Joint Submission

National Bioenergy Feedstock Strategy Discussion Paper

Department of Agriculture, Fisheries & Forestry | November 2025

Authored by:

food frontier

Cellular Agriculture Australia

Re: National Bioenergy Feedstock Strategy discussion paper

Food Frontier and Cellular Agriculture Australia thank the Department of Agriculture, Fisheries and Forestry (Department) for the opportunity to provide this joint submission to its National Bioenergy Feedstock Strategy (Strategy) discussion paper.

Food Frontier (FF) 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, FF's research, reports, events, and engagements have driven critical dialogue, investment and collaboration in this fast-emerging field.

Cellular Agriculture Australia (CAA) is the only philanthropically funded Australian not-for-profit dedicated to advancing Australia's cellular agriculture sector. We work across Australia's entire cellular agriculture sector, convening forums to identify and work on common, non-competitive priorities. We work on key thematic areas, including regulation, policy and advocacy, as well as communications and awareness-raising to build widespread familiarity and trust. We work collaboratively to achieve outcomes benefitting the entire sector.

FF defines alternative proteins as those that are plant-based, including plant-based meat and dairy alternative products and ingredients, as well as those that are manufactured via precision fermentation or cell cultivation technologies. FF's contributions to this submission focus on plant protein ingredients, including primary ones isolates and concentrates, and secondary ingredients flours, starches, fibres and oils manufactured from protein-rich grain crops via wet or dry fractionation.

CAA defines cellular agriculture as using cells and innovative technologies to produce new ingredients, food and agricultural products. The technologies used include precision fermentation, cell cultivation, gas fermentation and plant-based molecular farming. CAA's contributions to this submission focus on precision fermentation, which harnesses microorganisms like yeast, bacteria, and fungi, to produce specific ingredients that can be used in various food and agriculture products.

Precision fermentation is also categorised as a type of biomanufacturing technology and, in addition to food applications, is one of the technological pathways being explored here and abroad for bioenergy production.

FF and CAA have outlined the wide-ranging potential of these new and novel food technologies to the Federal Government on multiple occasions, including the Federal inquiries into Food Security in Australia and into Food and Beverage Manufacturing in Australia, the Agriculture and Land Sectoral Plan Consultation and most recently the National Food Security Strategy discussion paper. They span food security, sovereign manufacturing, agricultural value addition, regional development and jobs, circularity and sustainability, and economic growth and diversification.

Recognising that this Strategy's consultation discussion paper centres around feedstocks for bioenergy production, FF and CAA believe the growth of plant protein ingredient manufacturing and precision fermentation industries warrant additional consideration given their respective implications for future feedstock supply and demand. Namely, plant protein secondary ingredients

like starches and oils could provide alternative feedstock supply, and precision fermentation for food production is expected to have considerable and potentially competing feedstock demands to bioenergy production.

These considerations are explored in response to questions 4, 5 and 7 as follows, and have been informed by recent works from both organisations. These include FF's August-released report, *Unlocking Australia's Potential: The Case for a National Plant Protein Ingredient Industry* **(Report)**; and CAA's October-released white paper **(White Paper)** *Made & Grown: the future of biotechnology and biomanufacturing in Australia*, developed with the Australian Strategic Policy Institute, the ANU Agrifood Innovation Institute and the ANU National Security College.

Question 4) Which feedstocks, or mix of feedstocks, should be prioritised for immediate deployment, and which require further research and development (R&D) across the short, medium, and long term?

We recommend the Government include plant protein secondary ingredients – particularly starch and oil – as a strategic feedstock source to be prioritised for R&D over the short to medium term (1 – 5 years), and for investment to scale production over the long-term (5+ years). Doing so would not only support delivery of a diversified and ample feedstock resource pool for bioenergy production and other biomanufacturing technology applications; but also increased food security outcomes by enabling sovereign manufacturing of diverse plant protein ingredients from Australia's protein-rich grain crops.

This recommendation is underpinned by findings from FF's Report. Informed by extensive research and deep consultation with Australia's existing industry and expert agrifood supply chain stakeholders, the Report provides the first comprehensive analysis of Australia's opportunity to build a globally competitive plant protein ingredients industry, capturing more value from our world-class crops, strengthening supply chain sustainability and resilience, and driving regional economic development.

Plant protein ingredients – including those made from soy, wheat, pea and from a growing variety of oilseeds and pulses like hemp, faba bean and mung bean – are increasingly used here and abroad in diverse food and beverage product categories. Their use is also growing in pet food, personal care and industrial categories like packaging, and have been a longstanding staple within livestock and aquaculture feed.

In 2023, Australia imported an estimated 118,000 tonnes of plant-based isolates, concentrates, flours and starches, as well as more than 700,000 tonnes of soybean meal for animal fodder.[1] This is despite Australia's own growing production of these ingredients, with four commercial scale plant protein ingredient manufacturers now in operation and two more in the process of scaling. There are also a number of established companies, start-ups and research organisations alike exploring new ingredient opportunities.

R&D to unlock plant protein secondary ingredients as feedstocks

The potential to strategically link plant protein ingredient manufacturing with Australia's emerging bioeconomy – inclusive of bioenergy production – was identified in the Report as one of the industry's five major opportunities. Globally, starch and other secondary ingredients from plant protein processing are being explored as valuable feedstocks for biomanufacturing technologies,

[1] Redmond M. Unlocking Australia's potential: The case for a national plant protein industry. Food Frontier. [Internet] 14 Aug 2025 [Cited 7 Nov 2025]. Available from: https://www.foodfrontier.org/resource/the-case-for-a-national-plant-protein-industry/.

including for precision fermentation. CSIRO and AgriFutures have similarly suggested these pathways as promising for Australia's emerging bioeconomy.[2] [3]

Australia's largest and longest standing wheat protein ingredient manufacturer, the Manildra Group, exemplifies this potential. As the Report explores, Manildra utilises surplus wheat-based starch produced during its wet fractionation process as a feedstock for the company's co-located ethanol production capabilities.[4] As a result of Manildra's investment in advanced, diversified and scaled manufacturing capabilities at its Shoalhaven Starches facility in Nowra, NSW, the company has achieved significant efficiencies and circular operations in plant protein ingredient manufacturing and downstream product applications alike. It has also positioned itself to become a major supplier to growing global bioenergy markets.[5]

Realising this same potential for the industry as a whole, and unlocking it at scale, will require significant dedicated R&D efforts and deliberate public-private collaboration. While other cereal and pulse-derived starch byproducts appear conceptually well suited for biomanufacturing applications, these pathways remain largely untested in the Australian commercial context. Further research should also explore the suitability of oil byproducts from other grains, such as lupins and industrial hemp, that are being manufactured domestically into plant protein ingredients.

Recommendation I. Include plant protein secondary ingredients (e.g., starch, oil) as strategic feedstocks to be prioritised for R&D over the short to medium term (1 – 5 years), and for investment to scale production over the long-term (5+ years).

Question 5) How can government and industry support the utilisation of a diverse range of feedstocks, including resources like residues, woody biomass and other novel feedstocks?

We recommend the Government take a strategic and regional manufacturing precinct-based approach, backed by extensive R&D investments to test commercial viability, support the utilisation of a diverse range of feedstocks. This approach should be ambitious, seeking to both leverage the nation's regionally diverse agricultural production strengths and to facilitate complementary industry co-development in priority regions.

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[2] KPMG Australia. Manufacturing agriculture's future: Opportunities and challenges in developing regional manufacturing for the Australian agriculture, fisheries and forestry sector. AgriFutures Australia. [Internet] 5 June 2024 [Cited 7 Nov 2025]. Available from: https://agrifutures.com.au/product/manufacturing-agricultures-future-opportunities-and-challenges-in-developing-regionalmanufacturing-for-the-australian-agriculture-fisheries-and-forestry-sector/.

[3] Commonwealth Scientific and Industrial Research Organisation (CSIRO). Protein: A roadmap for unlocking technology-led growth opportunities for Australia. CSIRO. [Internet] 2021 [Cited 7 Nov 2025]. Available from: https://www.csiro.au/en/work-withus/industries/food-and-agriculture/food/protein/roadmap.

[4] Manildra Group. Our Facilities. Manildra Group. [Internet] [Cited 7 Nov 2025]. Available from: https://www.manildra.com.au/manildrafacilities/.

[5] Alsop E. Australia's ethanol plant underutilised by 60pc. Grain Central. [Internet] 20 Jan 2025 [Cited 7 Nov 2025]. Available from: https://www.graincentral.com/news/australias-ethanol-plants-underutilised-by-60pc/.

This same regional precinct approach was repeatedly highlighted during consultation and research for FF's Report. It was identified as both a major opportunity to deliver regional development and advanced manufacturing circularity benefits, as well as a key tactic to simultaneously address some of the plant protein ingredient industry's greatest challenges: cost-effectively achieving sufficient scale and production efficiencies, optimising byproduct valorisation and profitability; and harnessing regional supply chain capabilities.

It was suggested that by co-locating new plant protein fractionation facilities with complementary supply chain operations – such as grain storage, dehulling, drying (for wet fractionation), blending and packaging and other necessary capabilities – ingredient manufacturers could access shared infrastructure and services that are often prohibitively expensive to build independently. If equipped with technical capabilities to valorise all secondary protein ingredients – for instance to manufacture standalone flour, starch, fibre or oil products alongside primary protein outputs, as well as feed pelletisers – these precincts could further enable companies to capture value from all fractions of their source crops and diversify revenues, enhance resource efficiency and reduce waste, while also effectively embedding supply chain actors within the value stream.

The Report also advocated for this precinct potential to be extended over the longer-term to include biomanufacturing capabilities – given the feedstock potential of plant protein secondary ingredients – supporting their strategic evolution into future-focused and multi-purpose 'bioindustrial' precincts If equipped with dedicated R&D services, they could also serve as platforms for targeted R&D and feasibility assessments to evaluate feedstock suitability, processing compatibility, and the technical and regulatory settings required to build Australia's sovereign biomanufacturing capability.

Optimised onshore value addition through co-industry integration

We believe the Government should pursue this same strategy, for instance by establishing designated regional manufacturing growth zones or Special Activation Precincts in high priority regions. These models would support coordinated land use and infrastructure planning, efficient capital deployment, as well as workforce and freight network development – all issues noted in the discussion paper.

Adopting a regional precinct-based approach would also ensure Australia's feedstock industry – which should be sustainably unlocked to meet demand beyond just bioenergy production alone – grows to the multifaceted benefit of regional economies across the nation. It would also ensure the full resource and economic potential of diverse agricultural feedstocks, including their byproducts and residues, can be realised and valorised onshore by facilitating supply chain and complementary industry integration. Manildra's Shoalhaven Starches facility demonstrates this model in practice, albeit being privately owned and operated.[6]

Additional insights from FF's Report also help to illustrate the potential value that can be captured from protein and starch rich crops through diversified and circular manufacturing operations. Consider faba beans: a tonne of unprocessed faba beans in 2025 can be sold for an average of

[6] Manildra Group. Our Facilities. Manildra Group. [Internet] [Cited 7 Nov 2025]. Available from: https://www.manildra.com.au/manildrafacilities/.

AU$600 for export markets and AU$400 for produce intended for domestic feed consumption,[7] whereas prices in the plant protein industry average AU$500.[8] Once dry fractionated, a tonne of faba bean protein concentrate is valued at between AU$4,000–AU$6,500 if sold wholesale as an ingredient. If the same manufacturer can also produce standalone flour or starch products, an additional AU$500–$1,500 could be realised per tonne of product.[9]

If the starch is then sold as a feedstock for precision fermentation, more value could be realised onshore again through the production of high value bioproducts. Depending on access to other co-located capabilities, for example those designed to capture and utilise any waste residue, local value generation continues, with the economic and employment benefits flowing into the local regional economy.

Priority actions for considered activation

To effectively pursue this approach, regional supply chain capability mapping is a critical first step to determine the optimal location for these precincts. This would include analysis of local crop production volumes, diversity and continuity of supply; existing supply chain infrastructure; freight and logistics networks; energy, water, wastewater, digital and other utility infrastructure; and local workforce availability and capability.

Mapping should be progressed in conjunction with comprehensive modelling of Australia's related global market opportunities, including in plant protein ingredients and food, fibre, and fuel biomanufacturing, for instance, to determine overall capacity requirements and the opportunities Australia is best positioned to compete on. The Government must also partner with local development agencies, regional councils and industry stakeholders to design and deliver activation strategies tailored to high-potential zones. This would 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 in 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.

Mackay as a first test case

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[7] Grains Research & Development Corporation (GRDC). Faba beans in southern and central NSW farming systems. GRDC. [Internet] 11 Feb 2025 [Cited 7 Nov 2025]. Available from: https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdcupdate-papers/2025/02/faba-beans-in-southern-and-central-nsw-farming-systems.

[8] Redmond M. Unlocking Australia's potential: The case for a national plant protein industry. Food Frontier. [Internet] 14 Aug 2025 [Cited 7 Nov 2025]. Available from: https://www.foodfrontier.org/resource/the-case-for-a-national-plant-protein-industry/.

[9] Redmond M. Unlocking Australia's potential: The case for a national plant protein industry. Food Frontier. [Internet] 14 Aug 2025 [Cited 7 Nov 2025]. Available from: https://www.foodfrontier.org/resource/the-case-for-a-national-plant-protein-industry/.

Plans for Mackay, Queensland, to become a lead Asia Pacific hub for biomanufacturing could offer a valuable test case. As part of this vision, work is underway to establish scaled contract precision fermentation manufacturing capability alongside Queensland University of Technology's already existing pilot-scale Mackay Pioneer BioPilot Facility.[10] While current efforts are centred on using locally sourced sugarcane-derived biomass as the primary feedstock for precision fermentation, common rotational cropping of mung bean in North Queensland – including by local sugarcane growers – presents an opportunity to strategically co-locate complementary ingredient manufacturing infrastructure.[11]

Indeed, mung bean has been repeatedly recognised as a promising crop for protein ingredient manufacturing in the state, including by the Queensland Department of Agriculture and Fisheries and CSIRO.[12] [13]

Investing in co-located mung bean protein ingredient manufacturing capability would support delivery of important economic and regional manufacturing benefits, as outlined in Queensland's own investigations. It would also generate important flow-on benefits across the broader supply chain, including creating opportunities for value addition at the farm gate and reduce reliance on raw commodity export markets. In theory, it would also enable starch from mung bean processing to serve as an alternative feedstock for the region's growing biomanufacturing industry, especially in times of high demand for sugarcane from competing user markets.

As such, we recommend the Australian Government partner with the Queensland Government and local development bodies to explore this potential — beginning with the targeted R&D and feasibility assessments needed to test the commercial viability of this feedstock opportunity for biomanufacturing technologies like precision fermentation.

Recommendation II. Take a strategic and regional manufacturing precinct-based approach to support the utilisation of a diverse range of feedstocks, aimed at both leveraging the nation's regionally diverse agricultural production strengths and facilitating complementary industry co-development in priority regions. This must be backed by extensive R&D to test commercial viability of different agricultural feedstocks and market applications.

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[10] Mridu A. Queensland Govt Backs Cauldron Ferm's Efforts to Build APAC's Largest Precision Fermentation Facility. Green Queen. [Internet] 2 Oct 2023 [Cited 7 Nov 2025]. Available from: https://www.greenqueen.com.hk/cauldron-ferm-precision-fermentation-facilitycdmo-mackay-queensland/.
[11] Redmond M. Unlocking Australia's potential: The case for a national plant protein industry. Food Frontier. [Internet] 14 Aug 2025 [Cited 7 Nov 2025]. Available from: https://www.foodfrontier.org/resource/the-case-for-a-national-plant-protein-industry/.
[12] Commonwealth Scientific and Industrial Research Organisation (CSIRO) A plant protein processing hub in North Queensland. CSIRO. [Internet] 22 Dec 2021 [Cited 7 Nov 2025]. Available from: https://www.csiro.au/en/research/production/food/plant-protein-hub-northqld.
[13] Coriolis. Mungbean: The $70M diversification opportunity in North West Queensland. Coriolis Research. [Internet] Dec 2018 [Cited 7 Nov 2025]. Available from: https://www.coriolisresearch.com/reports/coriolis-daf-01-nwmp-stage-iii-mung-103r.

Recommendation III. Undertake comprehensive supply chain mapping to determine optimal regional locations to establish multi-purpose manufacturing precincts, as well as economic modelling of Australia's related global market opportunities (e.g., plant protein ingredients, food biomanufacturing) to determine overall infrastructure capacity requirements and the opportunities Australia is best positioned to compete in.

Recommendation IV. Partner with local development agencies, regional councils and industry stakeholders to design and deliver precinct activation strategies tailored to high-potential zones, including undertaking feasibility assessments and incentivising infrastructure and supply chain capability co-location.

Recommendation V. Partner with the Queensland Government and Mackay local development bodies to explore the potential to co-locate mung bean-based protein ingredient manufacturing with planned precision fermentation capacity, beginning with the targeted R&D and feasibility assessments required to test the commercial viability of mung bean-based starch as a feedstock.

Question 7) Besides those noted in the discussion paper, are there other key issues that should be considered in the development of a National Bioenergy Feedstock Strategy?

As already alluded to, there are significant opportunities to build Australia's biomanufacturing capability beyond bioenergy applications alone. Biomanufacturing is the engine that will power various industries within the bioeconomy - harnessing living systems, such as microorganisms, to produce food, fuels, fibres and a range of other products at commercial scale. In this way, biomanufacturing translates advances in biotechnology into scalable, commercially viable production systems.

Importantly, advances in one application area often deliver transferable knowledge, infrastructure, and technology that strengthen the entire biomanufacturing ecosystem. This interconnectedness means that investment in any single biomanufacturing vertical can yield broad spillover benefits, amplifying Australia's overall opportunity to build a competitive, diversified bioeconomy.

Food biomanufacturing refers to the use of biomanufacturing specifically applied to the production of food and ingredients. The biotechnologies central to this opportunity include synthetic biology, precision fermentation, plant molecular farming and cell cultivation. The ingredients produced using these technologies are increasingly being applied across the food system to drive the development of new food production systems and value-added opportunities for traditional agriculture. In this submission, we focus on precision fermentation.

Food biomanufacturing is underleveraged for food security and national resilience

We welcome the discussion paper's recognition that the Strategy must "account for competing demands when considering how Australia can make best use of its diverse feedstock resources to practically service future demand for bioenergy." We are also encouraged by the paper's

acknowledgement of the 'food vs fuel' tension and its intent to ensure that feedstock use for bioenergy remains complementary to food and fibre production.

While this is discussed primarily in relation to 'first-generation' edible feedstocks that may otherwise be consumed as food, another important and emerging consideration is the competing demand for feedstocks to support food biomanufacturing - which could comprise an important part of Australia's future food supply and security.

Food biomanufacturing represents one of Australia's most strategic, though currently underleveraged, opportunities to strengthen food security, enhance national resilience, and build a high-value bioeconomy.[14] This position is underpinned by CAA's White Paper, and is a position shared by co-developers the Australian Strategic Policy Institute, the ANU Agrifood Innovation Institute and the ANU National Security College.

By leveraging advanced biotechnologies, food biomanufacturing can reduce Australia's vulnerability to external shocks, lower reliance on imported inputs, and adapt more readily to changing climatic and market conditions - all while being less carbon-intensive than conventional production systems. Food biomanufacturing should therefore be viewed as a strategic national capability, critical to de-risking supply chains, diversifying food production, and ensuring Australia's long-term resilience in an increasingly volatile global environment.

Given that the Bioenergy Feedstock Strategy aligns with the development of the Feeding Australia National Food Security Strategy, we urge the Department to explicitly consider the role of emerging food biomanufacturing industries in both contexts.

Investment in food biomanufacturing industries alongside bioenergy production offers substantial economic and regional development benefits, building on Australia's existing comparative advantage as an exporter of high-quality foods and ingredients. Modelling by the Boston Consulting Group projects that the global food biomanufacturing industry could reach a value of USD $100 billion by 2040, surpassing other emerging biomanufacturing segments such as specialty chemicals and chemical precursors.[15] Capturing even a small share of this market would deliver significant returns in jobs, exports, and sovereign manufacturing capability for Australia.

Precision fermentation feedstock considerations

Precision fermentation – whether to produce bio- foods, fibres or fuels – requires large and reliable volumes of feedstocks. This creates a clear point of intersection with bioenergy production, especially has both currently rely on sugarcane as a primary feedstock.

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[14] Freitag, J. et al. Made & Grown: The future of biotechnology & biomanufacturing in Australia. Cellular Agriculture Australia (CAA). [Internet] Oct 2025 [Cited 7 Nov 2025]. Available from: https://www.cellularagricultureaustralia.org/publications/made-grown-future-food.

[15] Boston Consulting Group (BCG). Breaking the Cost Barrier in Biomanufacturing. BCG. [Internet] Feb 2024 [Cited 29 Sept 2025]. Available from: https://web-assets.bcg.com/b6/15/6a10d22c481e8bebaf0c2fab8294/bcg-breaking-the-cost-barrier-on-biomanufacturing-rev.pdf.

The Sustainable Nutrition Initiative has estimated that producing just an additional 10% of global protein through precision fermentation could require 11.7 million hectares of land - equivalent to 44% of the world's current sugarcane area.[16] This underscores the importance of assessing how Australia's 378,000 hectares of sugarcane land and associated 30-35 million tonnes of sugarcane biomass, comprising 2-3% of global supply, could be best utilised to advance Australia's national priorities. While alternative feedstocks are currently under exploration (e.g., seaweed sugars, and existing waste streams such as cassava waste), the overall potential tonnage required underscores the importance of identifying new feedstocks – such as plant protein starch – to meet demand across all biomanufacturing verticals.

Australia's biogenic feedstock allocation decisions should also be guided by a balanced assessment of national priorities – including economic opportunity, net-zero commitments, export commitments to key trading partners, and, critically, food and national security needs. Importantly, this assessment must account for both current demand and projected future requirements, as well as emerging opportunities. Strategic planning should anticipate feedstock demands, supply chains, and sustainability 10+ years from now, rather than focusing solely on immediate needs.

Future biomanufacturing industry growth potential

Feedstock access and costs are one of the most significant input drivers for food biomanufacturing industry growth. Currently Australia's sugar industry offers a unique competitive advantage in this regard as the world's third-largest raw sugar exporter, with globally competitive prices, reliable supply chains, and high-quality products. This positions Australia to supply cost-effective feedstock at scale, particularly if production facilities are co-located with sugar producers to avoid additional transport costs, which, according to a study by The Good Food Institute Asia-Pacific, can increase feedstock costs by up to 50%.[17]

The study also highlights that Australia's abundant, high-quality feedstock supply is a key factor in its attractiveness as a location for scaling food biomanufacturing, positioning the country as a leading contender in the Asia-Pacific region for commercial food biomanufacturing. Conversely, large-scale redirection of sugarcane towards bioenergy production could tighten supply and increase prices, potentially undermining the economic feasibility of scaling food biomanufacturing domestically. This effect may become increasingly prevalent as the finite land suitable for sugarcane production decreases due to the impact of climate change, unless complementary supply options are identified.

With this broader and significant potential in mind, we recommend the Government use this opportunity to expand its bioenergy focused strategy into a more ambitious National Biomanufacturing Feedstock Strategy. Such a strategy would take into account feedstock

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[16] Sustainable Nutrition Initiative. How feasible is it to produce large amounts of protein via fermentation? Sustainable Nutrition Initiative. [Internet] 30 Jul 2024 [Cited 29 Oct 2025]. Available from: https://sustainablenutritioninitiative.com/how-feasible-is-it-to-produce-large-amounts-protein-via-fermentation/.

[17] Morton, J., et al. Where to Build: site selection and competitiveness in APAC fermentation manufacturing. The Good Food Institute APAC. [Internet] 8 Oct 2025 [Cited 29 Oct 2025]. Available from: https://gfi-apac.org/wp-content/uploads/2025/10/Site-selection-and-competitiveness-in-APAC-fermentation-manufacturing-GFI-APAC-x-Hawkwood.pdf.pdf.

requirements and opportunities across the full spectrum of emerging biomanufacturing verticals, ensuring that feedstock planning supports integrated growth across Australia's entire bioeconomy. This approach would help prevent a blinkered focus on energy applications alone and ensure that other emerging and high-value bioindustries are not overlooked.

We also recommend the Government applies a 'value hierarchy' or 'cascading use' principle to feedstock allocation — prioritising higher-value applications (such as food, fibre and pharmaceutical biomanufacturing) before diverting biomass to lower-value, highly-commoditised energy generation. This approach aligns with international best practice and could maximise economic and environmental returns per hectare of biomass. Finally, we recommend that feedstock mapping and demand forecasting be undertaken as a priority first step and should explicitly consider projected feedstock demand across biomanufacturing verticals, including food.

Recommendation VI. Expand this Strategy's bioenergy focus into a broader, more ambitious National Biomanufacturing Feedstock Strategy that captures feedstock requirements and opportunities across the full spectrum of emerging biomanufacturing verticals, including food.

Recommendation VII. Apply a 'value hierarchy' or 'cascading use' principle to feedstock allocation, prioritising higher-value applications (such as food, fibre and pharmaceutical biomanufacturing) before diverting feedstocks to lower-value energy generation.

Recommendation VIII. Undertake feedstock mapping and demand forecasting, explicitly consider projected feedstock demand across all biomanufacturing verticals, including food.

Conclusion

In closing, Food Frontier and Cellular Agriculture Australia urge the Department to ensure this Strategy is designed as a genuinely integrated strategy — one that supports Australia's bioenergy manufacturing growth but does so in a way that is coordinated with the National Food Security Strategy and broader national bioeconomy opportunities.

This means recognising plant protein ingredient manufacturing as both a priority industry and feedstock supplier for sovereign development; as well as food biomanufacturing — including precision fermentation — as emerging, feedstock-dependent industries with strong alignment to the Government's broader sovereign manufacturing and regional development agendas.

With this in mind, we recommend the Government explore expanding this Strategy into a more ambitious and broader National Biomanufacturing Feedstock Strategy to capture the feedstock requirements and potential of all biomanufacturing verticals, including food.

We also encourage the Government to adopt a forward-looking, precinct-based approach to capability development and a "cascading use" approach to feedstocks — prioritising higher-value food and biomanufacturing applications where possible, enabling regional complementary industry

co-location to maximise byproduct valorisation, and investing in the mapping, R&D and infrastructure needed to de-risk new feedstock pathways.

Taking this approach now will help Australia remain food secure and make best use of finite agricultural feedstocks, avoid future competition between biomanufacturing technologies, and position Australia to capture a larger share of the growing global bioeconomy.

Food Frontier and Cellular Agriculture both welcome the opportunity for future discussions on this topic and participating in any supplementary public stages of this consultation.

Yours sincerely,

Sam Perkins
Chief Executive Officer
Cellular Agriculture Australia

Megan Redmond
Director, Government and Strategic Engagement
Food Frontier