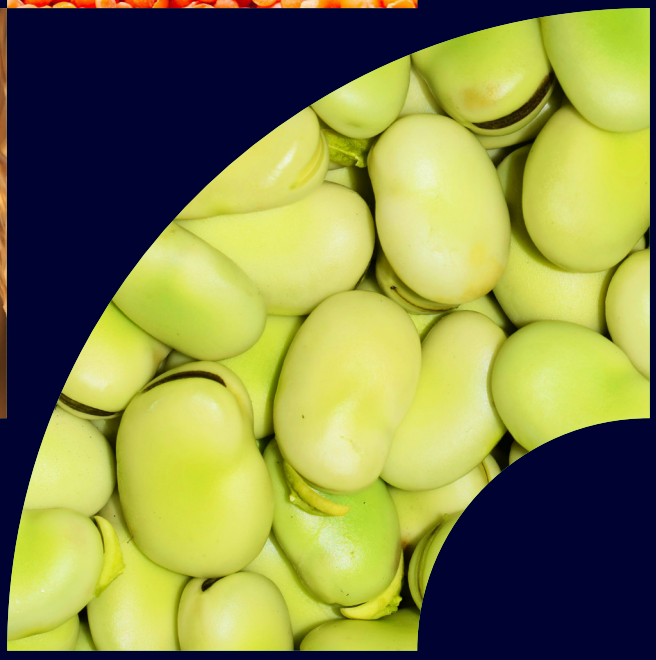
food frontier

Unlocking Australia's potential:

The case for a national plant protein ingredient industry



Unlocking Australia's potential: The case for a national plant protein ingredient industry

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Executive summary

Australia is at a strategic crossroads. Global demand for plant protein ingredients is rising rapidly, driven by food system innovation, consumer trends and increasing emphasis on traceability, sustainability and supply chain security. Yet with exception of substantial capability in wheat-based protein ingredients, Australia remains primarily a raw commodity exporter of its protein-rich crops, leaving high-value ingredient manufacturing to other nations.

This report sets out the case for unified, national action—showing that with the right strategy, Australia can leverage its crop production strengths, manufacturing and research capabilities, and growing market demand.

The goal? To lead in producing diverse plant protein ingredients and build a premium, provenance-led plant protein ingredient industry that enables Australia to capture its share of a growing global opportunity.

A global market undergoing structural transformation

The global plant protein ingredient market—valued at US$24.1 billion in 2024—is forecast to nearly triple by 2032[1], driven by expansion across food, beverage and nutrition categories, as well as others like pet food. While soy, wheat and pea remain dominant, demand is simultaneously diversifying toward alternative crops like faba bean, mung, and lentil due to functionality, allergen sensitivity, supply chain and environmental, societal and governance (ESG) pressures. Multinational manufacturers and governments are responding by investing in diversified sourcing, regional processing and new functional formats.

Leading countries are treating this shift and increased demand as a strategic opportunity. Canada has invested hundreds of millions to develop full value-chain ingredient processing capability, from crop to final product. China is integrating plant protein manufacturing into its food security and infrastructure planning. The European Union (EU) is advancing a Protein Diversification Strategy. These efforts reflect a growing consensus: sovereign capacity to produce functional protein ingredients is an economic and strategic priority.

Australia's production advantage is clear—but underleveraged

Australia produces roughly 59 million tonnes of protein-rich cereals, pulses and oilseeds annually, including a vast majority of the crops used for plant protein ingredients.[2] It leads globally in lupin, is a major producer of wheat, barley and canola, and has high growth potential in pulses such as faba bean, lentil and chickpea.

Despite this advantage, Australia exports roughly 65% of its grain into global commodity markets annually.[3] In one annual example for comparative purposes, Australia exported 40.9 million tonnes of its protein-rich source crops, unprocessed (FY23), yet imported an estimated 118 thousand tonnes of plant protein ingredients (2023). This disconnect points to a critical missed opportunity: a shift from bulk exports to high-value processing could enable greater domestic economic return, support regional resilience and meet growing demand for quality ingredients.

Evidence of demand is growing, domestically and abroad

Domestic manufacturers are reporting clear demand signals. Ingredient audits of 2,900 retail products across Australian supermarkets from 2022 to mid-2024 showed a 12% inclusion rate of plant protein ingredients including isolates and concentrates, particularly in plant-based food and beverage products.[4] Soy, wheat and pea remain dominant, but diversification is emerging: faba bean, lupin and hemp ingredients are entering retail channels.

Broader consumer trends are driving demand for functional, high-protein, fibre-rich, allergen sensitive and 'clean label' ingredients that align with values around health, sustainability and transparency. Foodservice data supports this, with healthcare settings investigating protein fortification to support nutritional outcomes. In parallel, shifting dietary patterns are fuelling the adoption of plant-based food and beverage products, including plant-based milks, snacks and supplements as part of these preferences. Global buyers (especially in Asia) are increasingly seeking sustainable and traceable ingredients aligned with Australia's production strengths and brand.

The nutritional qualities and multifunctionality of these ingredients are also contributing to adoption across personal care and industrial product categories, as well as livestock and aquaculture feed.

An emerging manufacturing sector is taking root

Australia's plant protein ingredient manufacturing sector now includes six manufacturers using commercial or pilot-scale wet or dry fractionation across wheat, pulses and oilseeds. Manildra Group is the largest and longest-standing, processing over one million tonnes of wheat annually into protein ingredients. Essantis, Integra Foods and Australian Plant Proteins are commercialising ingredients from yellow pea, faba bean, lentils and mung bean, while Wide Open Agriculture (lupin) and Hemp Harvests are scaling early-stage production from more novel crops.

Together, these firms are producing isolates, concentrates, flours, starches, fibres and oils (*see Definitions and clarifications, page 8*) for food, beverage, pet feed and other markets. Several are vertically integrated with local crop supply chains and are already exporting to priority regions. Yet compared to global peers, Australia's capacity remains limited, with significant barriers to achieving the scale and efficiency needed to compete on cost.

The opportunities are wide-ranging and strategic

Consulted manufacturers identified five major opportunity areas:

1. **Diversification to meet global demand:** Australia can supply high-quality, functional ingredients that meet shifting consumer and manufacturer preferences, especially in Asia-Pacific markets where provenance is a key differentiator, valuing both quality and safety.
2. **Import displacement to strengthen food security:** Replacing imported ingredients with local alternatives enhances supply chain resilience and reduces exposure to trade volatility.
3. **Sustainable value-addition for the agriculture sector:** Domestic ingredient production can deliver significant additional value of otherwise unprocessed crops, provide greater economic certainty for growers and incentivise rotational cropping for on-farm sustainability.
4. **Regional manufacturing to drive circularity:** Strategically located facilities can reduce freight costs, valorise co-products, and build regional supply chain resilience through co-location of complementary operations and shared infrastructure.
5. **Integration with Australia's emerging bioeconomy:** Secondary ingredients could serve as feedstocks for biomanufacturing applications such as biofuel production—strategically linking plant protein manufacturing with Australia's broader bioeconomy ambitions.

Intervention is critical to scaling a national sector

Despite growing demand and early success stories, manufacturers face persistent structural barriers:

1. **Sales and product development:** Uptake is hindered by limited awareness or understanding among food manufacturers and a lack of technical support for application research and development (R&D).
2. **Cost and scale:** High manufacturing costs, supply chain efficiency gaps and high per unit prices make it difficult to compete with mature international supply chains and cheap imports.
3. **Investment challenges:** Infrastructure and R&D is costly, and startups and scale-ups face significant capital constraints, with investors remaining cautious without catalytic public co-funding.
4. **Upstream supply variability:** Supply chain gaps, inconsistent logistics and utility services, and fluctuating raw commodity markets reduce supply security.
5. **Regulatory hurdles:** Industrial hemp, in particular, is held back by outdated and inconsistent regulations that restrict adoption, marketing and investment.

Without deliberate coordination, Australia risks losing competitive ground to countries with clearer strategies, larger investment pools and integrated value chain development.

The pathway forward: Five priorities for national action

The report identifies five strategic priorities for government to activate:

1. **Establish a national taskforce** to set a national strategy, coordinate efforts and align cross-jurisdictional policy, infrastructure and investment.
2. **Invest in shared R&D platforms** for crop breeding, processing optimisation, ingredient functionality and product application, and byproduct valorisation.
3. **Drive demand and reduce adoption barriers** through targeted marketing, reformulation incentives, traceability systems, and data on ingredient usage and trade flows.
4. **Scale manufacturing** via strategic investment in regional hubs, shared infrastructure and capital co-investment frameworks.
5. **Build workforce and regional supply chains** through targeted training, grower engagement, crop contracting and regional ecosystem development.

Conclusion: A nation-defining opportunity within reach

Australia has the crops, capability and credibility to become a preferred global supplier of plant protein ingredients and lead in the emerging wave of plant protein diversification. With coordinated leadership, strategic investment and whole-of-government planning, Australia can transform its protein-rich crops into high-value ingredients, drive resilient regional growth and secure a differentiated position in a rapidly growing global market.

The foundations are in place, and the case is clear–what is required now is leadership, coordination and national action.

Report overview

This report explores the opportunity for Australia to develop a globally competitive plant protein ingredient industry that delivers value across the supply chain—from growers and manufacturers to exporters and regional communities. It presents a well-evidenced, forward-looking analysis of the market, economic and policy conditions shaping the development of this emerging industry.

To inform this analysis, Food Frontier conducted in-depth consultation with Australia's newest entrants into plant protein ingredient manufacturing—Essantis, Integra Foods, Australian Plant Proteins, Wide Open Agriculture and Hemp Harvests. These insights directly informed our findings on major opportunities (*Chapter III*) and challenges (*Chapter IV*). Food Frontier also met with stakeholders from across the broader agrifood supply chain to capture considerations across production, processing and market dynamics. The report further draws on deep research into global market trends and policy settings to support a robust evidence base for decision-makers.

While extensive effort has been made to bring together the best available data, market signals and stakeholder insights, this report does not claim to be definitive. Critical gaps remain, particularly in economic and demand modelling, as well as supply chain mapping. The findings presented here should be viewed as a foundation to be built upon through further detailed, evidence-based analysis and broad, ongoing value chain engagement.

Purpose

The purpose of this report is to inform Australia's dual opportunity to build a premium, provenance-led ingredient industry across both wheat and emerging protein-rich crops and to secure a leading role in the global shift toward diversified plant protein ingredients.

To achieve this, the report includes data, evidence and consultations that address three key requirements:

1. To address evidence gaps and demonstrate growing demand for domestically produced plant protein ingredients and the strategic rationale for scaling onshore processing in Australia;
2. To surface and synthesise insights directly from domestic ingredient manufacturers on the key barriers and enablers shaping the industry's development; and,
3. To inform and activate the broader policy, market and investment settings needed to support the growth of a globally competitive, resilient and value-adding plant protein ingredient industry in Australia.

Scope

This report focuses on plant protein ingredients derived from Australian-grown crops—including pulses, oilseeds and cereals—that are produced using wet or dry fractionation technologies. These methods extract fractions of the raw crop into primary protein ingredients: isolates and concentrates; and secondary ingredients: flours, starches, fibres and oils. This definition distinguishes plant protein ingredient manufacturing from broader final product production that uses whole plant proteins (e.g. incorporating tofu or wholegrain pulses), as well as from those only using milling and/or pressing technologies to produce secondary protein ingredients. While this report's analysis of the Australian plant protein ingredient market does not include these product manufacturers, it should be noted that many of the downstream application opportunities as highlighted also apply to them.

These ingredients are used across a range of applications in Australia and around the globe, including plant-based food and beverages, as well as in sports nutrition, bakery, breakfast cereals, snacks and pet foods. The report also considers applications in animal feed and other food-adjacent sectors, including nutraceuticals, industrial uses and as feedstock inputs for biomanufacturing processes. The report does not investigate crops such as oat, almond or coconut, which are commonly used as ingredient 'bases' in plant-based dairy alternative products (milks, yogurts, cheeses, etc.) but are not processed specifically for their protein content.

Acknowledgements

Food Frontier gratefully acknowledges the contributions of the companies, researchers and agrifood stakeholders who generously shared their time, insights and expertise throughout the development of this report. We are especially grateful for the ingredient manufacturers who participated in detailed consultations, providing valuable perspectives that informed our findings and analysis. Their openness and industry knowledge were critical to shaping the evidence as presented.

Special thanks to the Grains & Legumes Nutrition Council for the provision of proprietary product audit data, and to Manildra Group, Grains Australia, the Pulse Council, the Grains Research and Development Corporation, Agriculture Victoria Research, the Australian Export Grains Innovation Centre, SGA Solutions, Bowman Richards & Associates, v2food and Harvest B for their expert insights. Deep gratitude also goes to Liz Lennon of Focused Solutions for her research and considered support during report development.

About Food Frontier

Food Frontier is the independent think tank on alternative proteins in Australia and New Zealand. We are dedicated to advancing new, sustainable and nutritious protein options that create value for farmers, businesses and consumers. Since our founding in 2017, Food Frontier's research, reports, events, and engagements have driven critical dialogue, investment and collaboration in this fast-emerging field.

Food Frontier is located on the traditional lands of the Wurundjeri people of the Kulin Nation. We pay our respects to Elders past and present and recognise and respect their abiding connection to this land, its waterways and community.

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Definitions & clarifications

Source: Essantis

Protein concentrates are protein-rich powders typically containing 40–79% protein by weight. They are commonly used as bulk-inclusion ingredients in formulations where moderate protein content, fibre retention and functional attributes—such as (though not limited to) water retention, emulsification and texture enhancement—are desirable. Concentrates are valued for their cost-effectiveness and ability to preserve more of the natural characteristics of the source material.

Source: Australian Plant Proteins

Protein isolates are highly refined powders containing 80% or more protein by weight. They are generally used at low inclusion rates in formulations requiring concentrated protein content, precise nutritional profiles or specific functional attributes such as (though not limited to) solubility, gelling and foaming. Considered premium ingredients, isolates are typically more expensive than concentrates due to their higher purity and processing requirements.

Fractionation is the process of separating components of a raw material based on their physical or chemical properties. In plant protein ingredient production, it is used to separate protein from other components such as carbohydrates (starch, fibre) and fats.

Two primary methods are used:

- **Dry fractionation** involves physical separation techniques, such as milling, air classification or electrostatic separation. It typically results in protein concentrates with moderate protein purity and retains more of the original material's non-protein components including fibre and starch.[5]
- **Wet fractionation** uses water and or mild solvents to solubilise protein, followed by precipitation, centrifugation and filtration processes to remove other components. It typically produces protein isolates with higher protein purity and reduced levels of starches, fats and fibre.[6]

Primary protein ingredients refer to protein isolates and concentrates—the main protein fractions produced through fractionation processes.

Secondary protein ingredients refer to the co-products generated during the fractionation process. While grain-dependent, these typically include flour, starch, fibre and oil. **Flour** generally consists of a blend of starch, with smaller proportions of protein and fibre. Within this report, these fractions are also referred to as **byproducts** when discussed in the context of their pre-commercial product applications.

Grains as a broad category includes cereal, pulse and oilseed crops. Within this report, terms such as plant protein or protein-rich source crops indicate the diverse grains processed into plant protein ingredients.

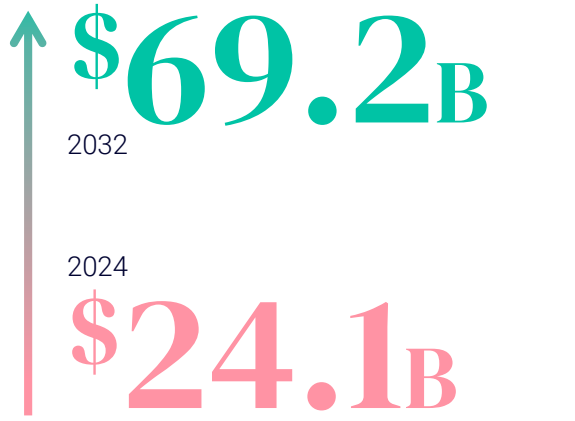
Industrial hemp: For the purposes of this report, Food Frontier has adopted industrial hemp's lesser used classification as an oilseed grain, rather than under its alternative classification as an industrial grain. This reflects its primary use in the ingredients industry, which is protein and oil extraction from seed, and enables comparison with other oilseed grains commonly used in rotational cropping systems.

I. The global market

The global market for plant protein ingredients is undergoing a period of transformation. Once dominated by a narrow set of applications and ingredients, it is now expanding rapidly in both size and scope. This is being driven by shifting consumer preferences, food industry innovation and a growing push for nutritional, environmental and supply chain resilience.

According to Market Data Forecast, the global plant protein ingredients market was valued at US$24.1 billion in 2024.[7] This market estimate encapsulates primary protein ingredients—such as isolates and concentrates—and secondary protein ingredients like flours, derived from soy, wheat, pea and other protein-rich source crops, for use across select food, beverage and nutrition applications.

Global plant protein ingredients market



Projected growth nearly 3x increase.
Projected figures are USD.

Source: Market Data Forecast

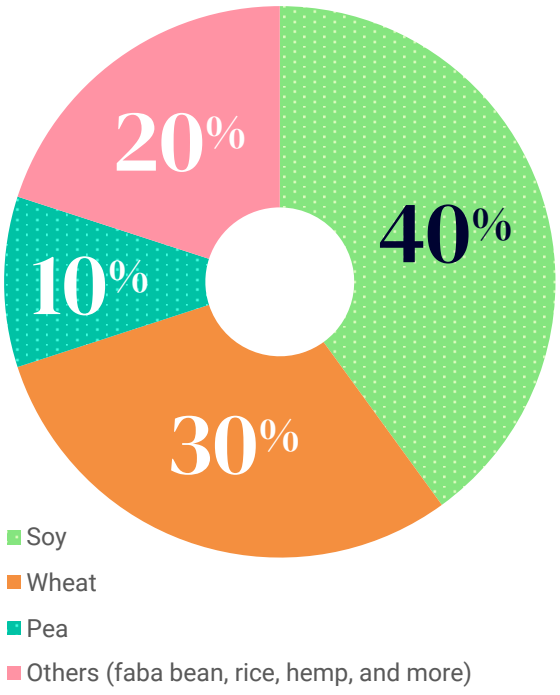
At an estimated compound annual growth rate (CAGR) of 14.1%, demand is expected to nearly triple to reach US$69.2 billion by 2032.[8] This expansion presents a significant opportunity not only for manufacturers and exporters, but for the countries able to supply a broad range of quality ingredients into a diversifying market.

Market composition and growth outlook

Today, soy-based protein ingredients make up the largest segment of the global market, reaching US$10 billion in value in 2024, roughly 40% of the market.[9] Wheat follows at 30% (US$7.3 billion) and pea at 10% (US$2.4 billion), while a variety of 'other' cereal, oilseed and pulse-based proteins make up the remaining 20% (roughly US$4.8 billion).[10] Soy is expected to maintain its market leadership over the forecast period, with wheat remaining the second most used ingredient base.[11] Pea is projected to hold its place as the third largest segment, while also gaining share as its use expands amongst manufacturers seeking pulse-based alternatives.[12, 13]

Notably, the remaining 20% 'other' plant protein ingredients market–encompassing ingredients made from faba bean, rice, hemp, among a range of other protein-rich source crops–is now the focus of some of the most exciting innovation and research and development (R&D) taking place globally. Companies and countries alike are exploring how these diverse plant proteins can meet the evolving needs of food, beverage and feed manufacturers, offering new functionality, nutrition and sustainability profiles. For Australia, this shift presents one of the most compelling opportunities to expand its role in the global plant protein industry.

Global plant protein ingredients market composition



Source: IMARC Group & Grand View Research

Projections by Ernst & Young (EY) suggest the scale of crops output required to supply growing global ingredient demand will be vast. To meet anticipated global demand for plant-based dairy, meat and baking fortification product categories alone, between 52 and 81 million tonnes of diverse protein-rich crops will be required annually by 2035. EY upholds soybean and wheat remaining the largest and second largest contributors, and estimates the share of demand met by pea, lentils, faba bean and a host of other grain crops will rise significantly.[14] These projections exclude adjacent growth markets such as nutrition and wellness, snacking, and pet food, amongst many other use categories, meaning the true volume of demand for diverse protein crop inputs is likely to be even greater.

Regional market distribution

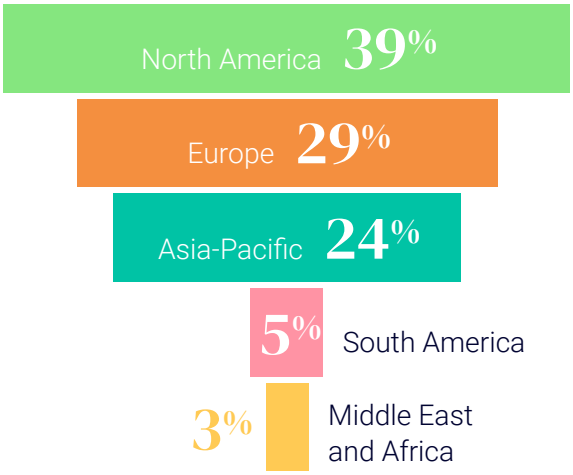
North America currently leads production for the global market, accounting for 39% of total share—driven by advanced food manufacturing systems, strong consumer uptake and well-established supply chains.[15] Within the region, the United States (US) holds the largest share by a significant margin, underpinned by its longstanding soy ingredient production, followed by Canada as an emerging global leader in pea and canola protein.[16]

Europe holds the second largest share at 29%, supported by a strong consumer push toward health, sustainability and high-quality product offerings. Younger demographics are seeking 'clean label' foods that align with health, ethical and environmental values, prompting rapid product innovation, particularly in snacking and functional categories, alongside a shift toward diverse and locally sourced and processed ingredients.[17]

However, the fastest growth is now occurring in the Asia-Pacific (APAC) region, which currently accounts for 24% of the global market.[18] Soy protein dominates regional production, followed by wheat and pea–the latter projected to be the fastest growing segment over the forward period. China accounts for the largest share within the APAC market, at an estimated 30%, with growth driven by strong government support for plant-based alternatives, rising health consciousness among consumers, extensive agricultural resources and an existing sophisticated manufacturing base.[19]

India and Japan follow as key APAC growth markets, with increasing demand from both consumers and manufacturers.[20] Outside the major regions, South America accounts for an estimated five percent of the global market, while the Middle East and Africa (MENA) region comprises the remaining three percent.[21]

Market share of global plant protein ingredient production



Source: Pro Market Reports & Mordor Intelligence

While the plant protein ingredients market is expanding, it remains highly concentrated amongst a handful of key global players.[22, 23] Major agribusiness and ingredients companies like Cargill, Archer Daniels Midland (ADM), International Flavors & Fragrances (IFF), Roquette Freres (Roquette) and Kerry Group dominate global manufacturing and supply of plant protein ingredients.[24] Likewise, a small number of countries—led by the US, Canada, China and parts of Europe—control the majority of global processing capacity and exports.[25]

This leaves nations reliant on imported ingredients vulnerable to trade disruptions, pricing volatility and limited supply chain visibility. In this context, building sovereign manufacturing capability is emerging as a strategic priority for countries seeking to secure both economic value and food system resilience.[26, 27] For countries that can produce and process a variety of high-quality, protein-rich crops, this trend offers an entry point into new segments of global value chains. Companies and governments alike are responding by diversifying both supply and strategy.

Evolving end use applications

Across all regions, the types of products driving demand are evolving.[28] Plant-based food and beverage product categories continue to be major destinations for both isolates and concentrates–with dairy alternative products, including plant-based milk, cheese and yogurt, leading at roughly 32% of the global market share in 2023.[29]

Global vegan pet food **$19.7B** by 2034

Source: Market.US News

At the same time, newer product categories are accelerating demand across all protein ingredient types, including for secondary ingredients such as flours, starches and fibres.[30] Baking, cereals, sports nutrition and dietary supplements are increasingly incorporating a broader variety of plant proteins to deliver targeted functional and nutritional attributes.[31] Snacking has also emerged as a critical growth avenue, as companies respond to consumer demand for convenience, protein-rich formulations and 'better-for-you' options.[32] Forecasts suggest the global market for plant-based snacks could reach US$96 billion by 2034, growing at nearly nine percent per year.[33]

Pet food represents another fast-growing segment. As pet ownership rises in emerging economies and pet humanisation trends spread globally, demand for plant-based, nutrient-rich alternatives is accelerating with it.[34] The global vegan pet food market is projected to grow a CAGR of 6.7%, reaching US$19.7 billion by 2034, underscoring the scale of the opportunity within this single segment alone.[35]

Plant protein ingredients are also gaining traction for use in nutraceutical and functional health products for their amino acid profiles, digestibility and associated health benefits, particularly their dietary fibre content.[36] In parallel, ingredient applications are being explored for use in non-food sectors such as personal care, bioplastics, packaging and adhesives.[37] As ingredient co-product functionality is better understood and processing infrastructure advances, application opportunities within the growing biomanufacturing sector are also emerging.[38]

Biomanufacturing technologies–which use biological systems such as microorganisms and cell cultures to produce 'bio' products including foods, fibres, fuels and feed, within controlled environments–rely on a steady supply of carbohydrate-rich feedstocks, which could be sourced from plant protein co-products such as starch.[39] The global bioeconomy is currently valued at US$4 trillion and is expected to reach US$30 trillion by 2050.[40]

Ingredient diversification

Today, manufacturers, investors and governments globally are exploring diversification of their plant protein source crops, turning their attention to alternatives to the incumbents (soy, wheat and pea) that can offer novel functionality, nutritional value and local adaptability. The diversification that began with the introduction of pea protein in the early 2010s[41]—the first pulse-based alternative to gain mass-market adoption[42]—has since gathered pace, with new ingredients beginning to compete on performance and appeal.

This shift is being propelled by a convergence of pressures and opportunities. As plant protein ingredients are progressively incorporated into a range of food, beverage and broader product categories, functional performance has become increasingly critical. Manufacturers are seeking proteins with specific properties, such as gelation, foaming and emulsification, to meet texture, stability and sensory requirements across diverse applications.[43, 44] Meanwhile, consumers are demanding 'cleaner' labels (loosely defined by concise ingredient lists, limited additives and minimal processing), more nutritional density, allergen sensitive formulations and sustainability credentials. These are attributes that many emerging ingredients are well positioned to deliver.[45]

This convergence has opened a window of opportunity for diverse protein-rich source crops such as faba bean, lupin, mung bean, rice, hemp and others, each of which offer distinct functional profiles suited to different applications. Blended protein formulations, including those combining plant and animal-based proteins, are also gaining popularity to leverage respective proteins' functional attributes, enhancing technical performance and nutritional quality, and thus, consumer appeal.[46, 47]

This diversification is evident not just in product formulation, but increasingly across R&D pipelines, investment flows and procurement strategies.[48] To meet growing demand, the major multinational firms are both doubling down on investments in their existing ingredients offerings[49, 50] and expanding their portfolios to capture market share in new categories and regions — investing in infrastructure and R&D, forming strategic partnerships and acquiring capability to scale emerging offerings.[51] Smaller and mid-sized companies globally are also driving important innovation at the edges of the market, just as startups are finding footholds with proprietary processing technologies and products that

respond to emerging functional and dietary niches.[52]

ADM, for instance, broadened its portfolio in 2021 to include eight additional plant protein crops—chickpea, black bean, navy bean, hemp seed, chia, quinoa, sunflower seed and pumpkin seed—based on targeted consumer insight and application potential.[53] ADM has also made strategic acquisitions such as Prairie Pulse in 2023, a Canadian lentil and pulse processor, to strengthen vertical integration and direct access to growers.[54] Similarly, Cargill has invested over US$100 million since 2018 in its joint venture with US-based PURIS, one of North America's largest pea protein manufacturers, including funding to scale and more than double its production capacity.[55]

Established leaders are also expanding their innovation capacity. Roquette, a longstanding producer of plant-based ingredients, operates the world's largest pea protein facility in Canada and owns two dedicated R&D centres focused on plant protein ingredient innovation and application, in France and Singapore.[56, 57] Backed by these capabilities, the company launched its first faba bean protein isolate into European and North American markets in 2024.[58]

Recognising the same opportunity, Louis Dreyfus Company (LDC) formally entered the plant protein ingredients market in 2022 with the establishment of a Plant Protein business unit and a dedicated R&D hub in California to first focus on the North American market. The facility is designed to develop and scale non-GMO plant protein ingredients and applications, initially focusing on pea and soy.[59] Only two years later, LDC launched a dedicated Pulse business unit to commercialise new ingredients from yellow peas, chickpeas, red lentils, faba beans and pigeon peas.[60]

For companies, diversification offers more than product differentiation; it is also becoming a strategic lever to de-risk supply chains and localise value creation.[61] By sourcing from a broader set of protein crops, manufacturers reduce exposure to commodity volatility, improve supply chain agility and leverage regional sourcing networks. Establishing processing capability closer to crop origin also enables shorter supply chains and greater control over quality, traceability and cost. This approach is also gaining traction amongst governments.

Enabling governments

As global demand for plant protein ingredients accelerates, governments are playing a decisive role in shaping how and where this growth occurs. From Europe to Asia to North America, countries have moved beyond passive market observation to active strategy—supporting industry development through targeted investment, public-private partnerships, and enabling infrastructure, often underwritten by comprehensive national protein sector plans. In many cases, this focus extends beyond ingredient manufacturing alone to capturing downstream value from the onshore production of end use products as well.

In several countries, plant protein ingredient manufacturing is being embedded within broader strategies to diversify domestic protein production or build sovereign food manufacturing capability. In China, for instance, recent strategies—including President Xi Jinping's *Grand Food Vision* and the Ministry of Agriculture's 2024–2028 Innovation Plan—outline bolstering sovereign plant protein extraction, ingredient functionality and regional infrastructure as part of efforts to modernise food production and enhance resilience.[62] These national priorities are mirrored at the provincial level. In regions like Guangdong and Suzhou, industrial parks, pilot facilities and R&D centres are being established to contribute to improving ingredient performance, supporting scale-up and accelerating market adoption.[63, 64]

Similarly, the European Union (EU) is currently developing a *Protein Diversification Strategy*. Amongst many other actions that span all protein industries, this strategy will seek to scale domestic plant protein production, reduce reliance on imported animal feed and strengthen food system resilience.[65] Proposed measures include fair pricing mechanisms, farmer de-risking tools and public procurement support. Other EU initiatives such as Horizon 2020 and Horizon Europe have seen more than EUR€640 million invested since 2015 in projects related to plant-based food systems and protein crop innovation.[66]

Countries such as South Korea have announced explicit plant-based industry strategies and are taking an unabashed, whole-of-system approach to catalysing domestic growth.[67] Amongst them, Canada stands as a global leader, having invested significantly through its Protein Industries Canada supercluster, while also supporting workforce, research and regulatory alignment across the value chain.[68] (*See further insights in the case study on page 14*.) Within Europe, Denmark and the Netherlands are leading nations—each leveraging their agricultural and broader strengths to drive economic development while advancing national climate goals.[69, 70]

Denmark's *2023 Action Plan for Plant-Based Foods* maps a comprehensive policy ecosystem—supporting crop diversification through R&D and infrastructure; developing export markets and recipe formulation; and investing in public education, institutional procurement and dietary guidelines to grow demand.[71] In the Netherlands, the Foodvalley initiative supports a sustainable plant-based foods system through public–private partnerships, including voucher schemes to reduce production costs and support early-stage scaling.[72]

In many countries, governments are aggressively investing in enabling R&D and infrastructure to leverage local production and manufacturing strengths, as well as to drive product innovation, scale-up and cross-sector collaboration.[73, 74, 75] Singapore is a leading example, having backed the creation of dedicated innovation centres to accelerate product development and commercialisation in plant and other novel proteins.[76] In nations such as China, Canada and India, plant protein R&D efforts are also being integrated with national biomanufacturing agendas to leverage co-product valorisation opportunities.[77, 78, 79]

Implications for Australia

These examples reflect a growing global consensus: investment in plant protein ingredient manufacturing is no longer just a food industry issue, but a strategic lever for economic competitiveness, sovereign capability and sustainability leadership. Governments in markets such as Canada, China and the EU are not waiting for demand to mature organically. They are actively shaping it—through national strategies, R&D investment, infrastructure support and institutional procurement—positioning themselves to lead in a global market increasingly defined by quality, functionality and supply chain integrity.

Australia faces a similar strategic choice. Countries with comparable agricultural and economic profiles are already leveraging public policy to build end-to-end industry ecosystems, linking crop production to high-value processing, market development and innovation. Their success is grounded not only in their natural endowments, but in deliberate policy design. Absent a coordinated national approach, Australia risks limiting itself to the role of raw material supplier while others capture value-added economic activity, skilled jobs and export potential.

Many of the global ingredient firms leading market diversification already maintain a footprint in Australia, including ADM, Roquette, LDC and Cargill. Yet these companies are concentrating major ingredient manufacturing investments elsewhere, drawn to jurisdictions offering clearer strategic alignment, long-term policy certainty and more competitive manufacturing environments. Without similar signals, Australia will struggle to support the growth of its existing industry—let alone attract the scale of investment needed to develop national capability and move beyond its current dependence on imported ingredients.

The implications extend beyond domestic industry growth. As global buyers prioritise traceability, sustainability performance and tailored functionality, they are forging supplier relationships with countries that can deliver ingredients made from high-quality, origin-linked plant protein source crops. Without domestic capability to meet these standards, Australia risks being excluded from the most valuable segments of the market—even where it already grows the raw material. In this context, the absence of a national strategy is not just a missed opportunity but a growing constraint on market participation.

Australia cannot afford to remain on the sidelines while other nations move decisively to capture this opportunity. Chapter II explores Australia's production advantages, outlining the crop, institutional and industry strengths—as well as the emerging usage and demand signals—that underpin not just the policy rationale for building a national plant protein ingredient industry, but also a compelling economic opportunity.

> **The growing global consensus:** Investment in plant protein ingredient manufacturing is a strategic lever for economic competitiveness, sovereign capability and sustainability leadership

Case study: Canada – A national strategy for plant protein growth

PIC's Road to $25 Billion report calls for Canada to supply 10% of global plant-based food, feed and protein ingredients by 2035

Few countries have moved as decisively as Canada to capture the economic and strategic value of not just plant protein ingredients, but the full plant-based food and animal feed opportunity. Recognising the global shift toward sustainable, diverse protein sources, Canada launched a coordinated national effort to build domestic capacity and position itself as a global leader in the plant protein ingredient and final plant-based product manufacturing sector. At the centre of this approach is Protein Industries Canada (PIC), an industry-led organisation established in 2018 under the federal government's Innovation Superclusters program.[80] With an initial investment of CA$150 million, PIC was tasked with developing a world-class ecosystem for plant protein and co-product innovation.[81] Its vision, formalised in *Road to $25 Billion*, is to grow the sector to CA$25 billion annually by 2035 and supply 10% of the world's plant-based food, feed and protein ingredients.[82]

PIC's activities span the full value chain, from crop R&D and ingredient functionality to processing scale-up, regulatory alignment, IP development and market engagement.[83] By early 2023, PIC had co-invested over CA$170 million in projects alongside CA$304 million in private capital, and helped companies secure a further CA$234 million in follow-on funding. More than 300 new IP assets had been created, and new commercial partnerships had been formed across Canada, the UK, EU, US and Asia. Recognising its impact, the Canadian Government renewed PIC's funding in 2023 with an additional CA$150 million to support its work through to 2028.[84]

Crucially, Canada's strategy is systemic. Governments and departments at all levels are working in tandem to reduce barriers, strengthen infrastructure, support grower participation, and accelerate innovation.[85, 86, 87, 88] Federal actions include:

- investment in crop production, ingredient and processing innovation through programs like AgriInnovate, AgriScience, and frameworks like the Sustainable Canadian Agriculture Partnership;
- inbound investment attraction and export market development through agencies like Export Development Canada and Invest in Canada;
- creation of regulatory navigation services and innovation hubs to streamline market entry;
- development of incentive frameworks for companies reformulating with domestic ingredients; and,
- targeted funding for IP development and shared scale-up infrastructure.

CA$700M+

Investment in plant protein and co-production facilitated by Protein Industries Canada

At the provincial level, jurisdictions like Manitoba have developed tailored strategies to support localised growth of plant protein ingredient value chains.[89] Manitoba's Protein Advantage initiative set explicit investment and job targets, successfully attracting more than CA$800 million by 2022.[90] This includes Roquette's CA$600 million facility, which has capacity to process 125,000 tonnes of locally grown peas annually.[91] Other provinces, such as Saskatchewan, are supporting site-specific infrastructure, R&D and workforce development aligned to their regional crop strengths. [92] For instance, the University of Saskatchewan is conducting government-backed research into canola meal as a fermentation feedstock, while LDC is constructing a new pea protein facility in Yorkton.[93, 94]

Canada has also embedded diversification at the heart of its strategy. Recent PIC-funded projects are developing high-value ingredients from faba bean, hemp, lupin and canola, with investments targeting functional performance, supply chain resilience and co-product valorisation.[95, 96, 97] New investment in 2025 will fund technology for blended protein products, combining cereals and pulses to meet emerging consumer demand for fibre- and protein-rich food solutions.[98] More broadly, PIC's 2025 agenda has focused on strengthening Canada's position in value-added agriculture, including through a jurisdictional review of business competitiveness, alongside efforts to scale infrastructure, unlock investment and enhance alignment across government and capital markets.[99]

Canada's success lies not in any single intervention, but in how it has aligned innovation funding, infrastructure investment, regulatory enablement, market access and sustainable crop diversification around a shared national objective. This systems approach ensures that supply-side capability evolves in tandem with downstream product innovation and export demand. As other countries move to secure their share of the global plant protein value chain, Canada's model demonstrates how early and coordinated action can translate into lasting competitive advantage. It offers a powerful reference point for Australia as it considers its own strategic pathway forward.

II. Australia's production advantage

Australia has reached a critical juncture in its ability to build a globally competitive plant protein ingredient industry. The country already possesses a significant foothold in global wheat-based protein ingredient manufacturing. There has also been foundational growth over the last 10 years in Australia's plant protein ingredient production across faba bean, yellow field pea and other pulses and oilseeds. However, despite having the raw inputs and a growing base of manufacturing capability, Australia has yet to earnestly unify around a national strategy to translate this advantage.

As countries around the world move with urgency to localise value-addition and secure leadership in the emerging protein economy, Australia must determine whether it will remain a supplier of raw materials or compete for its share of high-value ingredient manufacturing and export markets.

This chapter explores the domestic foundation on which such a nationally scaled industry could be built. It begins by outlining the breadth and scale of Australia's plant protein crop production, benchmarking it against global competitors like Canada. It then examines the evidence for growing demand across food, feed and functional applications, including signals from both product manufacturers and consumers. Finally, it details the capabilities of Australia's emerging ingredient manufacturing sector—from commercial fractionation of wheat and pulses to early-stage production of lupin and hemp proteins—and assesses the progress made to date.

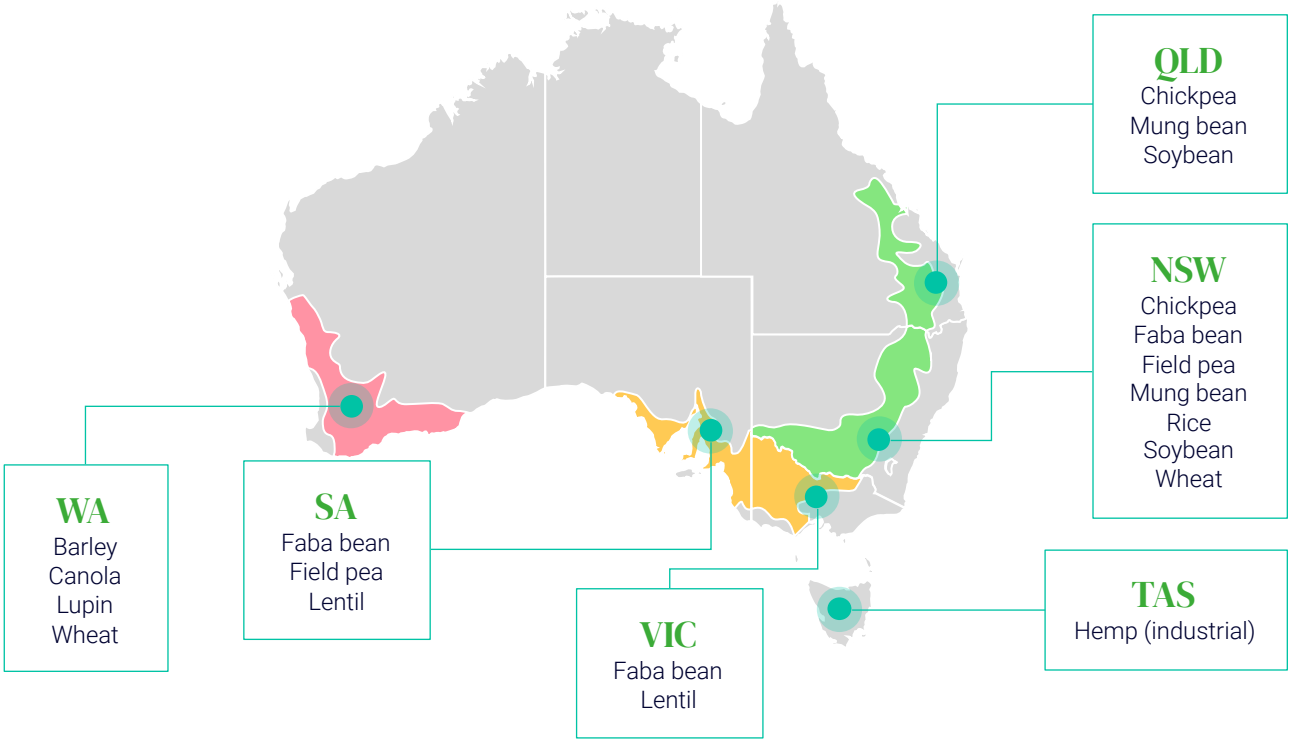
Together, these factors point to a country with the natural assets and early industrial capability to scale—but one that has yet to fully commit. As this chapter concludes, with strategic coordination, targeted investment and national ambition, Australia can transform its foundational strengths into a globally competitive industry.

Domestic plant protein source crop production

Australia's capacity to scale a plant protein ingredient industry is underpinned by one of the world's most advanced and reliable grain production systems. The country grows, in significant volumes, many of the grains used as raw inputs in global plant protein ingredient manufacturing. These include cereals such as wheat, barley and, to a lesser extent, rice; pulses including lentils, chickpeas, faba beans, lupins, field peas, and mung beans; and oilseeds like canola, as well as smaller volumes of soybeans and industrial hemp.

Production of these plant protein source crops in 2024-25 (FY24) is estimated to have reached approximately 59.3 million tonnes [accounting for gaps in official Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) data around mung bean and industrial hemp; *see Table A page 17*].[100] Cereals dominated, representing 81% of total domestic production. This was followed by oilseeds (10%) and pulses (9%),[101] the average annual production of both having grown more than 600% over the last 50-plus years.[102] Agriculture industry estimates projected that mung bean production for FY24 could exceed 150,000 tonnes, marking the crop's highest yield since 2016.[103] While volumes shift from year to year based on seasonal conditions and market signals, averaging at roughly 59 million tonnes over the past five years,[104] with all states contributing to the diverse national crop base.

Plant protein source crops grown in Australia



Western Australia (WA) claimed the largest share of plant protein source crop production in FY24, driven by its strength in wheat, and dominance in barley and canola. It produced over a third of the national wheat crop and more than three-quarters of all lupins. New South Wales (NSW) followed closely behind, topping national output for wheat, chickpeas and faba beans, while also accounting for nearly all of Australia's rice and more than half of its soybean crop. It was also equal with South Australia (SA) for field pea production. Victoria (VIC) topped the country for lentils and ranked second for faba beans, with SA following in production volume for both.[105] Queensland (QLD) was the second largest producer of chickpeas and soybean, but is also home to most of Australia's mung bean production, with the rest grown in northern NSW.[106, 107] Meanwhile, Tasmania (TAS) remains a specialist producer of industrial hemp, reportedly accounting for roughly 80% of the national supply.[108]

Table A. Plant protein source crop production by category, exports and key states, FY2024-25 (MT)

Crop type	Total production* (MT)	Total exports (forecast)** (MT)	Top producing states	Key crops included
Cereals	47.85	27.96	WA (18.7), NSW (16.8), VIC (5.5)	Wheat, barley, rice
Pulses	5.43	4.59	NSW (1.9), QLD (1), VIC (0.9)	Chickpea, lentil, faba bean, lupin, field peas, mung bean
Oilseeds	6.15*	5.59**	WA (2.9), NSW (1.8), VIC (1.1)	Canola, soybean
Total	**59.4**	**38.1**		

Source: ABARES, Australian Commodity Report June 2025[109]
**Note: ABARES production data unavailable for industrial hemp.*
***Note: ABARES export forecast data unavailable for industrial hemp or soybeans.*

Table B. FY24 Australian grain production by crop and state (KT)*

Crop Type	WA (KT)	NSW (KT)	VIC (KT)	SA (KT)	QLD (KT)	TAS (KT)	National (KT)
Cereals							
Wheat	12,650	**12,900**	3,500	2,770	2,230	60	34,110
Barley	**6,000**	3,400	2,000	1,300	535	30	13,265
Rice	0	**474**	0.5	0	2.3	0	477
Pulses							
Chickpea	6	**1,280**	22	9	950	0	2,267
Faba bean	23	**400**	180	110	37	0	750
Field peas	58	**65**	40	**65**	0	0	228
Lentil	16	50	**650**	555	1.5	0	1,272
Lupin	**585**	125	30	35	3	0	778
Oilseeds							
Canola	**2,900**	1,800	1,060	325	11	7	6,103
Soybean	0	**25**	3.7	0	18	0	47
Total	**22,238**	**20,519**	**7,486**	5,169	3,788	97	**59,297***

Bold figures *represent highest production volumes*
Source: ABARES, Australia Crop Report June 2025[110]
**Note: ABARES data unavailable for mung beans and industrial hemp.*

Benchmarking Australian production

Australia's scale and diversity of protein-rich crops place it in a strong global position, comparable to major grain producers and ingredient manufacturers like Canada. While Canada grows more grain overall, the more telling comparison lies in the composition of each country's output.[111, 112] Australia consistently outperforms Canada in barley,[113] while wheat remains a closely contested crop—despite Canada's recent gains.[114, 115] Canada leads in oilseeds, particularly soybean and canola, though Australia is still among the world's top canola producers.[116]

Dynamic competition also plays out in pulses. Canada's FY24 pulse production was forecast at 6.1 million tonnes,[117] compared to Australia's 5.4 million tonnes.[118] Canada dominates in peas and often leads in lentils, while Australia is the world's largest producer of lupins and regularly rivals Canada for chickpeas.[119, 120, 121] Both countries also produce a range of dry beans, with Canada focusing on breeds like pinto, white pea and black beans,[122] and Australia on faba and mung.[123] The critical difference is what each nation does with their protein-rich grains. While both countries are leading global grain exporters, Canada is actively supplying an increasing share of its retained volume into its globally competitive plant protein ingredient industry.[124, 125]

Demand for Australian ingredients

Australia's case for a scaled plant protein ingredient manufacturing industry is equally underpinned by growing demand for high-quality, functional protein ingredients both domestically and globally, reflecting their expanding role in food, beverage and feed product innovation.[126] Australian ingredient manufacturers are already tapping into these opportunities, here and abroad.

No comprehensive mapping of Australia's current or future demand (or export opportunities) for plant protein ingredients exists yet, making it difficult to define the true scale of the country's manufacturing potential. Past market analysis by Grains Australia (formerly Pulse Australia) identified emerging opportunities for several pulse crops across food and feed applications,[127] and multiple organisations have modelled Australia's overarching protein industry opportunities. Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), for instance, released an *AU$13B by 2030 National Protein Map*, which attributed AU$6 billion to plant-based foods.[128]

While these types of reports help to capture important international market trends and final product opportunities, none are yet to extend to the volumes, formats or functional applications of both primary and secondary plant protein ingredients, leaving a critical gap in national understanding.[129] Australia lacks a comprehensive picture of the ingredient quantities and formats being used across food, beverage, feed, and emerging non-food categories. High-value applications in health, aged care, supplements and personal care remain largely untapped, as does the market potential of secondary ingredients like starch and oil in industrial and advanced manufacturing uses.

Nevertheless, there are important indicators that demonstrate increasing domestic usage and interest in plant protein ingredients from final product manufacturers and consumers alike, as explored next.

Evidence of plant proteins use in retail and institutional foodservice

One of the most telling–though incomplete–public indicators of plant protein ingredient use in Australia is import quantities. As explored in the next chapter, *Findings: Major opportunities*, Australia imports an estimated average of 17 thousand tonnes of plant protein isolates and concentrates annually, at a value of AU$123 million (*see Tables F and G, page 34*).[130] A large portion of these imports are made from soybean or pea; however, it is not possible to discern the exact quantities and protein types, and we lack clear data on their final product applications.

Retail: There is evidence protein isolates and concentrates–whether animal or plant-based–are increasingly being incorporated into Australian food and beverage products.[131] This is occurring in part due to increasing consumer demand for high-protein and nutritionally functional foods.[132] Products such as breakfast cereals, pastas, nutritional snacks, spreads, dairy, drinks, amongst many others, are increasingly being marketed for their high or added protein content across Australian supermarket aisles.[133, 134]

At the same time, intersecting consumer desires for increased fibre content and plant-based foods are resulting in uptake of plant-based protein ingredients specifically.[135] Data from the Grains & Legumes Nutrition Council (GLNC) offers important insight into this trend.[136] Through multiple audits of food and beverage product labels across major Australian retailers from 2022 to mid-2024, the GLNC found a growing prevalence of plant protein isolates and concentrates across product categories including plant-based dairy and meat alternatives, breakfast cereals, breads, snacks and ready meals. Audited plant-based meat products and ready meals also showed frequent use of textured vegetable proteins (TVPs), which are often made from protein concentrates via extrusion processes.[137]

A total of 2,901 products were assessed across seven product categories. Approximately 12% (355 products) listed plant protein isolates, concentrates or TVPs in their ingredient lists. Plant-based meats had the highest inclusion rate (55%), followed by plant-based meals (34%), plant-based dairy alternatives (products other than plant-based milks) (14%), plant-based milks (11%) and breads (10%). Inclusion was lower in plant-based snacks (3%) and in breakfast cereals (0.4%).

Table C. Summary of GLNC plant protein ingredients audit: Inclusion (2022- mid-2024)

Category (year audit undertaken)	No. of products with plant protein ingredients	Total no. of products within category	Proportion
Plant-based meats (2022)	173	313	55.3%
Plant-based meals (2022)	45	134	33.6%
Plant-based dairy alternatives (2022)	14	100	14.0%
Plant-based milks (2022)	20	178	11.2%
Breakfast cereals (2022)	3	686	0.4%
Bread (2023)	78	794	9.8%
Plant-based snacks (2024)	22	696	3.2%
Total	**355**	**2901**	**12.2%**

Source: Grains & Legumes Nutrition Council, 2024

Soy was the most used protein source across the audited products (69%), followed by wheat (30%) and pea (27%). GLNC's data also demonstrated ingredient diversification, with smaller but notable use of faba bean, lupin, rice, hemp and mung bean, often in blended formulations. These diversified proteins were most frequently included as isolates.

While data across all audits does not indicate whether the protein ingredients are imported or locally sourced, some assumptions can be made about origin. Wheat and faba-based ingredients could be locally sourced given the domestic manufacturing capability existing at the time of the audits, while soy and pea-based ingredients are more likely to be imported. Several of Australia's ingredient manufacturers only began commercial production in recent years, and lengthy product development cycles and broader uptake barriers (as explored in *Chapter IV*) mean newer product innovations using diversified Australian ingredients are unlikely to have been captured.

Table D. Summary of GLNC plant protein ingredients audit: Source crops* (2022- mid-2024)

Plant protein source crops	No. of products	Proportion
Soy	243	68.5%
Wheat	108	30.4%
Pea	95	26.8%
Faba bean	22	6.2%
Lupin	4	1.1%
Rice	4	1.1%
Lentil	3	0.9%
Hemp seed	3	0.9%
Sunflower	3	0.9%
Mung bean	2	0.7%
Peanut	2	0.6%

Source: Grains & Legumes Nutrition Council, 2024
**Note: Plant protein ingredients and formats were often blended in audited products' formulations.*

For plant-based meats, Food Frontier's *2023 State of the Industry* report provides more specific information on ingredient sourcing. Industry consultation conducted for the report found most Australian plant-based meat manufacturers remain reliant on imported soy and pea protein ingredients due to limited local availability in the required volumes and formats, as well as the higher cost of domestic alternatives. However, nearly every company consulted expressed a strong desire to use more locally made ingredients, with some investing in R&D to explore how these could be integrated into future formulations.[138]

While limited in scope, the GLNC audits offer valuable insight into how plant protein ingredients are being incorporated into retail food and beverage products. Each audit represents a snapshot in time and covers only selected categories and distribution channels, underscoring the need for more comprehensive and ongoing tracking. Even so, the audits reveal clear signals of ingredient uptake and the types of plant proteins being used, highlighting where adoption is gaining traction across the retail landscape.

Foodservice: There is also evidence of protein fortification expanding into institutional foodservice settings. This is especially true in healthcare settings, where providers are using protein fortification as a strategy to improve nutritional outcomes and reduce reliance on supplements. A 2025 Food Industry Foresight report commissioned by Food Frontier found that 42% of the aged care settings (nursing homes and retirement villages) and 52% of the hospitals (public and private) interviewed used protein fortification ingredients in their food dishes and beverages in 2024. Across the two healthcare settings, the value of the total products used (159 tonnes) was AU$4.4 million.[139]

Growing demand signals for plant protein ingredients

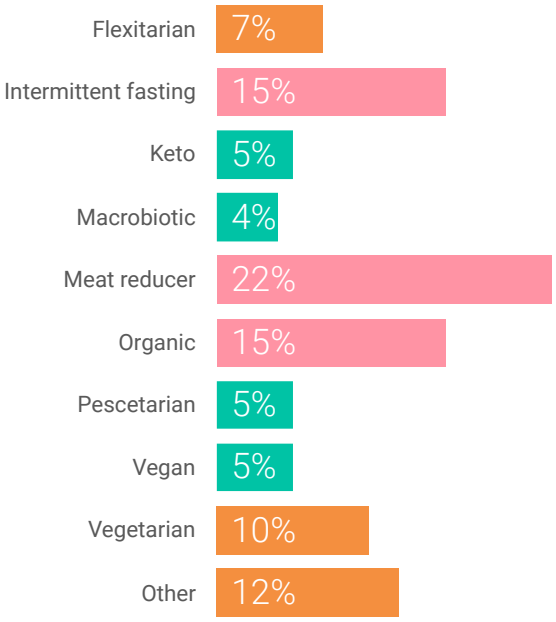
While plant protein ingredients have a wide range of potential non-food uses, dietary trends also help to indicate where the more immediate and growing demand lies for food and beverage applications. Food Frontier's 2024 nationally representative consumer survey found that 'meat reducer' had emerged as the most popular diet, and, combined with those practicing flexitarian, vegan, and vegetarian diets, 44% of Australians are now reducing or avoiding meat intake, primarily for health, environmental and medical reasons. The survey also found growing consumption of plant-based food and beverage products as part of this trend.[140] As reflected in the GLNC audit data, the intersecting demand for nutritionally functional foods means these categories represent new market opportunities for plant protein ingredients.

Plant-based dairy alternatives were found to be the most widely adopted category. Forty-one per cent of Australians have tried plant-based milks, with 34% consuming them weekly, making them the most regularly consumed product in the broader plant-based category. Other dairy-free options are also gaining traction: 37% of Australians have tried dairy-free ice cream (14% consume it weekly), 25% have tried dairy-free cheese and confectionery, and 22% have sampled dairy-free dips. Repeat purchase intent remains highest for plant-based milks (36%), followed by dairy-free ice cream (25%), with meaningful interest across other formats.[141]

Thirty-five per cent of Australians have now tried plant-based meat (up from 24% in 2021), and 16% consume these products regularly. Survey data also suggests increasing openness to lower-meat and meat-free pet food, reflecting broader shifts toward diverse plant protein sources across both human and animal nutrition.[142]

As will be explored further in Chapter III, the dietary adoption of plant-based alternatives sits within a wider set of consumer expectations that are shaping how domestic food and beverage manufacturers select ingredients. Mimicking international patterns, Australian consumers are increasingly seeking products that align with evolving values around health, sustainability and functionality. Alongside demand for protein-rich foods, there is growing interest in options that are high in fibre, non-GMO, locally made and aligned with 'clean label' preferences.[143, 144]

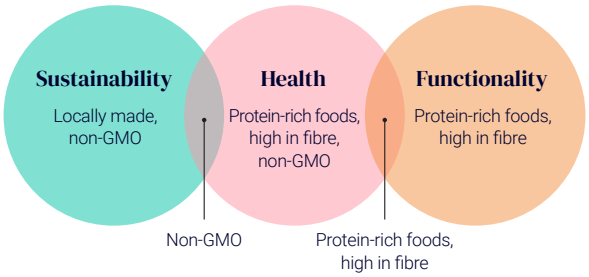
Proportion of Australians trying different diets – 2024



Source: The Food Frontier consumer survey 2024

There is also an emerging shift in Australia from some of the incumbent plant protein sources, particularly those that are imported.[145] Despite offering a well-established nutritional profile, consumer aversion for soy in particular is being fuelled here and abroad by concerns around perceived overprocessing.[146] Consumer aversion is also emerging in response to a lack of transparency regarding the production quality, traceability and sustainability of imported ingredients overall.[147] In this context, Australian-made plant protein ingredients offer a compelling alternative. Their ability to deliver on nutritional and varied functional qualities while also aligning with values such as local sourcing, 'clean label' transparency and crop diversity presents a strategic opportunity for domestic ingredient manufacturers.

Australian consumers increasingly seeking:



The domestic industry

Australia's plant protein ingredient manufacturing industry is part of an evolving value chain with significant potential to capitalise on the country's strong agricultural base and the increasing global demand for diversified plant proteins. At present, there are six established Australian plant protein ingredient manufacturers using fractionation technology to produce protein isolates or concentrates from various cereal, pulse and oilseed grains. While Australia has many other manufacturers producing secondary protein ingredients (flours, starches) using other production methods such as milling, the scope of our analysis comprises these six manufacturers due to their focus on these high-value primary protein products. (See *Scope, page 6, for more information.)*

Commercial scale fractionation

Australia's oldest and largest plant protein ingredient manufacturer is Manildra Group, which began producing protein ingredients from locally grown wheat as early as 1966.[148] Today, Manildra is a global leader in the manufacturing of vital wheat gluten–a protein concentrate–and other premium wheat protein products, as well as wheat-based flours and starches.[149] The company's protein ingredient manufacturing is centralised at its Shoalhaven Starches facility in Nowra, NSW. Each year, Shoalhaven processes more than one million tonnes of wheat–almost one-sixth of NSW's total annual production–into 950 thousand tonnes of value-added plant protein ingredients, using wet fractionation.[150] The company also has various operational facilities across the state's growing regions that extend beyond wheat into sugarcane and canola value addition.[151, 152] (*Learn more in the case study on page 27.*)

Plant protein ingredient manufacturers

For pulse-based protein ingredients, Australia's commercial-scale manufacturing is concentrated across three companies: Essantis and Australian Plant Proteins in Victoria, and Integra Foods in South Australia. All three have operationalised their commercial fractionation capability within the last five years, signalling a new wave of domestic manufacturing capacity development.

Family business Essantis is one of Australia's leading manufacturers of plant-based food and beverage ingredients, specialising pulse protein concentrates, starches and flours. Rebranded from Unigrain in 2024, the company has a longstanding history dating back to the 1970s. It has since become a national player with operations in Victoria and Western Australia, employing more than 120 staff.[153] Essantis commenced commercial production of yellow pea and faba bean protein concentrates in late 2023 as an innovative and natural extension of their plant-based ingredient portfolio and off the back of increasing customer demand for Australian offerings.[154]

The company's purpose-built dry fractionation facility in Smeaton, VIC, has the annual capacity to process up to 40,000 tonnes of grains into 30,000 tonnes combined of concentrates, starches and flours.[155] It is the second largest fractionation facility of its kind in the country. The site also hosts cereal and pulse milling capability, including for production of red lentil and chickpea flours, as well as Australia's first fully integrated oat processing and milk base production facility, with annual production capacity of over 50 million litres of oat milk.[156] The company has a second milling facility in Wagin, WA, which is currently under development to increase capacity and establish oat flour production capability (for oat milk).[157]

Also based in Victoria is Australian Plant Proteins (APP). Founded in 2016 as a spin-out from investment company EAT Group, APP was among the first to pursue protein isolate manufacturing in Australia from pulses.[158] Using its propriety, non-solvent, wet fractionation technology, the company is able to produce isolates with over 85% protein content from faba beans, yellow field peas, mung beans, and yellow and red lentils.[159] APP's Horsham-based commercial facility became fully operational in 2020, with capacity to process 6,000 tonnes of locally sourced pulses into 1,200 tonnes of isolates.[160]

APP experienced strong early growth and attracted significant investment to support its scale-up, including a major partnership with global agrifood company Bunge to expand operations in Horsham.[161] However, the company also encountered financial challenges, leading it to enter voluntary administration in mid-2024 to restructure.[162] In early 2025, APP was acquired by My Co, the Australian investment group known for scaling food brands such as Bio Cheese. The acquisition has since enabled APP to recommence production, with plans to develop new product lines including fibre and starch ingredients.[163]

South Australia-based Integra Foods (Integra) is the newest entrant to Australia's commercial-scale pulse protein manufacturing landscape. Integra is a wholly owned subsidiary of Australian Grain Export (AGE), one of Australia's longest-standing grain bulk handlers and exporters. AGE established Integra in 2023 to capture greater value from locally grown pulses through vertical integration of ingredient manufacturing.[164] The investment was also a response to structural shifts occurring across the pulse supply chain, including increasing exposure to commodity price volatility and more growers rotating faba beans as break crops and investing in on-farm storage. AGE identified localised ingredient manufacturing as a logical opportunity to move beyond bulk exports and offer its grower network more stable, premium market pathways.[165]

Integra's purpose-built dry fractionation facility in Dublin, SA, became operational in early 2024 with capacity to process up to 15,000 tonnes of locally grown faba beans annually into 15,000 tonnes of protein concentrate and flour (made from starch and smaller quantities of protein and fibre). The site is co-located with AGE's existing storage, handling, cleaning, splitting, dehulling and containerising infrastructure, which handles more than 250,000 tonnes of diverse grains per year, enabling significant supply chain efficiency gains.[166]

Smaller scale fractionation

There are also two earlier-stage companies manufacturing protein ingredients from lupins and industrial hemp in Australia. Wide Open Agriculture (WOA) and Hemp Harvests are each focused on unlocking the potential of these underutilised inputs through innovative and proprietary processing methods.

Established in 2015, WOA is an ASX-listed company based in Leederville, WA, developing protein ingredients from Australian sweet lupins. In 2020, the company licensed wet fractionation technology from Curtin University to develop and manufacture Buntine Protein®, WOA's proprietary lupin protein isolate.[167] While WOA has faced challenges scaling production in Australia, it successfully acquired German manufacturer ProLupin GmbH and its isolate manufacturing facility in 2023.[168] The purchase gave WOA immediate manufacturing capacity of 120 tonnes of output annually as well as direct access to the European market. While still pre-commercial domestically, WOA continues to invest in product development and accessing export opportunities, with a view to expanding its German facility and establishing local manufacturing in the future.

Hemp Harvests, a Tasmanian-based company founded in 2016, is focused on the development of hemp-based ingredients. The company operates a dedicated hemp processing facility in Red Hills, TAS, where it uses dry fractionation to produce hemp protein concentrate, alongside hemp oil and seeds (hearts). Drawing on partnerships with locally contracted growers, the facility processes 145 tonnes of industrial hemp each year to produce 36 tonnes of protein concentrate. Hemp Harvests remains early in its scale-up journey but is contributing to the emergence of industrial hemp as a promising input for Australia's plant protein industry, reflecting its growing popularity in established markets like North America.[169]

Plant protein ingredient manufacturing. Credit: Integra Foods

Table E. Australia's plant protein ingredient manufacturers

	Manildra Group	Essantis	Wide Open Agriculture	Australian Plant Proteins	Hemp Harvests	Integra Foods
Established	1952	1970s	2015	2016	2016	2023
Began protein manufacturing	1966	2023	2022	2020	2022	2024
Manufacturing location	Nowra, NSW US: Iowa	Smeaton, VIC	Leederville, WA GER: Mecklenburg-Vorpommern	Horsham, VIC	Red Hills, TAS	Dublin, SA
Plant protein source crop	Wheat	Yellow field pea, faba bean	Lupin	Faba bean, yellow field pea, red lentil, yellow lentil, mung bean	Industrial hemp	Faba bean
Products	Protein concentrates, isolates, flours, starches	Protein concentrates, flours, starches	Protein isolates	Protein isolates	Protein concentrate, seeds, oil	Protein concentrate, flour
Fractionation	Wet	Dry	Wet	Wet	Dry	Dry
Scale	Commercial, global	Commercial, domestic	AU: Bench; GER: small-scale commercial	Commercial, domestic	Pilot, domestic	Commercial, domestic
Input capacity (Annual)	AUS: 1MT	40,000T	GER: 500T	6,000T	145T	15,000T
Output capacity (Annual)	AUS: 0.95MT	30,000T	GER: 120T	1,200T	36T	15,000T

Foundations to national scale

Australia's plant protein ingredient industry has made significant headway in wheat and is increasingly striding into pulses and oilseeds. It is now supported by a foundation of diverse manufacturers, regional infrastructure and supply chain integration. Australia's globally recognised grains and food innovation R&D ecosystems are also sharpening their focus on plant protein value-addition.

The Grains Research and Development Corporation (GRDC) has emerged as a leading investor in plant protein R&D capability. It is partnering with government and academic institutions such as Agriculture Victoria Research, the Australian Export Grains Innovation Centre and the University of Queensland's Food and Beverage Accelerator to develop and benchmark market-aligned pulse and oilseed varieties, support pre-commercial capability and advance new ingredient opportunities.[170, 171, 172] Deep expertise in processing and product development also exists within CSIRO and increasingly across Australia's universities, with many having partnered with the industry to progress commercial opportunities and working to train future workforce entrants.[173]

However, the sector is at an inflection point.

Despite growth, manufacturing capacity is modest by international standards, investment is nascent and enabling policy and ecosystem coordination remain limited. Even with proven crop supply and early commercial capability, Australia risks falling behind globally unless it shifts from individual company progress to deliberate national scale.

Realising this opportunity will demand strategic focus, cross-sector collaboration and bold investment to overcome critical barriers. If the right conditions are put into place, Australia will be well positioned to build a globally competitive industry that strengthens food and economic security, delivers regional value and reinforces Australia's role in the future of sustainable food production. Chapter III explores where these opportunities lie.

> With the right conditions, **Australia can build a globally competitive industry** that strengthens food and economic security delivers regional value and reinforces its role in the future of sustainable food production

Case study: Manildra Group – An Australian success story

Manildra Group's manufacturing facility Shoalhaven Starches (Nowra, NSW), the largest wheat gluten and starch facility of its kind

Manildra Group stands as a compelling example of an Australian agribusiness that, with an innovative and long-term strategic vision, has achieved significant success processing locally grown grains into value-added foods and industrial ingredients. Beginning in 1952 with the purchase of a flour mill, Manildra is now a global leader in the manufacturing of wheat-based primary and secondary protein ingredients, including flour, starch and vital wheat gluten–a protein concentrate–and other premium protein products, used across baking, cereals, snacking, nutrition, pet and feed markets.[174, 175]

Manildra's entry into the plant protein ingredient sector began in 1966 with the establishment of a starch and gluten plant in Auburn (Sydney).[176] The company expanded production in 1970 by establishing Shoalhaven Starches in Nowra, NSW. After eventual consolidation with the Auburn facility and decades of continuous investment, Shoalhaven has become the largest wheat starch and gluten manufacturing facility in the world.[177] Manildra also has considerable manufacturing operations across regional NSW that extend beyond wheat processing into sugar and canola, as well as a US arm that was established in 1974.[178]

Shoalhaven's advanced technological capability was strategically developed over several decades to enable Manildra to extract diversified value from all portions of the grains they process.[179] For instance, alongside its human grade and industrial products, the company produces a range of dry and pelletised stockfeed products.[180] Shoalhaven is also home to a sizeable ethanol distillery that utilises the byproducts of Manildra's starch and other wheat ingredient manufacturing as feedstock to produce various grades of ethanol for a range of fuel, beverage and other industrial applications.[181, 182] In addition, the site houses a dedicated Water Treatment Plant to ensure reuse of the water used in the starch and gluten manufacturing process (wet fractionation).[183]

The prioritisation of ongoing innovation and R&D has been central to Manildra's commercial success. The company has specialised R&D facilities in Australia and the US, including its Innovation Hub in Gladesville, NSW, where it develops and tests new ingredients and food product applications.[184, 185] This forward-leaning approach and commitment to process optimisation and new product development (NPD) has enabled the company to consistently adapt to evolving market demands. This is exemplified by their response to dietary trends like low carbohydrate (low carb), added protein and fibre, and 'clean labels'.[186, 187]

Manildra has released a number of modified wheat protein ingredients for various low-carb food applications, such as low-carb tortillas, breads and bagels, and water-soluble protein isolates for weight management and meal replacement products.[188, 189] In 2018, Manildra USA released three 'clean label' products with versatile nutritional and functional attributes to meet consumer demand for added protein and simplified ingredient lists, including one that also acts as an egg replacer.[190] Within Australia, Manildra's brand The Healthy Baker has a range of premium and high fibre flours and protein-boosted baking premixes, including the world's first low-FODMAP flour.[191]

A cornerstone of Manildra's operations has been its longstanding partnership with Australian farmers, marked by a commitment to sourcing 100% of their crops locally. This close collaboration not only affords Manildra a reliable supply of GMO-free wheat and other high-quality grains but, as the largest domestic buyer of Australian wheat, has also helped to provide certainty on return for thousands of local grain growers.[192, 193] Using locally grown grain has also been core to Manildra's customer value proposition both domestically and internationally. The company found international success as early as the 1970s by trading on the high-quality reputation of Australian grains,[194, 195] with more than 40% of Manildra's revenue now coming from global exports.[196]

An Australian success story built on seven decades of investment and innovation

The success of Manildra's growth has been driven by seven decades of investment into scaled and diversified operations in anticipation of, and response to, evolving market demands. The Federal and NSW State Governments have also both provided critical financial and policy support at various times in Manildra's history to accelerate the company's operational efficiencies, international market access, and sustainability and decarbonisation efforts.[197, 198] For instance, the Export Finance Authority provided a series of guarantees totalling more than AU$150 million in 2018 to help Manildra secure the additional finance required from commercial banks to expand export capacity.[199]

This enabling public support and the company's pioneering approach has put Manildra in a leading position to capitalise on the growing global demand for plant protein and other wheat-based food, beverage and feed ingredients.[200] Thanks to their ethanol production capabilities, Manildra is also sitting favourably to tap into growing global biomanufacturing opportunities, such as the production of sustainable aviation fuel (SAF).[201] The positive ripple effect of capturing these global value-added manufacturing opportunities onshore will be sustained investment and jobs benefits for the regions within which Manildra operates, in turn helping to secure the long-term economic outlook for Australia's grains industries.

III. Findings: Major opportunities

To identify the most significant opportunities for growth and value creation, Food Frontier consulted ingredient manufacturers on where they see the greatest potential for Australia's plant protein ingredient industry. Questions focused on future market demand, domestic and export applications, ingredient diversification and the broader economic and sustainability benefits of building a scaled local industry. Additional insights were drawn from agrifood stakeholders to contextualise opportunities within the wider manufacturing, agricultural supply chain and policy landscape.

While each company's opportunity set is shaped by its specific crop inputs, technology platform, customer base and market strategy, shared themes emerged. These include:

- the ability to position Australian ingredients to meet evolving global demand for 'clean', functional, and traceable inputs.
- the potential to displace imported ingredients with Australian-made alternatives;
- the emergence of new use cases across feed and other non-food applications;
- the role of the industry in supporting regional development and circularity; and,

This chapter synthesises these themes into five major opportunity areas, drawing on company consultations, trade data, broader research and strategic analysis. It captures not only where growth is occurring today, but where coordinated investment and policy action could unlock Australia's full potential in plant protein ingredient manufacturing.

Opportunity 1

Diversified ingredients to meet global demand

Australia has the potential to supply a broad range of plant protein ingredients that meet evolving preferences across both local and global markets. Through companies like Manildra, Australia is already a major player in the global wheat-based ingredient market and is well positioned to continue meeting rising demand.[202]

Australia could also lead the next wave of growth in plant protein ingredients beyond soy, pea and wheat that are made from a diverse range of cereal, pulse and oilseed grains aligned with domestic production advantages. As noted in Chapter I, this broad category of protein ingredients collectively account for approximately 20% of the current global market. If it grows in line with broader sector estimates, as projected by Market Data Forecast, it could reach a value of US$14.2 billion by 2032.[203] With the right policy, market and investment settings, Australia can capture a meaningful share of this opportunity—recognising expanding category applications beyond food, beverage and nutrition continue to drive the potential of this demand even higher.

Diversified plant protein ingredients could be worth

US$14.2B

by 2030, according to Market Data Forecast

Customer and consumer trends driving diversified uptake domestically

Consulted manufacturers consistently reported that the same global trends influencing demand for plant protein ingredients—such as 'clean-label' preferences, high protein and fibre content, and allergen-sensitive formulations—are also shaping buying behaviour and product development within Australia. These trends are converging with the emerging shift away from imported soy and pea protein, driven by increasing consumer scrutiny of origin, quality and overprocessing, as well as alignment with emerging sustainability and health standards. Together, these drivers are creating new opportunities for Australian suppliers to position differentiated, locally produced alternatives.

> **Traceability, locally -made and sustainability** are competitive advantages for Australian plant protein ingredients

Consulted companies noted the move away from imports is being fuelled at both the final product manufacturer and consumer level. From the business perspective, it was noted that ESG-related reporting obligations are increasingly influencing procurement decisions by large food and beverage companies. Shareholder and regulatory expectations around sustainability, carbon footprint and ethical sourcing are prompting a move toward ingredients with lower embedded emissions and clearer provenance. While the economics remain paramount, suppliers are finding their ability to deliver traceable, locally-made and sustainable alternatives can be a competitive advantage in NPD conversations.

Several manufacturers confirmed that domestic customers, particularly those supplying into major retailers, are also actively seeking ingredients that support 'clean label' claims and respond to growing consumer demand for Australian-made, minimally processed products. This demand was noted as especially strong in health-conscious and nutrition segments, where there is increasing aversion to ultra-processed foods and complex additive lists.

All consulted companies emphasised their ability to produce high-quality, 'clean label' protein ingredients with desirable nutritional and multifunctional properties. While protein ingredients manufactured via chemical fractionation often require masking agents, gums or other additives to be incorporated into final products, all manufacturers explained that their respective non-chemical production methods were designed to avoid this. Across both wet and dry fractionation processes, companies highlighted the use of proprietary technologies that exclude chemical solvents and enzymes, enabling the production of ingredients considered to be more 'natural'. These inputs can help reduce final product ingredient lists and meet growing customer expectations for transparency and product integrity.

Functional performance is also emerging as a critical determinant of ingredient selection. Consulted manufacturers explained that food and beverage companies are increasingly focused not only on protein content, but on how ingredients behave in specific applications—particularly whether they can enhance texture, stability or sensory attributes and eliminate the need for other less-desirable additives. Noting isolates and concentrates offer varying functional applications, attributes such as solubility, binding, emulsification and mouthfeel are shaping procurement decisions, particularly in complex product formats where taste and texture have traditionally posed challenges. To meet multiple desired functional and nutritional characteristics, many companies are also adopting protein ingredient blends, including combinations with whey and other animal-based options.

This functionality-driven shift is particularly pronounced in categories like plant-based dairy alternatives, baked goods and high-protein supplements. Manufacturers supplying isolates and concentrates alike into these categories highlighted rising demand for ingredients that contribute to smooth texture, neutral taste and nutritional fortification. In parallel, pulse and oilseed-based flours and starches are gaining popularity across bread, pasta, noodles, cakes, snacks and other products lines, not only for their nutritional content but for their suitability in gluten-free and allergen-sensitive formulations.[204, 205] To the same effect, rising interest in these ingredients' ability to perform as vegan egg replacers was also noted.

In addition to mainstream food and beverage categories, consulted manufacturers reported rising interest from customers developing products in specialised markets. These include personal care, nutraceuticals and pet food segments that demand high functionality, safety assurance and unique characteristics not always available in incumbent ingredients. Companies noted that the demand for plant-based and cereal-free pet food formulations is driving strong uptake of pulse and oilseed-based ingredients, including concentrates, starches and fibres.

The opportunity for animal and aquaculture feed applications was also highlighted, spanning both primary and secondary protein ingredients. As buyers begin to shift away from imported soy, demand is emerging for locally sourced alternatives that offer consistency, reliability and scale. These

markets present a pathway for manufacturers to capture value across all fractions of their crop feedstock, including starches and fibres. The broader significance of animal and aquaculture feed applications is explored in greater detail on page 37.

Strategic value proposition of Australian ingredients internationally

Consulted manufacturers also highlighted a strong focus on export opportunities, driven by larger market sizes and stronger, more consistent levels of demand in international arenas. While domestic uptake is increasingly emerging, it often requires ongoing education, whereas for some companies the progressive adoption of diversified plant protein ingredients in more mature markets was seen as offering more immediate and scalable sales opportunities. In markets such as North America and Europe, customers are already actively seeking ingredient attributes that align with Australia's strengths: 'clean label' functionality, protein diversity and traceable production. In Europe, the demand for non-GMO offerings further enhances Australia's competitive position.

Asia was consistently identified as a high-priority market, with several consulted manufacturers already achieving strong traction in the region. Those exporting to Asia reported that buyers place a premium on "Australian-grown" or "Australian-made" branding, associating it with food safety, consistent quality and ethical production. While not a universal concern across all importing Asian nations, some customers were also reportedly willing to pay more for Australian imports to reduce reliance on regional offerings perceived to have weaker quality controls.

As in Australia, demand for plant protein ingredients spans multiple categories in international markets, with those manufacturers already exporting supplying a diverse range of food and non-food applications. While plant-based meat alternative products remain a target segment, companies are increasingly exporting their ingredients and bespoke formulations for alternative dairy products, including plant-based milks, cheeses, yoghurts and ice creams. Companies are also supplying functional inputs for baked goods, noodles and snacks, such as gluten-free or high-protein flours and fibre-enhanced mixes.

Protein supplements and health foods represent another area of export growth, particularly where 'clean label' claims and allergen-sensitive formulations are a priority, alongside emerging demand for cosmetic and personal care applications. Among the diverse export opportunities, pet food was repeatedly identified as one of the most significant areas of demand across the APAC region.

To streamline entry into priority international markets, several companies have partnered with international distributors. For instance, in May 2025 WOA announced an exclusive marketing and distribution agreement with Univar Solutions China for the Chinese market,[206] shortly after the company received regulatory approval to export its lupin protein into China.[207] Also in May 2025, APP announced a collaboration with Dutch protein ingredient distributor Big Wave Company to supply its isolates across the European market.[208] In parallel, some manufacturers have also leveraged government in-country trade programs to promote their products under the "Brand Australia" marquee, supporting visibility and trust in new markets.[209]

Australian plant protein ingredients value proposition:

- ☑ 'Clean' inputs
- ☑ Enhanced performance
- ☑ Trusted provenance

Nevertheless, manufacturers recognised the complexity of entering and scaling in export markets. Trade regulations, registration requirements, and long product development and

sales cycles were cited as barriers, particularly for companies without prior international exposure. For certain ingredients, such as industrial hemp and lupin, some export markets present prohibitively high regulatory barriers to entry, prompting a focus on those with more favourable entry conditions and existing ingredient familiarity. Several emphasised the need for coordinated export facilitation, including market development support, regulatory guidance and targeted brand positioning for Australian ingredients.

Ongoing diversification and valorisation opportunities

This diversification of demand, across both food and non-food applications, is also creating a compelling incentive for local manufacturers to expand their ingredient portfolios. Companies like APP and Essantis have already responded by offering protein ingredients derived from multiple plant protein source crops. Several consulted manufacturers are also actively trialling their proprietary fractionation technologies on a broader range of inputs, with plans to expand their product offerings over time. Others are exploring new plant protein sources not yet manufactured in Australia, such as chickpeas. Indeed, chickpea protein was identified as a particularly promising future ingredient due to its mild taste and functional versatility and lack of anti-nutritional properties (e.g. compounds such as phytate or lectins that reduce absorption of essential nutrients),[210] though the complexity of processing the pulse was seen as a hurdle.

Outside of Australia's ingredient manufacturers, several major agribusinesses, food manufacturers and startups are also seeking to unlock the protein ingredient potential of other Australian-grown grains. For example, oilseed commodity trading giant GrainCorp has been exploring the feasibility of producing human-grade protein ingredients from one of its largest oil manufacturing byproducts: canola meal. In 2022, GrainCorp partnered with CSIRO and v2food on an R&D initiative to separate and manufacture protein ingredients from canola, soy, faba beans and chickpeas. While no formal outcome has been announced yet, it is understood that with GrainCorp's expected increase in canola meal production–driven by its planned increase in oil processing to service growing biofuel opportunities–a positive R&D breakthrough could see Australia become a large-scale manufacturer of human-grade canola protein ingredients.[211, 212]

> **Australia can compete in diversified protein ingredients** from faba, mung, lupin and more

Another example is Melbourne-based startup Grainstone, which is working to unlock new ingredient value from brewers' spent barley grain. Through its proprietary drying and fractionation process, the company is converting this mass produced and underutilised byproduct into protein- and fibre-rich specialty flours.[213] This type of innovation highlights the potential to create high-value plant protein ingredients from existing agrifood waste streams, an opportunity that could be further advanced through greater investment in domestic R&D and cross-sector collaboration.

As with GrainCorp, several consulted manufacturers have partnered with Australian research and academic institutions to expand their ingredient portfolios. These collaborations have helped to validate functionality, improve product performance and test novel crops using their respective proprietary fractionation techniques. Partnerships with organisations such as CSIRO, universities and other applied research bodies have been instrumental in progressing crop suitability studies, ingredient optimisation and downstream applications. In many cases, these collaborations have also supported companies in securing grant funding, accelerating their R&D programs and advancing commercial readiness.

Stakeholder feedback highlighted that not all crops are equally commercialisable, however. Decisions to diversify ingredient offerings are shaped by a mix of agronomic, technical and commercial factors, such as raw material availability, processing complexity, offtake certainty and price competitiveness. Manufacturers stressed the importance of being selective, focusing on crops that offer clear functional or nutritional advantages alongside proven supply and demand. Several noted that their success in international markets stems not from broad crop coverage, but from delivering ingredients with a distinct value proposition, such as 'clean' inputs, enhanced performance or trusted provenance. These strategic entry points are seen as essential to building the demand and capability needed to expand diversification over time.

Opportunity 2

Imports displacement for greater food security

Consulted companies, as well as broader value chain stakeholders, agreed that Australia should prioritise efforts to displace the significant volumes of imported plant protein ingredients with domestically manufactured alternatives. While this shift is beginning to occur organically in response to broader market trends, Australia's entrenched reliance on imports highlights the need for a more coordinated national approach to increase sovereign manufacturing and enable greater food security. Indeed, when the extent to which Australia uses imported primary and secondary protein ingredients for use across food, beverage, and feed categories is investigated, the national food security implications and rationale to scale onshore production becomes evident.

Australian plant protein ingredient imports in 2023 = an estimated 118,000 tonnes, worth ...

US$230M+

Source: As estimated from World Integrated Trade Solution data

To support this position, Food Frontier conducted a preliminary audit and analysis of the current landscape of primary and secondary protein ingredient imports and exports. While comprehensive use modelling and more granular trade analysis are needed to fully quantify Australia's import reliance, in 2023, the country imported an estimated 118 thousand tonnes of primary plant protein ingredients and flours and starches at a value of US$230 million. As explained as follows, this estimate is based on incomplete data. Nevertheless, the level of dependence quantified here not only underscores Australia's existing demand but also points to a substantial economic opportunity to expand and scale domestic production. Read on for the detailed analysis.

Australia is a ...

Net exporter of **wheat**

Net importer of **soy & pea** ingredients

Isolates and concentrates

While publicly available data is incomplete, the available information coupled with shared insights from consulted stakeholders demonstrates a deep reliance on imported plant protein isolates and concentrates to meet local demand.[214, 215] Though Australia is a net exporter of premium wheat primary protein ingredients, the country remains reliant on soy and pea protein ingredient imports, largely from China and the US. This reliance presents risks associated with variable quality, lead times and global supply chain vulnerabilities, especially in the current context of changing geopolitical and trade conditions.[216]

Using two trade data points, HS Code 350400: 'Peptones/protein substances and derivates,' which captures protein isolates, and HS Code 210610: 'Protein concentrates, and textured protein substances', it is possible to begin conceptualising Australia's import reliance. As Tables F and G (*page 34*) demonstrate, Australia's five-year average to 2023 for imports of these two codes sits at a total of roughly 17 thousand tonnes, valued at US$123 million. This is despite Australia's significant onshore wheat protein manufacturing operations, which one can assume is also partly responsible for the sizeable exports seen in Table F. HS Codes specific to wheat gluten (HS Code 110900), though not explored in this report, would also capture wheat protein ingredient exports.

Table F. Peptones/protein substances and derivatives: Australian imports and exports, 2019–2023

Year	HS Code	Imports (T)	Value (US$M)	Exports (T)	Value (US$M)
2019	350400	6,879	$40.6	7,121	$48.7
2020	350400	8,015	$55.9	15,787	$114.9
2021	350400	7,514	$53.1	17,112	$122.5
2022	350400	8,962	$71.7	9,386	$84.3
2023	350400	5,452	$50.3	7,411	$67.5
5-year average		*7,364*	*$54.3*	*11,363*	*$87.6*

Source: World Integrated Trade Solution, 2023[217]

Table G. Protein concentrates and textured protein substances: Australian imports and exports, 2019–2023

Year	HS Code	Imports (T)	Value (US$M)	Exports (T)	Value (US$M)
2019	210610	7,762	$52.4	N/A	$25.8
2020	210610	8,921	$57.5	3,120	$21.3
2021	210610	10,633	$73.8	N/A	$25.6
2022	210610	9,582	$78.1	4,551	$29.6
2023	210610	8,598	$81.0	3,529	$26.7
5-year average		*9,099*	*$68.6*	*3,733*	*$25.8*

Source: World Integrated Trade Solution, 2023[218]

For all five years, China was Australia's largest import market for HS Code 350400 (isolates). The US was the second largest for three of the five years, alternating with either France or Germany for third for the other two years. For HS Code 210610 (concentrates), New Zealand was Australia's largest market for imports for four of the five years, and the US second. In 2022, the US overtook New Zealand for largest import market. China was Australia's third largest import market for all five years. Noting New Zealand was also Australia's largest export market for all five years, assumptions can be made in this regard about reciprocal trade partnerships and shared global supply chains.

However, it is not possible to definitively determine what percentage of imports or exports under either code are specifically protein concentrates or isolates, and from which protein sources they are made–most critically, including whether they are plant-based. This is because HS Code 350400 is also used for substances such as gelatine and hide powder, and HS Code 210610 also captures food preparations of flour and meal and hydrolysed proteins, amongst other goods. Publicly available HS Code reporting in Australia does not provide this level of data, though the existence of dedicated HS Codes for whey (HS Code 040410) and other animal-based proteins can help to reduce the likelihood of HS Codes 350400 and 210610 being used for these goods.

This lack of precision in Australia's trade data represents a significant barrier to informed policy and investment decision-making. Without specific HS or Australian Harmonised Export Commodity Classification (AHECC) codes, policymakers and industry alike are left without a definitive picture of Australia's import reliance or of the growing export potential. Updating these classifications would provide the foundational data needed to track market shifts, identify supply chain vulnerabilities and shape effective strategies to displace imports and grow domestic manufacturing. It is a low-cost, high-impact step that would directly support Australia's ambitions to build sovereign capability in plant protein production.

In 2023, Australia:

US$40.7M

IMPORTED VS EXPORTED

US$0.6M

of **non-wheat starches**

Source: As calculated from World Integrated Trade Solution data

Starches and flours

Beyond protein isolates and concentrates, Australia also relies heavily on imported starches and flours, especially those derived from non-wheat sources. These products are used across a range of food and beverage categories, making their supply critical to Australia. Given the large quantities of flours and starches produced by plant protein ingredient manufacturers, these two goods were similarly identified as import displacement targets.

Unlike the limited data available for primary protein ingredients, World Integrated Trade Solution data for starches and flours offers more detailed insights into Australia's import reliance.[219] The consumption and manufacturing of starch and flour products made from cereals, including wheat and rice, as well as food products like breads and pastas using these ingredients, are well established in Australia.[220, 221] Wheat-based starch also monopolises Australia's overall starch exports.

Nevertheless, Australia still imports significant quantities of starches made from maize (corn), manioc (tapioca), potato and other crops. As Table H (*page 36*) demonstrates, in 2023, Australia imported US$40.7 million, or 45 thousand tonnes, worth of starch products (excluding wheat-based), versus the US$0.6 million, or 355 tonnes, of non-wheat starches it exported.

Table H. Starches: Australian imports and exports, 2023

Type	HS Code	Imports (T)	Value (US$M)	Exports (T)	Value (US$M)
Wheat	110811	415	$0.7	90,923	49.2
Maize (corn)	110812	17,313	$13.1	137	$0.2
Potato	110813	12,681	$14.8	116	0.3
Manioc (cassava)	110814	13,375	$9.8	98	$0.1
Other	110819	1,963	$3.0	4	$0.0
	Total	**45,747**	**$41.4**	**91,278**	**$49.8**

Source: World Integrated Trade Solution, 2023[222]

In terms of flour (or meal) products, available global trade data also indicates that, overall, Australia imports more flour than it exports. In 2023, Australia imported US$60.6 million (58 thousand tonnes) of flour products made from wheat, maize, potato and other cereal, oilseed and legume crops, versus the US$25.9 million (29 thousand tonnes) in exports. This picture is partial however, as global trade data was unavailable for Australian rice and rye flour import and exports in 2023.

> In 2023, Australia imported **more than double the value** of flours than it exported.
>
> *Source: As calculated from World Integrated Trade Solution data*

Table I. Flours: Imports and exports, 2023

Flour	HS Code	Imports (T)	Value (US$M)	Exports (T)	Value (US$M)
Wheat or meslin	110100	>20,082*	$21.4	17,494	$12.5
Other cereal flour	110290	11,093	$11.4	7,955	$8.0
Maize (corn)	110220	11,673	$14.8	741	$2.1
Soya bean flour and meal	120810	2,473	$2.3	1,677	$1.8
Dried leguminous vegetables	110610	8,151	$7.1	543	$0.8
Potato flour and meal	110510	601	$1.4	222	$0.5
Flours and meal of oil seeds or oleaginous	120890	3,757	$2.2	119	$0.2
	Total	**57,823**	**$60.6**	**28,751**	**$25.9**

Source: World Integrated Trade Solution, 2023[223]
**Note: Missing import and export data for US*

These import figures for starch and flour products—totalling in 2023 about 104 thousand tonnes and US$102 million in value (including wheat-based products)—underscore a complementary and sizeable opportunity to displace reliance on imported products. There is clear and growing appetite for flours and starches made from diverse plant sources, with new and innovative food and beverage products featuring these ingredients regularly appearing on Australian supermarket shelves. As explored in *The pathway forward* (Chapter V), coordinated demand for Australian-made ingredients and strengthened local manufacturing supply chains are just some of the structural elements required to progress import displacement.

Australian imports of flours and starches worth US$102M in 2023

Source: As calculated from World Integrated Trade Solution data

Livestock and aquaculture feed

While human-grade food and beverage applications, as well as pet food, remain the primary focus amongst consulted manufacturers, they also identified livestock and aquaculture feed as a significant but currently underleveraged market. Companies explained that both the protein-rich byproducts (outer hull fibre, ash) and protein concentrates themselves could serve as alternative feed additives, generating large-scale and steady demand to underwrite commercial viability and valorised circular operations. As broader agrifood stakeholders have argued, increased uptake of Australian-grown and made plant protein ingredients could also have positive sustainability and security impacts for domestic animal protein industry supply chains.[224]

Using locally grown and processed protein-rich grains (such as canola and lupin) as livestock and aquaculture feed supplements is a common practice in Australia. Several consulted ingredient manufacturers are already supplying into various animal protein industries, in part to valorise byproducts streams. However, Australia has an entrenched dependence on imported soybean meal for animal feed, especially the poultry industry. In 2023, Australia imported 712 thousand tonnes of soybean-based animal fodder, at a value of US$389 million.[225]

Animal feed, particularly imported soybean meal, has been identified as a leading indirect greenhouse gas (GHG) emissions and environmental impact contributor to several domestic animal protein industries' sustainability profiles.[226, 227] A 2022 Life Cycle Assessment (LCA) of the Australian poultry industry found that chicken feed contributes up to 78% of this industry's supply chain emissions if also including the associated land use (LU) and direct land use change (dLUC) impacts of its production.[228]

The same poultry industry LCA study also found LU and dLUC impacts had increased since 2010 due to increased soybean meal imports, 98% of which was reportedly being sourced from South America. Conversely, a pork industry LCA found a drop in LU and dLUC associated impacts between 2020 and 2022, resulting from a 15% decrease in South American soybean meal imports in favour of imports from less emissions-intensive markets.[229]

The authors of both LCA studies argue sourcing low emissions alternative sources of feed and changing feed ratios are critical to improving sustainability outcomes and reducing supply chain emissions.[230, 231] While changing international soybean meal source markets may present a relatively straightforward solution, accessing domestically manufactured ingredients made from locally grown protein crops offers a more sustainable solution over the long term.

Countries around the world are increasingly taking this approach. The world's top two soybean importers, China and the EU, are working to reduce protein import reliance for animal feed production to address growing food and supply chain security concerns.[232] While both governing bodies are supporting efforts to increase their respective local soybean production, China and the EU are also actively exploring opportunities to utilise alternative, domestic-made, plant and other protein sources to reduce or displace soybean ratios in animal feed.[233, 234, 235] Australia could do the same.

There is currently limited Australian LCA data to demonstrate the sustainability impacts of animal feed made from plant proteins such as faba, lupin and hemp–a data gap that must be filled. However, the known benefits of pulse and oilseed rotational crops suggest they could offer an alternative feed additive that is more sustainable than imported soybean, depending on the crop production method and the ingredient manufacturing processes. This is explored in the following section.

It is also worth noting that the LCA studies as referenced additionally identified Australian grains, such as wheat, canola and barley, sourced as animal feed as leading contributors to supply chain emissions. This was found largely due to carbon soil loss and the grain industry's use of synthetic fertilisers.[236, 237] The GRDC's own commissioned 2022 LCA of Australia's grains industries confirmed this, finding 38% of the industries' Scope 3 (indirect GHG) emissions come from the embedded use of fertilisers. The report suggests strategic rotational cropping, including of pulses and oilseeds, could be a way to reduce use of synthetic fertiliser.[238] However, the GRDC highlighted more regionalised assessments are required to understand the optimal rotations to achieve this across Australia's varying growing regions.[239]

Incentivising rotational cropping with pulses and oilseeds could help lower supply chain emissions in both grain and animal protein industries, while also boosting the availability of sustainable, locally sourced plant protein feed additives. However, the guarantee of a favourable market to sell these grains into is required. Scaling a domestic plant protein ingredient industry could provide the necessary offtake, supporting climate and supply chain resilience goals while also helping to lower input costs for grain industries.

Opportunity 3

Value-added and sustainable agriculture industries

As articulated by consulted companies and broader ecosystem stakeholders alike, the growth of Australia's plant protein ingredient manufacturing industry offers a major opportunity to strengthen the domestic agrifood supply chain. By moving beyond bulk raw commodity exports, this industry can enable economic value-addition and onshore manufacturing, as well as contribute to regional development. Critically, it also supports a more resilient and diversified grains sector by creating new domestic markets, improving on-farm sustainability and embedding farmers more deeply into value-added supply chains.

More than **90%** of Australian pulses exported are unprocessed

Source: Grain Central

Australia's grain sector exports roughly 65% of its total annual production,[240] typically in raw or minimally processed formats. Of the pulses Australia exports, more than 90% leave the country unprocessed.[241] For instance, Australia exported 40.9 million tonnes of unprocessed protein rich source crops (FY23), [242] yet, as explored above, imported an estimated 118 thousand tonnes of plant protein ingredients (2023). This disconnect leaves significant value on the table, with the potential economic and employment benefits of domestic processing forfeited.

While detailed economic modelling is required to capture the full scale of the opportunity, industry consultation underscores the potential of domestic plant protein ingredient manufacturing. Companies reported that producing plant protein concentrates onshore can generate economic returns eight to 13 times higher than selling the same grains unprocessed. When co-products like starches, flours and oils are included, this multiplier can increase to between 10 and 16 times higher, depending on crop type and market. Isolates, considered premium products, raise this per tonne amplifier even higher.

> “
>
> Processing plant proteins onshore can generate returns up to **16 times higher** than selling raw grain — and even more for premium isolates.

Value of faba beans, unprocessed versus processed protein ingredients

Faba beans	Unprocessed, domestic	Processed, protein concentrate	Processed flour / starch
1 TONNE	AU$500	AU$4500-6500	AU$500-1500

Estimated 2025 value based on variable factors

To illustrate, consider faba beans: a tonne of unprocessed faba beans in 2025 can be sold for an average of AU$600 for export markets and AU$400 for produce intended for domestic feed consumption.[243] In contrast, and assuming a source crop purchase point in the middle of these two prices (~$500), a tonne of faba bean protein concentrate would be valued at between AU$4,000–AU$6,500 if sold wholesale. The value of one tonne of faba flour or starch would be worth an additional AU$500–$1,500, depending on the product specifications and destination market.

Of course, actual returns depend on several factors: crop type and purchase price, scale of production, market channel, and whether the ingredient is a concentrate or isolate. Co-product value is also market dependent. However, the potential uplift is substantial, even under conservative and variable assumptions.

Economic security through new domestic markets

A nationally scaled plant protein ingredient manufacturing industry will not only deliver greater value capture for growers through onshore processing; it has the potential to strengthen Australia's agricultural resilience by reducing reliance on volatile export markets.

With a predominant focus on exports, Australia's grain sector is highly exposed to changing global supply chain and market conditions. Multivariable volatility in recent years has culminated into higher input and commodity prices, logistics disruptions, and trade and market access challenges. This has resulted in increased risk for growers and actors along the export supply chain.[244] Consulted stakeholders highlighted the impact of these challenges for pulses in particular, as annual exports average 80 to 90% of total production.[245, 246] Australian pulses are also exported to a limited number of destination markets predominantly in South Asia and the MENA region, with many relying on a single market for a majority of their exports. For instance, in 2022-23 (FY23), 54% of Australia's chickpeas were exported to Pakistan, 50% of Australia's broad beans (which includes faba), went to Egypt, and 72% of Australia's mung beans went to China.[247]

Those consulted with experience in bulk pulse commodity exports stressed that, as a result, Australia's pulse industry is effectively at the mercy of these markets. In addition, demand and pricing fluctuations can have significant financial ramifications for domestic growers. An added complexity is the high export standards applied to pulses, which are largely aesthetic—based on appearance, colour and sizing, instead of nutritional or functional factors.[248] Should a rotation's yield be physically marked, damaged or disformed (wrinkled, shrivelled, stained, etc.) due to unfavourable growing conditions or adverse climatic or weather events, the pulses' value is likely to be downgraded. In failing to meet the specification requirements of the intended international market, downgraded pulses often end up as animal feed and provide a lower return to the grower.[249]

With the increasing impacts of climate change, including more frequent and severe natural disasters, localised changes to growing regions and heightened biosecurity risks, growers' ability to control for their yields' aesthetics is diminished. This in turn risks weakened financial returns for the pulse industry if alternate markets based on their produce's nutritional and functional qualities are not also established.[250, 251] This is what a scaled domestic plant protein ingredient manufacturing industry could provide.

For plant protein ingredient manufacturing, pulse aesthetics are largely immaterial as the grains will be dehulled and processed into their respective nutritional fractions. So long as the downgraded pulses retain their desirable nutritional and functional qualities, this produce can be directed into the ingredient manufacturing supply chain for a higher value than if it was destined for animal feed markets. Though the industry's required pulse crop tonnage is currently small, it already provides for those supplying into it clear economic and

investment security benefits. These benefits could be scaled across Australia.

It is important to remember that farmers are ultimately driven by financial returns and global commodity markets will continue to have a significant influence on national crop prices and rotational planting decisions. However, as Australia's plant protein ingredient manufacturing industry scales and its demand increases, the signal to farmers to grow specific protein-rich crops for domestic processing would become stronger, driven by price and greater buyer confidence. While the domestic plant protein ingredient market might not always compete with international prices, it would offer growers a more reliable 'backstop' price and a guaranteed market where they can command a premium above animal feed.

In the long term, growers would also have a potentially lucrative opportunity to grow and supply under contract new, optimised plant protein source crops, purposefully bred to meet manufacturers' nutritional and functional demands. This potential is already front of mind for many in Australia's crop science disciplines, seeking to recreate the crop optimisation success and skills long advanced in Australia's wheat and other major crop industries.[252]

Improved on-farm productivity and sustainability outcomes

Beyond the economic security a scaled domestic plant protein ingredient manufacturing industry would offer, the increased production of protein-rich pulses and oilseeds across Australia would simultaneously support the grains sector more broadly to deliver on its sustainability and net zero emissions targets.[253]

> Increased production of protein-rich pulses and oilseeds would support the grains sector to **deliver on sustainability and net zero emissions targets**

As is well understood among the increasing number of Australian farmers practicing rotational ('break') cropping, there are important on-farm productivity, biodiversity and sustainability benefits in growing pulses and oilseeds.[254] When grown in rotations, pulses and certain oilseeds alike are known to improve soil structure and health, as well as to support insect, weed and disease control.[255] These qualities in turn allow growers to reduce usage of synthetic pesticides and herbicides, just as pulses' innate ability to 'fix' atmospheric nitrogen into the soil reduces their reliance on synthetic fertilisers.

Not only can this bring down input costs, but rotational cropping is also known to increase subsequent crop yields and therefore increase potential financial return while also diversifying grower income.[256, 257] Reducing synthetic fertiliser usage has also been identified as critical to emissions reduction in the grains sector given its position as the second largest GHG contributor.[258]

Pulses are also known to be water efficient and low-cost in their ongoing production, with the ability to grow in diverse climate and soil types.[259] This makes them widely accessible for growers across Australia, however the volatility of their respective global commodity markets compared to more established oilseeds (and cereals) can act as a barrier to their adoption.[260] Other barriers to rotational cropping include the required initial high learning curve and capital outlay, increased operational and agronomic complexity, and performance and benefit variability between different crops in different growing regions.[261] Pulses and oilseeds also bring their own challenges regarding harvestability and insect, weed and disease susceptibility.

There is a suite of financial, R&D and other public support mechanisms that must be deployed to accelerate growers' ability to overcome these challenges, as explored in *The pathway forward* (Chapter V). However, the potential for a more secure and attractive financial return through a scaled domestic market for protein-rich pulses and oilseeds could be pivotal in incentivising rotational cropping uptake. This is already happening in international markets like Canada, where demand from large-scale fractionation facilities has increased pea production in surrounding growing regions.[262, 263]

Opportunity 4

Regional development and advanced manufacturing circularity

A scaled plant protein ingredient manufacturing industry presents a strategic opportunity to invigorate regional economies, create skilled jobs and advance a more circular and future focused agrifood system, as validated by leading agrifood and research institutions. AgriFutures, the GRDC, the Australian Farm Institute, Grains Australia (formerly Pulse Australia) and CSIRO have all identified plant protein ingredient manufacturing as a promising and priority pathway for regional development and agricultural value addition.[264, 265, 266, 267]

> Plant protein ingredient manufacturing represents a rare **convergence of Australia's existing agricultural strengths**, advanced manufacturing potential and regional development agendas

Indeed, plant protein ingredient manufacturing represents a rare convergence of Australia's existing agricultural strengths, advanced manufacturing potential and regional development agendas. Despite some value chain scepticism stemming from 'overhyped' downstream product market expectations, shifting policy signals and slower-than-anticipated growth, consulted stakeholders maintained regional Australia stands to be a major beneficiary of a scaled industry.

Regional development and jobs

All of Australia's existing plant protein ingredient manufacturing facilities are located in, or close to, grain growing regions in New South Wales, Victoria, South Australia and Tasmania. Consulted companies expressed this was a strategic choice to reduce freight logistics and costs and ensure protein source crop traceability and quality–a valuable point of difference for branding in domestic and export markets. Importantly, it also creates greater on-farm and supply chain connectivity and community buy-in for, and participation in, the industry.

The industry's investment in infrastructure development to date has also created direct regional employment opportunities and stimulated ancillary local economic activity, including in the grains, hospitality and retail sectors. Consulted companies reported employing a wide range of local workers and contractors across the construction and commissioning phases, with ongoing business operations supporting sustained employment in manufacturing, logistics, maintenance and administration. While some companies cited difficulties in sourcing technical expertise in remote areas, many overcame this by investing in on-the-job training and hiring workers with adjacent skills from meat, dairy and grain sectors, as well as from food and beverage manufacturing.

A scaled industry, coupled with dedicated regional workforce training and attraction programs, could amplify these benefits across Australia's grain-growing regions. Manildra Group exemplifies this potential: the company's commitment to its regional roots has driven decades of continuous investment in NSW's regions, including more than AU$700 million in recent years. Manildra is now the largest private employer in the South Coast region and has longstanding supply contracts with more than 1000 Australian farmers.[268]

Consulted stakeholders stressed that infrastructure development must be strategically progressed and, most importantly, matched with ingredient demand creation to ensure each site's long-term commercial viability. Detailed mapping of supply chains, growing regions and application markets is essential. This will enable identifying high-potential development sites and strategically positioning facilities to leverage each region's major protein-rich crops and comparative supply chain strengths.

In some of Australia's jurisdictions, state-based investment and regional development agencies have already undertaken targeted work to identify comparative strengths and priority opportunities, laying the groundwork for future investment attraction. For instance, South Australia has highlighted lentil, faba bean and field peas as priority crops for local ingredient manufacturing,[269] while Western Australia is emphasising the state's unique global position in lupin production, alongside barley and canola, [270]

New South Wales has identified the Riverina Murray, Central-West Orana and New England as examples of high-potential sites for facility development, based on their production of key cereals and pulses such as chickpea, and strong access to established freight infrastructure.[271] In Victoria, the Wimmera Southern Mallee Regional Partnership identified the Wimmera region as a priority and advantageous location for faba and lentil processing capacity, the research for which helped to progress APP's business case to establish its Horsham facility.[272, 273]

Mung bean has also been repeatedly recognised as a promising crop for protein ingredient manufacturing in Queensland.[274] Most notably, a 2018 report commissioned by the Queensland Department of Agriculture and Fisheries identified the crop as part of a $70 million diversification opportunity in North-West Queensland, proposing local processing to unlock economic value, improve supply chain efficiency and support regional development.[275] Similarly, CSIRO identified North Queensland, specifically Townsville, as a potential hub for multi-crop processing, including mung bean and industrial hemp, based on favourable climatic conditions and regional infrastructure development potential.[276]

CSIRO's Townsville study illustrates the opportunity to activate new regional economies yet reinforces that foundational infrastructure investments are critical to realising this potential.[277] Consulted stakeholders echoed this, highlighting access to sufficient and reliable energy supply and water resources, efficient freight corridors and digital connectivity as critical enablers of commercial scale growth, especially in the regions. While some regions may already possess elements of this infrastructure, others will require targeted co-investments from governments to overcome existing constraints. Several also noted the critical need for national leadership and cross-jurisdictional coordination, including at the local development level, to attract and deploy strategic investment and ensure consistent infrastructure and workforce planning across Australia.

Regional manufacturing hubs and circularity

To both address infrastructure and investment constraints and harness local strengths, many within the ecosystem have advocated for a regional, precinct-based development approach. Aligning new processing facilities with designated regional growth zones, such as Special Activation Precincts (SAPs) or regional manufacturing hubs, can streamline infrastructure planning, integrate complementary industries and supply chain capabilities, and maximise investment leverage. These precincts also offer governance frameworks to coordinate land use, workforce development and freight networks.[278, 279]

> **A regional, precinct-based development approach** can both harness local strengths and help solve infrastructure and investment constraints

Crucially, regional manufacturing hubs could provide a practical response to several of the most significant challenges facing plant protein ingredient manufacturers: the capital intensity of scaling, achieving supply chain efficiencies and byproduct valorisation. These challenges are explored in detail in *Findings: Major challenges* (Chapter IV). For example, by co-locating complementary supply chain operations, such as dehulling, drying (for wet fractionation), blending and packaging, and other necessary capabilities, manufacturers could access shared infrastructure and services that are often prohibitively expensive to build independently. To date, companies without these capabilities in-house have had to take a staged approach to expansion or contract out these services.

Additionally, if equipped with technical capabilities to valorise all secondary protein ingredients–for instance to manufacture standalone flour, starch, fibre or oil products alongside the primary protein outputs, as well as feed pelletisers–these hubs could further enable companies to diversify revenue streams, enhance resource efficiency and reduce waste. In parallel, establishing specialised R&D centres within these precincts would also embed applied research into process optimisation, product development and new ingredient applications.

Together, this integrated model offers the potential to accelerate innovation, reduce commercial risk, ease individual cost burdens and catalyse more resilient, circular supply chains within regional manufacturing ecosystems. Manildra Group's Shoalhaven Starches facility illustrates this integrated regional model in practice, albeit being privately owned and operated.[280]

Opportunity 5

Integration with Australia's emerging bioeconomy

The cross-sector integration demonstrated at Shoalhaven also points to a broader strategic opportunity: linking plant protein ingredient manufacturing with the emerging biomanufacturing sector. This potential fifth opportunity was identified by Food Frontier through broader agrifood stakeholder and research institution insights.

For Manildra Group, investing in ethanol production, initially to utilise surplus starch, has enabled it to become Australia's largest wheat-based ethanol producer and has positioned the company to be a major supplier to growing global SAF markets.[281] Reports by CSIRO and AgriFutures suggest that starch and other byproducts from plant protein processing could serve as valuable feedstocks for biomanufacturing technologies such as precision fermentation.[282, 283] These advanced technology platforms are capable of producing bio-based outputs, including future foods, feed additives, fibres, fertilisers and fuels such as SAF, and are projected to play a key role building Australia's AU$30 billion bioeconomy by 2040.[284]

Strategically integrating biomanufacturing capabilities into regional manufacturing hubs could also support evolution of these sites into future-focused 'bioindustrial' precincts. Within this model, ingredient manufacturing byproducts are no longer secondary revenue streams but are repositioned as strategic inputs that could underpin the growth of Australia's sovereign biomanufacturing capability.

Realising this potential will require dedicated innovation and deliberate public-private collaboration. While starch-rich byproducts appear conceptually well suited for biomanufacturing applications, these pathways remain largely untested in the Australian commercial context.

Targeted R&D and feasibility assessments will be essential to evaluate input suitability, processing compatibility, and the technical, commercial and regulatory conditions required for successful integration with emerging biomanufacturing technologies.

> Plant protein processing byproducts could **serve as strategic feedstocks for Australia's AU$30 billion bieconomy by 2040**

Plans for Mackay, QLD, to become an APAC biomanufacturing hub could offer a valuable test case. As part of this vision, precision fermentation company Cauldron will build a large-scale contract manufacturing facility in Mackay, co-located with the Queensland University of Technology's existing Mackay Renewable Biocommodities Pilot Plant.[285] Current efforts are centred on locally sourced sugarcane-derived biomass as the primary feedstock for precision fermentation.[286] However, common rotational cropping of mung bean in North Queensland, including by local sugarcane growers, presents an opportunity to strategically co-locate complementary plant protein ingredient manufacturing infrastructure.[287]

Investing in the capability would not only support delivery of the economic and regional manufacturing opportunities outlined in Queensland's own investigations but also generate important flow-on benefits across the broader supply chain. It would create opportunities for value addition at the farm gate, reduce reliance on raw commodity exports,[288] and, in theory, enable starch-rich byproducts from mung bean processing to serve as an alternative feedstock for the region's budding biomanufacturing industry.

Although this potential has not yet been formally proposed or evaluated, it represents a strategic opportunity that warrants dedicated investigation as part of broader planning for Queensland's 'biofutures' food and fuel policy agenda.[289] The Federal Government's *Feeding Australia* national food security strategy also highlights ambitions around using agricultural feedstocks for biofuel production.[290] This reinforces the policy imperative to assess plant protein ingredient manufacturing's role as a strategic contributor to Australia's sovereign biomanufacturing capability.

IV. Findings: Major challenges

To understand the most pressing challenges facing the industry, consulted ingredient manufacturers were asked about the difficulties they face, their greatest operational risks, barriers to domestic product uptake and competitive pressures from international markets. Additional insights from broader agrifood stakeholders help contextualise the supply chain and regulatory barriers.

Five key challenges emerged, the most prominent of which was sales: building awareness, driving demand and catalysing product development. This was followed by scale: reducing costs to drive competitiveness; access to capital and investment; supply chain variability; and regulatory barriers–specifically for industrial hemp.

While there are shared themes across the sector, each company's journey is also highly personalised, and their challenges deeply nuanced. There is also a dichotomy in experience and in the scale of challenge between the ingredient manufacturers who began as startups and the established agrifood businesses that have diversified into new manufacturing capability. Different grains, processing technologies, final products, locations and local supply chains also present issues unique to each company.

This chapter covers the overarching, shared industry challenges while also exploring some of the intricacies experienced by consulted ingredient manufacturers.

Challenge 1

Sales: Building awareness, driving demand and catalysing product development

The biggest challenge facing the plant protein ingredient manufacturing industry is converting the growing global and local demand for protein ingredients into demand specifically for ingredients made from diversified Australian plant protein sources. While price is a key sticking point, consulted ingredient manufacturers explained the challenge begins even earlier. Namely, there is a limited–though growing–awareness of new, domestic ingredient offerings and willingness to undertake NPD from food and beverage manufacturers.

> **The biggest challenge facing the plant protein ingredient manufacturing industry** is converting the growing demand for protein ingredients into demand specifically for diversified Australian plant protein ingredients

Depending on the food and beverage category, the use of incumbent plant protein ingredients (soy, wheat and, increasingly, pea), as well as animal proteins [egg and dairy (whey, casein)] is entrenched.[291, 292] While each has its limitations, be it dietary, allergenicity, functionality, taste or sustainability–or even availability, as has been the case recently for egg protein[293]–final product manufacturers have extensive experience using them. They can also do so at a relatively cost-effective price point, given their well-established global supply chains. Depending on the ingredient, manufacturers also see great value maintaining the use of these proteins for their functional and/or nutritional benefits, as well as consumers' preference for and familiarity with them.

As explored in Chapter II, multiple consumer trends are resulting in growing demand for diverse plant protein ingredients. Progress is slow and methodical in the food industry, however, based on incremental change and guided ultimately by demonstrably large-scale consumer demand. For ingredient manufacturers seeking to drive B2B

sales, the challenge lies in persuading final product manufacturers to embrace their diverse offerings as solutions to meet these evolving and converging consumer needs.

This has led consulted ingredient manufacturers to launch extensive education and marketing campaigns with final product manufacturers to build greater awareness. While some have been able to leverage existing supply networks as a strong starting point, others have had to undertake resource heavy approaches to forging new relationships and a viable opportunity pipeline. All consulted companies spoke to the substantial and ongoing work required to get final product manufacturers to understand the value in exploring new plant protein ingredient opportunities, especially in current macroeconomic settings.

Research and development: Ingredients application and product development

Consulted companies noted that significant R&D and resources are required to facilitate ingredient testing and support NPD. They highlighted a current gap in technical knowledge around the functional properties of diversified pulse- and oilseed-based ingredients, particularly in comparison to more established plant and animal protein ingredients. Some final product manufacturers rely heavily on their ingredient suppliers for formulation support, meaning that if the suppliers themselves lack deep functional understanding of these novel inputs, it can deter product development. The resulting learning curve presents a barrier to uptake unless ingredient manufacturers themselves actively guide their customers through the process.

As a result, many consulted manufacturers have had to invest heavily in their own functionality testing and application trials, as well as in technical support and customer education. Several reported going as far as developing finished food and beverage concepts themselves, identifying this as a critical strategy to drive adoption and secure sales.

To support this work, many companies have contracted applied research and academic institutions, such as CSIRO, to access their expertise and facilities. Those with the financial means have also established their own dedicated in-house teams and/or facilities to undertake application trials and product development on behalf of their customers. For instance, APP previously conducted R&D operations at their dedicated facility in Werribee, while in 2024, Integra Foods announced the construction of a state-of-the-art laboratory to sit alongside its production facility in Dublin, focused on product and process development.[294, 295]

Another challenge companies raised was gaining traction with multinational food and beverage manufacturers. Consulted companies spoke to a higher willingness from domestic and smaller manufacturers to collaborate on NPD with Australian ingredients. In comparison, the product development decisions for major multinational manufacturers are often made offshore and influenced by existing international supplier relations. With access to cost-competitive alternatives in other markets, the incentive to switch to Australian ingredients is reduced, particularly when consumer demand for local sourcing does not outweigh price as the primary purchasing driver.

This challenge is further compounded by the lengthy and iterative nature of food and beverage product development, which can take months or even years to reach a commercial outcome. The process often involves multiple rounds of feedback and refinement based on real-world performance and market reception. For ingredient manufacturers, the time and cost involved in pursuing these opportunities–especially when they do not result in a sale–can place significant pressure on financial runways. Several companies described investing considerable resources into promising commercial partnerships, only to have the opportunity fall through, leaving them financially exposed.

Ingredient specific concerns

Certain ingredient manufacturers also face challenges specific to plant protein source types. For instance, industrial hemp continues to carry stigma due to its association with drug-type cannabis, creating hesitancy in some food and beverage manufacturers to use hemp as an ingredient, and for some consumers to consume it.[296]

Lupin presents a different challenge. Although valued for its nutritional and functional qualities, it is classified as an allergen in Australia, New Zealand and some international markets.[297, 298] This classification can be a deterrent for manufacturers reluctant to invest in products with a potentially limited consumer base. Additionally, introducing an allergenic ingredient into a facility can trigger broader labelling requirements and raise concerns about cross-contamination and food safety–risks manufacturers may be unwilling to take.

Nonetheless, similar allergenicity barriers have been successfully managed for other widely used ingredients, including soy, wheat (gluten), eggs and dairy (lactose). With targeted efforts in manufacturer education, consumer communication and risk management, the barriers facing lupin could likewise be addressed.

Challenge 2

Scaling up: Reducing costs to drive competitiveness

The second biggest challenge for the industry is achieving competitive pricing with incumbent ingredients, namely imported soy and pea, and managing production costs. The entire plant protein ingredient market and supply chain is ultimately driven by the economics, making the ability of Australia's ingredient manufacturers to compete on price critical to success. Intrinsically linked to this are the issues of reaching scaled production, efficient byproduct utilisation and optimising manufacturing processes to achieve profitability.

As previously explored, foreign-made soy and pea protein ingredients dominate the global market, with significant manufacturing capacity and longstanding supply chain capabilities spread across North America, Europe and China.[299] Australian food, beverage and feed manufacturers are reportedly able to import these ingredients in various formats and quantities at competitive pricing and have done so at scale for some time.

The price disparity as compared to relatively inexpensive imports reduces willingness amongst product manufacturers to switch to new, domestically produced ingredients, unless they can justify a premium based on factors like provenance, quality, 'clean labelling' or sustainability. While broader evolving consumer trends, sustainability reporting and other business requirements are helping to build the case for domestically-made proteins, Australia must ultimately be able to manufacture at scale to reduce product unit costs and cultivate greater demand.

Infrastructure and manufacturing costs

The significant cost of commercial scale fractionation infrastructure itself is also a fundamental barrier to industry growth. Depending on the scale of the commercial facility, ingredient type (concentrate or isolate), and any complementary capabilities established alongside fractionation, the capital outlay required can vary between the tens of millions to the hundreds of millions of dollars.

For example, initial construction of APP's commercial plant protein isolate facility, which has a production capacity of 1200 tonnes of isolates annually, cost AU$20 million,[300, 301] and planned expansion to 6000 tonnes was estimated to cost an additional AU$22.5 million.[302, 303] Another planned expansion by APP into South Australia with partners Thomas Foods International and AGT Foods would have seen construction of three fractionation facilities at a total capacity of 25,000 tonnes annually. While the project did not proceed, it was valued at AU$378 million in combined private and government funding.[304] Integra Foods' commercial facility, which can produce up to 15,000 tonnes of protein concentrate and flour, was constructed as part of an AU$30 million vertically integrated precinct by parent company Australian Grain Exports.[305]

These substantial sums can be especially difficult for startup or smaller ingredient manufacturers to accumulate if they are unable to fund construction themselves or secure the required financial support from public and private sources. The challenges related to obtaining the necessary levels of investment are explored in more detail in *Securing investment*, page 48.

As a result, some companies have explored alternative routes to reaching scaled, cost-effective production, including repurposing existing facilities and equipment or offshoring operations. For example, to avoid the high capital requirements of building from scratch, WOA acquired Prolupin GmbH's lupin isolate facility in Germany. WOA purchased the facility for AU$4.3 million, giving them immediate access to 120 tonnes of annual production capacity and the European market. The company plans to invest another AU$3-5 million to upgrade production to 1000 tonnes of isolates annually in coming years.[306]

Another significant hurdle highlighted by all consulted companies is Australia's inherent high cost of manufacturing, including labour, energy and other inputs.[307] In its submission to the Federal Inquiry into Food and Beverage Manufacturing in Australia, APP highlighted that this cost burden can be especially acute in regional areas where existing utility services may not be sufficient to support new, commercial scale manufacturing operations and the companies themselves must invest in ensuring adequate supply.[308]

For companies employing wet fractionation, an additional and costly component is drying infrastructure. Converting the wet protein isolate (and co-products) at the end of the fractionation process into a stable, dry powder requires industrial-scale spray dryers or equivalent equipment. These systems demand a high capital outlay, specialised housing and large quantities of energy to operate.[309] For those without in-house drying equipment, an alternative has been to seek contract access to existing infrastructure. However, this presents its own commercial and supply chain challenges as Australia has a limited number of accessible industrial-scale spray dryers, most of which are owned by other industries with their own use demands.

Supply chain efficiencies

Ingredient manufacturers also emphasised that cost reduction relies on achieving production and supply chain efficiencies. This includes having labour-light and automated manufacturing processes where possible–an approach shared by all consulted companies. For those with the financial capacity, another strategy involves developing complementary supply chain capabilities in-house.

For instance, the ingredient manufacturers with their own grain storage, cleaning and de-hulling equipment can source crops directly from growers, reducing raw material costs. In contrast, manufacturers without this infrastructure must rely on third-party processors, often at a higher cost. Some also maintain blending, packaging and R&D capabilities to support product development and application trials. Smaller manufacturers, however, often need to outsource one or more of these functions, driving up their overall production costs.

The feasibility of contracting such capabilities also varies depending on the local ecosystem within which the company operates. In well-supported regions, manufacturers may be able to contract established local service providers with relative ease. In less developed regions, where supporting infrastructure and supply chain partners are limited, companies are often forced to look beyond their local area, or even to other industries, for viable solutions, increasing both operational complexity and cost.

While integrating supply chain functions in-house can improve long-term cost efficiency, the upfront capital required is substantial. As a result, many companies have opted for a staged or partnership-based approach to building their capabilities over time.

Co-product valorisation

Managing and commercialising the substantial volumes of byproducts generated during protein extraction is another element critical to the overall economic viability of plant protein ingredient manufacturing. Effectively addressing this challenge requires significant investments into process optimisation-related R&D, in-house equipment and supply chain and market development.

Plant protein fractionation typically includes the dehulling (removal of the outer fibrous layer) and defatting (removal of any oils and fats) of a grain before it is either dry or wet fractionated into its remaining components: protein, starch and fibre, as well as ‘ash’, the residual mineral residue. The proportion of each component produced is grain dependent. For instance, lupins and hemp have high oil content and little to no starch, whereas pulses like faba and pea have a much higher starch content.

Consulted companies emphasised finding value in all these components as crucial to optimising profitability. Those with byproduct valorisation capabilities sell a variety of co-products such as starch and flour (a finely milled blend of starch and smaller quantities of protein and fibre) alongside their primary protein products. Companies without the necessary capabilities said they are the immediate priority for operational expansion. To this effect, WOA recently announced the successful production trial of a ‘high purity’ lupin oil for use in cosmetic and personal care products, with plans to trial additional production of a fibre product as part of an upcoming feasibility study.[310] For wet fractionation, there is a further consideration on how to both extract any residual value from the wastewater (leftover protein, oils, etc.), as well as how to cost effectively and sustainability treat it for reuse.

A widespread practice across consulted ingredients manufacturers is to sell the outer hull fibre, if the company has dehulling capabilities, and the remaining ash to farmers as animal feed. Essantis for instance, has a dedicated animal feed business and in-house pelletising capability that enables it to manufacture a diverse feed range from the byproducts of their various plant-based ingredient productions.[311] In the case of industrial hemp, fibre byproducts are also sold for use in compost.

Starch is the critical byproduct that manufacturers working with cereal and many pulse grains must manage. While the quantities generated are

dependent on the grain, the processing technology and the desired purity of the primary protein ingredient, the considerable amount of starch produced necessitates significant efforts to dedicated market and sales development. For instance, concentrate manufacturers explained that every tonne of protein produced generates approximately two to three tonnes of starch. Essantis Co-CEO Andrew May made light of this at the AltProteins 24 conference saying, "…the protein generation industry is really the starch generation industry."[312]

Today, roughly 104 thousand tonnes of various flour and starch products enter Australia annually as imports. As with their primary protein ingredients, consulted companies spoke to the priority challenge of translating demand for these incumbent starch and flour products (both onshore and internationally) into demand for their diversified offerings. The same barriers for protein ingredient uptake exist for their starch and flour products: price sensitivity, and limited ability or willingness from final product manufacturers to undertake NPD or switch suppliers.

This issue is amplified by companies having significantly larger quantities of these products to sell, but overall, less food, beverage and other market opportunities than for their primary protein ingredients. As a result, companies must dedicate substantial efforts to finding and securing wholesale supplier contracts, as well as to investigating new and creative application opportunities, such as those emerging in biomanufacturing for starch as a feedstock. There is still significant R&D and industry collaboration to be progressed in this regard.

Challenge 3

Securing investment

Investment is a significant challenge for the plant protein ingredient manufacturing industry. Consulted companies emphasised that while the challenge is shared, the experience—and therefore the needs—differ markedly between smaller startups and larger, more established manufacturers. A consistent view across all companies was that attracting capital depends on demonstrating clear market demand and a credible path to profitability. However, both public and private investors must be prepared to adopt a long-term outlook on sector growth and return on investment.

Infrastructure and equipment

Prior to investing in commercial scale fractionation capability, Australia's larger ingredient manufacturers were already established businesses with diversified agrifood portfolios. This stable financial foundation, along with an existing infrastructure footprint, enabled them to largely self-fund their expansion into scaled plant protein ingredient production. A broader balance sheet and integrated supply chains have also placed them in a stronger position to absorb first-mover risks and carry the resource burden of the lengthy R&D and product development cycles required by their customers.

In contrast, manufacturers that built their businesses from the ground up around proprietary fractionation capability have faced greater exposure to slow product uptake and challenging market conditions. While some succeeded in securing initial startup support, they have encountered more substantial barriers to raising the capital needed to scale operations and achieve lower-cost unit production. In some cases, this has necessitated government support to bridge the gap between private investment and access to traditional finance.

These companies pointed to persistent hurdles such as investor risk aversion and misaligned expectations around returns. For instance, some investors reportedly expect unrealistic high return rates in short timeframes unsuitable for infrastructure development and the slower growth trajectory typical of the food industry. Investor confidence has also been affected by the struggles of other market entrants, overinflated expectations around certain final product user categories and ingredient-specific concerns, such as allergenicity and regulatory hurdles.[313]

Although consulted companies expressed strong confidence in the sector's long-term profitability and sustained demand growth, they agreed that securing capital in the short term, while demand is still maturing, is a challenge.

The struggle of attracting investment is not specific to plant protein ingredient manufacturers. Companies across Australia's food and beverage manufacturing sector continue to highlight the increasing difficulties in funding onshore manufacturing operations, let alone expansion, amid challenging macroeconomic conditions.[314, 315, 316] These same macroeconomic trends have also resulted in reduced private investments in startups across the globe,[317] with Australia experiencing a year-on-year decline of 54% in 2023

for investment in startups compared to a global decline of 38%.[318] Within this shrinking capital pool, ingredient manufacturers noted it is even more difficult to compete for funding against high-growth sectors such as AI and MedTech, which are often viewed as offering faster or higher returns.

Research and development

In an emerging field grounded in deep technical expertise and complex processing methods, R&D is both a foundational enabler and a continuous imperative. Consulted companies spoke to the substantial initial R&D required to establish optimised processing and products, and the iterative nature of their R&D programs thereafter–designed to resolve technical challenges as they arrive, refine production methods and identify new application opportunities in collaboration with prospective customers.

However, all companies also underscored the high cost and time intensity associated with R&D. Depending on the scope, duration and level of partner involvement, individual projects can range from tens of thousands to several million dollars. Even when outcomes are positive, they often lead to further research needs, compounding both timelines and financial commitments. As a result, companies stressed the importance of a highly strategic approach to R&D investment that prioritises high-impact opportunities and closely aligns with demonstrated market interest.

Multiple companies cited Australia's R&D Tax Incentive Scheme as a key public financial support mechanism helping to bridge these costs. Government and research institution matched co-funding programs were also mentioned, but some expressed difficulties in repeatedly securing the requisite co-investments. Likewise, the cost of accessing contract R&D services, including from government funded research organisations, was noted by some as prohibitive. While public support remains essential to sustaining innovation, many stakeholders suggested future programs are needed to better support co-investment feasibility, scale-appropriate R&D access and end-to-end commercialisation pathways.

Compounding these challenges are wider macroeconomic headwinds. Several consulted companies observed that cost pressures and a wider economic downturn have also led food and beverage manufacturers–key downstream partners–to cut back on their own R&D and NPD budgets. This hesitancy is particularly acute during the current cost-of-living crisis, where concerns about ingredient costs and final product pricing have made manufacturers more risk-averse. These conditions unfold against the backdrop of a broader national decline in R&D investment, which in 2022 fell to just 1.66% of GDP, its lowest level in nearly two decades.[319]

This constrained appetite for innovation has direct implications for ingredient manufacturers. With NPD critical to securing sales, ingredient companies have increasingly shouldered the financial burden of final product R&D themselves. While all companies reported challenges in managing these costs, their capacity to absorb them varied significantly.

Challenge 4

Upstream supply chain variabilities

Consulted ingredient manufacturers acknowledged that vulnerabilities and changing conditions in Australia's upstream grain industries could have a notable impact on operations, though noted this was not an immediate business constraint.

As established, Australia has an abundant and diverse supply of high-quality, protein-rich source crops. This means consulted ingredient manufacturers can typically access the roughly 61,000 tonnes of the pulse and oilseed crops needed if running at full capacity. However, increasing input and production costs for growers, as well as fluctuations in production rates and global commodity markets, can substantially affect the domestic purchase price of these grains. For manufacturers sourcing raw materials in spot markets or further downstream, rather than via forward contracts, these price shifts can result in unanticipated and sometimes significant budget pressures.

Pricing and access fluctuations

Supply and price variability is not uniform across Australian grains, with supply chain and global demand intricacies affecting each season's cereal, pulse and oilseed crop production. For example, where certain crops are already in high demand from established markets, ingredient manufacturers must offer competitive pricing to secure supply, while still allowing for value addition and a profit margin. When production rates are low due to poor seasonal conditions, extreme weather events, or because of a perceived lack of demand at planting time, this can also increase prices of the limited available supply. Conversely, oversupply can reduce spot prices, though farmers with storage options may choose to hold onto their supply until market conditions improve.[320]

Navigating volatile pricing and raw material availability is complex and can directly impact ingredient manufacturers' profitability. Consulted companies therefore emphasised the importance of establishing direct and mutually beneficial relationships with grower networks, including by offering contracts with guaranteed prices, to help mitigate price volatility and incentivise local farmers to grow sufficient supply of specific protein-rich crops.

For ingredient manufacturers using pulses, another approach to managing fluctuating raw material costs is to purchase downgraded supply that has failed to meet high export standards, which are largely aesthetic.[321] This means downgraded pulses may still contain the desirable protein levels for fractionation but at a more favourable price point. If purchased directly from the farm, this approach also provides an alternative market for growers' de-valued crops that can deliver a better return than animal feed, helping to recover their return on investment and build confidence for future rotations. With this approach, however, ingredient manufacturers also take on the risk the nutritional makeup of the pulse was similarly affected, introducing quality variability into their supply.

Sourcing downgraded grain is not a readily available approach for all ingredient manufacturers. Nascent demand coupled with stringent licensing regulations means access to industrial hemp in Australia is currently limited and often only available under contract.[322] These grower contracts can also be relatively expensive, as they must be attractive enough to: enable farmers to rationalise the regulatory and cost hurdles of becoming a licensed industrial hemp contractor; overcome cannabis-related misconceptions and market opportunity scepticism; and, stave off competition from other rotational crops that might offer better returns.

As a result, Australian industrial hemp and its seeds–which are used to make protein ingredients–can carry a high input cost for manufacturers, especially as the domestic markets and accompanying demand to use the remainder of the crop (the stalk, flowers and leaves) are still being iterated under current regulatory and industry settings.[323, 324] The flow on effect is that manufacturers seeking to use Australian hemp must compete with potentially cheaper products made from imported hemp. Greater market access, regulatory reform and investments into diverse, downstream manufacturing capability are some of the factors that must be progressed to drive greater production and ultimately bring down the commodity cost of Australian industrial hemp.[325, 326]

Broader grain industry challenges

Challenges facing Australia's grain industry more broadly will also shape the future prospects of plant protein ingredient manufacturing. As demand for protein-rich crops increases, manufacturers may face issues of availability and access, particularly as climate change alters growing regions and intensifies weather-related disruptions such as droughts, floods and bushfires.[327]

Supply chain stakeholders also highlighted persistent logistical constraints that could limit the development of a robust national plant protein supply chain. Inconsistent logistics infrastructure across grain-growing regions—such as gaps in transport, storage, or port access—may hinder the efficient movement of crops to processing facilities, potentially constraining the industry's geographic expansion.

Finally, the relatively low investment in pulse and oilseed R&D, agronomy and supporting agricultural sciences—when compared to Australia's dominant cereal and major oilseed crops—will need to be addressed to support upstream supply development. [328] This includes investment in improved varietals for greater yield, functionality and nutrition, climate-resilient cultivars, rotational cropping systems, extension services and coordinated supply chain support to give growers the confidence, knowledge and market access needed to scale production in line with demand.

Challenge 5

Regulatory barriers: Industrial hemp

The final barriers consulted companies highlighted were regulatory, though these were specific to industrial hemp. While still in its infancy, Australia's industrial hemp industry is recognised as a rapidly growing sector with significant economic and sustainability potential owed to the crop's versatile applications. Industrial hemp can be used to produce sustainable building materials, textiles and food products, like seeds, oil and protein powders.[329]

Despite this promise, the industry faces structural challenges, many of which are exacerbated by outdated regulatory frameworks. The historical condemnation of drug-type cannabis, combined with a lack of nuanced policymaker understanding, has led to industrial hemp being conflated with medical and recreational cannabis in legislation.[330]

This has created unnecessary regulatory complexity for farmers and manufacturers seeking to engage with what is otherwise a high-potential crop sector.

It was only in 2016 that the Federal Government enacted the Narcotic Drugs Amendment Bill enabling states to regulate low-tetrahydrocannabinol (THC) hemp production (not exceeding 1.0% THC levels).[331] The following year, Australia's Food Standards Code was amended to permit the sale of hemp seed food products for consumption.[332] However, the industry has strict licensing requirements that compel growers and processors to obtain licenses from state governments before they can cultivate, process and supply industrial hemp products.[333] While mutual recognition laws generally allow industrial hemp license holders to operate nationally, variations between state regulations also create confusion and complexity for businesses operating across borders.[334]

More recently, in May 2025, the Australian Pesticides and Veterinary Medicines Authority (APVMA) approved the sale of hemp seed products and byproducts seed hulls and seed cake for use in livestock and pet feed.[335] This approval does not extend to hemp oil products, however. The APVMA's decision followed sustained advocacy from the hemp industry and marked a reversal of the APVMA's 2023 position, which classified all hemp-based products as Veterinary Chemical Products requiring formal registration before sale.[336, 337]

In this stigmatised regulatory environment, one of the flow-on effects is the heavy restrictions placed on manufacturers that hamstring sales. Marketing is a serious challenge for the industry, as online advertising in Australia is severely restricted by major social media platforms' regular practice of banning ads involving hemp, misclassifying it as related to narcotic drugs.[338] This limits marketing options to more resource-intensive alternatives, stifling businesses' abilities to effectively build awareness, educate new customers about the benefits of hemp and successfully compete in the market.[339] The industry's persistent stigma has also made it challenging for businesses to secure funding from traditional financial institutions, including banks and brokerage firms. Consequently, startups have frequently had to rely on venture capital investment or financial support from personal networks.[340]

Recognising the industry's potential, industry advocates have called for stronger government support, including regulatory harmonisation and simplification. Several state governments have begun taking steps in this regard, including legislative reforms in Tasmania,[341] consideration of a standalone Industrial Hemp Act in Victoria to provide a more dedicated regulatory framework,[342, 343] and the establishment of a Hemp Industry Taskforce in New South Wales to modernise legislation and explore national harmonisation.[344, 345, 346] The progress now underway in certain jurisdictions signals a promising shift toward more enabling and coherent regulation. To unlock the full value of this high-potential industry, including for plant protein ingredient manufacturing, coordinated national reform and targeted market activation is essential to overcome the remaining outdated, inconsistent and overly restrictive regulatory settings.

Industrial hemp production in Victoria. Credit: Agriculture Victoria

V. The pathway forward

Australia's plant protein ingredient industry stands at a decisive juncture. The building blocks of a globally competitive, value-adding sector are already in place: world-class agricultural inputs, a growing cohort of manufacturers, aligned regional development agendas and mounting market traction across food, beverage, feed and other applications. Australia also possesses formidable and expanding R&D capabilities spanning plant protein crop science, processing and product development, anchored in a multitude of applied research and academic institutions across the country.

Yet without catalytic leadership to align these efforts, Australia risks being outpaced by—and its future market share ceded to—countries with more assertive policy settings and integrated national industry strategies. Australian governments must play a pivotal role in uniting the value chain, de-risking investment and activating the market and industry conditions required for growth at scale.

The findings presented in this report reflect the industry's growing maturity while also illuminating the strategic levers available to accelerate its development at a national scale. Consulted companies and broader value chain stakeholders articulated a clear, shared vision: a robust domestic industry that:

- displaces imports;
- strengthens sovereign capability;
- adds value to Australian crops and regional communities; and,
- positions Australian-made ingredients as premium and preferred offerings in global markets.

This chapter articulates a proposed pathway to realise that vision. It presents five interlocking priorities for governments, industry and research partners to progress in tandem, establishing the strategic foundations and practical mechanisms needed to scale with confidence.

1. Establish a national taskforce to deliver a fit-for-purpose strategy

To translate growing momentum into national impact, Australia requires a dedicated mechanism to unify efforts and coordinate strategic progress across the plant protein ingredient industry. A dedicated National Taskforce should be established as a first priority to drive this next phase—convening government, industry, growers, researchers, investors and regional representatives to co-design and deliver a fit-for-purpose strategy for plant protein ingredient manufacturing.

This strategy must identify priority crops and value chains aligned with Australia's comparative advantages, determine national objectives around import displacement and global positioning, and map the policy, investment and infrastructure levers needed to support growth. Commercialisation decisions should be market-led, but governments have a critical role to play in enabling foundational and catalytic investment, clarifying Australia's strategic direction and coordinating action across jurisdictions.

Just as importantly, the Taskforce should act as a mechanism for aligning and sequencing efforts across the full set of priorities outlined in this chapter—including infrastructure investment, workforce development, R&D, supply chain alignment, market activation and regulatory reform. This work must also include close coordination with state and territory governments to align planning, investment and regulatory approaches and to ensure nationally consistent delivery. Such coordination will be essential to ensure investments are targeted, risks are mitigated, and the opportunities are captured.

To support the strategy's design and legitimacy, the Taskforce should also:

1. Commission detailed economic modelling of Australia's plant protein ingredient opportunity, including growth, trade, jobs, regional development and sustainability impacts. Leverage this modelling to inform considered national infrastructure and workforce development roadmaps (priorities IV and V).

2. Develop a national ambition statement for onshore grain value addition that positions Australia as a global leader in diversified plant protein ingredient manufacturing. Building on the country's success in value-adding major cereals and oilseeds, this ambition should signal a commitment to investing in the onshore processing and commercialisation of underutilised protein-rich crops, supporting both market differentiation and regional economic development.
3. Engage with departmental counterparts on embedding the industry within existing federal policies, such as *Feeding Australia: Food Security Strategy, A Future Made in Australia* and *Delivering Ag2030* and integrate it within national food security and biomanufacturing industry planning, recognising the strategic role of agricultural inputs and ingredient manufacturing byproducts.
4. Engage traditional agrifood and regional leadership early to build broad-based legitimacy, foster supply chain coalitions and ensure the opportunity is understood as a national value-adding priority and global opportunity, not a niche industry or downstream category.
5. Coordinate with equivalent national and state-led efforts to scale the industrial hemp industry, ensuring regulatory reform enables its use as a source crop for plant protein ingredients.

2. Invest in shared R&D platforms and innovation infrastructure

Unlocking the industry's full potential will require coordinated, end-to-end investment in research and development—from crop breeding to processing innovation and final product applications. While Australia has a strong and expanding R&D base across applied research institutions, universities and government agencies, these capabilities remain dispersed and underleveraged for commercial outcomes.

To drive innovation at scale, Australia must align these capabilities around shared goals, improve accessibility for manufacturers and redistribute the financial burden currently carried by individual ingredient manufacturers. Public investment will be key to funding pre-competitive crop science, accelerating process innovation and expanding access to facilities and services that help manufacturers validate, differentiate and scale local ingredients.

With nationally elevated and coordinated research platforms, Australia can generate the technical evidence, product functionality, nutritional data and application insights required. Such insights will underpin future recommendations to meet evolving consumer demands, increase commercial uptake and embed Australian ingredients in the next generation of sustainable food, feed and biomanufacturing systems.

Recommendations:

1. Establish an Australian Research Council (ARC) Plant Protein Centre of Excellence that unites and coordinates the relevant network of government agencies, research organisations, universities, agrifood bodies and industries across Australia working on relevant R&D. Through the Centre:
   - Progress pre-competitive and open-access R&D across crop sciences, processing and process optimisation; ingredient nutrition, functionality and application; and byproduct valorisation.
   - Prioritise R&D on the nutritional properties and applications of Australian plant protein ingredients to support their suitability across diverse end uses, including institutional foodservice (e.g. aged care, hospitals), retail products and animal feed.
   - Establish targeted education and engagement programs to support ingredient and final product manufacturers in identifying, accessing and collaborating on relevant R&D programs.
   - Partner with the ARC Centres for Synthetic Biology to assess and integrate opportunities for upcycling byproducts from plant protein ingredient manufacturing (e.g. starch) as feedstock for biomanufacturing processes.
   - Create translational fellowships and industry placement programs to embed researchers and technical specialists within industry, fast-tracking skills transfer and knowledge exchange.
   - Pursue international research partnerships with leading plant protein innovation agencies, such as Protein Industries Canada, to accelerate learning, facilitate technology access and promote Australian-grown ingredients in global markets.

2. Fund a national research program to identify regionally appropriate and commercially viable rotational cropping systems across Australia's growing regions for priority protein-rich break crops. This could be led and coordinated by the GRDC and delivered in partnership with relevant state-based agencies.
3. Expand and subsidise industry access to plant protein R&D and commercialisation infrastructure and services through targeted investment in two complementary facility types:
   - Ingredient development facilities: Fund government-backed food innovation research institutions to establish or expand dedicated plant protein ingredient user facilities. These should provide access to pilot-scale fractionation equipment, support for proprietary process and product R&D, and small-batch production of primary and secondary ingredients.
   - Final product development facilities: Support the expansion or establishment of final product development centres—via public-private partnerships or investment in existing food innovation hubs—to enable bench-scale development of food, beverage and other end-products using Australian ingredients. These facilities should also serve as a platform for ingredient manufacturers to demonstrate functionality and accelerate commercial uptake.

3. Drive demand generation and reduce adoption barriers

Translating growing global demand for protein ingredients into commercial outcomes for Australian-made products requires coordinated market activation. While demand itself is not the constraint, the opportunity lies in steering this demand toward ingredients produced onshore, from locally grown crops, with clear functional and nutritional credentials.

To realise this opportunity, Australia will need to take deliberate steps to build market confidence, reduce friction to adoption and position local ingredients as competitive, 'clean label' alternatives in both domestic and export markets. This begins with a clear understanding of current usage patterns and import reliance across food, beverage, feed, industrial and other applications—for all protein, starch, flour, fibre and oil products.

At the same time, companies will need support to validate and communicate the benefits of their ingredients, through life cycle data, traceability systems and tailored marketing strategies, including a cohesive Australian-made story. Strategic demand creation efforts will be critical to unlocking adoption among domestic manufacturers, embedding Australian ingredients in institutional procurement and differentiating Australia's offer in international markets. With coordinated activation, the sector can generate the commercial pull signals needed to accelerate industry growth.

Recommendations:

Cross-market actions

1. Map ingredient usage, imports reliance and demand trends across food, beverage, feed, industrial and other applications, covering both primary protein (isolates and concentrates) and secondary (starch, flour, fibre, oil) ingredients, to identify priority markets and inform production targets.
2. Reform ABARES accounting systems and Australian trade classifications (e.g. HS Codes) to enable granular tracking of plant protein ingredient flows by crop type, product format and end use.
3. Support manufacturers to strengthen their ESG credentials by funding life cycle assessments by funding LCAs and enabling adoption of digital traceability systems.

Domestic market development

1. Deliver coordinated demand creation campaigns that highlight the nutritional, sustainability and provenance benefits of Australian ingredients and address ingredient-specific concerns (e.g. allergenicity, regulatory confusion).
2. Incentivise domestic product manufacturers to trial and adopt local ingredients, including through small-scale grants for R&D projects or specialist equipment purchases, R&D tax incentives and subsidised access to technical services and food innovation facilities.
3. Facilitate commercial linkages between ingredient suppliers and final product manufacturers, including major food companies, through matchmaking programs and supply chain engagement platforms.
4. Support the use of Australian primary and secondary plant protein ingredients in aged care, hospital and institutional foodservice settings—where nutritional suitability is confirmed—to improve dietary outcomes.

Export market expansion

1. Launch a dedicated trade promotion campaign to position Australian ingredients as premium, 'clean-label' and provenance-led alternatives in priority international markets.
2. Feature Australian ingredient manufacturers prominently in global trade shows, delegations and export programs, underpinned by a unified brand marquee for Australian plant protein ingredients.

4. Scale domestic manufacturing capacity through strategic investment

Scaling Australia's plant protein ingredient manufacturing industry requires a nationally coordinated approach to infrastructure development that delivers regional value, supports sovereign capability (and thus food security), and meets growing market demand for diversified options. While a handful of companies have taken bold early steps, the capital intensity of processing infrastructure—and the challenge of reaching cost-efficient scale—remains a major barrier to broader growth.

To succeed, Australia must sequence infrastructure expansion with market activation and R&D progress. Scaling too early or without alignment risks duplicating capacity, stranding investment and undermining the viability of both new and existing operations. At the same time, companies require targeted support to expand efficiently and competitively within a high-cost manufacturing environment.

Governments have a central role to play in unlocking enabling infrastructure, improving access to affordable capital and guiding investment to regions with the strongest long-term prospects. Without targeted public support for both firms and regions, Australia instead risks ceding future manufacturing capability to offshore jurisdictions with lower capital costs or more assertive strategies.

Recommendations:

1. Conduct national and jurisdictional infrastructure mapping to identify optimal regions for plant protein processing. This should include analysis of:
   - Local crop production volumes, diversity and continuity of supply
   - Existing supply chain infrastructure (e.g. storage, dehulling, handling)
   - Freight and logistics networks
   - Energy, water, wastewater, digital and other utility infrastructure
   - Local workforce availability and capability
2. Commission federal and state investment agencies to develop and publish prospectuses to showcase strategic investment opportunities for manufacturing scale-up. Prospectuses should outline target

crop supply, infrastructure requirements, regional strengths, co-investment options and market potential.

3. Expand access to scale-appropriate capital and co-investment programs for ingredient manufacturers and supply chain actors. This includes leveraging existing funding mechanisms, such as the National Reconstruction Fund, Export Finance Australia, and others to provide concessional loans, matched capital grants, long-term investment guarantees or blended finance structures to support:
   - Facility construction, expansion and equipment acquisition
   - Process automation, utility upgrades and circularity improvements (e.g. byproduct and waste valorisation, renewable energy systems)
4. Promote a coordinated, precinct-based regional development approach to support the emergence of efficient, resilient plant protein manufacturing hubs. Governments should partner with local development agencies, regional councils and industry stakeholders to design and deliver activation strategies tailored to high-potential zones. This must include:
   - Funding feasibility assessments and regional planning to identify optimal locations for new or expanded manufacturing hubs based on crop supply, infrastructure, workforce and logistics capacity
   - Establishing Special Activation Precincts or similar programs to streamline investment and regulatory approvals in priority locations
   - Incentivising co-location, shared infrastructure and vertical integration between ingredient manufacturers and adjacent sectors such as feed, fibre and biomanufacturing to support the development of circular and biomanufacturing ecosystems

5. Build the workforce and regional supply chains for long-term growth

Delivering a competitive and resilient plant protein industry will also depend on building workforce capability and aligning regional supply chains to support long-term growth. While many companies are already investing in training and capability, critical skills shortages remain across the supply chain—particularly in food technology, process engineering, automation and advanced manufacturing. These gaps are especially pronounced in regional areas, where workforce pipelines are often less established.

To support the next phase of growth, stronger coordination will be needed to build industry momentum and legitimacy. This is especially true in growing regions where long-term success depends on locally engaged and aligned supply chains. Regional supply chain actors must be brought in early to help shape the industry in ways that direct value into their communities, reinforcing trust, grower participation and local economic resilience. As the sector scales, growers will need to be confident and equipped to produce the right types, volumes and quality of crops needed by processors. This alignment will become increasingly important as Australia contends with climate volatility, shifting global trade conditions and systemic risks across its grains sector.

In this context, national coordination will be vital to define priority skills, expand regionally tailored training pathways and position the sector as a long-term economic opportunity. In parallel, regional strategies will need to ensure growers and supply chain actors are able to respond to evolving manufacturer needs and participate in higher-value markets.

Recommendations:

1. Establish a national plant protein workforce roadmap in partnership with industry TAFEs, universities and regional development agencies. The roadmap should identify priority roles across the value chain, map existing training pathways and gaps, and inform the development of new qualifications, micro-credentials and regional skills programs.

2. Fund regional training programs and apprenticeships to build technical capability across food science, process engineering, automation and advanced manufacturing. Programs should be co-designed with local employers and education providers to meet region-specific workforce needs.
3. Undertake targeted stakeholder engagement and awareness campaigns in growing regions to build trust, legitimacy and coordination across regional supply chains. These efforts should communicate market opportunities, clarify processing and logistics requirements, and connect growers, suppliers, manufacturers and regional development actors to foster durable supply chain partnerships.
4. Establish regional taskforces and designate plant protein activation hubs in priority processing zones to coordinate ecosystem development. These hubs should align local growers, pre-processing suppliers, manufacturers, infrastructure planners and workforce providers around a shared regional growth strategy. Governments should provide tailored planning mechanisms, foundational infrastructure investment and operational support to enable strategic co-location, shared services and ecosystem-scale growth.
5. Incentivise greater pulse and oilseed production to meet future processing needs and support sustainable rotational cropping outcomes. Provide targeted support to growers to improve supply consistency, crop quality and confidence to engage with value-added supply chains, including:

- Expanding education and extension programs to promote regionally suitable rotational cropping systems and best practices
- Investing in crop R&D to develop varietals with high functionality, nutrition and climate resilience, as well as contracting growers for their production
- Establishing crop classification systems that differentiate food, ingredient and feed-grade outputs, and enable pricing structures that reward functionality and processing suitability
- Exploring incentives, such as carbon credits schemes, to encourage sustainable cropping practices that reduce reliance on synthetic inputs

Conclusion: A national opportunity within reach

Australia can build a nationally scaled plant protein ingredient industry that delivers lasting value for farmers, manufacturers, regional communities and our nation's economic future.

Our strategic advantages are clear—from world-class crop production and growing processing capability, to expanding R&D capacity and the ability to meet rising global demand for high-quality and diversified ingredients. However, the current model—defined by individual effort, import dependence and missed downstream value—will persist unless deliberate, unified action is taken.

This chapter has outlined a practical pathway to unlock this change. The five priorities—establishing national strategy, investing in innovation and infrastructure, driving demand, building workforce capability, and aligning regional supply chains—are mutually reinforcing. They will require shared leadership from government, industry, research institutions and regional actors to succeed.

Importantly, success will not come from imitating dominant global players or rapidly commercialising every emerging crop. Instead, the winning formula lies in sharply focusing on plant protein opportunities that align with Australia's standout production strengths, processing potential and clear demand signals—ensuring our nation builds not just an industry, but a competitive and differentiated one.

With national leadership and coordinated implementation, Australia can realise the dual opportunity set out in this report: to position Australian-made ingredients as premium, provenance-led products, and to secure a leading role in the next wave of global plant protein diversification.

The window is open, and the opportunity is clear. With focused action, Australia can seize it—and fundamentally reshape the future of global plant protein ingredients.

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