industries and is not unique to the plant-based or alternative proteins industries.

The *State of Australian Startup Funding report 2023* found that there was a year-on-year decline of 54% for investment in Australian start-ups, compared to the global reduction of 38%.[191] The AFGC highlighted the difficulties for Australian food manufacturers to raise funds in the current macroeconomic conditions, noting that FY22 saw a 12.3% decline in investment in the food product manufacturing subsector.[192]

Speaking to the impacts of this reduced investment, AFGC CEO Tanya Barden highlighted the need for investment in helping to modernise and transform Australia's food production. In reference to the food manufacturing industry she said, "[It] must attract new capital to embrace new technologies and remain competitive with offshore competitors after more than a decade of stagnant investment."[193]

A 2022 report from CSIRO found that every dollar invested in R&D returned $3.50 to the wider economy, and that there was a 10% average annual return on investments, although noted that attracting R&D investment in Australia was challenging.[194] In February 2024, the Department of Industry, Science and Resources confirmed that direct Australian Government spending on R&D in 2022-23 was the lowest in the last 30 years at only 0.49% of GDP. For comparison, nations such as South Korea and Germany typically invest 3% of GDP on domestic R&D projects.[195]

Equally important is the investment in the plant-protein supply chain, a lost revenue stream for Australia's agricultural sector and farmers if this supply chain and value-adding opportunity is not realised.

In August 2023, the Australian Government announced that a proposed project from a consortium of APP, Thomas Foods, and AGT Foods Australia, was one of eight Modern Manufacturing Initiative grant recipients to have their funding withdrawn by the Government.[197] [198] The proposed project would have supplied up to 25,000 tonnes of Australian grown pulse protein per year, as well as created up to 1,345 construction jobs and 384 new direct manufacturing jobs by 2024. The change in direction from the Government leads to uncertainty in the sector, and slows the progress towards developing a commercial Australian plant protein supply chain.

> ***"Investment in Australia's food and grocery manufacturing industry is an investment in the future and our sovereign manufacturing capacity."***
>
> Tanya Barden, CEO, AFGC[196]

Co-investments by governments in plant protein processing facilities remain essential, as they build considerable momentum within the sector, increasing confidence and attracting further investment and R&D, ultimately to the benefit of Australian farmers and regional centres. Future investments in plant processing facilities remain essential and there is more on this topic in the Path Forward chapter.

Source: Australian Plant Proteins.

Plant-based meat and plant protein ingredient businesses operating in Australia in April 2024

Plant protein ingredient suppliers (7)

- Australian Plant Proteins
- Eighth Day
- Unigrain
- Wide Open Agriculture
- Integra Foods
- Hemp Harvests

Plant-based meat manufacturers (22)

- Byron Plant Based
- Coco Lucas
- Fascin Foods
- forbidden. foods
- G&G
- Harvest B
- Proform Foods
- Sanitarium
- Vegetarian Butcher
- Delicious
- flexitarian foods
- Rogue
- Simplot
- Soulfresh
- Unreal Co
- The Why Meat Co.
- Plant Based
- CD Cale's Daughters
- fable
- Slape + Sons

Brands and products

In FY23 there were 23 Australian businesses in the plant-based meat industry, producing products under 28 brands. This number reduced to 22 with a merger in late 2023.

Since FY23, a handful of Australian brands have seized the opportunity to partner and consolidate their position in the market. Fenn Foods and All G Foods' plant-based meat brand Love BUDS merged forming the Aussie Plant Based Co.[199] Fenn Foods brand vEEF will continue with its retail presence, while Love BUDS' products will be focused on foodservice channels. The Aussie Plant Based Co has said it will consolidate its production to the existing manufacturing facility previously owned by Fenn Foods in Queensland.[200]

Food Frontier's industry consultation found that most Australian plant-based meat companies produce their products domestically. Some companies employ a mixed method of importing some specific products, while producing other products in their range locally, and a minority of companies import their entire range of products. The common reason for importing these products is due to the highly specialised manufacturing process, machinery and skills required to manufacture these products, which is not currently available in Australia, but has long been established in overseas markets.

22 Australian plant-based meat companies in 2024

Up from 10 in FY19

270 products in Australian retail
63% of products are Australian brands

v2food acquired plant-based meal provider Soulara in 2024 and launched fitness meals provider MACROS (which includes animal based and plant-based options) in early 2024 to extend its product range through new channels.[201]

Harvest B commercialised its ambient 1.0kg meal prep protein kits for food service use and was added to online consumer health retailer Healthylife in 2023.[202] In 2024, the kits were launched in the United States via Walmart and Kroger. In 2024 the company also launched a range of complementary proteins including a beef burger, diced beef and diced lamb for the foodservice sector, containing a mix of plant and animal proteins. Co-founder Kristi Riordan explained that Harvest B's complementary proteins "help consumers to eat in the way they love—food that tastes great, in familiar formats, but is healthier, more sustainable and a cost-effective solution for businesses in the face of ongoing inflationary pressures."[203]

In 2023 international company Monde Nissin developed and locally produced new ready meal products and plant-based deli slices for the Australian market to capitalise on the growth in these formats, sold through major retail outlets.[204] In 2022, Cale and Daughters, parent company of brands Made with Plants and Get Plant'd, announced a joint partnership with Israeli plant-based food company Vgarden to expand its production capability with new production and warehousing facilities in Brisbane.[205] The facility will be used by both companies to locally produce both plant-based meats and plant-based dairy products.

Retail

Of the 292 plant-based meat products available in Australian retailers at the close of FY23, 63% were from Australian brands, an increase from 42% in FY20. Forty-eight per cent of the 292 were manufactured domestically.

The retail component of the plant-based meat market has evolved considerably since Food Frontier's FY20 *State of the Industry* report. An increase in the overall number of SKUs since 2020 shows that manufacturers are adapting to consumer demand and growth, especially in some key formats, however this increase in product numbers does not correlate directly to increased retail sales.

"We're ripe for a period of consolidation. There's still a strong belief in the end game, but we underestimated how difficult it would be to change people's entrenched habits" - Phil Morle, Main Sequence Ventures[206]

In January 2024 there were 275 plant-based meat products for sale in Australia, in FY23 this number was higher—peaking at almost 350. Across the 2023 financial year and into the start of 2024, the plant-based meat category experienced consolidation, with SKU rationalisation occurring in the two major supermarkets. The shelf space for plant-based meats in these retailers has reduced from the highs in 2020 - 2021, particularly in regional stores. Retailers note that the demand for plant-based meats is much higher in capital cities than in regional areas, aligning with the wider availability of products on shelves in city stores. Independent supermarkets such as IGA, Foodworks and Harris

Farm often stock a broader variety of plant-based meat products than Coles and Woolworths, however these retailers have a smaller overall market share.

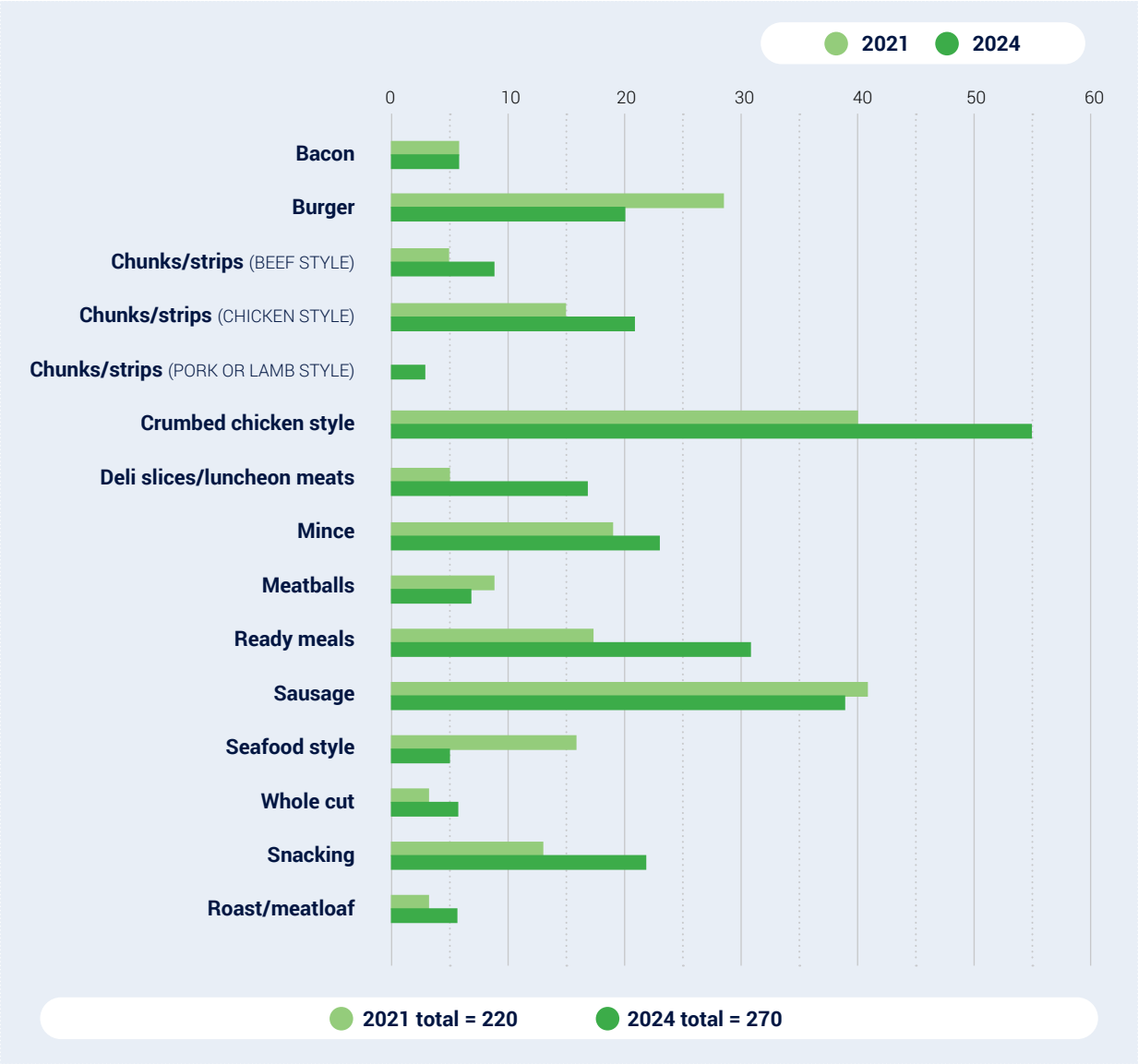
During FY23, several international plant-based meat brands withdrew products from the Australian market and are reviewing their strategy within the sector, notably Nestle's Harvest Gourmet brand as well as NotCo, Future Farm, Oumpf and Moving Mountains. However, the past year has also seen several New Zealand brands enter the Australian market, with Off Piste, Plan*t and Grater Goods launching products into Australian retail and foodservice channels across 2023.

Format trends

The past few years has seen the diversity of plant-based meat formats increase, with relative stabilisation in the number of long-standing formats such as burgers and mince in favour of increases in newer formats and flavours such as strips and chunks, or whole-cut style products. A shift towards convenience products has been observed since January 2021. The number of deli meats, ready meals, snacking and crumbed chicken-style products has increased, despite the removal of some products or flavours since their launch. Interestingly, the number of seafood-style products has declined, with a 69% reduction in product numbers since 2021.

Replicating trends seen overseas, the number of frozen products available for sale in Australia has increased by 10% and now makes up just over half of all products on shelves. Chilled is still the preferred format for retail consumers, while frozen products are preferred by the foodservice channel.

Figure 10. Plant-based meat product format trends



Changes in plant-based meat products formats available in retail in Australia. Data collected January 2021 and January 2024.

Price

The impact of inflation on consumer spending

Similar to the trends explored in the Global Landscape chapter, reduced consumer confidence and overall spending impacted Australian retail sales of plant-based meat across FY23. In times of increased cost-of-living pressures the price of products becomes a deciding factor for consumers, and many consumers still view plant-based meat products as luxury or occasional purchases. Both plant-based meat companies and retailers report stronger retail sales during price promotions, indicating that the regular retail prices for plant-based meat is still too high for many consumers.

Inflation began to increase in Australia in September 2020, rising sharply to December 2022, increasing the prices of goods, services and manufacturing for all Australians. According to the RBA, between 2021 and 2023, general inflation rose 6.1% annually,[207] with ABS data showing that total food inflation was even higher at 9.2%.[208]

According to Roy Morgan Australian consumer confidence remained well below its long-term average sitting at 77.9 points in October 2023—lower than levels recorded in the Global Financial Crisis.[209] Fifty-two per cent of households felt they were financially worse off than they were 12 months previously and 37% believed the next 12 months economic conditions would be bad. Unsurprisingly, spending on discretionary retail remained low towards the end of 2023.[210]

In November 2023 Nielsen IQ found that 86% of Australians were using cost saving techniques to manage rising grocery prices, including switching to more affordable brands (45%), buying cheaper alternatives such as a cheaper cut of conventional meat (42%), buying less of what they previously had (36%), not buying certain products at all (32%), and trying to consume less food or drink (24%).[211] When asked what items they were most likely to cut back on to manage rising grocery prices, more Australians reported reducing purchases of perceived indulgences, snack foods and premium foods, and were less likely to reduce purchases of fresh fruit and vegetables and dairy products.[212]

Price analysis

Food Frontier product and price tracking of retail products found that as a category, plant-based meat products have increased in price an average of 7.4% from December 2021 to December 2023 (figure 11). Average prices of conventional meat and seafoods increased 8.2% in the same time.[213]

Figure 11. Average prices of plant-based meat formats over time

Format category	Average price per kilo 2021 Dec	Percentage change		Average price per kilo 2023 Dec
Bacon	$35.33 (n=6)	**27.5**	▲	$45.04 (n=6)
Burgers	$26.04 (n=13)	**9.5**	▲	$28.95 (n=13)
Strips / chunks chicken style	$28.55 (n=6)	**4.4**	▲	$29.80 (n=6)
Strips / chunks beef-style	$30.98 (n=5)	**-10.0**	▼	$27.88 (n=6)
Mince	$23.69 (n=12)	**-5.3**	▼	$22.44 (n=9)
Crumbed chicken-style	$23.57 (n=27)	**-0.6**	▼	$23.43 (n=37)
Sausages	$20.06 (n=16)	**26.6**	▲	$25.40 (n=13)
Ready meals	$20.66 (n=12)	**7.8**	▲	$21.82 (n=13)
Seafood-style	$22.52 (n=7)	**17.6**	▲	$25.87 (n=4)
Snacking (pies, sausage rolls, finger foods)	$24.55 (n=9)	**-21.1**	▼	$19.37 (n=9)
Other (meatballs, whole cut, roast, deli slices, chunks/ strips other flavours)	$28.12 (n=18)	**14.7**	▲	$32.26 (n=18)
All products	$24.57 (n=128)	**7.4**	▲	$26.39 (n=135)

All prices in AUD. Methodology: Price data collected at major metro Coles and Woolworths retail stores in Melbourne and Sydney in December 2021 and December 2023. Whilst Food Frontier has endeavoured to portray a two-year comparison of the same products, due to the dynamic and growing nature of the category, an exact comparison of the same products is not possible. Many products and/or flavours have been removed from sale since December 2021, and many more products have launched since December 2021.

Whilst some formats of plant-based meat experienced significant price increases across the two-year period, such as sausages and bacon, others remained stable or even decreased.

Beef-style strips/chunks and mince products experienced average price reductions of -10.0% and -5.3% respectively, while prices of crumbed chicken-style products such as schnitzels and nuggets fell by -0.6%. The biggest reduction in price was observed in the snacking category which includes products such as pies, sausage rolls and finger foods, with an overall price reduction of -21.1%.

Food Frontier's consultation with industry showed that many Australian plant-based meat producers have made efforts to avoid price increases and instead aimed to lower the costs of products, with mince products being a primary focus due to its familiarity to consumers and versatility across cuisines. Acknowledging that price is a key barrier to consumer uptake, Australian plant-based meat manufacturers explained that where possible they absorbed price increases and avoided passing them on to the consumer. Some companies improved efficiencies in their supply chain, while others vertically integrated their operations to reduce overall costs.

Speaking to the *Australian Financial Review* in March 2022, v2food founder Nick Hazell said that although the costs of ingredients had increased 5 to 15%, the company had pursued a deliberate strategy to internalise costs and maintain its pricing. Their long-term strategy aims to appeal to consumers faced with price increases for conventional meat as the company builds scale, but it reduces company profits in the short term.[214]

Another reason for the reduction in price in some format categories is the departure of several imported plant-based meat brands and products that were priced much higher per kilo than locally produced products.

Food Frontier product and price analysis of 135 products on retail shelves in December 2023 found that, per kilo, Australian made plant-based meat products are on average $3.72 less than imported products—meaning that imported products are 15% more expensive.

Food Frontier's *2020 State of the Industry* report found that imported products were $3.50 higher per kilo than domestic products, with the difference between domestic and imported products increasing by 22 cents in the past three years (figure 12). Some reasons for this include the relative weakness of the Australian dollar against international currencies and that imported products tend to be frozen (which requires cold-chain logistics and transport below -18C and is more expensive to operate than chilled cold chain). These products are often imported to Australia via distributors or other intermediaries, rather than directly by the companies themselves, which also increases the costs.

Figure 12. Average price comparison of Australian made plant-based meat products compared to imported plant-based meat products

	Price per kilo	
Australian plant-based meat products	$24.99	n=84
Imported plant-based meat products	$28.71	n=51
Price difference	$3.72	14.8%

All prices in AUD. Prices at December 2023. Prices compared were regular ticketed prices, not promotional or sale prices. Country of origin was determined by product labelling.

Comparison to conventional meat

Plant-based meat is getting closer to reaching price parity with conventional meat, with some formats costing only a few cents more per kilo.

Overall, plant-based meat products still command a price premium compared to their conventional meat counterparts, however Food Frontier's analysis found that this price premium has reduced significantly since 2020, which tracked an average price premium of 49%. Plant-based meats are now on average 33% more expensive than conventional meat products, a reduction of 15% since 2020.

Ready meals featuring plant-based meats have almost reached price parity at 3.2% more expensive, with seafood-style products and beef-style strips/chunks close to reaching price parity. Bacon and burger formats have the highest premium.

Per kilo, plant-based meat products are priced similarly to low-fat or premium conventional meat equivalent products, and lower than most organic or grass-fed conventional meat products. However, compared to the budget or bulk packaged conventional meat products, equivalent plant-based meat products are on average 40–100% more expensive. Plant-based meat products are generally priced similarly to traditional vegetable burgers.

Products produced in Australia are much more price competitive than imported products: commanding, on average, a 22% premium compared to a 48% premium for imported products. Some domestically produced format categories have reached or are close to reaching price parity with conventional meat: chicken-style chunks/strips (-0.5%), ready meals (0.3%) and seafood-style products (-5.3%).

Figure 13. Price comparisons between plant-based meat and conventional meat products

Format category	Price premium for plant-based meat compared to conventional meat	Price premium for Australian made plant-based meat compared to conventional meat	Price premium for Imported plant-based meat compared to conventional meat
Bacon	83.0%	53.2%	112%
Burgers	63.4%	49.4%	98%
Chunks/strips Beef-style	12.4%	2.8%	33.2%
Chunks/strips Chicken-style	22.5%	-0.5%	36.5%
Crumbed chicken-style	35%	37.3%	31.4%
Mince	24.6%	8.0%	57.9%
Sausages	56.8%	56.9%	54.3%
Seafood-style	1.5%	-5.3%	9%
Ready meals	3.2%	0.3%	4%
All products	32.8%	22.4%	48.5%

All prices in AUD. Methodology: Prices compared December 2023. Prices compared were regular ticketed prices, not promotional or sale prices. Prices for conventional meat products were recorded in-store and from retailer's online stores and were averaged to determine the price per kilo of each format category. This was then compared with plant-based meat products, to determine the price premium for both domestically produced and imported plant-based meats.

Foodservice

Foodservice has emerged as the biggest growth area for domestic plant-based meat manufacturers in FY23. Wholesale sales of plant-based meat to the foodservice sector grew at a 58.6% CAGR from $31m in FY20 to $123.6m in FY23. The volume of plant-based meat sales to foodservice was 4,396 tonnes in FY23.

Noting the growth seen in foodservice internationally; the growth of plant-based meat in the Australian foodservice sector is not unexpected. The last time wholesale foodservice sales were calculated in FY20, the final quarter of the period included the first pandemic lockdown. This resulted in a reduction of $4m on the year before in FY19, when $35m in wholesale foodservice sales was recorded. In FY23 however, increased consumer interest in health and plant-based eating coincided with a rebound in the foodservice sector as Australian consumers returned to dining out, producing record growth and sales for the plant-based meat category.

The plant-based meat industry still has room to grow in the foodservice sector, as foodservice distributors and venues are in the early phases of adopting plant-based meats in their offerings. As discussed in the Global Updates chapter, the foodservice channel plays a role as an accessible trial opportunity for consumers due to the often-heightened experience of taste, a sense of novelty and enjoyment, and the element of expert preparation in restaurant environments.

There is evidence to show that although consumers may be cutting back on their grocery spend, many Australians are still willing dine out. In November 2023 CommBank iQ found that while consumers were cutting back in several categories of essential and discretionary spending, spending on dining out increased, as did spending on travel/accommodation and entertainment. This trend defies slowdowns observed in the commercial foodservice sectors in the US and UK, with Food Industry Foresight noting that in uncertain economic times, Australians will 'trade down' to a more affordable venue or meal but won't stop dining out altogether.[215]

Trends

The commercial foodservice sector in Australia includes QSRs, cafes, full-service restaurants, hotels and accommodation providers, caterers, clubs, pubs and function centres; and the institutional foodservice sector comprises hospitals, aged care, education, childcare, military, correctional and workplaces.

According to Food Industry Foresight, in the commercial foodservice sector, QSRs represented 80% of the volume of plant-based meat sales in 2022,[216] indicating the potential for growth in other segments including cafes and full-service restaurants.

In terms of value, Food Industry Foresight's data shows that in 2022 the top five plant-based meat formats the commercial foodservice sector were in descending order: beef-style burgers, bacons, chicken-style burgers, mince and chicken-style strips/slices. This aligns to the higher volume of plant-based meat sold in QSRs in the same year, which typically serve burgers or sandwich style products. In the same year in the institutional foodservice sector, it was noted that sausages, chicken-style strips/slices, mince, chicken-style pre-prepared products (battered and crumbed), and beef-style burgers were top five formats in value, indicating that institutional operators are looking for and serving plant-based meat in a wider variety of dishes and cuisines.[217]

The early adopters in embracing plant-based meats on menus, QSRs, are still leading by example when it comes to offering diners more choice in the form of plant-based meat options. With research demonstrating that pricing influences consumer choice, some restaurants have chosen to offer plant-based meat menu items at the same price as conventional meats.

Plant-based rendang prepared by Compass Group chefs.

Hunky Dory offers Omni plant-based fish on its menu for the same price as the default fish option.

In 2019 Hungry Jacks was the first major QSR in Australia to introduce plant-based meat using v2food product for its Plant Based Whopper® burger as well as several other variations, priced the same as conventional meat menu items. Mexican restaurant chain Fonda features Fable Food Co's shredded mushrooms, offering consumers the opportunity to substitute plant-based meat for the same price as conventional meats. Burger restaurant chain Grill'd has partnered with Impossible Foods since 2021, offering the Impossible burger patty on two standalone burgers and the option to swap it into a conventional meat burger for an extra dollar. Seafood QSR Hunky Dory has included a plant-based fish option on its menu since February 2020. In May 2023 the chain began a new partnership with Hong Kong plant-based meat brand OmniFoods and now uses the Omni Golden Fillet as its Fishless Fish for the same price as its default fish option across its 15 stores.

Following suit from its international franchises, McDonalds in Victoria partnered with Beyond Meat to trial the McPlant on menus across 270 stores in January 2023, however the trial did not result in a permanent menu fixture.[218]

Australian consumer trends

Depending on sources, it is reported that between of 20 to 39% of Australians are reducing their meat consumption or eating none at all.[219 220 221 222 223]

YouGov data from January 2023 found that 39% of Australians are looking to reduce their meat intake. The data later found in October 2023 that 19% of Australians follow a flexitarian diet pattern (defined by YouGov as mostly vegetarian but occasionally consume meat or seafood), with a further 6% either vegetarian (no animal meat or seafood but do consume eggs and dairy) or vegan (no animal products at all).[224] The data did not contain information on meat reducers—consumers who are eating less meat than they have in previous years, but more than a few times a week. Research from Griffith University in February 2023 found that 32.2% of Australians had reduced their meat consumption compared to the previous year.[225]

When comparing dietary patterns between generations, YouGov found that Millennials (25%) and Gen X (24%) have the highest proportion of flexitarians, with Baby Boomers (13%) and Gen Z (12%) the lowest proportion. However, Gen Z (9%) and Millennials (8%) have the highest proportion of vegan/vegetarians.

OECD[226] and ABS data shows[227] that red meat has witnessed a decline in consumption in Australia for the past two decades. In contrast, consumption of poultry has continued to climb due to its comparatively lower price and the perception of fewer associated health impacts than red meats.

Consumer views on plant-based meat

In January 2023 YouGov found that 38% of Australians are open to substituting conventional meat with plant-based meat.[228]

In December 2023 v2food analysed more than 16,000 consumers to determine what drives Australian consumers to try plant-based meat products.[229] v2food ANZ General Manager Nathaniel Tupou said that when v2food has had success in reaching new customers it can be tracked to developments in taste, health and convenience. He said consumers are "looking for products that taste delicious, are high in protein and healthy, that are convenient and easy to work into the meals they already consume."

Toluna research from 2021 found that 1-in-4 Australians had tried plant-based meat, with 66% saying they would purchase it again. When asked why they purchased plant-based meat, 70% said plant-based meats are healthier, 54% said environmental benefits and 44% said ethical reasons.[230] When asked why they wouldn't purchase plant-based meat again, consumers identified poor taste (52%) as their main barrier, followed by too expensive (39%), too rubbery (29%), or disliked by a family member or members (17%).

Similarly, in 2022 ingredients company Kerry found that 55% of Australian consumers started eating plant-based meat products because they considered them healthier, 46% due to curiosity and 41% because it is 'better for the planet'.[231] The survey found that consumers have higher taste expectations of plant-based meat burgers than they have for conventional beef burgers and are not willing to compromise on taste.

It reported that Australians are looking for chargrilled and caramelised notes, a depth and complexity of flavour, while rejecting bitter or overly salty tastes.

Price is a consistent barrier for consumers when it comes to purchasing plant-based meat in Australia and internationally. It was the second biggest barrier identified in the Toluna research and is increasingly important amidst cost-of-living pressures where consumers are looking to cut back on luxury items or indulgences in their grocery shop. As highlighted earlier, both plant-based meat companies and retailers notice that sales are strongest during promotional periods, indicating that current prices are too high for the casual shopper. The importance of meeting consumers' taste and price expectations is explored further in the Path Forward chapter.

Health

YouGov found that flexitarians are most likely to rank health (36%) a determining factor in dietary choices, while meat eaters are the most likely to rank taste (56%). [233] Griffith University found that health concerns were the biggest driver for those reducing their consumption of meat, followed by environmental concerns.[234]

As cost-of-living pressures continued to mount across 2023, in November 2023 NielsenIQ found that price and affordability were consistently the top attributes Australian consumers looked for when grocery shopping (88%). Many consumers were also influenced by the source and quality of the ingredients (74%) and the health credentials of new products (65%).[235]

As part of this emphasis on health, Australian consumers are increasingly looking for and purchasing high protein products. This coincides with the ongoing popularity of the CSIRO Total Wellbeing diet, which prioritises a higher protein intake in its various meal plans to increase satiety and reduce cravings for participants.[236] Euromonitor noted that products that can deliver both protein content and convenience to consumers were experiencing the biggest growth, such as protein bars (9.4% CAGR), and powders (10.7% CAGR).[237]
As older Australian's have higher daily protein requirements to protect against muscle loss as they age, Euromonitor highlighted the Baby Boomer generation as a key market for manufacturers of high protein products.

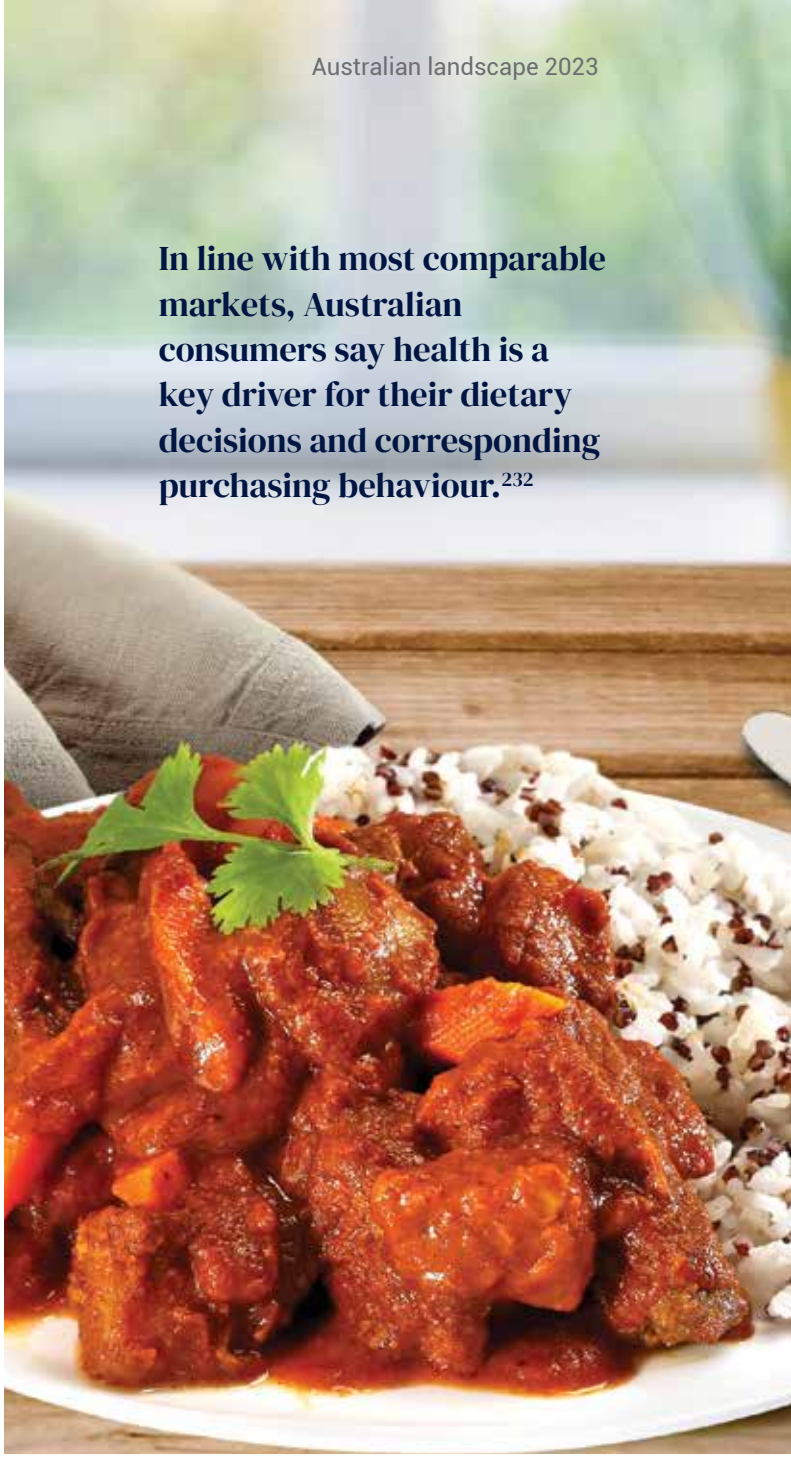
Research from November 2023 shows that health is also becoming a key driver for consumers when dining out with more than 40% of Australians intending to reduce meat consumption at home and dining out. While the research found that half of the respondents believe that eating healthier is more expensive, 93% of the respondents were willing to spend more when dining out, if it means the meal is healthier.[238]

Environment

Consumer awareness about the impacts of food systems on the environment and climate change has the potential to influence Australian consumer dietary trends and drive interest in flexitarian or plant-based diets. In Australia consumer awareness of the issue remains low, in-part due to minimal media coverage. A 2023 study analysing Australian media coverage of climate change over a 10-year period from 2011 to 2021, found that only 5% of the 2,892 articles mentioned the contributions of food systems to climate change.[239]

Similarly, a 2023 study found that although most Australians (88%) believe in climate change, a much smaller percentage (55%) understand that animal agriculture has an impact on climate change.[240] The authors highlighted that consumer awareness of the impacts of food production and dietary choices must increase for Australians to engage in pro-environmental behaviour change.

In line with most comparable markets, Australian consumers say health is a key driver for their dietary decisions and corresponding purchasing behaviour.[232]



Source: Cale & Daughters.

One way consumer awareness could increase is through public health measures such as official dietary guidance. In January 2024 it was announced that as part of the ongoing review of the 2013 The Australian Dietary Guidelines, the revised guidelines would incorporate messaging on sustainability.[241] The independent expert body responsible for developing the Australian Dietary Guidelines, The National Health and Medical Research Council noted multiple international examples of dietary guidelines that already incorporate sustainability messaging. Australia's move to incorporate messaging on sustainability within the Dietary Guidelines would place it alongside other nations as Canada, Switzerland, Sweden, Qatar, Norway, Brazil, and Germany that have embedded sustainability messaging within its national dietary guidelines.[242]

Nutrition

The motivational factors determining consumers' entry into the sector and regularly purchasing plant-based meats is more nuanced than it was in 2019 and 2020, when there was an element of novelty and excitement around the new products. What is apparent from the qualitative data gathered by Food Frontier and from other research is that health and nutrition has played a significant part in directing consumer choices around the sources of centre of plate protein. A prime driver of consumption, health concerns will impact the position of plant-based meats in diets both positively and negatively in Australia.

A 2022 Australian study by the George Institute for Global Health compared plant-based meat alternatives with their conventional meat counterparts, finding that overall, the plant-based meat products had a healthier nutritional profile than conventional meat products.[243] On average, plant-based meat products were found to be significantly lower in sodium and saturated fat than animal-based products, had higher Health Star Ratings and had equivalent protein and energy values. When assessing on levels of processing, most plant-based meat products (84%) and conventional meat products (89%) were considered ultra-processed. Uniquely, plant-based meats also offered high levels of fibre, which is not found in conventional meat.

The study echoed the findings of Food Frontier's 2020 nutrition analysis, which found that plant-based meat products are nutritionally comparable to or superior to their conventional meat counterparts when macronutrients, energy and health star ratings are compared.[244]

The George Institute study noted that of the 132 plant-based meat alternatives studied, only 12.1% were fortified with micronutrients such as iron, vitamin B12 and zinc highlighting an area for domestic plant-based meat manufacturers to focus on in future formulations.[245] Food Frontier product monitoring notes that since the data informing the George Institute study was collected in 2021, many more products are now including fortification of a combination of these three micronutrients as a standard part of product formulations, and expects this number to increase in coming years.

A 2024 Deakin University-led study, which collected data in 2022, analysed the nutritional composition of 704 plant-based products on sale in Australia including 178 plant-based meat products.[246] The study found that while the vast majority of plant-based meat products contained similar amounts of energy and key nutrients such as protein, saturated fat, sodium, there were a handful of outlier products that had exceptionally high values for sodium and saturated fat. As the study was deidentified, it is not possible to know if these products were manufactured locally or imported, however the results still highlight an area for Australian manufacturers to monitor in their own product formulations.

As noted in the Global Landscape section, there is an increase in media and consumer awareness of UPFs and associated health impacts. The increase in commentary about UPFs represents a new consideration for Australian consumers and has been used by detractors, particularly in the US, to deliver negative messaging about the sector.[247]

Food Frontier's consultation with industry confirmed that Australian plant-based meat manufacturers are prioritising the health and nutrition of their products. Food Frontier product audits have found that most companies have reformulated older products or launching new products that have improved nutritional profiles. Companies also confirmed that mineral fortification of products is a focus, with locally produced products from Vegie Delights, v2food, the Meet Co, vEEF, Birds Eye and others fortified with micronutrients such as vitamin B12, zinc and iron.

Projections

Australia 2030

Reviewing the 10-year horizon

Beginning with the first Food Frontier *State of the Industry* report, Deloitte Access Economics used the heuristic device of modelling three potential scenarios for where the Australian plant-based meat manufacturing industry could reach across the decade to 2030. Those scenarios represented a conservative, moderate and accelerated growth trajectory as follows:

1. **Conscious consumers' choice**, in which the Australian plant-based meat industry was considered to experience conservative growth between 2020 and 2030, which would see Australians spend a total of $1.4b on plant-based meat
2. **Popular and accessible alternative**, where the Australian plant-based meat industry maintained a strong growth path with total consumer expenditure reaching $2.9b
3. **Mass-market commodity,** which was modelled such that the popularity of the plant-based meat industry accelerated rapidly through to 2030 with a total annual spend of $4.6b.

As with the *2020 State of the Industry* report, this report evaluates how the current state of the industry reflects against each of those scenario projections. As seen in the table below, the actual change in size of the market from FY19-FY23 is not currently on track to realise any of the positions outlined by the scenarios developed in 2019.

These original scenarios were developed at a time of strong industry growth from FY18-FY19, amidst a backdrop of historically low interest rates, high investor confidence and generally positive consumer sentiment. Consumer interest in trying newly available plant-based meats was reflected by strong retail sales, retailers rapidly expanding the category's shelf space, low interest rates and strong venture capital deal flow among new businesses.

The slower than expected growth in recent years can be attributed to a confluence of macroeconomic trends as well as supply chain factors specific to the food manufacturing sector industry. Of note, poor consumer experiences with early iterations of plant-based meat products meat have resulted in lower rates of repurchase, and a slower return to the category, clashing with the early assumptions that consumer behaviour change would eventuate much faster than was possible.

Figure 14. Average annual growth rates required to achieve 2030 scenarios, and actual growth from FY19-FY23

Variable	Scenario 1: Conscious consumer's choice	Scenario 2: Popular and accessible alternative	Scenario 3: Mass market commodity	Actual CAGR from FY19 FY23
Consumer expenditure	23%	32%	38%	18%
Manufacturing sector revenue	21%	45%	48%	15%
Volume of local production	25%	42%	64%	15%
Direct FTEs supported by the sector	11%	23%	35%	27%

Source: Deloitte Access Economics 2024.

As Food Frontier highlighted in the *2020 State of the Industry* report, the growth trajectory of the industry will not be linear and could be expected to plateau, fall and accelerate at certain points, influenced by changes in technology, availability, prices and consumer preferences.[248]

Australia 2033

For this report Food Frontier engaged Deloitte Access Economics to recalculate new 10-year scenario models to incorporate the current best knowledge on economic impacts mentioned throughout the earlier chapters, consumer behaviours in response to these impacts, as well as to incorporate the FY23 business indicators of the Australian plant-based meat industry and its projected scope for growth. The market size for plant-based meat in Australia is now tipped to reach $1.65b in FY33, contributing over half a billon dollars in value added to the Australian economy and supporting more than 6,000 jobs.

The three scenarios project the potential economic contribution that the plant-based meat industry could make to the Australian economy by 2033, again under three different scenarios—conservative, moderate and accelerated—with new baselines and taking into account the factors affecting the industry over the past four years. Updated projections from Deloitte Access Economics have been revised down from previous versions to reflect a lower FY23 baseline, and recent observations on the changing size of the market. Further modelling and calibration will be required over time as social and commercial pressures impact the variables, as do the level of R&D and infrastructure investment in the industry.

This chapter presents a brief summary of the three different 2033 scenarios and the factors and societal requirements and data that underpins them. For the full explanation of the assumptions, projected outcomes and data underpinning the 2033 scenarios, please download the full 2033 Projections Report.

Figure 15. Potential 2033 scenario modelling outputs for the Australian plant-based meat industry

	FY20	FY23	FY33 Scenario 1	FY33 Scenario 2	FY33 Scenario 3
Total Australian consumer expenditure	**$185.2m**	**$272.5m**	**$361.1m**	**$1.65b**	**$3.70b**
Yearly expenditure per capita	$8.40	$10.20	$12.30	$54.80	$118.80
Manufacturing sector revenue	$69.8m	$62.0m	$117.5m	$572.8m	$1.88b
Volume of local production	2,482.9t	2,205.4t	4,756.3t	25,449.2t	98,646.4t
Total value added	**$59.0m**	**$45.8**	**$86.0m**	**$582.0m**	**$1.67b**
Direct value added	$12.6m	$9.7m	$18.2m	$123.4m	$354.7m
Indirect value added	$46.3m	$36.1m	$67.8m	$458.6m	$1.32b
Indirect value added - agriculture	NA	7.6m	14.3m	96.5m	277.4m
Total employment (FTE)	**547.0**	**477.5**	**895.7**	**6,063.0**	**17,430.7**
Direct employment (FTE)	246.0	204.2	383.1	2,593.1	7,455.0
Indirect employment (FTE)	301.0	273.3	512.6	3,469.9	9,975.7
Indirect employment - agriculture (FTE)	NA	89.6	168.1	1,137.7	3,270.9
Value of Australian exports	$2.7m	$4.0m	$11.8m	$114.6m	$564.6m

Source: Deloitte Access Economics, 2024.

Note: All dollar figures are nominal, in AUD. Value added and employment projections also assume that industry operational structure (e.g. intermediate expenditure, GOS margin, average wage) and the underlying input-output tables remain constant from FY23.

$361m
in domestic sales

896
full-time equivalent jobs

10%
of product exported

Scenario 1

Conscious consumers choice

Scenario 1 reflects a potential outcome for the Australian plant-based meat industry following minimal local R&D and infrastructure investment, continued reliance on imported ingredients and imported finished goods, and little growth in the consumer base for plant-based meat.

This scenario represents a conservative growth trajectory to 2033. In this scenario the plant-based meat category maintains a similar retail and food service market share to FY23 and grows at a similar rate to other food products, while the domestic plant-based meat manufacturing industry also grows at a similar pace. This reflects a continuation of trends observed in the past two to three years, such as the increasing cost pressures and consolidation that led to the slight reduction in domestic manufacturing from FY20-FY23, resulting in overall minimal nominal growth for the sector.

$1.65b
in domestic sales

6,063
full-time equivalent jobs

20%
of product exported

Scenario 2

Popular and accessible alternative

Scenario 2 reflects the potential with increased investment in local R&D and infrastructure, driving a competitive domestic plant-based meat manufacturing industry, reduced reliance on imported ingredients due to a growing local plant protein supply chain and reduced share of imported finished goods consumed in Australia. Growth in the number of consumers reducing conventional meat in their diets and improved product offerings corresponds to solid growth in consumer demand for plant-based meat. Scenario 2 is presented as the central scenario, encompassing the mid-points of all parameters and assumptions considered and is most likely to occur with the right industry action, investment and policy settings.

This scenario represents a moderate growth trajectory to 2033 and reflects a continuation of the medium-term trends (over the last five years) including the strong growth observed from FY19 to FY20. In this scenario moderate growth in the category is experienced in both the retail and foodservice sectors, with similar growth observed in the domestic plant-based meat manufacturing industry.

$3.7b
in domestic sales

17,430
full-time equivalent jobs

30%
of product exported

Scenario 3

Mass market commodity

Scenario 3 reflects a high-growth scenario for the Australian plant-based meat industry, towards the upper bound of potential values. It projects an outcome made possible by substantial local R&D and infrastructure investment driving a competitive domestic plant-based meat manufacturing industry with improved product offerings and little reliance on imported ingredients, a minor share of imported products consumed in Australia and strong growth in the consumer base for plant-based meat.

This scenario is characterised by strong and sustained growth in both the Australian consumption and production of plant-based meat, reflecting a resumption of the market conditions that led to the pre-pandemic era growth observed in FY19-FY20.

State-based contribution

Figure 16. State-based breakdown of economic contribution under future scenarios

State	FY23 actual	Scenario 1	Scenario 2	Scenario 3
NSW value added ($m)	21.0	39.3	266.2	765.3
NSW employment—total (FTE)	218.4	409.6	2,772.9	7,971.8
Qld value added ($m)	12.9	24.1	163.2	469.3
Qld employment—total (FTE)	133.9	251.2	1,700.3	4,888.3
Vic value added ($m)	10.9	20.4	138.1	397.0
Vic employment—total (FTE)	113.3	212.5	1,438.5	4,135.5
Rest of Aus value added ($m)	1.1	2.1	14.5	41.8
Rest of Aus employment—total (FTE)	11.9	22.4	151.3	435.0

For each scenario presented, Figure 16 shows the projected contribution that the plant-based meat manufacturing industry could make for economic value added and FTE employment to each state by 2033. These projections assume that plant-based meat manufacturing is likely to continue to expand in areas where food manufacturing already occurs, utilising existing infrastructure, machinery, workforce and supply chains that are already established in the Eastern states, with New South Wales, Queensland and Victoria the three largest expected beneficiaries of local plant-based meat manufacturing.

Importantly, these projections do not reflect any additional incentives or policy settings that individual states may introduce over the coming decade to attract and retain this new manufacturing industry, which would further influence the distribution of benefits from Australia's plant-based meat industry. Should governments invest in the required processing infrastructure to value add to their local grain and pulse crop production, for instance lupins in Western Australia or faba beans in South Australia, the share of economic contribution added to these states from the plant-based meat industries is likely to increase.

The impact of changes to consumer base and purchase frequency

Two of the key drivers of growth in all the three scenarios are the proportion of the population that purchases plant-based meat and the frequency at which they purchase it. Using current consumption rates as a baseline, further projections demonstrating the impact of changes to consumer base and purchase frequency have been modelled. Increases to either consumer base or purchase frequency could result in an increase between $759m and $1.36b of plant-based meat sales annually.

Please download the full 2033 Projections Report for graphs and details.

The path forward

Introduction

The ability of the plant-based meat industry to achieve the projected $1.65b of value by 2033 is not guaranteed. The past three years have shown several things of note.

The more mature international plant-based meat markets in North America and Europe have stalled somewhat, while the emerging markets in Latin America and Asia Pacific have continued to grow. Despite significant financial pressures felt by manufacturers and a cost-of-living crisis experienced by consumers, a market for plant-based meat has endured in Australia.

Regardless of these consumers' dietary habits—flexitarians, meat-reducers, vegetarians or vegans—a core base of them has enabled the industry to ride the storm of headwinds and survive against critical international media commentary. It is evident that the Australian plant-based meat industry is charting its own course. The data from FY23 shows an established industry that has market appeal to a segment of committed consumers. The challenge remains as to how the industry grows from a core of plant-based evangelists and early adopters to a mainstream consumer base, and beyond that, to continue expanding into export markets to supercharge the growth opportunity to hand.

The industry has universally adopted the mantra of "price, taste, texture". That is, in order to make progress and 'cross the chasm' from early adopters to reach the bulk of consumers, products need to be at price parity with conventional meat products against which they compete—whether on a weight basis or unit price basis. If not slightly cheaper they need to meet consumers' taste expectations and the texture of some products, particularly chunk and strip style products, needs to mimic more closely the texture to which consumers are accustomed.

Data shows that despite Australian consumers indicating they want to purchase products that are environmentally sustainable, when it comes to actual shopping behaviours, few consumers currently prioritise factors like environmental sustainability to compromise significantly on price, taste and texture. Currently, the only significant conscious decisions being made by consumers that determine their food choices are around health and nutrition. The clear message to the industry is that plant-based meat must compete against alternative protein sources as good, nutritious, high-quality food in its own right and win its place on the customer's plate, at the right price.

The plant-based meat industry is at an inflexion point in its growth trajectory. Data from this report and elsewhere shows that conscious consumption decisions are not yet strong enough to outweigh consumers' requirement for good, tasty food at the right price and the industry needs to focus on meeting requirements for price, taste, and texture.

Although it is inevitable that the challenges of food systems transformation, including health and environmental factors will become more mainstream and begin to influence more consumer choices in 2033, this is not the case just yet, but it is coming. The National Health and Medical Research Council has recommended that sustainability considerations be included in the new Australian Dietary Guidelines to be published in 2026, which could see more Australians have access to information about diet choices and sustainability.[249]

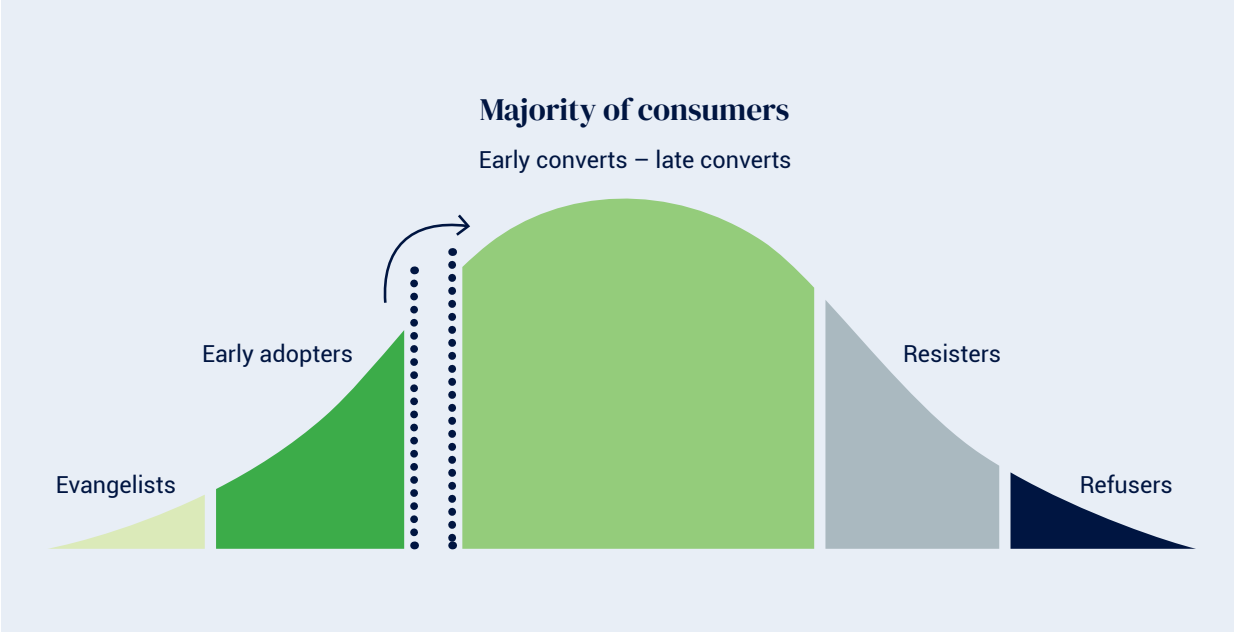
What is at risk?

There is ample evidence from global experts and authorities on why the food system requires transformation to become more sustainable, secure and healthy.[250 251] Global food systems are estimated to account for one quarter to one third of all greenhouse gas emissions[252 253] while the current western dietary patterns are linked to the development of non-communicable diseases like type 2 diabetes, cancers and cardiovascular diseases.[254 255 256 257]

There is no silver bullet for designing the successful transformation of our food system to make it sustainable, nutritious, plentiful and equitable. Instead, it will take all actors in the food system, working in tandem to bring about sustainable food systems transformation. It is evident that this transformation must include protein diversification, producing products with existing and alternative proteins, to meet future protein demand. This approach will reduce the environmental and health impacts of current production systems and help to meet the projected protein demand in the face of population growth, and reduced availability of resources such as land and water and an increasingly unpredictable climate.[258 259]

Increasing the availability and consumer uptake of plant-based meats and plant-based proteins represent an immediate opportunity for protein diversification in a way that is familiar and convenient for consumers, and an opportunity which Australia has the natural capital to play a leading role in. The potential outcomes for this opportunity were highlighted in the last chapter of this report—the Australian plant-based meat manufacturing industry could likely contribute half a billion dollars in value add, more than 6,000 jobs and reach a market value of $1.65b by 2033 if the central scenario projections are realised.

Figure 17. Crossing the chasm to mainstream adoption



The challenge ahead for the industry is to gain adoption by the majority of consumers beyond the existing core of committed evangelists and early adopters.

The focus now shifts to *how*. Not only how businesses can produce more plant-based meat and plant protein ingredients to meet the projected demand in years to come, but how this production can successfully and sustainably increase, and garner the support required to do so. How can governments and investors best support this industry, how can retailers and foodservice operators integrate this category into their operations to build value from the transition and most importantly, how can more consumers be convinced to choose plant-based meats as part of their regular diets.

Despite the wins and the growth seen in the Australian plant-based meat industry across FY23, the findings of this report also indicate that the time required for plant-based meat to move from trial purchases to mainstream is longer than was predicted in 2019. The industry must anticipate extended horizons for product development and consumer behaviour change, which in turn influence the timelines of consumer adoption of plant-based meat. Developing new markets to diversify distribution channels, including through accessing export markets, may help manufacturers find success in markets where plant-based meats and plant protein products are consumed more regularly. How can the information about where the scenarios project the industry could be in 10 years be used to help 'cross the chasm' to reach more consumers and increase the market share of plant-based meats?

The following are the settings, support and actions that, based on Food Frontier's assessment and consultations, are required to enable the Australian plant-based meat industry to meet the central scenario projection and realise its potential of $1.65b in value by 2033.

Plant-based meat companies

Key takeaways

- **Taste and texture**
  Collaboration across the food manufacturing supply chain is required to improve the taste and texture of plant-based meat products. R&D and advancements within the ingredients, flavour and equipment sectors will play a crucial role in new product development.
- **Price**
  Collaboration within the plant-based meat industry and across the entire food sector—particularly with conventional meat companies—will be crucial in helping the plant-based meat industry build scale and reduce costs.
- **Convenience**
  Convenience products are increasing in popularity with both consumers and retailers, so plant-based meat manufacturers should find ways for their products to fill this demand.
- **Health and nutrition**
  Health is a key driver for consumer interest and purchase, so plant-based meat manufacturers should consider health and nutrition when formulating products and the messaging on product labelling.
- **Consumer messaging**
  Brands should lead with messages about the taste and health of their product, followed by creating value propositions around the sustainability benefits of incorporating plant-based meats in diets.
- **Blended and hybrid products**
  New product categories such as blended and hybrid products offer new ways to improve the taste and texture of products, while also offering sustainability benefits.

Collaboration for innovation on taste and texture

Feedback from consumers over the past few years has been clear—some plant-based meat products taste great, while others are lacking. Consumers who are left disappointed by poor tasting products are harder to win back to the category the second time around.

While many products that fall short of consumer expectations haven't survived retailer range reviews, others may still remain due to a brand's ability to meet expectations on factors like price and marketing spend. Other brands have made incremental improvements through gradual reformulation, however scope to develop new generations of plant-based meat offerings is significant. Never has the need for collaboration across the industry to innovate on taste been higher.

Research shows that a high percentage of all new products in the fast-moving consumer goods category fail due to poor sales, for reasons including not meeting consumer taste or sensory expectations,[260] proving that even the most experienced of companies do not have a magic formula for new product development. New product development requires functional, sensory and stability testing and, depending on the scale of the change or complexity of the recipe, it can take three months to three years to develop a new product.[261] Improving existing products, for example replacing a plant protein concentrate or isolate with one made using different fractionation methods, could result in functional changes in the final product due to changed solubility of the protein, or gelling, thickening, foaming, of the ingredients. Given the long lead times required to see these changes reach the end consumer, plant-based meat manufacturers must ensure they have ongoing new product development processes in place to allow for continuous incremental innovation, from new and better performing ingredients to optimised manufacturing processes.

Progress across the supply chain is required to improve the taste and texture of plant-based meat products, with R&D and advancements within the ingredients, flavour and equipment sectors also playing a crucial role in new product development. Ingredients suppliers and flavour houses are innovating in tandem to offer the plant-based meat industry new solutions to improve on taste, while major equipment companies are developing new manufacturing processes and equipment to help improve the texture of products.

Some major food businesses are playing a role in facilitating access to new processing and flavour capabilities and alleviating the upfront capital expenditure required for major manufacturing equipment, by supporting access to pilot production or co-manufacturing facilities. For example, through initiatives like Bühler and Givaudan's Protein Innovation Centre in Singapore, plant-based meat companies have the opportunity to work with experts from both companies, refine their products and experiment with specialised advanced manufacturing equipment for a fee, and even utilise pilot production services.[262] With the Centre located in Singapore, it also has a focus on localising plant-based meat products to suit Asian palettes and cuisines, ready for export markets in the region. This approach allows plant-based meat manufacturers to defer the purchase of acquiring machinery too early. Instead, manufacturers can test and develop prototypes, and build scale and markets prior to moving to co-manufacturing or acquiring equipment for inhouse manufacturing. Without ongoing innovation and solutions from these specialised parts of the supply chain and close collaboration between suppliers and plant-based meat producers, the development and improvement of plant-based meat products will slow, and consumer uptake will suffer.

Similarly, further investment and innovation in manufacturing technologies can further improve the texture of plant-based meat products. The past few years has seen an increase in the use of high-moisture extrusion (HME) in plant-based meat manufacturing across the globe, with many in the industry considering that HME manufacturing imparts superior texture and mouthfeel to products. Food Frontier's consultation with industry found that in FY20 there was minimal Australian capability and capacity in HME manufacturing for plant-based meats, however in FY23 that capacity has grown among several Australian companies and will continue to increase with new HME capacity planned for 2024.

Other methods of product manufacturing that can impart improved textural qualities should also be explored, such as 3D printing or 3D layering to produce whole-cut plant-based meat products. Given the positive response to 3D food printing and layering applications in overseas markets used in products from Redefine Meat and Juicy Marbles in delivering realistic textures for whole-cut products, Australian companies that can commercialise similar technologies locally could secure a first-mover advantage in this region.

Collaboration to reduce prices

Food Frontier's price data shows that Australian plant-based meat manufacturers are working hard to bring down prices where possible, in a deliberate strategy to win consumers over. Despite the gains seen in some formats which have resulted in price drops or plateaus notwithstanding the inflationary economic environment, prices in other formats have increased and will continue to act as a deterrent to all but the most committed consumer.

Reducing prices will be a key requirement for increasing plant-based meat's market share in Australia and internationally, however it's a daunting proposition for start-ups or smaller businesses new to food manufacturing and operating on narrow margins. It is far easier for plant-based meat brands owned by large protein processors or multinational food corporations with an existing understanding of the food industry, access to capital, integrated supply chains, shared manufacturing facilities, production efficiencies and established distribution centres to reduce prices. Collaboration within the industry and across the entire food sector—particularly with conventional meat companies—will be crucial in helping the plant-based meat industry reduce its costs.

There are examples of Australian businesses that manufacture both plant-based meat products and conventional meat products. Norfolk & Rogue Foods produces plant-based and conventional meat products in its facility in Victoria and has offered a B2B contract manufacturing (co-manufacturing) service for plant-based meat products since 2019,[263] and Australian conventional meat processor Australian Country Choice in Queensland began manufacturing plant-based products for existing plant-based meat brands in 2023. Speaking to the decision to diversify their manufacturing capabilities into plant-based, Australian Country Choice Director David Foote said, "There's always someone in a family who doesn't have meat as a preference, so we just thought having this product in our stable of goods was just presenting more meal options."[264] Further collaborations with companies from across the food sector, including those with the necessary capability, capital and scale, can potentially unlock further price reductions for both businesses and consumers.

Convenience

Consumers want convenience and retailers have been working to meet that demand. Food Frontier's product data shows an increasing number of convenience-focused plant-based meat product formats in retail, from deli meats, mince packs with sauce, and ready meals containing plant-based meat. Australian retailers indicated there is still room for growth in convenience categories such as ready meals, offering opportunities for the plant-based meat industry to innovate new product offerings.

Convenience is also a consideration for export markets. Consumers in Asia are looking for plant-based meats that easily fit into their existing routines and cuisines and, outside of foodservice, are less interested in Western-style products like burger patties. Plant-based meat formats like mince, strips and chunks have experienced the most success in Asia thus far due to their versatility and familiarity, with newer products like plant-based luncheon meats also rising in popularity with consumers.[265]

Health and nutrition

A key theme from the past year in Australia and internationally is the consumer demand for healthier products. Health will continue to be a key driver and concern for consumers. The insights in the Global Updates and Australian Landscape chapters highlight areas of consumer interest when considering health and nutrition: a 'clean label' approach and reduced ingredient lists; a diversity of plant protein ingredients; fortification for nutritional equivalence with conventional meat; reduced saturated fat and sodium; and Health Star Ratings of 3.5 or above.

An ongoing challenge for manufacturers is the need to balance a great tasting product that delivers on nutrition, whilst communicating that value to consumers. The consumer interests mentioned above influenced the wording of v2foods' new packaging, launched in January 2024, which saw the company replace the term 'plant-based' with 'plant-protein' and highlight fibre. General Manager of Australia and New Zealand at v2food Nathaniel Tupou said it was crucial to highlight the products' high protein content on the front of the pack, "Getting the number one health benefit (protein) in the labelling of our product is an insight we believe helps all customers shortcut their decision making to one of the core benefits of our product."[267]

Consumer messaging

A key consideration for plant-based meat manufacturers and marketers is how to translate the pressing need for more sustainable protein options into products that taste great, meet health requirements, fit easily into routines, and win consumers over.

Marketing from some brands and purpose-driven companies has focussed on ideology and environment; however data now indicates that macro-economic factors, high price and poor taste experiences have slowed the expected growth of plant-based meat sales. This suggests that brands need to move beyond communicating the problem and offer solutions. This can be achieved by leading with value propositions about taste and health, followed by the sustainability and climate change benefits of adopting plant-based meats, which would appeal to consumers and their purchase motivations.

Original packaging

New packaging

source: v2food.

> *"New generation versions of existing products that are tastier, driving improved nutrition and higher health ratings in our products, or launching products that are familiar and easy to consume, are all areas that have allowed us to reach new customers"*
>
> Nathaniel Tupou,
> ANZ GM, v2food[266]

Research and consumer uptake indicates that consumers don't respond well to complex messages as they lead to consumer confusion. Similarly, messages with negative framing and suggestion of personal sacrifice, that goes against current normative behaviour, causes consumers to disengage[268] (for example a message implying that consumers should restrict all animal products from their diets, when consuming animal products is the norm for the majority of society).[269]

A 2023 Australian study found that a majority of participants were unwilling to stop eating conventional meat completely to reduce their own climate impact, however participants were more willing to reduce their meat consumption by half, ranking this action more likely than avoiding air-freighted foods and using public transport.[270] The study, along with others, demonstrates that in 2023 the average Australian consumer is unlikely to engage in wholescale dietary change and is more likely to make incremental steps.[271] [272]

Research shows that marketing messages that speak to dynamic normative behaviour change over time are better received[273] (for example messages that emphasise that more consumers are reducing consumption of animal products, rather than complete restriction), and that consumers are willing to make incremental pro-environmental changes in their habits and diets.[274] [275] This is a chance for plant-based meat manufacturers to offer a value proposition speaking to smaller, simple dietary swaps. This strategy should highlight the taste, health and environmental benefits of plant-based meat products and offer consumers convenient and familiar ways to diversify their protein choices a few times a week.

Regulations on climate reporting and traceability, such as reporting on scope 3 emissions, will come into effect for large companies in Australia over the next decade. They may also be expected of smaller companies in future. The challenge—and opportunity—for all companies, but especially plant-based meat manufacturers, is to create value from these new reporting requirements. While the cost of compliance for new regulations might appear onerous, these processes can also uncover new prospects for improving business performance and innovation, resulting in new, higher standard offerings to consumers.[276] Such reporting requirements will also highlight those food producers and manufacturers that may have been greenwashing their products and production methods, whilst rewards those products that are verifiably more sustainable and make for an even playing field for all Australian food manufacturers.

In 2033, Gen Z will be 22 to 37 years old and Millennials will be 38 to 53, and it will be Millennials who form the biggest population group in Australia. With research demonstrating that that Gen Z and Millennial consumers are more likely than older generations to purchase from brands they trust to care about the planet and sustainability,[277] such reporting can also be an important selling point for these consumers in years to come—a trait which plant-based meat companies should work to cater to in transparent messaging and where possible, quantifiable environmental metrics.

Blended and hybrid products

Blended products contain a mix of both plant-based proteins and conventional animal ingredients and demonstrate that embracing new protein types does not need to be an entirely exclusive approach. Blended products can help meet multiple goals at one time. During a cost-of-living crisis adding plant proteins to a burger patty can help bring down the cost of the meal for the provider and the consumer, it can improve the nutritional profile by reducing saturated fat and cholesterol—while also adding fibre and still serving equivalent protein to a conventional burger patty—and it can help meet sustainability goals by reducing the environmental impact of a 100% beef patty. A blended product can also meet consumer taste, texture and familiarity expectations. As with traditional plant-based meat products, the key will be to clearly and compellingly communicate the product's value-proposition to avoid consumer perceptions of inferiority. Harvest B co-founder Kristi Riordan spoke to the benefits of their blended products, saying its Complementary Proteins range "help consumers to eat in the way they love—food that tastes great, in familiar formats, but is healthier, more sustainable and a cost-effective solution."[278]

Hybrid products contain a mix of alternative protein ingredients in one product, such as plant-based proteins combined with fats made through precision fermentation. No hybrid products are on the market in Australia yet, however the technological developments in cellular agriculture and future collaborations across the alternative proteins sector will help drive the taste and texture of plant-based meat forward in meeting consumer expectations.

One example of the potential for collaboration is from Australian company Nourish Ingredients. The company makes animal-free fats through precision fermentation, intending for them to be sold B2B and used in plant-based meats to improve flavour and mouthfeel. Nourish Ingredients launched its first commercial product Tastilux in late 2023 at a public tasting of a chicken-style hybrid product, and is currently working to scale its production. Founder James Petrie believes that using an animal-free fat in plant-based meats is essential to getting the flavour and mouthfeel right and encouraging consumers to the category. He said that so far, "The emphasis has been on the protein, but very few people have been working on the fats. We thought there must be something that we could do to make these foods authentic and to bring in that real taste and aroma experience that you get out of an animal product."[279]

"As advancements in plant-based meat production continue, efficiency will improve, eventually rivalling the lean production processes of conventional animal meat. This will see it eventually scale to compete in the mass market food industry where manufacturers operate on a volume driven tight margin business model.

If plant-based meat companies are to survive they need to focus on profitability, efficiency, and returning value to the consumer. Key to this equation is the paramount importance of taste. And there is a need to educate consumers about the taste and the benefits of their products."

Alejandro Cancino, CEO and co-founder, Aussie Plant Based Company[280]

Retailers

Key takeaways

- **Price**
  - Retailers have a chance to demonstrate market leadership and follow the example of European counterparts in taking deliberate strategy to reduce the price of plant-based meat products to aid in consumer update.
- **Product placement in store**
  - Following the success of placing plant-based meat in a section of the conventional meat aisle, Australian consumers now expect to find plant-based meat products stocked here. A move away from this strategy may negatively affect sales.
  - Frozen products are slowly increasing in popularity, but some consumers may not be aware that plant-based meat products are available in the freezer aisle.

Price

Highlighted in the Global Updates chapter, many forward-thinking major retailers across the EU such as Lidl and Aldi, and QSR chains such as Burger King Germany, are leading with price parity tactics to contribute to their sustainability strategies. These businesses have intentionally set the price of plant-based meats and other alternatives at the same price or lower than their conventional counterparts, to remove the price barrier for consumers and encourage greater trial and repeat purchase.

Australian retailers have unparalleled influence on consumer uptake of new food products, especially through their pricing, margin, and marketing decisions. By following the lead of their counterparts in Europe and actively reducing internal benchmarks to make plant-based meat options more affordable, Australian retailers have the chance to demonstrate market leadership and attract customers loyal to the category, while advancing ESG objectives. The result could be rapid category growth: a 2022 report from consulting firm Kearney found that every 1% drop in price of plant-based meat burgers will lead to a 3% increase in market share.[281]

Fridge vs freezer

Research continues to indicate that displaying chilled plant-based meat products in the chilled section next to or near conventional meat is the best strategy for retailers to increase sales of plant-based meat for flexitarian consumers, without negatively impacting the sales of conventional meat.[283] These sections are best merchandised with clear aisle signage and shelf indicators separating plant-based products and conventional meat products.[284] [285]

UK retailer Tesco was an early pioneer of this placement and remains committed to the strategy, noting it was experiencing a 'second phase' of growth in the plant-based meat category in early 2024 as sales in the category rebounded.[286] The retailer reported that it sold an unprecedented amount (more than 100,000 units) of the newly stocked Juicy Marbles whole-cut steak-style product in the lead up to Valentine's Day, which it places in the chilled section nearby conventional meat products.

With Australian consumers now expecting to see plant-based meat products in the conventional meat section, any changes to this placement strategy for chilled plant-based meat products will potentially hinder sales growth of the category.

> ***"Before plant-based meats are in a position to reach their full potential, every link in the protein supply chain needs to focus on long-term growth rather than short-term profits. At the current rate, it may take plant-based proteins five to seven years to reach price parity, but there's no reason why that timeline can't be shortened if manufacturers and retailers can agree to put consumer needs and preferences ahead of margin."***
>
> Dr Jayson Lusk,
> Agricultural Economist,
> Kearney[282]

Food Frontier's retail product data shows a slow but growing trend towards plant-based meat products that are sold and stored in the freezer, although sales of chilled products still constituted more than half of total retail sales in FY23. In the past freezer products have been inaccurately perceived by some consumers as poorer quality compared to chilled products; however this perception seems to have shifted in recent years and consumers are now more willing to trial frozen products. Whilst freezer products require a more expensive cold chain for distribution and storage, consumers and retailers have indicated a growing preference for this storage format due to its longer shelf life to help reduce wastage. Some flexitarian consumers may not be aware that plant-based meat products are also available in the freezer aisle and so retailers and brands should consider increasing communication to highlight this through aisle signage, in-store marketing and other tactics.

Foodservice

Key takeaways

- **Institutional foodservice**
  This segment can offer large volume and consistent orders; however operators in this segment have greater requirements for cost effectiveness, specific nutritional parameters and restrictions on allergens.
- **Education**
  Chefs and foodservice operators will require education and support to become familiar with preparing plant-based meat products and to incorporate them on menus.
- **Menus**
  Foodservice operators can increase the uptake of plant based-meat dishes by their diners by employing behavioural nudges implemented through menus and the placement of dishes.

The biggest growth story of FY23, the foodservice sector presents the most immediate opportunity for Australian plant-based meat manufacturers to continue to grow in coming years. Compared to the unprecedented rates of growth observed in FY20-FY23 for plant-based meat in the foodservice sector—as the industry rebounded post-pandemic—slower rates of growth are probable in future years. However, with relatively small penetration of plant-based meat in just a few segments of the foodservice category, such as in QSRs and fast casual outlets, a large share of the foodservice market remains untapped for the plant-based meat industry with the potential to generate sustained and long-term growth across the next decade.

Already discussed in this chapter, and crucial for helping Australian plant-based meat manufacturers to increase market share in the foodservice sector as well, is the development of improved products to meet diners' needs while also offering benefits to foodservices businesses through increased product performance, nutrition and sustainability. Australian manufacturers have scope to develop both plant-based meat products as well as new blended products (plant-based proteins combined with conventional animal ingredients) to offer even more choice and flexibility.

Plant-based meat manufacturers that are looking to access institutional foodservice segments, such as hospitals, aged care or daycares, should also consider the nutritional requirements these sectors have for food. For example, hospitals and aged care centres need easily chewed and digestible high-protein products, while daycare centres are likely to have restrictions on certain allergens as well as specific nutritional guidelines they must follow. Institutional foodservice operators are price sensitive and operate on slim margins and will require cost effective solutions from suppliers.

Education

Strong and sustained growth of plant-based meat in foodservice will require a focus on education. Companies should ensure that chefs and foodservice operators are confident in preparing and offering plant-based meats to their diners. One method to achieve this is by supplying free product sample packs which include varied recipes, clear instructions for cooking products, provision of engaging foodservice-specific instructional content and videos featuring chefs from a variety of venues—such as high-end dining, fast casual, catering, and even institutional establishments—thereby demonstrating the versatility of applications and settings the products can be used in.

"Foodservice is great place to launch new products like plant-based meats. Diners are more willing to try something new in foodservice, when they have an expert cook preparing it for them."

Rod Fowler, Director,
Food Industry Foresight[287]

"Chef education and sending out free samples to venues is a good way to get in the door— operators don't want to spend money to experiment. There is always an element of trial and error for outlets as they won't know if diners will order new dishes until they put them on the menu, so they need to be confident in the product and their ability to create a dish their diners will enjoy."

Rod Fowler, Director,
Food Industry Foresight[288]

There are also opportunities to educate the next generation of chefs and foodservice operators in culinary schools and training institutes, ensuring that those who enter the foodservice workforce of the future are comfortable cooking with plant-based meats. Consider sponsorships or partnerships with training institutes, suppling product for students to use in lessons or lending internal company chef expertise for guest lectures and training modules.

Menus

Foodservice operators can take measures to increase the trial and uptake of plant-based meats on their menus. As discussed in earlier chapters, behavioural nudges such as the placing of dishes featuring plant-based meat ahead of conventional meat dishes influences their uptake by diners, as does increasing the total number of plant-based dishes on a menu.[289] [290]

Other successful initiatives on menus include using terms like 'plant-based' or 'plant-protein' over 'vegan' and 'vegetarian', and using sensory and hedonic descriptions on menus such as 'chargrilled plant-protein burger with smoky chipotle mayonnaise', instead of 'burger with plant patty'.[291]

In institutional settings where diners choose meals from a set buffet or canteen, research has found that presenting plant-based dishes first or as the default option increases their uptake, as does having information available on menus or in cafeterias about the environmental or health benefits of the plant-based dishes.[292] [293] Importantly, these messages are best received when they emphasise the positives of the plant-based dish, rather than highlighting the negatives of conventional animal dishes.

Agriculture and ingredients

Key takeaways

- **Benefits to agriculture**
  The agriculture sector is the largest indirect beneficiary of the economic activity generated from the plant-based meat industry in FY23. This is projected to remain the same in FY33, potentially worth $96m and creating 1,137 jobs.

- **Infrastructure**
  The agricultural opportunity is largely untapped in Australia due to a lack of domestic plant protein processing infrastructure. Expanded domestic production and availability of Australian grown plant protein ingredients offers new economic opportunities for Australian farmers with strong demand in both domestic plant-based food industries and in overseas export markets.

The agriculture sector is currently the largest indirect beneficiary of the economic activity generated from the plant-based meat industry, receiving a 21% share of the total value added and a 32% of total jobs in FY23. In 2033 Deloitte Access Economics predicts these values could be worth $96m and create 1,137 jobs with scope to increase further if agricultural potential is realised through increased domestic processing infrastructure.

Food Frontier's consultations revealed that the agricultural opportunities offered by the plant-based meat manufacturing industry and the broader plant-based food industry, are largely untapped in Australia due to a lack of domestic plant protein processing infrastructure. Expanded domestic production and increased availability of Australian grown plant protein ingredients offers new economic opportunities for Australian farmers to sell their commodity crops into value adding supply chains, with strong demand in both domestic plant-based food industries and in overseas export markets looking for high-quality and consistent plant protein products.

To unlock Australia's potential in plant protein ingredients, both public and private infrastructure investment is required in the immediate term to help build the required plant protein ingredient processing capacity. As highlighted in the Australian Landscape chapter, Australia already needs at least 10 facilities to meet current demand and could house up to 20 given expected demand growth. The capital outlay to construct processing facilities is considerable and will likely require co-investment, either in consortiums or public private partnerships to fund construction.

As it is not possible for Australia to compete on scale and price with long established suppliers of plant protein concentrates and isolates like China, Australia can instead compete on quality, traceability, consistency and functionality, and by offering plant proteins from less common sources with potentially superior qualities. Increasing the scale of plant protein production in Australia will go some way in reducing the costs of Australian ingredients for plant-based meat manufacturers, and provide new sourcing opportunities for those interested in utilising more Australian grown plant protein ingredients in their formulations. Beyond just plant-based meats, an increased supply of Australian plant protein ingredients would be leveraged by a broad spectrum of Australian food and beverage categories and can be expected to enjoy considerable export success with international manufacturers looking to incorporate Australia's consistently high-quality ingredients. As explored in Australian Landscape, we are already witnessing this with the current available domestic plant protein ingredient supply.

Without these strategic support mechanisms, Australia will continue to forfeit the economic value-adding opportunities for farming communities, limiting pulse production to rotational cropping and raw-form export into insecure global commodity markets, and leaving domestic manufacturers to depend on mostly imported plant protein ingredients.

Investors

Key takeaways

- **Infrastructure**
  - Australia remains underserved by plant protein processing infrastructure despite strong global demand for plant protein ingredients. Australian processing infrastructure will be in a strong position as one of the only domestic processing facilities in the face of such demand, combined with Australia's reputation for delivering high-quality and consistent products.
  - There are few shared, pilot production or co-manufacturing facilities with specialised equipment for plant-based meat products. These facilities can provide benefits and services across many smaller companies and may appeal to impact investors.
- **Sustainability outcomes**
  - Given that increased supply and uptake of plant-based proteins can help reduce the environmental impact of the current food system, investments in this industry can help to meet ESG goals for impact investors, large corporates or funds, and governments.

As emphasised in preceding chapters, investment from public and private sectors is paramount for the advancement and expansion of the plant-based meat industry. However, securing funding has become increasingly challenging in the current economic climate compared to previous years. The investment opportunity in Australia is in two main areas—in the upstream plant protein ingredients sector that supplies plant-based meat companies and the broader plant-based food sector with high-quality Australian grown and processed plant protein ingredients, and in the plant-based meat manufacturing industry itself.

To unlock Australia's potential in plant protein ingredients, infrastructure investment is required to help build the required plant protein ingredient processing capacity. Those that invest in commercial scale ingredient processing infrastructure will be in a strong position as one of only a handful of plant protein processors in Australia, producing ingredients that are already in demand locally and internationally. Future Australian processing facilities are well positioned to take advantage of Australia's existing high-protein crops and international reputation for exporting high-quality and consistent products.

Investment opportunities are ongoing in Australian plant-based meat companies, as these businesses look to expand and scale their facilities or incorporate new manufacturing equipment and processes. Similarly, plant-based meat manufacturers will require R&D funding for optimising products formulations, incorporating new ingredients, new product development, consumer testing and more.

Given that increased supply and uptake of plant-based proteins can help reduce the environmental impact of the current food system, investment in this industry can help to meet ESG goals for impact investors, large corporates or funds, and governments.

Impact investors looking to maximise benefits across many businesses may be interested in investing in shared, pilot production or co-manufacturing facilities, likely to be located at universities or research centres. Shared manufacturing facilities can allow for smaller businesses without the capital to purchase manufacturing equipment up front to access and produce proof of concept products and pilot scale production runs, helping them to produce income to build and scale their businesses sustainably.

Investments in the plant-based meat industry and its supporting supply chain and infrastructure are capable of strong returns, but likely to yield a lower internal rate of return due to the longer timeframe required to realise the return. This is a key consideration for generalist investors used to the rapid returns from software and other technologies with smaller infrastructure requirements. These timelines will shorten as the industry scales and profits will build as food security becomes more pressing over time. However, the importance of attracting funding from impact investors or investors from aligned or supportive VC firms shouldn't be discounted.

According to the 2022 report The Untapped Climate Opportunity in Alternative Proteins from the Boston Consulting Group, investments in plant-based meat led to greater cuts in greenhouse gas emissions than other green investments did.[294] The report found that each dollar invested in improving and scaling up the production of meat and dairy alternatives resulted in three times more greenhouse gas reductions compared with investment in green cement technology, seven times more than green buildings and 11 times more than zero-emission cars.[295]

Governments

Key takeaways

- **Leadership**
  Demonstrations of government support though communications, thought leadership and proactive engagement in the plant-based meat industry and the broader plant protein sector will help engender investor and consumer confidence.
- **Agriculture and ingredients**
  Government funding is required to help build plant protein processing infrastructure to unlock Australia's potential in plant protein ingredients, as well as to incentivise increased farming of plant protein crops.
- **Scaling sectoral capability**
  Government support for manufacturing facilities, R&D programs, skills development and targeted migrations programs are required to increase sectoral capabilities.
- **Regulation**
  The plant-based meat sector has shown it is willing to cooperate across the food sector and regulate through voluntary labelling guidelines. Overregulation of this fledgling industry risks losing opportunities.

Government leadership

By 2033, Deloitte Access Economics projects that the Australian plant-based meat industry could grow in market size from $272m in consumer expenditure in FY23, to between $361m to $3.7b. The industry could contribute between $86m and $1.6b in total value added to the economy and support a total employment figure between of 896 to 17,430 FTEs. But success in the higher range of Deloitte Access Economics' estimates for the industry is contingent on the right settings and support.

Highlighted in the Global Updates chapter, governments around the world that have recognised the requirement for food system transformation as an economic opportunity for their jurisdictions are engaging heavily with new and innovative food industries including alternative proteins. Policymakers should seek to facilitate the growth of this industry in Australia in recognition of its complementary nature to conventional animal protein industries, noting that all forms of protein will be critical to meet the exponential growth in global protein demand as the world's population reaches up to 9.7 billion by 2050.

A fundamental first step is the demonstration of support by Australian governments for the entire plant-based sector through public communication, thought leadership and proactive sectoral engagement. Such actions will foster positive sentiment for protein diversification and help engender investor and consumer confidence in the plant protein sector. This includes the exploration and adoption of strategies that increase the accessibility and affordability of plant-based options, in recognition of both the health and climate change imperatives of doing so. Similarly, utilising government procurement to incorporate such options into institutional settings, such as in aged care, hospitals, and schools, can address growing diet-related health issues and help reduce emissions.

Countries with comparable grain and legume crop production, such as a Canada, have sought to leverage their competitive advantages amidst growing global demand for plant protein ingredients. Through the government funded innovation supercluster, Protein Industries Canada, and $353m in public funding from 2018 through to 2028,[296] Canada has set itself on course to capture 10 per cent of the global market by 2035—valued at CA$25b— partnering across the entire supply chain to value-add commodities that were otherwise exported in raw form.[297]

Source: Fable.

Canada's plant protein ecosystem is now booming, bringing with it greater economic security for its growers, as well as increased private investment and employment in downstream manufacturing. Read full details in Spotlight on Canada on page 57.

Agriculture and ingredients

To unlock Australia's potential in plant protein ingredients, Australian governments need to co-invest with industry to help build the required plant protein ingredient processing capacity. The capital outlay for processing facilities is considerable and requires government support to realise. A 2022 report from GFI detailing the projected ingredient, infrastructure, and investment needs for the global plant-based meat industry in 2030, highlighted that US$27b in manufacturing facilities would be required to meet the demand for both plant-based ingredients and finished plant-based meat products, "underscoring the importance and urgency of bold infrastructure investments" to advance the category.

Given the shared policy priorities the construction of these facilities would deliver on, federal and state governments should investigate the pooling of resources, including joint financing through the National Reconstruction Fund and other regional development or infrastructure funds, to ensure sufficiently scaled sovereign processing capacity for plant protein ingredients across the country.

Recognising that Australian farmers always seek the best return for their produce, and determine their yearly production largely based on market price and demand, governments could also provide incentives to farmers to grow more pulses for the domestic plant protein supply chain. For instance, as part of a climate agreement plan, in 2021 Denmark established a €160 million fund for plant based food research and development, a portion of which was made available to farmers who produce plant protein crops.[298] Global research analysing the success of government incentive programs to influence changes at the farm level have found that the strongest motivations for farmers to adopt changes is through the perceived financial benefit their farms, the benefit to environment, or both.[299] [300] Incentivising greater pulse production would have the dual benefit of reducing the sector's environmental impact and emissions, as well as reliance on synthetic fertilisers because of pulses' nitrogen-fixing qualities.[301] Similarly, food and beverage manufacturers must be enabled to undertake the required product development, including through dedicated innovation hubs, to adopt more locally grown and processed ingredients.

Scaling sectoral capability—manufacturing, R&D, skills

The industry's issues of scaling manufacturing capacity can also be addressed by governments through co-funding support of contract and co-access food manufacturing facilities. An example of such a facility is a contract manufacturing facility for plant-based meats in Singapore, jointly funded by the investment firm Temasek (owned by the Singapore Government) and German agri-food company Cremer.[302] Supporting such facilities would allow a greater number of smaller companies to sidestep the often-insurmountable capital costs of facility construction, providing a more secure and direct path to market and commercial success.

Funding must also be directed towards dedicated R&D programs and precincts aimed at addressing the sector's more pressing research needs. For instance, Australia's alternative proteins ecosystem has come together for a fourth year to submit a bid to the Federal Cooperative Research Centre (CRC) Program. Should it be successful, this 10-year R&D program will enable the industry to advance critical product and process development, delivering solutions for agricultural optimisation, new IP generation, and nutritional, functional and taste benefits for consumers.

Australia must also invest in building a domestic skilled workforce. The sector is already struggling with workforce and skills shortages, including in food science, technology, production, and manufacturing. Governments can address this by partnering with universities and skills institutions to provide subsidised studies and industry placements to train the next generation of workers. Targeted and skilled migration programs are also required to fill existing shortages, especially in regional and remote locations.

Regulation

In addition to adhering to the same regulatory standards applied to all food and beverage products in Australia, the plant-based meat and milk alternative industries have shown a willingness to cooperate across the food sector and are regulating their respective categories via the Alternative Protein Council's voluntary labelling guidelines.[303] These guidelines were designed in recognition of, and to help address, concerns raised by the conventional meat and dairy industries. Calls for heavy handed regulation of this fledgling industry are not supported by the best available evidence and mustn't detract from the agricultural value that the industry represents for Australia, in complement to conventional protein industries. As highlighted by CSIRO, the growing global demand for protein is so large it can only be met by a combination of animal, plant and novel proteins,[304] therefore the only competition amongst Australia's protein industries should be with international markets.

The opportunity

Source: Delicou.

Despite the challenges of the last three years, the commercial and economic opportunities presented by plant-based meats and the broader plant-based food sector remain, as does the environmental, health and societal imperative to diversify protein supply with familiar and convenient alternatives.

This report has laid out what's at stake, as well as what can be achieved—the Australian plant-based meat industry can contribute half a billion dollars in economic value, create more than 6,000 jobs, and generate $1.65b in sales by 2033 if Deloitte Access Economics' central projection is realised.

Through focused co-investment and multi-disciplinary collaboration, policymakers, investors, primary producers, retailers, foodservice operators and food manufacturers can elevate new choices for consumers while strengthening Australia's competitiveness in an increasingly diverse global protein market.

Methodology

The 2023 State of the Industry report was compiled by Food Frontier through a process of primary and secondary research and is the third State of the Industry report from Food Frontier covering the Australian plant-based meat industry.

This report incorporates new economic data commissioned from Deloitte Access Economics to quantify the economic contribution of the Australian plant-based meat industry in the 2023 financial year using an input-output model. This economic contribution study was informed by data provided by Australian plant-based meat manufacturers to Deloitte Access Economics. This data also informed Deloitte Access Economics' future market scenarios and scenario outputs, which project the potential economic contribution of the Australian plant-based meat industry in the 2033 financial year.

The 2023 State of the Industry report also presents unique Food Frontier insights informed by in-depth industry consultations undertaken by Food Frontier with Australian plant-based meat manufacturers and those in supporting sectors in September 2023; as well as analysis of primary data collected by Food Frontier on the Australian plant-based meat industry, and the price and availability of retail products in Australia. This data was combined with insights from secondary research and data analysis, covering academic and grey literature sources.

The economic contribution study from Deloitte Access Economics covers the 2023 financial year (July 1, 2022 – June 30, 2023). Food Frontier has endeavoured to include relevant information and insights made public since the previous 2020 State of the Industry report was published, in March 2021, until the 2023 State of the Industry report was finalised, in early April 2024.

For further enquiries on the data, methodology, or to request supporting infographics, please email info@foodfrontier.org

Glossary

Diet definitions

Meat eater: A person who consumes conventional animal meat and seafood with no restrictions

Meat reducer: A person who consumes less conventional animal meat and seafood than in the previous 12-month period.

Flexitarian: A person who consumes plant-based foods at some or most meals, although also consumes conventional animal meat and seafood in their regular diet.

Pescatarian: A person who does not consume conventional animal meat products from land animals, but does consume seafood, as well as conventional dairy and egg products.

Vegetarian: A person who does not consume conventional animal meat or seafood but does consume conventional dairy and egg products.

Vegan: A person who does not consume any conventional animal products. This diet type is also referred to as plant-based.

Products

Alternative proteins: An umbrella term that refers to alternatives to conventional animal products, encompassing plant-based meat, cultivated meat and products of precision and biomass fermentation.

Cellular agriculture: An umbrella term that refers to the production of foods made through technologies that mimic the biological processes that would otherwise occur within an animal. This term encompasses two main novel food production technologies—cell cultivation and precision fermentation—and will likely expand to cover new cellular technologies as they arise. Cellular agriculture products are not yet available in commercial markets in Australia and thus are not represented in the data underpinning this report.

Plant-based meats: Newer products made to taste, look and cook like conventional meat. Early products began appearing in Western markets in the 1970s and 1980s, with a new generation of plant-based meats emerging in around 2015 marketed to flexitarians and meat reducers who are seeking familiarity in taste and format to conventional meat. Generally, these products contain plant proteins (most often in the form of protein isolates and concentrates) as a base ingredient to achieve a more meat-like appearance and texture.

Traditional plant proteins: Long-standing products such as tofu, tempeh, falafel, and traditional lentil patties, which have existed for centuries and do not closely replicate meat.

Cultivated meat/seafood: Animal cells created through the process of cell cultivation. A small sample of stem cells from an animal are collected and then grown in tanks called bioreactors or cultivators, which provide a controlled environment. The cells are fed a cell culture medium that contains amino acids, carbohydrates, and vitamins, allowing them to replicate and multiply, mimicking the biological process of growth that would occur within an animal. The cells are typically grown on a cell scaffold, and are harvested, prepared and packaged into final products after about two to eight weeks.

Precision fermentation: A category of cellular agriculture that uses microorganisms (such as yeast or bacteria) that are programmed to efficiently produce a specific compound (such as a protein or fat). These proteins and fats can be harvested and used to create foods like egg white and dairy products.

Blended products/meat: Products that combine a minority percentage of conventional animal meat with a larger proportion of plant-based ingredients–including a plant-based protein.

Conventional meats/seafood: Animal flesh from a whole mammal, bird or fish, including shellfish or other sea animals. It is also referred to as conventional animal meat.

Hybrid products: Alternative protein products that contain a mixture of alternative protein types, such as plant-based ingredients combined with cultivated meat or fat produced via precision fermentation.

Fractionation: The process of isolating the protein component of a raw ingredient, such as peas or faba beans, from the other components including fats and carbohydrates. Various fractionation processes are used depending on the raw material, base ingredient used, or the desired outcome sought by the processor.

Plant protein ingredients: Protein isolates, concentrates or flours derived from legumes, pulses, wheat and other crops via fractionation or other extraction processes. These ingredients typically make up a primary portion of plant-based meat products and are also used in other foods such as baked goods and sports nutrition, or sold directly to consumers.

Protein concentrate: A powder or solution that contains between 40% and 79% protein content. This can be animal or plant protein.

Protein isolate: A powder or solution that contains a minimum 80% protein content. This can be animal or plant protein.

Textured vegetable protein (TVP): Also known as textured soy protein (TSP) or textured plant protein (TPP) is small chunks of a high protein flour, typically a by-product of extracting soybean oil. It is used on its own as an alternative to meat, incorporated into plant-based meat products, or animal-based products. TVP is generally sold in dehydrated format and rehydrated prior to consumption. It is typically produced using soy but may also be produced from any protein-rich meal left over from extracting oil from seeds like lentils, peas, and faba beans.

Market terms

Retail: In this report, the retail market refers to retail trade businesses such as supermarkets, where groceries, food and beverage products are sold directly to the consumer.

Foodservice: Covers all situations where food is eaten out of the home. Organisations are segmented by size, supply chain and setting factors, like individual customer choice versus institutional supply. There are two key categories of foodservice: commercial and Institutional.

Commercial foodservice: Settings in which one of the primary functions is to provide food and beverages, and the consumer chooses the dish. This includes full-service restaurants, hotels and motels, cafes, QSR chains and independents, caterers, clubs and pubs. The commercial foodservice channel forms the largest channel for foodservice offerings in Australia at just over 70%.

Institutional foodservice: Refers to settings where food is served to patrons as part of the institution's operations, but it is not the primary function of the institution. This includes hospitals, aged care facilities, schools, long day care centres, military, correctional and training facilities and workplace canteens.

Quick service restaurant (QSR): A foodservice outlet categorised by fast service, a casual atmosphere, typically limited seating, and a generally inexpensive and focused menu. Food and beverages sold at QSRs can be taken away, delivered to the customer, or in some cases, eaten quickly on site.

Economic terms

Compound annual growth rate (CAGR): A financial metric that describes the change or growth in the value of something over a stated period.

Employment (FTE): Measures the number of workers (in full-time equivalent terms) that are employed by the entity, rather than the value of the workers' output.

Direct economic contribution: The direct economic contribution is a representation of the flow from labour and capital committed in the economic activity.

Indirect economic contribution: The indirect contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by economic activity.

Total economic contribution: The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

Gross operating surplus (GOS): Represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation, and amortisation (EBITDA).

Value added: Measures the value of output (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals GDP. Given the relationship to GDP, the value-added measure can be thought of as the increased contribution to welfare.

References

EXECUTIVE SUMMARY

1 Straight K. Meat alternatives industry hits reset button after dramatic rise and fall. ABC Landline. [Internet] 17 Jul 2023 [cited 4 Mar 2024] Available from: https://www.abc.net.au/news/2023-07-17/meat-alternative protein-substitute-industry-stock-market-fall/102597196

INTRODUCTION

2 Alexandratos, N., & Bruinsma, J. World agriculture towards 2030/2050: the 2012 revision (Vol. 12, No. 3). [Internet] FAO, Rome: ESA Working paper. 2012.[cited 5 Apr 2024] Available at: http://www.fao.org/docrep/016/ap106e/ap106e.pdf

3 Department of Agriculture, Fisheries and Forestry (DAFF). Australia endorses Emirates Declaration on Sustainable Agriculture, Resilient Food Systems and Climate Action. [Internet] 2 Dec 2023 [cited 23 Mar 2024]. Available from: https://www.agriculture.gov.au/about/news/australia-endorses-emirates-declaration

4 COP28 UAE. COP28 UAE Declaration on Climate and Health. [Internet] Dec 2023 [cited 23 Mar 2024]. Available from: https://www.cop28.com/en/cop28-uae-declaration-on-climate-and-health

GLOBAL UPDATES

5 International Monetary Fund. IMF Annual Report – Cost of Living Crisis. [internet] Aug 2023 [cited 4 Jan 2024] Available from: https://www.imf.org/external/pubs/ft/ar/2023/in-focus/cost-of-living-crisis/

6 Baptista DMS, Farid M, et al. Climate Change and Chronic Food Insecurity in Sub-Saharan Africa. International Monetary Fund. [internet] 15 Sep 2022. [cited 4 Jan 2024] Available from: https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2022/09/13/Climate-Change-and-Chronic-Food-Insecurity-in-Sub-Saharan-Africa-522211

7 Gill, I. Conflict in Middle East Could Bring 'Dual Shock' to Global Commodity Markets. The World Bank. 30 Oct 2023 [cited 19 Jan 2024] Available from: https://www.worldbank.org/en/news/press-release/2023/10/26/commodity-markets-outlook-october-2023-press-release#:~:text=Prices%20of%20agricultural%20commodities%20are,have%20been%20limited%20so%20far

8 International Monetary Fund. IMF Annual Report – Cost of Living Crisis. [internet] Aug 2023 [cited 4 Jan 2024] Available from: https://www.imf.org/external/pubs/ft/ar/2023/in-focus/cost-of-living-crisis/

9 Food and Agriculture Organization. FAO Food Price Index. [internet] 8 Dec 2023 [cited 4 Jan 2024] Available from: https://www.fao.org/worldfoodsituation/foodpricesindex/en

10 Baffes J, Mekonnen D. Falling food prices, yet much higher than pre-covid. World Bank Blog. 16 Aug 2023. [cited 4 Jan 2024] Available from: https://blogs.worldbank.org/opendata/falling-food-prices-yet-much-higher-pre-covid

11 International Monetary Fund. World Economic Outlook – Navigating Global Divergences. [Internet] Oct 2023. [cited 4 Jan 2024] Available from: https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023

12 Gill, I. Conflict in Middle East Could Bring 'Dual Shock' to Global Commodity Markets. The World Bank. 30 Oct 2023 [cited 19 Jan 2024] Available from: https://www.worldbank.org/en/news/press-release/2023/10/26/commodity-markets-outlook-october-2023-press-release#:~:text=Prices%20of%20agricultural%20commodities%20are,have%20been%20limited%20so%20far

13 International Monetary Fund. World Economic Outlook – Navigating Global Divergences. [Internet] Oct 2023. [cited 4 Jan 2024] Available from: https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023

14 Adrian T. Higher-for-Longer Interest Rate Environment is Squeezing More Borrowers. International Monetary Fund. [Internet] 10 Oct 2023. [cited 19 Jan 2024] Available from: https://www.imf.org/en/Blogs/Articles/2023/10/10/higher-for-longer-interest-rate-environment-is-squeezing-more-borrowers

15 Gourinchas P. Global Economy Approaches Soft Landing, but Risks Remain. IMF BLOG. [Internet] 30 January 2024 [cited 1 Feb 2024]. Available from: https://www.imf.org/en/Blogs/Articles/2024/01/30/global-economy-approaches-soft-landing-but-risks-remain

16 Good Food Institute. 2023 State of the Industry Report: plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

17 Roerink AM, Another Record Year for the Meat Department. IRI for 210 Analytics. [Internet] Dec 2022 [cited 18 Jan 2024] Available from: https://www.provisioneronline.com/articles/114082-another-record-year-for-the-meat-department

18 Good Food Institute. 2023 State of the Industry Report: plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

19 Ignaszewski E. 2023 Outlook: The state of the plant-based meat category. Good Food Institute.[Internet] 11 Apr 2023 [cited 12 Jan 2024] Available from: https://gfi.org/blog/2023-outlook-the-state-of-the-plant-based-meat-category/

20 Good Food Institute. 2023 State of the Industry Report: plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

21 GFI 2023 State of the Industry Report: Plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

22 Braeger E. Tesco in 'second phase' of plant-based food revolution after sales dropped last year. Express. [Internet] 4 Mar 2024 [cited 26 Mar 2024] Available from: https://www.express.co.uk/news/uk/1873371/tesco-plant-based-food-revolution-drop-in-sales

23 Ignaszewski E. 2023 Outlook: The state of the plant-based meat category. Good Food Institute.[Internet] 11 Apr 2023 [cited 12 Jan 2024] Available from: https://gfi.org/blog/2023-outlook-the-state-of-the-plant-based-meat-category/

24 Good Food Institute. 2023 State of the Industry Report: plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

25 Bryant, C. Plant-based proteins, US, 2023. Mintel. [Internet] Apr 2023 [cited 6 Feb 2024] Available from: https://store.mintel.com/report/us-plant-based-proteins-market-report

26 Bryant, C. Plant-based proteins, US, 2023. Mintel. [Internet] Apr 2023 [cited 6 Feb 2024] Available from: https://store.mintel.com/report/us-plant-based-proteins-market-report

27 Zoio N. Tesco's meat aisles now contend with plant-based food. Retail World. [Internet] 24 Sep 2019 [cited 6 Feb 2024] Available from: https://retailworldmagazine.com.au/tescos-meat-aisles-now-contend-with-plant-food/

28 PBFA. PBFA and Kroger Plant-Based Meat Study. Plant Based Foods Association. [Internet] 2020 [cited 6 Feb 2024] Available from: https://plantbasedfoods.org/pbfa-kroger-plant-based-meat-store-test

29 Footprint. Plant-based sales slide when placed directly next to meat counterparts. Footprint. [internet] 20 Oct 2022 [cited 12 Jan 2024] Available from: https://www.foodservicefootprint.com/plant-based-sales-slide-when-placed-directly-next-to-meat-counterparts/

30 Ignaszewski E. Meat-aisle merchandising catapults plant-based meat sales. Good Food Institute. 30 Jul 2020 [cited 6 Feb 2024] Available from: https://gfi.org/blog/merchandising-plant-based-meat/

31 GFI 2023 State of the Industry Report: Plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

32 Pierce, B. Azoff, M. The rise of plant-based in US foodservice. Good Food Institute. [Internet] Aug 2023 [cited 23 Jan 2024] Available from: https://gfi.org/wp-content/uploads/2023/08/foodservice-whitepaper.pdf

33 Pierce, B. Azoff, M. The rise of plant-based in US foodservice. Good Food Institute. [Internet] Aug 2023 [cited 23 Jan 2024] Available from: https://gfi.org/wp-content/uploads/2023/08/foodservice-whitepaper.pdf

34 GFI 2022 State of the Industry Report: Plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] Apr 2023 [cited 12 Jan 2024] Available from: https://gfi.org/resource/plant-based-meat-eggs-and-dairy-state-of-the-industry-report/

35 ProVeg. Top of the food chain: Burger King number one for plant-based offerings. ProVeg. 13 Apr 2023 [cited 4 Apr 2024] Available from: https://proveg.org/press-release/top-of-the-food-chain-burger-king-number-one-for-plant-based-offerings/

36 Foreman, P. Burger King Makes Plant-Based Food Cheaper Than Meat In Germany. Plant Based News. [Internet] 5 Mar 2024 [cited 26 Mar 2024] Available from: https://plantbasednews.org/news/economics/burger-king-plant-based-food-cheaper-meat-germany/

37 Sweeney. M Burger King becomes first UK fast food restaurant chain to offer vegan nuggets. The Guardian. [Internet] 4 Jan 2022 [cited 23 Jan 2024] Available from: https://www.theguardian.com/business/2022/jan/04/burger-king-says-it-is-first-uk-fast-food-chain-to-offer-vegan-nuggets

38 McDonalds UK. McDonald's UK&I boosts plant-based offering with double McPlant. McDonalds UK. [Internet] 29 Dec 2022 [cited 23 Jan 2024] Available from: https://www.mcdonalds.com/gb/en-gb/newsroom/article/new-double-mcplant.html

39 Ettinger, J. Beyond Meat Vegan McPlant Nuggets & Burger Come to All 1,429 McDonald's Germany Restaurants. Green Queen Media [Internet] 17 Feb 2023 [cited 23 Jan 2024] Available from: https://www.greenqueen.com.hk/beyond-meat-vegan-nuggets-come-to-mcdonalds-germany/

40 Merca2.0. McPlant: A McDonald's mistake in the US becomes a worldwide sensation. [Internet] 2 Jan 2023 [cited 23 Jan 2024] Available from: https://www.merca20.com/mcplant-a-mcdonalds-mistake-in-the-us-becomes-a-worldwide-sensation/

41 F+B Tech. 3D Printed Meat Impresses Top Chef. F+B Tech [Internet] 2 Jan 2023 [cited 23 Jan 2024] Available from: https://www.fbtech.co.nz/2022/01/18/3d-printed-meat-impresses-top-chef/

42 Curto S. Marco Pierre White: "Veganuary? Not enough. I will have a vegan menu all year round". Reporter Gourmet. [Internet] 1 Feb 2024 [cited 1 Apr 2024] Available from: https://reportergourmet.com/en/news/6473-marco-pierre-white-veganuary-not-enough-i-will-have-a-vegan-menu-all-year-round

43 Starostinetskaye A. VegNews. Chunk Foods Carves Into the Vegan Steak Market, Expected to Cross $1 Billion by 2032. [Internet] October 2023 [cited Jan 2024] Available from: https://vegnews.com/2023/10/chunk-foods-vegan-steak-market

44 Wilkund J. Case Study: Rebellyous Foods & Engineering the Future. The Food Institute. [Internet] 12 Dec 2023 [cited 23 Jan 2024] Available from: https://foodinstitute.com/focus/case-study-rebellyous-foods-engineering-the-future/

45 Pierce B, Azoff M. The rise of plant-based in US foodservice. Good Food Institute. [Internet] Aug 2023 [cited 23 Jan 2024] Available from: https://gfi.org/wp-content/uploads/2023/08/foodservice-whitepaper.pdf

46 Compass Group. Plant-Forward Meals. Compass Group. [Internet] n.d. [cited 23 Jan 2024] Available from: https://www.compass-group.com/en/sustainability/planet/plant-forward-meals.html

47 Carrington D. Hundreds of academics call for 100% plant-based meals at UK Universities. The Guardian. [Internet] 4 Sep 2023 [cited 22 Jan 2024] Available from: https://www.theguardian.com/environment/2023/sep/04/hundreds-academics-call-for-meat-free-meals-british-universities

48 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

49 Wang G, Plaster M et al. Consumers' experiences and preferences for plant-based meat food: Evidence from a choice experiment in four cities of China. Journal of Integrative Agriculture. [Internet] 1 Jan 2023 [cited 23 Jan 2023] 22:1.306-319. Available from: https://doi.org/10.1016/j.jia.2022.09.008

50 Green Queen. Sustainable Dining at Starbucks Korea Finds Favor With Record-Setting Sales. Green Queen Media. [Internet] Apr 2023 [cited 23 Jan 2024] Available from: https://www.greenqueen.com.hk/starbucks-korea-plant-based-food/

51 Bae YJ. Indonesia's Green Rebel Partners with Starbucks Malaysia and Nando's Singapore. Asia Tech Daily. [Internet] 23 Jun 2023 [cited 23 Jan 2024] Available from: https://asiatechdaily.com/indonesias-green-rebel-partners-with-starbucks-malaysia-and-nandos-singapore/

52 Perez-Cueto F. Nudging plant-based meals through the menu. International Journal of Gastronomy and Food Science [Internet] Jul 21 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.ijgfs.2021.100346

53 Kwasny T, Dobering K, et al. Towards reduced meat consumption: A systematic literature review of intervention effectiveness, 2001–2019. Appetite. [Internet] 1 Jan 2022. 168-105739 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.appet.2021.105739

54 Buratto A, Lotti L. Encouraging sustainable food consumption through nudges: An experiment with menu labels. Ecological Economics [Internet] Jan 24 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.ecolecon.2023.108024

55 Rosenfeld D, Bartolotto C et al. Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. Journal of Environmental Psychology. [Internet] Jun 22 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.jenvp.2022.101825

56 Pierce B, Azoff M. The rise of plant-based in US foodservice. Good Food Institute. [Internet] Aug 2023 [cited 23 Jan 2024] Available from: https://gfi.org/wp-content/uploads/2023/08/foodservice-whitepaper.pdf

57 GFI 2023 State of the Industry Report: Plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] 16 Apr 2024 [cited 16 Apr 2024] Available from: https://gfi.org/state-of-the-industry-reports/

58 Speed, M. Venture capital funds cool on plant-based meat start-ups. Financial Times. [Internet] 4 Jul 2023 [cited 11 Jan 2024] Available from: https://www.ft.com/content/b868021a-0ee7-4681-b9aa-b1adb57f43fa

59 Center for Strategic and International Studies The Future Appetite for Alternative proteins. [Internet] 2023 [cited 19 Jan 2024] Available from: https://features.csis.org/the-future-appetite-for-alternative-proteins/

60 Schreijen S, Filott C et al. A Path for Plant-based Meat out of the Trough of Disillusionment: Consolidation Seems Inevitable in Europe. Rabobank. [Internet] Jun 2023 [cited 12 Jan 2024] Available from: https://research.rabobank.com/far/en/sectors/consumer-foods/a-path-for-plant-based-meat-out-of-the-trough-of-disillusionment.html

61 Maeder B, Walter H et al. How alternative proteins are reshaping meat industries. EY Pathenon. 14 Mar 23 [cited 18 Jan 24] Available from: https://www.ey.com/en_gl/strategy/how-alternative-proteins-are-reshaping-meat-industries

62 Ellis, S. Starfield scores $100m in China's biggest alt-protein round to date. TechCrunch. [Internet] 13 Jan 2022 [cited 23 Jan 2024] Available from: https://agfundernews.com/starfield-chinese-plant-based-protein-startup-scores-100m-in-series-b-raise

63 Shu, C. Singapore-based alternative protein startup Next Gen Foods gets $100M Series A. Tech Crunch. [Internet] 15 Feb 2022 [cited 23 Jan 2024] Available from: https://techcrunch.com/2022/02/15/singapore-based-alternative-protein-startup-next-gen-foods-gets-100m-series-a-for-u-s-growth/

64 Lomas N. Planted gets $72M to put whole cuts of vegan chicken on Europe's menu. TechCrunch. [Internet] 1 Sep 2022 [cited 23 Jan 2024] Available from https://techcrunch.com/2022/09/01/planted-series-b/

65 Poinski M. NotCo raises $70M to make its AI available to other companies. FoodDive. [Internet] 15 Dec 2022 [cited 23 Jan 2024] Available from: https://www.fooddive.com/news/notco-70m-b2b-ai-giuseppe/638511/

66 Poinski M. No Meat Factory raises $42M to expand plant-based protein manufacturing. FoodDive. [Internet] 13 Jan 2023 [cited 23 Jan 2024] Available from: https://www.fooddive.com/news/no-meat-factory-raises-42m-plant-based-meat-manufacturing/640243/

67 Foreman, P. Vegan 'Seafood' To Launch In 4,500 Stores After Netting $26 Million [Internet] 3 Aug 2023 [cited 23 Jan 2024] Available from: https://plantbasednews.org/news/economics/canada-based-vegan-seafood-konscious-foods/

68 Morrison, O. French food tech firm Umiami raises €32.5 million to speed up distribution in Europe. [Internet] 17 Oct 2023 [cited 23 Jan 2024] Available from: https://www.foodnavigator.com/Article/2023/10/17/french-food-tech-firm-umiami-raises-32.5-million-to-speed-up-distribution-in-europe

69 Bens, M. Why Investors Need To Take The Long View On Alternative Proteins. Forbes. [Internet] 23 Jun 2023 [cited 19 Jan 2024] Available from: https://www.forbes.com/sites/forbesfinancecouncil/2023/06/23/why-investors-need-to-take-the-long-view-on-alternative-proteins/?sh=7f3003444db1

70 Schreijen S, Filott C et al. A Path for Plant-based Meat out of the Trough of Disillusionment: Consolidation Seems Inevitable in Europe. Rabobank. [Internet] Jun 2023 [cited 12 Jan 2024] Available from: https://research.rabobank.com/far/en/sectors/consumer-foods/a-path-for-plant-based-meat-out-of-the-trough-of-disillusionment.html

71 Schreijen S, Filott C et al. A Path for Plant-based Meat out of the Trough of Disillusionment: Consolidation Seems Inevitable in Europe. Rabobank. [Internet] Jun 2023 [cited 12 Jan 2024] Available from: https://research.rabobank.com/far/en/sectors/consumer-foods/a-path-for-plant-based-meat-out-of-the-trough-of-disillusionment.html

72 Southey F, From 'pandemic peaks' to sales slumps: Grasping the rollercoaster of plant-based meat consumption. Food Navigator. [Internet] 23 Jun 2023 [cited 19 Jan 2024] Available from: https://www.foodnavigator.com/Article/2023/09/20/What-s-powering-the-rollercoaster-of-plant-based-meat-consumption

73 Durbin D. Beyond Meat's shares soar on better-than-expected Q4 revenue despite weak US sales. Yahoo Finance. [Internet] 28 Feb 2024 [Cited 26 Mar 2024] Available from: https://au.finance.yahoo.com/news/beyond-meats-shares-soar-better-224225511.html

74 Beyond Meat. Beyond meat unveils its Beyond IV platform, the fourth generation of the Beyond Burger. Beyond Meat [Internet] 21 Feb 2024 [cited 26 Mar 2023] Available from: https://www.beyondmeat.com/en-US/press/beyond-meat-unveils-its-beyond-iv-platform-the-fourth-generation-of-the-beyond-burger-and-beyond-beef

75 Schreijen S, Filott C et al. A Path for Plant-based Meat out of the Trough of Disillusionment: Consolidation Seems Inevitable in Europe. Rabobank. [Internet] Jun 2023 [cited 12 Jan 2024] Available from: https://research.rabobank.com/far/en/sectors/consumer-foods/a-path-for-plant-based-meat-out-of-the-trough-of-disillusionment.html

76 Plant Based News. Meatless Farm Returns To Supermarkets Following VFC Acquisition. [Internet] 9 Aug 2023 [cited 22 Jan 2024] Available from: https://plantbasednews.org/news/economics/meatless-farm-returns-supermarkets/

77 Vegconomist. VFC Foods Becomes The Vegan Food Group, a Plant-Based Powerhouse "Heralding a Transformative Era" in Plant-Based Foods. [Internet] 10 Jan 2024 [cited 24 Jan 2024] Available from: https://vegconomist.com/company-news/vfc-foods-becomes-the-vegan-food-group-heralding-transformative-era-plant-based-foods/

78 Mridul A. THIS is On TV: Plant-Based Sausages 'Fool' British Food Critic Grace Dent. Green Queen Media. [Internet] 19 Oct 2023 [cited 24 Jan 2024] Available from: https://www.greenqueen.com.hk/this-isnt-pork-plant-based-meat-sausage-food-critic-grace-dent-andy-shovel-tv-ad/

79 Braeger E. Tesco in 'second phase' of plant-based food revolution after sales dropped last year. Express. [Internet] 4 Mar 2024 [cited 26 Mar 2024] Available from: https://www.express.co.uk/news/uk/1873371/tesco-plant-based-food-revolution-drop-in-sales

80 Braeger E. Tesco in 'second phase' of plant-based food revolution after sales dropped last year. Express. [Internet] 4 Mar 2024 [cited 26 Mar 2024] Available from: https://www.express.co.uk/news/uk/1873371/tesco-plant-based-food-revolution-drop-in-sales

81 GFI 2022 State of the Industry Report: Plant-based meat, seafood, eggs and dairy. Good Food Institute. [Internet] Apr 2023 [cited 12 Jan 2024] Available from: https://gfi.org/resource/plant-based-meat-eggs-and-dairy-state-of-the-industry-report/

82 Mintel. US plant-based proteins report 2023. Mintel. [Internet] 2023 [cited 20 Jan 2024] Available from: https://store.mintel.com/us/report/us-plant-based-proteins-market-report/

83 FMI & Nielsen IQ. Power of Plant-Based Foods and Beverages. [Internet] 27 Jul 2022 [cited 17 Jan 2024] Available from: https://www.fmi.org/newsroom/latest-news/view/2022/07/27/fmi-releases-inaugural-power-of-plant-based-foods-and-beverages-report

84 King, T, Eassom, S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

85 ProVeg. Plant-based meat now cheaper on average than conventional meat in Netherlands. ProVeg. [Internet] 25 Jul 2022 [cited 22 Jan 2024] Available from: https://proveg.org/press-release/plant-based-meat-now-cheaper-than-conventional-meat-in-netherlands/

86 Foreman, P. Lidl makes Vegan food the same price as meat equivalents in Germany. Plant Based News. [Internet] 18 Oct 2023 [cited 24 Jan 2024] Available from: https://plantbasednews.org/news/economics/lidl-vegan-food-price-meat-equivalents/

87 Vegeconomist. Lidl Austria Joins Price-Parity Movement, Slashes Prices for Over 30 Vemondo Products. [Internet] 29 Jan 2024 [cited1 Feb 2024] Available from: https://vegconomist.com/retail-e-commerce/lidl-austria-price-parity-movement-slashes-prices-30-vemondo-products/

88 Vegconomist. Jumbo Drops Plant-Based Meat Prices as Sweeping Trend for Price-Parity Continues in Europe. Vegconomist [Internet] 21 Nov 2023 [cited 24 Jan 2024] Available from: https://vegconomist.com/retail-e-commerce/jumbo-drops-plant-based-meat-prices/

89 Mintel. US Plant-Based Proteins Market Report 2023. Aug 2023 [cited 17 Jan 2024] Available from: https://store.mintel.com/us/report/us-plant-based-proteins-market-report/

90 Kerry. Stepping up Taste in Plant Based: Global report [Internet] 12 May 2022 [cited 17 Jan 2024] Available from: https://explore.kerry.com/plant-based-taste.html

91 Cooke E. Signal: Nestlé, DSM-Firmenich, Cargill lead way on plant-based meat patent applications. JustFood. [Internet] 23 Ag 2023 [cited 23 Jan 24] Available from: https://www.just-food.com/news/food-giants-nestle-dsm-and-cargill-file-for-most-plant-based-meat-patent-applications/?cf-view

92 Starostinetskaya A. How Chilean Unicorn NotCo Uses AI to Help Food Giants From Starbucks to Dunkin' Go Vegan. VegNews. [Internet] 22 Feb 2023 [cited 23 Jan 2024] Available from: https://vegnews.com/2023/2/chilean-unicorn-notco-ai-starbucks-dunkin-vegan

93 Morrison, O. Why high moisture extrusion could solve alt meat's nutritional as well as structural challenges. Food Navigator. [Internet] 12 May 2022 [cited 17 Jan 2024] Available from: https://www.foodnavigator.com/Article/2022/03/24/Why-high-moisture-extrusion-could-solve-alt-meat-s-nutritional-as-well-as-structural-challenges

94 Williams, Z. 3D-printed steak, anyone? The Guardian. [Internet] 17 Nov 2021 [cited 23 Jan 24] Available from: https://www.theguardian.com/food/2021/nov/16/3d-printed-steak-taste-test-meat-mimic

95 Hamlett, C. You Can Now Buy The 'World's First' 3D Printed Vegan Salmon Filet. Plant Based News. [Internet] 17 Nov 2021 [cited 23 Jan 24] Available from: https://plantbasednews.org/news/alternative-protein/worlds-first-3d-printed-vegan-salmon-europe/

96 Kerry. Stepping up Taste in Plant Based: Global report [Internet] 12 May 2022 [cited 17 Jan 2024] Available from: https://explore.kerry.com/plant-based-taste.html

97 Mintel. US Plant-Based Proteins Market Report 2023. Aug 2023 [cited 17 Jan 2024] Available from: https://store.mintel.com/us/report/us-plant-based-proteins-market-report/

98 Kerry. Stepping up Taste in Plant Based: Global report [Internet] 12 May 2022 [cited 17 Jan 2024] Available from: https://explore.kerry.com/plant-based-taste.html

99 Rees T. Health Continues to Drive Plant-Based Food Sales. Euromonitor. [Internet] 23 May 2022 [cited 24 Jan 2024] Available from: https://www.euromonitor.com/article/health-continues-to-drive-plant-based-food-sales

100 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

101 Cargill. Plant-based proteins and the convenience factor: A Marriage Of Two Trends. Cargill. [Internet] 2022 [cited 17 Jan 2024] Available from: https://www.cargill.com/doc/1432212967259/plant-based-proteins-and-the-convenience-factor-doc.pdf

102 Mintel. US Plant-Based Proteins Market Report 2023.[Internet] Aug 2023 [cited 17 Jan 2024] Available from: https://store.mintel.com/us/report/us-plant-based-proteins-market-report/

103 Mintel. US Plant-Based Proteins Market Report 2023.[Internet] Aug 2023 [cited 17 Jan 2024] Available from: https://store.mintel.com/us/report/us-plant-based-proteins-market-report/

104 Monteiro C. Nutrition and health. The issue is not food, nor nutrients, so much as processing. Public Health Nutrition. [Internet] 1 May 2009. 5.729-731. Available from: https://www.cambridge.org/core/journals/public-health-nutrition/article/nutrition-and-health-the-issue-is-not-food-nor-nutrients-so-much-as-processing/0C514FC9DB264538F83D5D34A81BB10A

105 FMI & Nielsen IQ. Power of Plant-Based Foods and Beverages. [Internet] 27 Jul 2022 [cited 17 Jan 2024] Available from: https://www.fmi.org/newsroom/latest-news/view/2022/07/27/fmi-releases-inaugural-power-of-plant-based-foods-and-beverages-report

106 Cordova, R. et al. Consumption of ultra-processed foods and risk of multimorbidity of cancer and cardiometabolic diseases: a multinational cohort study. The Lancet Regional Health: Europe. [Internet] 13 Nov 2023 [cited 17 Jan 2024] Available from: https://www.thelancet.com/journals/lanepe/article/PIIS2666-7762(23)00190-4/fulltext#

107 Gibney, M. Ultra-Processed Foods: Definitions and Policy Issues. Current Developments in Nutrition [internet] Feb 2019. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6389637/

108 Formanski K. US Plant-based Proteins Market Report 2021. Mintel [Internet] 2021 [cited 24 Jan 2024] Available from: https://store.mintel.com/report/us-plant-based-proteins-market-report-2021

109 GFI Europe Plant-Based Meat Nutrition Report [Internet] Dec 2023 [cited 18 Jan 2024] Available from: https://gfieurope.org/plant-based-meat-and-health-in-europe/

110 GFI Europe Plant-Based Meat Nutrition Report [Internet] Dec 2023 [cited 18 Jan 2024] Available from: https://gfieurope.org/plant-based-meat-and-health-in-europe/

111 Beyond Meat. Beyond meat unveils its Beyond IV platform, the fourth generation of the Beyond Burger. Beyond Meat [Internet] 21 Feb 2024 [cited 26 Mar 2023] Available from: https://www.beyondmeat.com/en-US/press/beyond-meat-unveils-its-beyond-iv-platform-the-fourth-generation-of-the-beyond-burger-and-beyond-beef

112 GFI APAC. Asian Cropportunities. GFI APAC [Internet] 2021 [cited 18 Jan 2024] Available from: https://gfi-apac.org/industry/asian-cropportunities/

113 Cargill. Plant-based proteins and the convenience factor: A Marriage Of Two Trends. Cargill. [Internet] 2022 [cited 17 Jan 2024] Available from: https://www.cargill.com/doc/1432212967259/plant-based-proteins-and-the-convenience-factor-doc.pdf

114 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

115 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

116 Bae YJ. Indonesia's Green Rebel Partners with Starbucks Malaysia and Nando's Singapore. Asia Tech Daily. [Internet] 23 Jun 2023 [cited 23 Jan 2024] Available from: https://asiatechdaily.com/indonesias-green-rebel-partners-with-starbucks-malaysia-and-nandos-singapore/

117 Buhler Group. Givaudan and Bühler open Protein Innovation Centre in Singapore. Buhler Group. [Internet] 26 Apr 2021 [cited 22 Jan 2024] Available from: https://www.buhlergroup.com/global/en/media/media-releases/givaudan_and_buehleropenproteininnovationcentreinsingapore.html

118 Roquette. Roquette unveils its new Customer Experience Center in Singapore. Roquette. [Internet] 17 Nov 2021 [cited 23 Jan 24] Available from: https://www.roquette.com/media-center/press-center/20230720-press-release-new-customer-experience-center-singapour

119 Department of Agriculture, Fisheries and Forestry (DAFF). Insight – Australia is a key global exporter of pulses. [Internet] 27 Nov 2023 [cited 2 Feb 2024] Available from: https://www.agriculture.gov.au/about/news/insight-australia-key-global-exporter-pulses

120 Protein Industries Canada. A Long-Term Roadmap for the Development of Canada's Plant-Based Food, Fibre and Ingredient Sector. [Internet] Jul 2021 [cited 2 Feb 2024] Available from: https://www.proteinindustriescanada.ca/uploads/PIC-Sector-Roadmap.pdf/

121 Protein Industries Canada. Protein Industries Canada receives federal funding another five years. [Internet] 13 Feb 2023 [cited 2 Feb 2024] Available from: https://www.proteinindustriescanada.ca/news-releases/protein-industries-canada-receives-federal-funding-for-another-five-years

122 Government of Canada. Canada's Dietary Guidelines. [Internet] 22 Jan 2019. Available from: https://food-guide.canada.ca/en/guidelines/

123 Donellon-May. Hungry China's Growing Interest in 'Future Foods' and Alternative Protein. The Diplomat. [Internet] 4 May 2022. Available from: https://thediplomat.com/2022/05/hungry-chinas-growing-interest-in-future-foods-and-alternative-protein/

124 Good Food Institute. Look Closer: China is Quietly Making Moves on Cultivated Meat. [Internet] 2021 [cited 8 Feb 2024]. Available from: https://gfi-apac.org/look-closer-china-is-quietly-making-moves-on-cultivated-meat/#:~:text=A%20National%20Key%20R%26D%20Program,(%2493M%20USD)%20in%20funding

125 Rajput, S. Asia Pacific is a promising market for plant-based meat. National Outlook. [Internet] 28 Sep 2023 [cited 8 Feb 204]. Available from: https://www.nutritionaloutlook.com/view/asia-pacific-is-a-promising-market-for-plant-based-meat

126 Giehle, S. Good food for everyone: The Federal Government's food strategy aims to create a "healthy environment for food and exercise" from 2023. Deutscheland.de. [Internet] 29 Mar 2023 [cited 2 Feb 24] Available from: https://www.deutschland.de/en/topic/life/food-strategy-key-points-in-germanys-plans

127 Good Food Institute Europe. Denmark publishes world's first national action plan for plant-based foods. [Internet] 13 Oct 2023 [cited 2 Feb 24] Available from: https://gfieurope.org/blog/denmark-publishes-worlds-first-national-action-plan-for-plant-based-foods/

128 Mridul, A. South Korea Unveils National Plan to Promote Plant-Based Food Industry. Green Queen. [Internet] 26 Oct 2023 [cited 2 Feb 24] Available from: https://www.greenqueen.com.hk/south-korea-vegan-strategy-national-plan-plant-based-food-industry-alt-protein/

129 Good Food Institute (GFI). Denmark publishes world's first national action plant for plant-based foods. [Internet] 13 Oct 2023 [cited 2 Feb 24] Available from: https://gfieurope.org/blog/denmark-publishes-worlds-first-national-action-plan-for-plant-based-foods/

130 State of Green. Denmark introduces official climate-friendly dietary guidelines. [Internet] 7 Jan 2021 [cited 2 Feb 24] Available from: https://stateofgreen.com/en/news/denmark-introduces-official-climate-friendly-dietary-guidelines/

131 Mridul, A. 'A Paradigm Shift': Germany Earmarks €38M Investment for Alt-Protein Transition in 2024 Federal Budget. GreenQueen. [Internet] 20 Nov 2023 [cited 2 Feb 24] Available from: https://www.greenqueen.com.hk/germany-federal-budget-bundestag-2024-38-million-investment-alt-protein-plant-based/

132 Mridul, A. South Korea Unveils National Plan to Promote Plant-Based Food Industry. Green Queen. [Internet] 26 Oct 2023 [cited 2 Feb 24] Available from: https://www.greenqueen.com.hk/south-korea-vegan-strategy-national-plan-plant-based-food-industry-alt-protein/

133 Government of Canada. Global Innovation Clusters. [Internet] Jan 2024 [cited 18 Mar 2024]. Available from: https://ised-isde.canada.ca/site/global-innovation-clusters/en

134 Fletcher A. Canadian cluster drives new opportunities in plant protein. Global insights. [Internet] 4 Oct 2022 [cited 18 Mar 2024]. Available from: https://insights.figlobal.com/protein-industries-canada-pic/canadian-cluster-drives-new-opportunities-plant-protein

135 A Long-Term Roadmap for the Development of Canada's Plant-Based Food, Feed and Ingredient Sector. Protein Industries Canada. [Internet] July 2021 [cited 18 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/uploads/PIC-Sector-Roadmap.pdf/

136 Blatchford A. Ais, oceans and proteins: Ottawa announces winners of $950 million 'supercluster' competition. CBC News. [Internet] 16 Feb 2018 [cited 18 Mar 2024]. Available from: https://www.cbc.ca/news/science/innovation-superclusters-bains-1.4536551

137 Protein Industries Canada. [Internet] [cited 18 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/

138 Protein Production Technology. Protein Industries Canada receives CA$150 million in federal funding. [Internet] 20 Feb 2023 [cited 18 Mar 2024]. Available from: https://www.proteinproductiontechnology.com/post/protein-industries-canada-receives-ca-150-million-in-federal-funding

139 Protein Industries Canada. Developing a plant-based seafood product line. [Internet] 15 Jun 2021 [cited 18 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/projects/developing-plant-based-seafood-product-line

140 Protein Industries Canada. Commercializing a whole muscle-cut of plant-based salmon. [Internet] 15 Nov 2023 [cited 18 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/projects/commercializing-a-whole-muscle-cut-of-plant-based-salmon

141 Protein Industries Canada. Strengthening Canada's regulatory system. [Internet] 05 Apr 2022 [cited 23 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/projects/strengthening-canadas-regulatory-system

142 Pulse Canada. What We Do. [Internet] 2024 [cited 23 Mar 2024]. Available from: https://pulsecanada.com/about/what-we-do

143 Plant-Based Foods of Canada (PBFC). What We Do. [Internet] 2024 [cited 23 Mar 2024]. Available from: https://www.plantbasedfoodscanada.ca/what-we-do

144 Loblaw Companies Limited. Who We Are. [Internet] 2024 [cited 23 Mar 2024]. Available from: https://www.loblaw.ca/en/who-we-are/

145 Protein Industries Canada. Helping industry navigate and address regulatory modernization. [Internet] 14 Dec 2023 [cited 23 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/projects/helping-industry-navigate-and-address-regulatory-modernization

146 Protein Industries Canada. Protein Industries Canada receives federal funding for another five years. [Internet] 13 Feb 2023 [cited 23 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/news-releases/protein-industries-canada-receives-federal-funding-for-another-five-years

147 Government of Canada. Government of Canada invests over $1.4 million in plant-based food production in British Columbia. [Internet] 7 Jul 2022 [cited 23 Mar 2024]. Available from: https://www.canada.ca/en/agriculture-agri-food/news/2022/07/government-of-canada-invests-over-14-million-in-plant-based-food-production-in-british-columbia.html

148 National Post. Liberals announce $18 million in funding for small food producers. [Internet] 12 Aug 2020 [cited 23 Mar 2024]. Available from: https://nationalpost.com/pmn/news-pmn/canada-news-pmn/liberals-announce-18-million-in-funding-for-small-food-producers

149 Agri-food Innovation Council. Plant-Based Protein Market: Global and Canadian Market Analysis. [Internet] Mar 2019 [cited 23 Mar 2024]. Available from: https://nrc.canada.ca/sites/default/files/2019-10/Plant_protein_industry_market_analysis_summary.pdf

150 The Global and Mail. Why alternative proteins are good for business and the environment. [Internet] 14 Nov 2022 [cited 23 Mar 2024]. Available from: https://www.theglobeandmail.com/business/adv/article-why-alternative-proteins-are-good-for-business-and-the-environment/

151 CNN. Canada is putting down roots in plant-based proteins. [Internet] 2022 [cited 23 Mar 2024]. Available from: https://sponsorcontent.cnn.com/edition/2022/invest-in-canada/canada-is-putting-down-roots-in-plant-based-proteins/

152 Pointing C. Canadian Governments Invests $1.4 Million in Plant-Based Food Manufacturing. Plant Based News. [Internet] 12 Jul 2022 [cited 23 Mar 2024]. Available from: https://plantbasednews.org/news/canadian-government-invests-plant-based-food/

153 Pointing C. Canadian Government Invests $2.6 Million in Plant Protein. Live Kindly. [Internet] 12 Aug 2020 [cited 23 Mar 2024]. Available from: https://www.livekindly.com/canadian-government-invests-plant-protein/

154 Government of Canada. Government of Canada invests over $1.4 million in plant-based food production in British Columbia. [Internet] 7 Jul 2022 [cited 23 Mar 2024]. Available from: https://www.canada.ca/en/agriculture-agri-food/news/2022/07/government-of-canada-invests-over-14-million-in-plant-based-food-production-in-british-columbia.html

155 Cult MTL. Canada to invest $100-million in plant-based food industry. [Internet] 22 Jun 2020 [cited 23 Mar 2024]. Available from: https://cultmtl.com/2020/06/canada-to-invest-100-million-in-plant-based-food-industry-proteins-merit-functional-foods-justin-trudeau/

156 Starostinetskaya A. Justin Trudeau Announces $100 Million Investment in Canada's Plant-Based Protein Industry. VegNews. [Internet] 23 Jun 2020 [cited 23 Mar 2024]. Available from: https://vegnews.com/2020/6/justin-trudeau-announces-100-million-investment-in-canada-s-plant-based-protein-industry

157 Smart Prosperity Institute. Skills Needs for Workers in the Growing Plant-Based Protein Industry in Manitoba and Saskatchewan. [Internet] Feb 2024 [cited 23 Mar 2024]. Available from: https://institute.smartprosperity.ca/Plant-Protein-Jobs-Skills-Needs

158 Saskatchewan. Saskatchewan Value-added Agriculture Incentive. [Internet] 1 Sep 2017 [cited 23 Mar 2024]. Available from: https://www.saskatchewan.ca/business/%20investment-and-economic-development/business-incentives-and-tax-credits/saskatchewan-value-added-agriculture-incentive

159 Engage Manitoba. The Manitoba Protein Advantage Strategy. [Internet] 2019 [cited 23 Mar 2024]. Available from: https://engagemb.ca/manitoba-protein-advantage?tool=story_telling_tool

160 Financial Times. Protein From the Prairies: The Global Potential of Canadian Crops. [Internet] [cited 23 Mar 2024]. Available from: https://canada-next-best-place-to-home.ft.com/protein-from-the-prairies-the-global-potential-of-canadian-crops

161 Roquette. Roquette Opens World's Largest Pea Protein Plant. [Internet] 17 Nov 2021 [cited 23 Mar 2024]. Available from: https://www.roquette.com/media-center/press-center/2021-11-17-roquette-opening-world-largest-pea-protein-plant

162 Laychuk R. Massive pea-processing plant nears completion, opening new market for Manitoba growers. CBC. [Internet] 02 Feb 2021 [cited 23 Mar 2024]. Available from: https://www.cbc.ca/news/canada/manitoba/roquette-manitoba-portage-la-prairie-pea-processing-1.5892463

163 Laychuk R. Massive pea-processing plant nears completion, opening new market for Manitoba growers. CBC. [Internet] 02 Feb 2021 [cited 23 Mar 2024]. Available from: https://www.cbc.ca/news/canada/manitoba/roquette-manitoba-portage-la-prairie-pea-processing-1.5892463

164 Piche G. 'Significant challenges' on Prairie horizon. The Free Press. [Internet] 6 Feb 2024 [cited 23 Mar 2024]. Available from: https://www.winnipegfreepress.com/business/2024/02/06/significant-challenges-on-prairie-horizon

165 Kemp C. New plant welcome addition for farmers. The Star. [Internet] 24 Nov 2021 [cited 23 Mar 2024]. Available from: https://www.thestar.com/news/canada/new-plant-welcome-addition-for-farmers/article_e22a6311-64af-5023-b774-6623fa984452.html

166 Louis Dreyfus Company. Louis Dreyfus Company Announces the Construction of a Pea Protein Production Plant in North America. [Internet] 7 Feb 2024 [cited 23 Mar 2024]. Available from: https://www.ldc.com/press-releases/louis-dreyfus-company-announces-the-construction-of-a-pea-protein-production-plant-in-north-america/

AUSTRALIAN LANDSCAPE 2023

167 AFGC. Food & Grocery Manufacturing's long covid: Jobs, investment remain challenged during pandemic recovery. Australian Food and Grocery Council. [Internet] 2 Aug 2023 [cited 15 Feb 2024] Available from: https://www.afgc.org.au/news-and-media/2023/08/food-grocery-manufacturings-long-covid-jobs-investment-remain-challenged-during-pandemic-recovery

168 AFGC. 2021-2022 Pre-Budget Submission. The Australian Government; Treasury. [Internet] May 2023 [cited 22 Feb 2024] Available from: https://treasury.gov.au/sites/default/files/2021-05/171663_australian_food_and_grocery_council.pdf

169 ABS. Consumer Price Index, Australia – December Quarter 2023. Australian Bureau of Statistics. [Internet] 31 Dec 2023 [cited 12 Feb 2024] Available from: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/latest-release

170 ABS. Wage Price Index, Australia – June Quarter 2023. Australian Bureau of Statistics. [Internet] 15 Aug 2023 [cited 22 Feb 2024] Available from: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/wage-price-index-australia/jun-2023

171 Wood D, Chan I, Coates B. Inflation and inequality: How high inflation is affecting different Australian households. Working paper prepared for the RBA Annual Conference, Sydney, 25–26 September 2023. [Internet] Sep 2023 [cited 22 Feb 2024] Available from: https://grattan.edu.au/wp-content/uploads/2023/11/RBA-Conference-2023-Inflation-and-Inequality.pdf

172 Pieters L, Edsall D, Geddes I, et al. Food fight: Consumers confront inflation with frugality. Deloitte. [Internet] 23 Feb 2023 [cited 22 Feb 2024] Available from: https://www2.deloitte.com/us/en/insights/industry/retail-distribution/consumer-behavior-trends-state-of-the-consumer-tracker/rising-food-prices-inflation.html

173 AFGC. Food & Grocery Manufacturing's long covid: Jobs, investment remain challenged during pandemic recovery. Australian Food and Grocery Council. [Internet] 2 Aug 2023 [cited 15 Feb 2024] Available from: https://www.afgc.org.au/news-and-media/2023/08/food-grocery-manufacturings-long-covid-jobs-investment-remain-challenged-during-pandemic-recovery

174 Alsop E. v2food to close Wodonga plant despite strong sales. Grain Central. [Internet] 15 Feb 2023 [cited 14 Feb 2024] available from: https://www.graincentral.com/news/v2food-to-close-wodonga-plant-despite-strong-sales/

175 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

176 Australian Bureau Statistics, Population clock and pyramid. [Internet] 5 March 2024 [cited 5 March 2024] Available from: https://www.abs.gov.au/statistics/people/population/population-clock-pyramid

177 Alexandratos, N., & Bruinsma, J. World agriculture towards 2030/2050: the 2012 revision (Vol. 12, No. 3). [Internet] FAO, Rome: ESA Working paper. 2012.[cited 25 Feb 2024] Available at: http://www.fao.org/docrep/016/ap106e/ap106e.pdf

178 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

179 Statista. Meat Substitutes - Asia 2023. [Internet] 2023 Mar [cited 15 May 2023] Available from: https://www.statista.com/outlook/cmo/food/meat/meat-substitutes/asia

180 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

181 Berry K. Australian Plant Proteins secures $45.7m investment. Food & Drink Business. [Internet] 14 Apr 2021 [cited 9 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/australian-plant-proteins-secures-45-7m-investment

182 Wells L. SA pulse investment loses traction as Unigrain's nears start. Grain Central. [Internet] 16 Aug 2023 [cited 9 Mar 2024] Available from: https://www.graincentral.com/news/sa-pulse-investment-loses-traction-as-unigrain-nears-start/

183 Dupe C, Rooney D. Unigrain on a roll with $10 million Wagin oat processing expansion thanks to $3 million State grant. Countryman. [Internet] 17 Aug 2023 [cited 25 Feb 2024] Available from: https://www.countryman.com.au/countryman/grain/unigrain-on-a-roll-with-10-million-wagin-oat-processing-expansion-thanks-to-3-million-state-grant-c-11619815

184 Grain Central. AGE's Integra Foods gets SA grant for faba venture. Grain Central. [Internet] 28 Feb 2024 [cited 9 Mar 2024] Available from: https://www.graincentral.com/news/ages-integra-foods-gets-sa-grant-for-faba-venture/

185 Sui E. Discovering China's role in growing the global plant-based industry. Good Food Institute. [Internet] 30 April 2019 [Cited 16 Mar 2024]. Available from: https://gfi.org/blog/chinas-role-in-the-plant-based-industry/

186 Good Food Institute (GFI). State of Global Policy 2022. [Internet] 2023 [cited 16 Mar 2024]. Available from: https://gfi.org/resource/alternative-proteins-state-of-global-policy/.

187 Brookes J. Harvesting Australia's future food potential in Western Sydney. Innovation Australia [Internet] 13 Dec 2022 [cited 24 Feb 2024] Available from: https://www.innovationaus.com/harvesting-australias-future-food-potential-in-western-sydney/

188 Brookes J. Harvesting Australia's future food potential in Western Sydney. Innovation Australia [Internet] 13 Dec 2022 [cited 24 Feb 2024] Available from: https://www.innovationaus.com/harvesting-australias-future-food-potential-in-western-sydney/

189 Fullerton T. Harvest B pioneers Kristi Riordan and Alfred Lo gear up for plant-based meats expansion. The Australian [Internet] 1 Jan 2023 [cited 24 Feb 2024] Available from: https://www.theaustralian.com.au/business/small-business/harvest-b-pioneers-kristi-riordan-and-alfred-lo-gear-up-for-plantbased-meats-expansion/news-story/cc535cc2384ba2e7a6a8de95aa8311d0

190 Nicholls N. Fable Food Co defies global plant-based meat downturn to raise $12.2 million in Series A round. Business News Australia. [Internet] 9 Feb 2023 [cited 29 Feb 2024] Available from: https://www.businessnewsaustralia.com/articles/fable-food-co-defies-downturn-in-plant-based-meat-to-raise--12-2-million-in-series-a-round.html

191 Cut Through Ventures, Folklore Ventures. State of Australian Startup Funding. Australian Startup Funding [Internet] 6 Feb 2024 cited 15 Feb 2024] Available from: https://www.australianstartupfunding.com/

192 AFGC. Food & Grocery Manufacturing's long covid: Jobs, investment remain challenged during pandemic recovery. Australian Food and Grocery Council. [Internet] 2 Aug 2023 [cited 15 Feb 2024] Available from: https://www.afgc.org.au/news-and-media/2023/08/food-grocery-manufacturings-long-covid-jobs-investment-remain-challenged-during-pandemic-recovery

193 AFGC. Food & Grocery Manufacturing's long covid: Jobs, investment remain challenged during pandemic recovery. Australian Food and Grocery Council. [Internet] 2 Aug 2023 [cited 15 Feb 2024] Available from: https://www.afgc.org.au/news-and-media/2023/08/food-grocery-manufacturings-long-covid-jobs-investment-remain-challenged-during-pandemic-recovery

194 CSIRO. Quantifying Australia's returns to innovation. CSIRO. [Internet] May 2022 [cited 8 Mar 2024] Available from: https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/CSIRO-futures/Innovation-Business-Growth/Quantifying-Australias-returns-to-innovation

195 Butler J. Australia being 'left behind' as federal research and development funding sinks to 30-year low [Internet] 22 Jan 2024 [cited 8 Mar 2024] Available from: https://www.theguardian.com/business/2024/jan/22/australia-being-left-behind-as-federal-research-and-development-funding-sinks-to-30-year-low

196 AFGC. Food and grocery manufacturing holds strength despite pandemic stress. Australian Food and Grocery Council. [Internet]15 Aug 2022 [cited 15 Feb 2024] Available from: https://www.afgc.org.au/industry-resources/state-of-the-industry-2

197 Berry, K. APPs' $113m federal MMI grant withdrawn. Food & Drink Business. [Internet] 8 Aug 2023 [cited 9 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/apps-113m-federal-mmi-grant-withdrawn

198 Wells L. SA pulse investment loses traction as Unigrain's nears start. Grain Central. [Internet] 16 Aug 2023 [cited 9 Mar 2024] Available from: https://www.graincentral.com/news/sa-pulse-investment-loses-traction-as-unigrain-nears-start/

199 Coyne A. Australia's All G, Fenn Foods to combine plant-based meat assets. Just Food. [Internet] 18 Oct 2023 [cited 15 Feb 2024] Available from: https://www.just-food.com/news/aussie-plant-based-businesses-fenn-foods-all-g-announce-merger/

200 Coyne A. Australia's All G, Fenn Foods to combine plant-based meat assets. Just Food. [Internet] 18 Oct 2023 [cited 15 Feb 2024] Available from: https://www.just-food.com/news/aussie-plant-based-businesses-fenn-foods-all-g-announce-merger/

201 Berry K. V2food flex: Acquires Soulara, launches new brand. Food & Drink Business [Internet] 16 Jan 2024 [cited 8 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/v2food-flex-acquires-soulara-launches-new-brand

202 Harvest B gets distribution through Healthylife. AuManufacturing. 20 Nov 2023 [cited 8 Mar 2024] Available from: https://www.aumanufacturing.com.au/harvest-b-gets-distribution-through-healthylife

203 Harvest B. Better Burger Gourmet Beef Patty. [Internet] n.d. [cited 8 Mar 2024] Available from: https://www.harvestb.io/product/better-burger-gourmet-beef-patties

204 Vegconomist. Monde Nissin Australia Launches Deli-Licious Meat Slices into Coles. 30 May 2023 [cited 8 Mar 2024] Available from: https://vegconomist.com/products-launches/monde-nissin-australia-deli-licious-coles/

205 Dedovic A. Cale & Daughters to open plant-based protein facility in Brisbane with Israel's Vgarden. Business News Australia. 7 Sep 2022 [cited 8 Mar 2024] Available from: https://www.businessnewsaustralia.com/articles/cale---daughters-to-open-plant-based-protein-facility-in-brisbane.html

206 Sier J. Plant-based meat start-up consolidation begins with merger. Australian Financial Review. [Internet] 23 Oct 2023 [cited 12 Jan 2024] Available from: https://www.afr.com/technology/plant-based-meat-start-up-consolidation-begins-with-merger-20231018-p5ed98

207 Reserve Bank of Australia. Inflation Calculator. Reserve Bank of Australia. [Internet] n.d. [cited 21 Mar 2024] Available from: https://www.rba.gov.au/calculator/

208 ABS. Consumer Price Index, Australia – December Quarter 2023. Australian Bureau of Statistics. [Internet] 31 Dec 2023 [cited 12 Feb 2024] Available from: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/latest-release

209 Stewart J, Bora L, Butt T. Retail health Index December 2023. [Internet] Dec 2023 [cited 12 Feb 2024] Available from: https://kpmg.com/au/en/home/insights/2023/09/retail-health-index.html

210 Stewart J, Bora L, Butt T. Retail health Index December 2023. [Internet] Dec 2023 [cited 12 Feb 2024] Available from: https://kpmg.com/au/en/home/insights/2023/09/retail-health-index.html

211 Williams T. Snacks and treats become 'luxury items' as Australians cut back on indulgences to combat rising grocery prices, new data shows. Nielsen IQ via ABC. [Internet] 16 Nov 2023 [Cited 12 Feb 2024] Available from: https://www.abc.net.au/news/2023-11-16/grocery-prices-spending-data-snacks-luxury-items-cost-of-living/103083250

212 Williams T. Snacks and treats become 'luxury items' as Australians cut back on indulgences to combat rising grocery prices, new data shows. Nielsen IQ via ABC. [Internet] 16 Nov 2023 [Cited 12 Feb 2024] Available from: https://www.abc.net.au/news/2023-11-16/grocery-prices-spending-data-snacks-luxury-items-cost-of-living/103083250

213 ABS. Consumer Price Index, Australia – December Quarter 2023. Australian Bureau of Statistics. [Internet] 31 Dec 2023 [cited 12 Feb 2024] Available from: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/latest-release

214 Evans S. Rich Lister Jack Cowin's v2food expands into plant-based 'chicken'. Australian Financial Review. [Internet] 15 Mar 2022 [cited 12 Jan 2024] Available from: https://www.afr.com/companies/retail/rich-lister-jack-cowin-s-v2food-expands-into-plant-based-chicken-20220314-p5a4cu

215 Food Industry Foresight. Presentation to Alternative Proteins Conference 2023. [conference]

216 Food Industry Foresight. New Proteins in the Australian Foodservice Market [Internet] August 2022 [cited 8 Mar 2024] Available from: https://fiforesight.com/report/australian-foodservice-market-size-alternative-proteins/

217 Food Industry Foresight. Presentation to Alternative Proteins Conference 2023. [conference]

218 McDonalds. McPlant. McDonalds Australia. [Internet] 30 Jan 2023 [cited 21 Mar 2024] Available from: https://mcdonalds.com.au/help-centre/article/kA02s000000Go7LCAS

219 Malek L, Umberger W. Distinguishing meat reducers from unrestricted omnivores, vegetarians and vegans: A comprehensive comparison of Australian consumers. Food Quality and Preference. 88:10408 [Internet] Mar 2021 [cited 31 Jan 2024] Available from: https://doi.org/10.1016/j.foodqual.2020.104081

220 Estell M, Hughes J, Grafenauer, S. Plant protein and plant-based meat alternatives: consumer and nutrition professional attitudes and perceptions. Sustainability 13 (3) 1–18. [Internet] 1 Feb 2021 [cited 31 Jan 2024] Available from: https://doi.org/10.3390/su13031478

221 Tan S. What are Australia's major dietary preferences? You Gov. [Internet] 13 Oct 2023 [cited 31 Jan 2024] Available from: https://au.yougov.com/consumer/articles/47583-world-food-day-australia-major-dietary-preferences-most-favourite-cuisines-2023

222 Toluna. Aussie shoppers are buying less meat. Toluna via B&T. [Internet] 23 Aug 2021 [cited 31 Jan 2024] Available from: https://www.bandt.com.au/toluna-survey-finds-aussies-shoppers-are-buying-less-meat/

223 Riverola C, Harrington S et al. Consumer views on plant-based foods: Australian sample. Griffith University. [Internet] Feb 2023 [cited 31 Jan 2024] Available from: https://research-repository.griffith.edu.au/items/63b7d677-1d1b-4376-9910-1611b62d6e97

224 Tan S. What are Australia's major dietary preferences? You Gov. [Internet] 13 Oct 2023 [cited 31 Jan 2024] Available from: https://au.yougov.com/consumer/articles/47583-world-food-day-australia-major-dietary-preferences-most-favourite-cuisines-2023

225 Riverola C, Harrington S et al. Consumer views on plant-based foods: Australian sample. Griffith University. [Internet] Feb 2023 [cited 31 Jan 2024] Available from: https://research-repository.griffith.edu.au/items/63b7d677-1d1b-4376-9910-1611b62d6e97

226 OECD. Meat Consumption. OECD Data [Internet] 2024 [cited 4 Apr 2024] Available from: https://data.oecd.org/agroutput/meat-consumption.htm

227 Australian Bureau of Statistics. Apparent Consumption of Selected Foodstuffs, Australia. ABS. [Internet] 30 Mar 2022 [cited 5 Apr 2024] Available from: https://www.abs.gov.au/statistics/health/health-conditions-and-risks/apparent-consumption-selected-foodstuffs-australia/latest-release

228 Tan S. How attitudes to plant-based alternatives vary. YouGov. [Internet] 25 Jan 2023 [cited 31 Jan 2024] Available from: https://au.yougov.com/consumer/articles/45056-tasmanian-victorian-politics-aussie-plant-meat

229 Berry K. Study: The impact of a label on consumer opinion. Food & Drink Business. [Internet] 25 Mar 2024 [cited 26 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/study-the-impact-of-a-label-on-consumer-opinion

230 Toluna. Aussie shoppers are buying less meat. Toluna via B&T. [Internet] 23 Aug 2021 [cited 31 Jan 2024] Available from: https://www.bandt.com.au/toluna-survey-finds-aussies-shoppers-are-buying-less-meat/

231 Kerry. Stepping up Taste in Plant Based: Australia [Internet] 12 May 2022 [cited 17 Jan 2024] Available from: https://explore.kerry.com/plant-based-taste.html

232 Riverola C, Harrington S, Matthew R. Consumer views on plant-based foods: Australian sample. Griffith University. [Internet] Feb 2023 [cited 8 Feb 2024] Available from: https://research-repository.griffith.edu.au/items/63b7d677-1d1b-4376-9910-1611b62d6e97

233 Tan S. What are Australia's major dietary preferences? You Gov. [Internet] 13 Oct 2023 [cited 31 Jan 2024] Available from: https://au.yougov.com/consumer/articles/47583-world-food-day-australia-major-dietary-preferences-most-favourite-cuisines-2023

234 Riverola C, Harrington S, Matthew R. Consumer views on plant-based foods: Australian sample. Griffith University. [Internet] Feb 2023 [cited 8 Feb 2024] Available from: https://research-repository.griffith.edu.au/items/63b7d677-1d1b-4376-9910-1611b62d6e97

235 Haupt P. Product of the Year 2024 revealed. NielsenIQ via Food & Drink Business [Internet] 16 Nov 223 [cited 12 Feb 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/product-of-the-year-2024-revealed

236 CSIRO. Total Wellbeing Diet. CSIRO. [Internet] 2024 [cited 8 Mar 2024] Available from: https://www.totalwellbeingdiet.com/au/the-diet/meal-plans/

237 Mawla A. Foulds T. Shifting Nutritional Trends: Protein Products for Australia's Ageing Population. Euromonitor. [Internet] 5 Feb 2024 [cited 8 Mar 2024] Available from: https://www.euromonitor.com/article/shifting-nutritional-trends-protein-products-for-australias-ageing-population

238 OpenTable from Pure Spectrum. 58% of Australians say their resolution for 2024 is to eat healthier. PR Newswire. [Internet] 17 Jan 2024 [cited 21 Mar 2024] Available from: https://www.prnewswire.com/apac/news-releases/58-of-australians-say-their-resolution-for-2024-is-to-eat-healthier-and-more-than-a-quarter-26-of-australians-struggle-to-make-healthy-choices-at-restaurants-302035471.html

239 Atkinson A, Ferguson M, et al. Are the impacts of food systems on climate change being reported by the media? An Australian media analysis. Public Health Nutrition. [Internet] 27 Apr 2023 [cited 21 Mar 2024] Available from: https://pubmed.ncbi.nlm.nih.gov/37100460/

240 Rattenbury A. Ruby M. Perceptions of the Benefits and Barriers to Vegetarian Diets and the Environmental Impact of Meat-Eating. Sustainability [Internet] 1 Nov 2023 [cited 21 Mar 2024] Available from: https://www.mdpi.com/2071-1050/15/21/15522

241 NHMRC, Communiqué – November and December 2023. [Internet] 30 Jan 2024 [cited 18 March 2 024] Available from: https://www.nhmrc.gov.au/health-advice/nutrition/australian-dietary-guidelines-review/communicating/communique-nov-dec-2023

242 James-Martin G, Baird D Hendrie G et al. Environmental sustainability in national food-based dietary guidelines: a global review. [Internet] The Lancet Planetary Health. 1 Dec 2022 [cited 21 Mar 2024] Available from: https://www.sciencedirect.com/science/article/pii/S2542519622002467

243 Shahid M et al. The George Institute. The nutritional profile of plant-based meat analogues available for sale in Australia. Nutrition & Dietetics. [Internet] 18 Jan 2023. [cited 19 Feb 2023] Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/1747-0080.12793

244 Kalocsay K, King T, Lichtenstein T, Weber J. Plant-based meat: A healthier choice? Food Frontier [Internet]12 Aug 2020 [cited 9 Mar 2024]. Available from: https://www.foodfrontier.org/resource/plant-based-meat-a-healthier-choice/

245 Shahid M et al. The George Institute. The nutritional profile of plant-based meat analogues available for sale in Australia. Nutrition & Dietetics. [Internet] 18 Jan 2023. [cited 19 Feb 2023] Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/1747-0080.12793

246 Marchese L. Hendrie G. McNaughton S et al. Comparison of the nutritional composition of supermarket plant-based meat and dairy alternatives with the Australian Food Composition Database. Journal of Food Composition and Analysis. [Internet] May 2024 [cited 8 Mar 2024] Available from: https://www.sciencedirect.com/science/article/pii/S0889157524000516

247 Arbetter L. Meat Wars Heat Up: Lobbyists Have It In for Plant-Based Meat Alternatives. The Beet. [Internet] 6 Dec 2019 [cited 4 Apr 2024] Available from: https://thebeet.com/the-meat-wars-heat-up-lobbyists-launch-campaign-against-plant-based-alternatives/

PROJECTIONS

248 Job K, Kalocsay K. et al. 2020 State of the Industry: Australia's plant-based meat industry. Food Frontier. 15 Mar 2021 [Cited 21 Mar 2024] Available from: https://www.foodfrontier.org/resource/2020-state-of-the-industry/

THE PATH FORWARD

249 NHMRC, Communiqué – November and December 2023. [Internet] 30 Jan 2024 [cited 18 March 2 024] Available from: https://www.nhmrc.gov.au/health-advice/nutrition/australian-dietary-guidelines-review/communicating/communique-nov-dec-2023

250 Fanzo J, Rudie C, Sigman I et. al Sustainable food systems and nutrition in the 21st century: a report from the 22nd annual Harvard Nutrition Obesity Symposium. The American Journal of Clinical Nutrition [Internet] 1 Jan 2022 [cited 22 March 2024] Available from: https://doi.org/10.1093/ajcn/nqab315

251 Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, et al. Food in the Anthropocene: the EAT Lancet Commission on healthy diets for sustainable food systems. Lancet [Internet]. 2019; 393(10170):447-92 [cited 4 Apr 2024] Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31788-4/fulltext#

252 Crippa, M., Solazzo, E., Guizzardi, D. et al. Food systems are responsible for a third of global anthropogenic GHG emissions. Nature Food [Internet] 8 Mar 2021. 2,198–209 [cited 22 March 2024] Available from: https://www.nature.com/articles/s43016-021-00225-9

253 Poore, J., & Nemecek, T. Reducing food's environmental impacts through producers and consumers. Science. [internet] 1 Jun 2018. 360(6392), 987-992. [cited 29 March 2024] Available from: https://www.science.org/doi/10.1126/science.aaq0216

254 Pan A, Sun Q, Bernstein AM, Schulze MB, Manson JE, Stampfer MJ, et al. Red meat consumption and mortality. Arch Intern Med [Internet]. 2012 [cited 2021 Feb 17];172(7):555–63. Available from: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1134845

255 Wang X, Lin X, Ouyang YY, Liu J, Zhao G, Pan A, et al. Red and processed meat consumption and mortality: Dose-response meta-analysis of prospective cohort studies. Public Health Nutr [Internet]. 2015 [cited 2020 Jun 23];19(5):893-905. Available from: https://pubmed.ncbi.nlm.nih.gov/26143683/

256 Micha R, Wallace SK, Mozaffarian D. Red and processed meat consumption and risk of incident coronary heart disease, stroke, and diabetes mellitus: A systematic review and meta-analysis. Circulation [Internet]. 2010 [cited 2020 Jun 23];121(21):2271-83. Available from: https://pubmed.ncbi.nlm.nih.gov/20479151/

257 International Agency for Research on Cancer (FR). IARC Monographs evaluate consumption of red meat and processed meat [Internet]. Lyon: World Health Organization; 2015 Oct 26 [cited 2021 Feb 17]. Available from: https://www.iarc.fr/wp-content/uploads/2018/07/pr240_E.pdf

258 Food and Agriculture Organization of the United Nations. World Livestock 2011 - Livestock in food security. [Internet] Rome: FAO. 2011 Dec [cited 29 March 2024] Available from: https://www.fao.org/3/i2373e/i2373e00.htm

259 Nidjam et al. The price of protein: Review of land use and carbon footprints from life cycle assessments of animal food products and their substitutes. Food Policy. [Internet] Dec 2012. [cited 29 March 2024] Available from: https://www.sciencedirect.com/science/article/abs/pii/S0306919212000942

260 Askew K, Most new products fail: Implicit sensory testing can help beat the odds. Food Navigator. [Internet] 18 March 2019 [cited 28 March 2024] Available from: https://www.foodnavigator.com/Article/2019/03/18/Most-new-products-fail-Implicit-sensory-testing-can-help-beat-the-odds

261 Gilbert K, Prusa K. Food Product Development Lab Manual. Iowa State University Digital Press. [Internet] 2021 [cited 28 March 2024] Available from: https://iastate.pressbooks.pub/foodproductdevelopment/

262 Buhler Group. Givaudan and Bühler open Protein Innovation Centre in Singapore. Buhler Group. [Internet] 26 Apr 2021 [cited 22 Jan 2024] Available from: https://www.buhlergroup.com/global/en/media/media-releases/givaudan_and_buehleropenproteininnovationcentreinsingapore.html

263 Lu Donna. How the sausage gets made: the serious business of fake meat. The Guardian. [Internet] 11 Jul 2021 [cited 26 Mar 2024] Available from: https://www.theguardian.com/food/2021/sep/11/how-the-sausage-gets-made-the-serious-business-of-fake-meat

264 Staight K. Meat alternatives industry hits reset button after dramatic rise and fall. ABC Landline. [Internet] 17 Jul 2023 [cited 26 Mar 2024] Available from: https://www.abc.net.au/news/2023-07-17/meat-alternative-protein-substitute-industry-stock-market-fall/102597196

265 King T, Eassom S et al. Alternative Proteins and Asia. Food Frontier. [Internet] 6 Jul 2023 [cited 22 Jan 2024] Available from: https://www.foodfrontier.org/resource/alternative-proteins-and-asia/

266 Berry K. Study: The impact of a label on consumer opinion. Food & Drink Business. [Internet] 25 Mar 2024 [cited 26 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/study-the-impact-of-a-label-on-consumer-opinion

267 Berry K. Study: The impact of a label on consumer opinion. Food & Drink Business. [Internet] 25 Mar 2024 [cited 26 Mar 2024] Available from: https://www.foodanddrinkbusiness.com.au/news/study-the-impact-of-a-label-on-consumer-opinion

268 Graca J, Calheiros MM, Oliviera A. Attached to meat? (Un) Willingness and intentions to adopt a more plant-based diet. Appetite [Internet] 1 Dec 2015. 95; 113-125 [cited 29 Mar 2024] Available from: https://www.sciencedirect.com/science/article/pii/S0195666315003189

269 De Groot JIM, The effectiveness of normative messages to decrease meat consumption: The superiority of dynamic normative messages framed as a loss. Sustainable Consumption. [Internet] 31 Aug 2022 [cited 21 Mar 2024] Available from: https://www.frontiersin.org/articles/10.3389/frsus.2022.968201/full

270 Rattenbury A. Ruby M. Perceptions of the Benefits and Barriers to Vegetarian Diets and the Environmental Impact of Meat-Eating. Sustainability [Internet] 1 Nov 2023 [cited 21 Mar 2024] Available from: https://www.mdpi.com/2071-1050/15/21/15522

271 Kwasny T, Dobering K, Reifler P. Towards reduced meat consumption: A systematic literature review of intervention effectiveness, 2001–2019. Appetite [Internet] 1 Jan 2022. 168; 105739. [cited 29 Mar 2024] Available from: https://www.sciencedirect.com/science/article/pii/S0195666321006462

272 Rattenbury A. Ruby M. Perceptions of the Benefits and Barriers to Vegetarian Diets and the Environmental Impact of Meat-Eating. Sustainability [Internet] 1 Nov 2023 [cited 21 Mar 2024] Available from: https://www.mdpi.com/2071-1050/15/21/15522

273 De Groot JIM, The effectiveness of normative messages to decrease meat consumption: The superiority of dynamic normative messages framed as a loss. Sustainable Consumption. [Internet] 31 Aug 2022 [cited 21 Mar 2024] Available from: https://www.frontiersin.org/articles/10.3389/frsus.2022.968201/full

274 Strassner AM, Hartmann C. Gradual behaviour change towards meat reduction: Development and validation of a novel decisional balance scale. Appetite. [Internet] 2023 [cited 1 Apr 2024] Available from: https://www.sciencedirect.com/science/article/pii/S0195666323000909

275 Rattenbury A. Ruby M. Perceptions of the Benefits and Barriers to Vegetarian Diets and the Environmental Impact of Meat-Eating. Sustainability [Internet] 1 Nov 2023 [cited 21 Mar 2024] Available from: https://www.mdpi.com/2071-1050/15/21/15522

276 Kitching J. Hart M. Wilson N. Burden or benefit? Regulation as a dynamic influence on small business performance. [Internet] 4July 2013 [cited 22 March 2024] Available from: https://doi.org/10.1177/0266242613493454

277 Reichheld A, Peto J, Ritthaler C. Research: Consumers' Sustainability Demands Are Rising. Harvard Business Review. [Internet]18 Sept 2023 [cited 22 March 2024] Available from: https://hbr.org/2023/09/research-consumers-sustainability-demands-are-rising

278 Riordan, K. Harvest B. Personal communication with Food Frontier, March 2024

279 Whittaker M. Is fat flavour? Neil Perry's verdict on the new vegan 'animal fat' [Forbes] Forbes [Internet] 19 Oct 2023 [cited 25 Mar 2024] Available from: https://www.forbes.com.au/news/innovation/nourish-ingredients-show-off-its-vegan-animal-fat/

280 Cancino, A. Aussie Plant-Based Co. Personal communication with Food Frontier, April 2024

281 Lusk J, Chafin C, Larson B. Plant-based protein: parity on the horizon. Kearney. [Internet] 20 Mar 2022 [cited 22 Jan 2024] Available from: https://www.kearney.com/industry/consumer-retail/article/-/insights/plant-based-protein-parity-on-the-horizon

282 Lusk J. Plant-based protein: parity on the horizon. Kearney. [Internet] 20 Mar 2022 [cited 22 Jan 2024] Available from: https://www.kearney.com/industry/consumer-retail/article/-/insights/plant-based-protein-parity-on-the-horizon

283 PBFA. PBFA and Kroger Plant-Based Meat Study. Plant Based Foods Association. [Internet] 2020 [cited 6 Feb 2024] Available from: https://plantbasedfoods.org/pbfa-kroger-plant-based-meat-store-test

284 Footprint. Plant-based sales slide when placed directly next to meat counterparts. Footprint. [internet] 20 Oct 2022 [cited 12 Jan 2024] Available from: https://www.foodservicefootprint.com/plant-based-sales-slide-when-placed-directly-next-to-meat-counterparts/

285 Ignaszewski E. Meat-aisle merchandising catapults plant-based meat sales. Good Food Institute. 30 Jul 2020 [cited 6 Feb 2024] Available from: https://gfi.org/blog/merchandising-plant-based-meat/

286 Braeger E. Tesco in 'second phase' of plant-based food revolution after sales dropped last year. Express. [Internet] 4 Mar 2024 [cited 26 Mar 2024] Available from: https://www.express.co.uk/news/uk/1873371/tesco-plant-based-food-revolution-drop-in-sales

287 Fowler, R. Food Industry Foresight. Personal communication with Food Frontier, April 2024

288 Fowler, R. Food Industry Foresight. Personal communication with Food Frontier, April 2024

289 Rosenfeld D, Bartolotto C et al. Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. Journal of Environmental Psychology. [Internet] Jun 22 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.jenvp.2022.101825

290 Perez-Cueto F. Nudging plant-based meals through the menu. International Journal of Gastronomy and Food Science [Internet] Jul 21 [cited 23 Jan 2024] Available from: https://doi.org/10.1016/j.ijgfs.2021.100346

291 Hielkema MH, A "vegetarian curry stew" or just a "curry stew"? - The effect of neutral labelling of vegetarian dishes on food choice among meat-reducers and non-reducers. Journal of Environmental Psychology. [Internet] 1 Dec 2022. 84; 101877. [cited 23 Jan 2024] Available from: https://www.sciencedirect.com/science/article/pii/S0272494422001220

292 Guedes D et al. Promoting plant-based eating in meat-centric meal contexts: a field study. Public Health Nutrition. [Internet] 1 Nov 2023; 26(11): 2619–2627. [cited 23 Jan 2024] Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10641616/

293 Boronowsky R. et al. Plant-based default nudges effectively increase the sustainability of catered meals on college campuses: Three randomized controlled trials. Frontiers in Sustainable Food Systems. [Internet] 9 Nov 2022 [cited 1 Apr 2024] Available from: https://www.frontiersin.org/articles/10.3389/fsufs.2022.1001157/full

294 Morach B, Clausen M, Rogg J et al. The Untapped Climate Opportunity in Alternative Proteins. Boston Consulting Group. [Internet] 8 Jul 2022 [cited 31 Mar 2024] Available from: https://www.bcg.com/publications/2022/combating-climate-crisis-with-alternative-protein

295 Morach B, Clausen M, Rogg J et al. The Untapped Climate Opportunity in Alternative Proteins. Boston Consulting Group. [Internet] 8 Jul 2022 [cited 31 Mar 2024] Available from: https://www.bcg.com/publications/2022/combating-climate-crisis-with-alternative-protein

296 Protein Industries Canada. Protein Industries Canada receives federal funding for another five years. [Internet] 13 Feb 2023 [cited 23 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/news-releases/protein-industries-canada-receives-federal-funding-for-another-five-years

297 A Long-Term Roadmap for the Development of Canada's Plant-Based Food, Feed and Ingredient Sector. Protein Industries Canada. [Internet] July 2021 [cited 18 Mar 2024]. Available from: https://www.proteinindustriescanada.ca/uploads/PIC-Sector-Roadmap.pdf/

298 Plant Based World Pulse. Government Support Drives Plant-Based Innovation in Denmark. [Internet] 8 Feb 2023 [cited 08 Apr 2024]. Available from: https://plantbasedworldpulse.com/government-support-drives-plant-based-innovation-in-denmark/

299 Piñeiro P. et al. A scoping review on incentives for adoption of sustainable agricultural practices and their outcomes. Nature Sustainability. [Internet] 12 Oct 2020; 3,809-820. [cited 7 Apr 2024] Available from: https://www.nature.com/articles/s41893-020-00617-y

300 Lencucha R et al. Government policy and agricultural production: a scoping review to inform research and policy on healthy agricultural commodities. Globalisation and Health. [Internet] 20 Jan 2020; 16,11. [cites 7 Apri 2024] Available from: https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-020-0542-2#Sec20

301 Food and Agriculture Organization of the United Nations (FAO). Pulses: Nutritious seeds for a sustainable future. [Internet] Apr 2016 [cited 23 Mar 2024]. Available from: https://www.fao.org/3/i5528e/i5528e.pdf

302 EDB Singapore. New facility opens in Tuas for firms to produce plant-based protein like meatless patties. EDB Singapore. [Internet] 20 Jul 2022 [cited 5 Apr 2024] Available from: https://www.edb.gov.sg/en/business-insights/insights/new-facility-opens-in-tuas-for-firms-to-produce-plant-based-protein-like-meatless-patties.html

303 Alternative Proteins Council. Industry Compliance Guidelines for Labelling of Meat & Dairy Alternative Products (plant based) in Australia and New Zealand. APC. 24 Apr 2023 [cited 1 Apr 2024] Available from: https://www.alternativeproteinscouncil.org/guidelines-for-labelling-of-meat-dairy-alternative-products-au-nz/

304 Commonwealth Science and Industry Research Organisation. Protein: A Roadmap for unlocking technology-led growth opportunities for Australia. CSIRO. [Internet] 2022 [cited 18 Mar 2024] Available from: https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/agriculture-and-food/australias-protein-roadmap

About Food Frontier

Food Frontier is the independent think tank on alternative proteins in Australia and New Zealand. Funded by grants and donations, we work to create a diverse and sustainable protein supply that supports people and our planet to flourish.

Through our work, we advance dialogue and decision-making to accelerate the market development of alternative proteins, unlocking economic, environmental and health benefits.

Food Frontier priorities:

Increasing understanding of alternative proteins: We are focused on strengthening the evidence base on the benefits of alternative proteins, and ensuring those data and insights are accessible to consumers, business leaders, policymakers, media and more.

Strengthening pathways for engagement across the supply chain: We are delivering valuable insights to farmers interested in diversifying their crops, ingredients makers considering the growing demand for domestically produced protein ingredients, and Australian and New Zealand businesses seeking to bolster their exports, particularly into Asian markets.

Making the business case for investment: We are providing key insights to both public and private investors, backed by market analysis and our collective knowledge of where the local alt-proteins sector is headed, to ensure funding into high-impact areas.

food frontier™

Food Frontier lead author

Klara Kalocsay | Head of Research Strategy

Food Frontier contributing authors and review

Dr Simon Eassom | CEO

Thomas King | Founder and non-executive director

Susie O'Neill | Head of Industry Engagement

Kathy Cogo | Head of Communications and Marketing

Megan Redmond | Head of Government Relations and Policy

Suggested citation

Kalocsay, K, et al. State of the Industry: Australia's plant-based meat industry. Food Frontier, Melbourne. 22 April 2024. Available from foodfrontier.org/resource/2023-state-of-the-industry

Report review

Sections of this report pertaining to Deloitte Access Economics modelling were reviewed by Dr Daniel Terrill, Deloitte Access Economics.

Acknowledgements

Publishing a State of the Industry underpinned by updated economic modelling was made possible by Food Frontier's supporters, and the dedicated professionals at Deloitte Access Economics. Food Frontier would like to thank the team, led by Dr Daniel Terrill, for their excellent work. Food Frontier is grateful to those in the plant-based meat industry and supporting sectors who donated their time and insights to contribute to the unique intelligence and information contained in this report.

food frontier™

foodfrontier.org