Ag2050 next steps – scenarios to decisions

Discussion paper

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Australian Farm Institute

CSIRO

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Use of AI

AI-assisted tools were used as a support mechanism for planning the workshop materials and synthesising the workshop outputs. All outputs were subject to review by the project team and technical validation through consultation with relevant CSIRO experts.

Executive summary

Why now: from scenarios to decisions

The Ag2050 program delivered a multi-year, evidence-driven effort to define the transformational shifts required for Australia's farming systems to be profitable, productive, and sustainable by 2050. The program's momentum and wider sectoral shifts now need to be translated into clear, investable priorities, as the decisions being made in the next 12–18 months will materially shape productivity, resilience, market access and investment pathways to 2050.

Australian agriculture is transitioning from a period of exploring possible futures to one in which near-term decisions are actively shaping long-term outcomes. Since the publication of CSIRO's *Ag2050 Scenarios Report* in 2024, sustainability commitments, land-use pressures, geopolitical instability, rising input costs and constrained public budgets are no longer emerging signals; they are structural features of the operating environment.

What the Ag2050 Roundtable did

Against this backdrop, CSIRO convened the Ag2050 Roundtable (March 2026) to support decision-making at a critical inflection point. Rather than revisiting scenarios or debating preferred end states, the Roundtable focused on identifying the real decisions already underway or imminent, particularly those shaping Financial Year 2027 (FY27) settings, and where uncertainty is constraining effective action. The Roundtable also focused on scoping a small number of projects that could reduce this uncertainty and improve decision confidence. More than 45 senior participants from government, industry, research, regional and Indigenous organisations contributed insights grounded in lived decision-making contexts.

What decisions are at stake

Across agricultural domains, participants consistently noted that delays or fragmented action do not enable flexibility. Instead, interim arrangements, upstream buyer requirements, pilots and compliance pathways are already defaulting Australia's agricultural sector toward certain outcomes, often before their long-term implications are fully visible.

From the Roundtable discussions, three decision domains emerged where current choices are expected to have significant influence on Australia's agricultural pathways to 2050 (outlined in ES Figure 1). Uncertainty around these decisions will narrow future options and discourage coordinated investment.

What this discussion paper provides

This discussion paper synthesises the Roundtable outputs to make these decision bottlenecks visible. It reveals where uncertainty is most constraining decision-makers, why it matters for farmers and regions, and what practical enablers (projects) could materially improve confidence and coordination in time to influence outcomes. The suggested projects, shown in ES Figure 1, are not intended as comprehensive solutions; rather, they are focused, near-term actions designed to reduce uncertainty around decisions already underway and to enable more deliberate, investable pathways toward a productive, resilient and sustainable agricultural sector to 2050.

Get involved

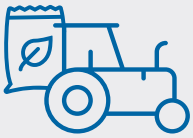
CSIRO sees a clear opportunity to establish a shared, decision-focused agenda for agricultural R&D to 2050 that aligns national priorities, strengthens delivery pathways and accelerates adoption. This will require system-level leadership by government, working in partnership with industry and research, to provide the governance and continuity needed to coordinate effort across domains and avoid fragmented implementation.

CSIRO invites and encourages government, industry, research and regional leaders to use this discussion paper to (1) align future priorities and investments, (2) collaborate on a small number of projects that reduce uncertainty and improve decision confidence, and (3) commit to shared governance arrangements that prevent fragmented implementation and keep options open to 2050.

CSIRO welcomes engagement from government, industry and research stakeholders interested in contributing to this next phase of work and shaping the decisions and direction of Australian agriculture.

ES Figure 1. Roundtable decision domains and associated enabling projects

Three decision domains emerged as materially shaping Australia's agricultural pathways, with participants identifying six projects that could reduce uncertainty in near-term decisions.



Sovereign security, productivity and resilience

- Decisions regarding how Australia manages critical input, energy and supply chain dependence to reduce exposure to shocks and sustain long-term productivity.
- These are constrained by limited system visibility, unclear resilience targets and cost-sharing, and fragmented cross-portfolio coordination.

Project 1. Critical inputs risk assessment to inform the food security strategy

Project 2. Scoping study for a national product diversification strategy

Trusted sustainability reporting

- Decisions regarding how carbon and nature performance is measured, reported, assured and governed to enable credible market access, investment and on-farm participation.
- These are constrained by contested and shifting standards, variable methodological fit and cost, and unclear data governance/interoperability and benefit pathways.

Project 3. Farmer-led framework for consistent, rewarding, on-farm measurement of natural capital and carbon

Project 4. Integrated Natural Capital Tracker (tracking national-level impacts over time)

Evolving agricultural innovation

- Decisions regarding how the innovation system is coordinated and how digital/data/AI are invested in and adopted to translate R&D into scalable productivity, capability and competitiveness gains;
- These are constrained by unclear ownership and alignment across institutions, weak visibility of initiatives, and gaps in incentives, skills and enabling infrastructure.

Project 5. Digital, data and decision-support opportunities in Ag and Food

Project 6. AI-enabled Ag Collaborative Concierge

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1 Ag2050: From scenarios to decisions

CSIRO's *Ag2050 Scenarios Report*, published in 2024, explored what productive, resilient and sustainable farming systems might look like in Australia in 2050.

At the time, key elements of the context were emerging signals but had not yet been embedded into decision-making. Two years on, that context is continuing to evolve. Dynamics that were previously prospective are increasingly functioning as structural forces, shaping policy settings, market expectations and investment priorities. As a result, Australian agriculture has moved from a period of exploring plausible futures to one in which near-term decisions made by default or through delay are actively shaping pathways within a system already in motion. Since the Ag2050 Scenarios Report, the sector has experienced the following shifts:

- **Landscape stewardship and land use have become mainstream decision language, now embedded in programs, strategies and narratives well beyond agriculture.** Decisions formerly treated as sector-specific are increasingly shaped in wider contexts and toward cross-sector objectives with more explicit consideration of production, water, biodiversity and climate outcomes and trade-offs. For example, the Australian Agricultural Sustainability Framework (AASF) provides a common foundation for all stakeholders relating to environmental stewardship; people, animal and community wellbeing; and economic resilience.[1]
- **Sustainability and net zero commitments now function as structuring forces of the sector.** The Agriculture and Land Sector Plan is now embedded in the national Net Zero Plan and standards for voluntary greenhouse gas (GHG) emissions estimation and reporting (VEERS) across sectors are now under development.[2,3] The expectations for sustainability are carried into policy design, market standards, and corporate strategies, and they shape investment behaviour, assurance and reporting practices.
- **Increasing pressures on food and feedstock security, together with rising geopolitical uncertainty, have highlighted the strategic role of Australian agriculture.** Global conflict, fuel volatility and repeated supply disruptions have elevated agriculture's strategic importance in government decision-making. Food and fuel security are both in the spotlight, with the government developing both a National Food Security Strategy and a National Bioenergy Feedstock Strategy (both in development at time of writing).[4,5] Agriculture's place as a strategic national sector, central to Australia's resilience and long-term economic security, sharpens urgency around near-term decisions with long-term consequences.

The pathways to 2050 will be directed by the practical choices the sector's leaders are making right now regarding standards, coordination, capabilities and investment. The agricultural sector continues to produce food for the nation and our neighbours; however, pressure is building as policy settings and regulatory requirements tighten, market expectations rise, natural resources compete and public budgets remain constrained. Delays in making important decisions or inaction will not preserve optionality. Instead, they will create pathways by default and progressively narrow future choices. Australian agriculture needs to make clear, timely decisions responding to immediate pressures while also strengthening long-term productivity, resilience and sustainability to 2050.

1 Australian Agricultural Sustainability Framework (AASF) (2025) Australian Agricultural Sustainability Framework. National Farmers' Federation, Canberra. <https://aasf.org.au/> (accessed 21 April 2026)

2 DAFF (2025) Agriculture and Land Sector Plan. Commonwealth of Australia, Department of Agriculture, Fisheries and Forestry, Canberra. <https://www.agriculture.gov.au/agriculture-land/farm-food-drought/climatechange/ag-and-land-sector-plan> (accessed 21 April 2026)

3 DCCEEW (2026) Voluntary emissions estimation and reporting standards – agriculture, fisheries and forestry. Commonwealth of Australia, Department of Climate Change, Energy, the Environment and Water, Canberra. <https://www.dcceew.gov.au/climate-change/emissions-reporting/voluntary-emissions-estimation-reporting-standards> (accessed 4 May 2026)

4 DAFF (2026) Feeding Australia: a national food security strategy. Commonwealth of Australia, Department of Agriculture, Fisheries and Forestry, Canberra. <https://www.agriculture.gov.au/agriculture-land/farm-food-drought/food/national-food-security-strategy> (accessed 21 April 2026)

5 DAFF (2025) National bioenergy feedstock strategy. Commonwealth of Australia, Canberra. <https://www.agriculture.gov.au/agriculture-land/farm-food-drought/climatechange/bioenergy-feedstocks> (accessed 21 April 2026)

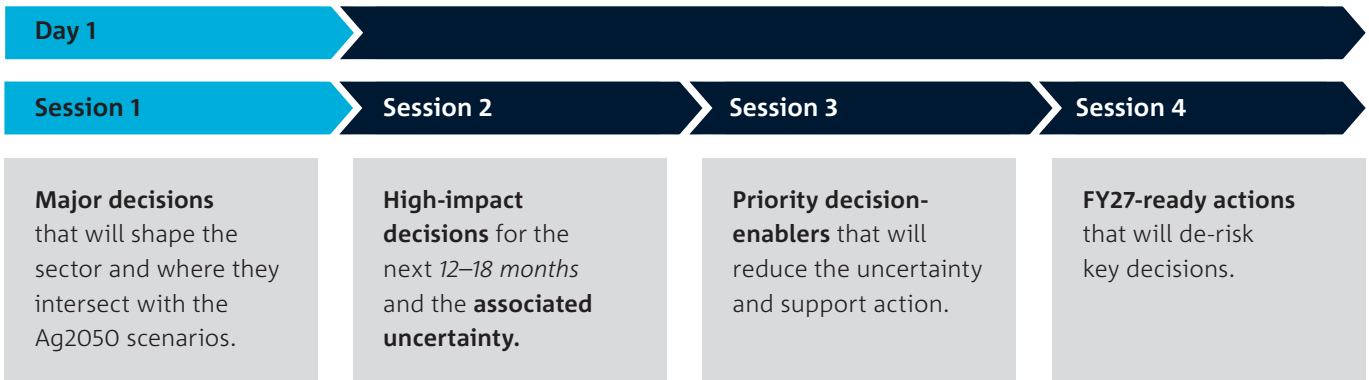
1.1 The Ag2050 Roundtable and this discussion paper

A two-day, in-person Roundtable, co-hosted by CSIRO and the Australian Farm Institute (AFI), brought together over 45 senior stakeholders from 25 organisations spanning government, industry, Indigenous organisations, regional groups and research partners. Participants were asked to engage from lived decision-making contexts rather than organisational positions, with a shared focus on identifying decisions where uncertainties relating to evidence, coordination, standards, data interoperability or confidence were influencing decision-making and affecting the timing and confidence of responses.

The Roundtable followed a structured decision-to-action framework, delivered through four facilitated sessions (see Figure 1). The sessions identified major decisions already shaping Australia's agricultural sector, then diagnosed the specific uncertainties constraining those decisions, before exploring targeted enablers, including evidence, coordination mechanisms and practical pathways to reduce uncertainty and support more confident, timely and coordinated action. The final session focused on translating priority enablers into FY27-ready actions and early project concepts capable of being mobilised within the next 12-18 months. Ag2050 scenarios were used throughout as a lens to interpret how current decisions may compound over time, not as outcomes in themselves.

This discussion paper synthesises the outputs of that process. It is intended as a decision-support document, not a consensus statement or comprehensive strategy. Its role is to make visible the decisions that matter most in the near term, articulate why the uncertainty (or uncertainties) around them is consequential, and co-design practical actions that could strengthen confidence, coordination and capability in time to influence Australia's agricultural pathways to 2050.

Figure 1. Ag2050 Roundtable session agenda



2 The decisions shaping Australian agriculture

During the Roundtable, the Ag2050 scenarios were used as a lens to understand how present-day decisions shape long-term outcomes. The scenarios helped identify what current choices were locking in, what they were ruling out, and where Australian agriculture may drift unintentionally. This involved repeatedly applying a small set of questions to real, live decisions to explore long-term consequences, rather than to evaluate preferences.

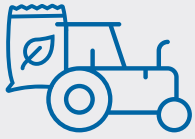
Participants acknowledged Australia's agricultural outcomes to 2050 will not be determined by a single reform, technology or policy choice. These outcomes will emerge through a series of system-setting decisions already underway, about standards, coordination, capability, investment. Participants emphasised that the most consequential decisions are not farm-level choices alone, but include decisions that shape and lock in the conditions under which producers, industry value chains and regions operate. Many of these decisions progress through pilots and interim arrangements, often before their long-term implications are fully visible.

From the Roundtable discussions, three decision domains emerged where current choices are expected to have outsized influence on Australia's agricultural pathways to 2050 (see Figure 2). These domains represent clusters of related decisions already shaping incentives, risks and options across Australian agriculture. Within each domain, participants identified what is being decided; why it matters on-farm; where uncertainty is limiting confidence or coordination; and what would materially improve decision-making in time to influence outcomes.

How to read this section

Within each decision domain, the discussion follows a consistent structure: what is being decided; why it matters; where uncertainty is constraining actions; and what would materially strengthen decision-making within the next 12-18 months. This section does not catalogue all activity or propose comprehensive solutions. It highlights decision bottlenecks where uncertainty is delaying, fragmenting or distorting action, and what would make a practical difference to decisions already in motion.

Figure 2. The three decision domains



Sovereign security, productivity and resilience

where choices about critical inputs, energy security, diversification and value-adding will determine exposure to volatility, farm viability and national food security.

Trusted sustainability reporting

where decisions about how carbon and natural capital are measured, reported and assured will shape market access, costs, confidence and whether sustainability expectations deliver value for producers as well as assurance for markets.

Evolving agricultural innovation

where coordination, governance and capability decisions, particularly around digital, data and AI, will determine whether innovation translates into adoption at scale and productivity gains, or remains fragmented.

2.1 Sovereign security, productivity and resilience

This decision domain considers how Australia responds to increasing volatility, disruption and uncertainty across global and domestic supply and value chains, and how near-term choices shape long-term productivity, risk exposure and sectoral stability. Participants consistently framed these as system-setting decisions that extend well beyond individual farms, while carrying direct consequences for farm viability and regional economies.

Ensure system resilience beyond the farm for critical inputs and energy security

What is being decided

This decision cluster encompasses how Australia manages reliance on imported and concentrated supplies of critical agricultural inputs and energy, and whether resilience is pursued deliberately or left as a by-product of market efficiency.

Key decisions already underway or imminent include choices about fertiliser and fuel supply pathways, domestic manufacturing and processing capability, alternative energy sources, circular and waste-to-resource systems, and the extent to which contingency planning is embedded across food, energy and logistics systems. These choices collectively determine long-term exposure to supply shocks, cost volatility and system fragility, underlining the importance of integrated and iterative approaches to risk management.

Why it matters

Rising geopolitical tension, supply-chain disruption and energy price volatility mean that business-as-usual now carries higher and less predictable risk. These impacts are felt most acutely by producers with limited scale or flexibility, heavy reliance on external inputs, or location-specific exposure to logistics and energy constraints.

At a sectoral level, unmanaged exposure to disruption erodes productivity, increases costs and heightens food-security risks. Participants emphasised that the challenge is not resilience at any cost, but whether decisions taken now embed fragile, reactive arrangements or support more stable and investable pathways over time.

Where uncertainty is constraining action

Uncertainties raised by participants in this cluster encourage short-term, reactive responses and discourage coordinated investment, even where risks are widely recognised. These include:

- **System complexity and visibility:** limited shared mapping of critical input dependencies, vulnerabilities and how risk propagates across interconnected food, energy and transport systems. Inconsistent definitions of what constitutes “critical inputs” further constrain coordinated planning.
- **Trade-offs and cost allocation:** uncertainty about what level of resilience is acceptable, how trade-offs should be weighed (for example, land-use implications of energy or manufacturing infrastructure), and who should bear the costs of resilience investments across public and private actors.
- **Coordination and execution:** challenges associated with coordinating activity across portfolios, jurisdictions and supply chains, which participants noted could increase transaction costs and complexity.
- **Transition pathways:** uncertainty about the technical and commercial viability of alternative energy and input pathways, including sequencing of pilots, infrastructure and underwriting required to make options investable within relevant timeframes.

What would materially strengthen decision-making

Participants agreed that reducing uncertainty in this domain requires action beyond the farm gate, particularly to improve system understanding and coordination of critical input supply chains. Priority enablers identified include:

- **Decision-ready system mapping:** shared analysis of critical inputs, dependencies and vulnerabilities to support prioritisation, contingency planning and alignment with food and energy security strategies.

- **Clear resilience objectives and governance:** explicit articulation of resilience goals, acceptable trade-offs and cost-sharing arrangements to guide consistent decisions across portfolios and sectors.
- **Integrated infrastructure and circularity planning:** coordinated assessment of manufacturing, processing, logistics and energy infrastructure options, supported by circularity analytics to reduce input dependence over time.
- **Sequenced transition pathways:** clearer pathways for testing, scaling and underwriting alternative energy and input solutions so decisions can move from pilots to investible change across critical input and energy supply chains.

Together, these enablers were seen as essential to shift from reactive crisis-driven responses toward deliberate risk management, supporting productivity and resilience while maintaining competitiveness over the long term.

Develop product diversification and value-adding pathways to operate under volatility

What is being decided

This decision cluster concerns whether Australia pursues deliberate, coordinated diversification and value-adding pathways, or continues to rely primarily on volume-based commodity production with diversification occurring informally at the farm level.

Key decisions already underway or emerging include strategic diversification across commodities, regions or supply chains; product positioning across higher-value vs. higher-volume pathways; and investment in circular or residue-to-product opportunities such as biofuels, biomaterials and non-food products. These decisions shape how land, capital and capability are allocated across regions and value chains.

Why it matters

Increasing price volatility, climate risk and input cost pressures are compressing margins and increasing exposure for producers. Diversification and value-adding offer potential pathways to spread risk, improve returns and strengthen long-term viability, but only when supported by viable demand, infrastructure, market access and coordinated investment beyond the farm gate.

Participants noted that without clear national and sector-level direction, diversification tends to remain fragmented, unevenly accessible and commercially fragile, favouring those with scale, capital or market proximity. Decisions made now will influence who can participate in diversified value chains, where value is captured, and how resilient regional economies become under future volatility.

Where uncertainty is constraining action

Uncertainties raised by participants in this cluster are driven less by a lack of ideas and more by commercial and confidence gaps that discourage coordinated action and lead to conservative, incremental decisions that limit the pace and scale of diversification. These include:

- **Product and capability clarity:** limited shared understanding of which differentiated products Australia is well placed to deliver, at scale, and how those offerings compete in global and domestic markets.
- **Market demand and returns:** uncertainty about the depth, durability and price signals of potential markets, and how value is distributed across producers, processors and downstream partners.
- **Investment and scaling risk:** unclear pathways for de-risking early investment, including who funds market development, infrastructure and learning during pre-commercial phases.
- **Value-chain coordination:** fragmentation across how producers, processors, manufacturers and logistics partners coordinate, particularly where value-adding sits outside traditional agricultural investment and governance structures.

What would materially strengthen decision-making

Participants identified several enablers that would materially improve confidence and coordination in diversification and value-adding decisions:

- **Coordination mechanisms across value chains:** structures that support alignment across production, processing and market development, particularly for emerging or non-traditional products.
- **Place-based collaboration and capability building:** support for regionally grounded diversification pathways, including collaboration with Aboriginal and Torres Strait Islander producers to integrate place-based knowledge, land-use strengths and new commercial opportunities into viable value-adding models.
- **Targeted market intelligence and prioritisation:** clearer evidence on market demand, differentiation potential and comparative advantage to support deliberate selection of priority pathways.
- **Systematic learning from global markets and adjacent industries:** more deliberate capture and translation of lessons from global markets and other industries that have successfully developed, scaled or exited diversification and value-adding models. Participants emphasised the value of understanding not only what worked, but why, under what conditions, and where models failed, to avoid repeating costly mistakes and shorten learning cycles.
- **Decision-ready commercial models:** practical pathways for value capture, investment sequencing and risk-sharing across producers, processors and investors, including clearer expectations about who carries early risk and who benefits as markets mature.

Together, these enablers were seen as essential to move diversification from ad hoc experimentation toward repeatable, investable pathways that strengthen resilience and productivity under increasing volatility.

2.2 Trusted sustainability reporting

This decision domain centres on whether Australia's transition toward lower-emissions, nature-positive agriculture is supported by carbon and nature reporting systems that are trusted, practical and value-creating. While common reference points are emerging, including the AASF and VEERS, participants noted that many consequential implementation choices are being made implicitly through buyer requirements, finance conditions, interim standards and early adoption pathways.[6]

Support the agricultural sustainability transition through trusted and effective carbon and nature reporting

What is being decided

Decisions in this cluster concern how carbon and nature performance are measured, reported and assured across Australian agriculture, and how these systems are governed, aligned and implemented in practice.

Key decisions already underway or imminent include how producers measure and report emissions and natural capital; whether reporting frameworks align across commodities, jurisdictions and supply chains; how voluntary and mandatory requirements interact; how data is governed, reused and assured; and what incentives, regulatory settings, and support mechanisms accompany reporting expectations.

Why it matters

Participants highlighted that near-term decisions about how emissions and natural capital are measured, reported, assured and used will shape producer behaviour, market access and investment flows for decades. This will determine whether sustainability reporting functions as a sectoral enabler (supporting productivity, resilience and competitiveness) or as a compliance overlay that shifts cost and risk onto producers without clear returns.

Where uncertainty is constraining action

Uncertainties raised by participants in this cluster drive cautious, minimal-compliance behaviour and hinder coordinated investment in reporting systems that could otherwise deliver shared value. These include:

- **Measurement integrity and practicality:** uncertainty around robustness, cost and suitability of existing measurement methodologies for different production systems and uses. Concerns persist that some methods are overly complex, insufficiently validated, or misaligned with on-farm realities, creating burden without improving decision quality.
- **Shifting priorities, contested standards and unclear direction:** uncertainty regarding the future alignment and recognition of reporting frameworks, standards and protocols as these continue to evolve. Participants noted that this creates confusion about which approaches will endure, discouraging investment in systems, capability and data infrastructure and delaying broad uptake.
- **Trust, legitimacy and benefit sharing:** limited confidence in parts of the emerging carbon and nature ecosystem, including concerns about project integrity, credibility of claims and whether reporting outcomes deliver fair and tangible value to producers and regions. These issues undermine willingness to participate and slow system development.

6 Australian Agricultural Sustainability Framework (AASF) (2025) Australian Agricultural Sustainability Framework. National Farmers' Federation, Canberra. <https://aasf.org.au/> (accessed 21 April 2026)

- **Governance, interoperability and duplication:** uncertainty about how frameworks align across jurisdictions and supply chains, whether data can be reused securely, and how multiple frameworks interact without duplicating effort and cost.
- **Capability and support:** gaps in advisory capacity, digital readiness and producer confidence, particularly for smaller and regionally remote producers. Even where intent exists, limited access to trusted support constrains effective action.

What would materially strengthen decision-making

Participants emphasised that supporting the sustainability transition through carbon and nature reporting requires deliberate system-level enablers that build confidence, reduce complexity and align incentives:

- **Clear minimum standards and long-term alignment signals:** agreement on baseline, fit-for-purpose standards for carbon and nature reporting, with clear signals about the sector's strategic direction. Participants stressed the importance of reducing ambiguity about which frameworks and methods will be recognised over time, to encourage early investment and avoid stranded effort.
- **Decision-ready guidance for producers and advisors:** practical, trusted guidance that clarifies what data is required, how it will be used, and where participation delivers value (differentiated by purpose, such as regulatory, market, finance, rather than a one-size-fits-all approach). This would reduce confusion and improve confidence in sustainability reporting systems.
- **Demonstrated value and benefit pathways:** stronger evidence, modelling and case studies showing how reporting translates into commercial, risk-management or productivity benefits at the farm and regional level, including how value flows back to producers rather than being captured solely downstream.
- **Capability building and trusted intermediaries:** investment in advisory capability, digital tools and support mechanisms that reduce burden and build confidence, particularly during early adoption phases. Trusted intermediaries were seen as critical to bridging technical complexity and on-farm decision-making.
- **Data governance and reuse frameworks:** clear governance arrangements that enable secure data sharing and reuse across reporting, finance and market requirements, improving modelling capabilities, reducing duplication and lowering long-term costs for producers and supply-chain partners.

Collectively, these enablers were seen as essential to ensure sustainability reporting evolves as a trusted agricultural system asset that supports participation, investment and long-term sustainability.

2.3 Evolving agricultural innovation

This decision domain focuses on whether Australia's agricultural innovation system translates ambition and investment into adoption at scale, productivity gains and long-term competitiveness. Participants emphasised that the critical choices are not simply about technology selection, but about coordination, governance, capability, investment discipline and trust across the sector.

Coordinate the innovation system to enact broader reform

What is being decided

This cluster concerns decisions about how Australia's agricultural innovation system is structured, coordinated and led, and whether efforts are effectively aligned around shared priorities.

Key decisions already underway or imminent include how national innovation and R&D priorities are implemented; how roles are allocated across government, RDCs, research organisations and industry; what innovation infrastructure and coordination mechanisms receive investment; and how regulatory, funding and tax settings support translation, adoption and value creation.

Why it matters

The recent *Ambitious Australia: Strategic Examination of R&D (SERD)* report reinforces this challenge, identifying agriculture and food as national innovation priorities and setting a strategic direction for agricultural technology Research, Development and Extension (RD&E).[7] Participants highlighted that the issue is no longer strategic intent, but how it translates into investment choices, system coordination and capability development that enable adoption at scale.

Australia has strong research capability and an active agricultural technology ecosystem, yet some participants reported experiencing innovation activity as difficult to navigate, with challenges relating to coordination, timing and alignment across initiatives.

Participants highlighted that, where innovation activity is not well coordinated, producers and supply-chain participants can face increased engagement burden, fatigue and lower cumulative impact than intended, particularly when navigating multiple projects, pilots and data requests across commodities. They also noted that clearer coordination across the agricultural innovation system could improve relevance, reduce duplication and help innovation investment deliver practical productivity gains, workforce capability and regional value. Decisions made now will influence whether innovation acts as a sector-wide enabler of adaptation and competitiveness, or remains dispersed across disconnected initiatives.

Where uncertainty is constraining action

Uncertainties raised by participants in this cluster weaken alignment across innovation strategy, funding and delivery, increasing the risk that priority areas generate activity without cumulative system impact. These uncertainties include:

- **Direction, alignment and leadership:** uncertainty around how priorities align across industries, who leads cross-cutting innovation challenges, and how work that sits between organisations is progressed and resourced.
- **Innovation delivery mechanisms:** limited clarity on when and how mechanisms such as hubs, Cooperative Research Centre (CRC) type structures, coalitions or networks are most effective, and how they connect to real adoption and investment decisions.
- **Siloed visibility and duplication:** challenges associated with maintaining visibility of activities across jurisdictions, Research Development Corporations (RDCs), research providers and adjacent sectors, which can reduce opportunities for coordination, learning and scaling.
- **Capacity and funding constraints:** limited research capacity, high engagement costs and fragmented funding leading to gaps where system-level issues lack clear ownership.

7 Department of Industry, Science and Resources (2025) Ambitious Australia: strategic examination of research and development – final report. Commonwealth of Australia, Canberra. <https://www.industry.gov.au/sites/default/files/2026-03/ambitious-australia-strategic-examination-of-research-and-development-final-report.pdf> (accessed 21 April 2026)

What would materially strengthen decision-making

Participants identified the following system-level enablers as critical to coordinated reform:

- **Clear system-level priorities and ownership:** shared articulation of national and sector priorities, with explicit ownership for cross-cutting challenges to reduce ambiguity and duplication.
- **Greater transparency and system mapping:** improved visibility of innovation initiatives, funding flows and capabilities across agriculture and adjacent sectors to support alignment and learning.
- **Fit-for-purpose coordination mechanisms:** deliberate use of different innovation vehicles for different stages of innovation, with clear pathways from discovery to deployment and adoption.
- **Stronger alignment between strategy and funding:** investment mechanisms that reinforce strategic priorities and encourage collaboration rather than competition between institutions.
- **Inclusive, place-based co-design:** meaningful engagement with producers, regional communities and Aboriginal and Torres Strait Islander peoples to ensure innovation responds to real constraints and builds legitimacy for system reform.

Together, these enablers were seen as essential to move from fragmented innovation activity to deliberate system reform with sustained impact.

Effectively invest and adopt digital, data and AI technologies at scale

What is being decided

This cluster focuses on whether digital, data and artificial intelligence (AI) capabilities are treated as core agricultural infrastructure, or remain optional, fragmented add-ons.

Key decisions include the level of ambition and risk appetite for adoption; how digital systems are integrated across production and supply chains; whether workforce and advisory capability is developed in parallel; and how regulatory, investment and access settings support scale.

These choices will determine how productivity gains are realised, who benefits, and how evenly digital transformation is distributed across farm types and regions.

Why it matters

Digital and AI technologies offer significant potential to improve productivity, decision quality and resilience. However, agriculture's digital transition is not new; a decade of national coordination has produced analysis and strategy,[8] yet participants note limited action has resulted in uneven adoption, low confidence and rising uncertainty.

Poorly coordinated digital investment risks widening gaps between producers with scale and capability and those without. Decisions made now will shape whether digital transformation reduces or amplifies inequity, and whether gains accrue across the sector or remain concentrated.

Where uncertainty is constraining action

Uncertainties raised by participants in this cluster encourage cautious, incremental adoption and fragmented investment, limiting the ability of digital, data and AI technologies to lift productivity and decision quality at scale. These uncertainties include:

- **Unclear value and return on investment:** limited translation of farm-level evidence into clear, comparable measures of returns from digital and AI tools across different production systems. Where the value is unclear, there is little incentive for businesses to change existing models or processes.
- **Trust deficits and information overload:** mistrust in AI claims, inconsistent data quality and an overwhelming array of tools, reducing confidence in decision-making.
- **Regulation and investment settings:** rapid technology changes and unclear policy, tax and data settings discouraging long-term investment and coordinated adoption.
- **Skills, advisory and infrastructure gaps:** shortages in digital skills, trusted advisory capability and reliable regional connectivity, constraining effective use at scale.

8 Leonard, E (Ed), Rainbow, R (Ed), Trindall, J (Ed), Baker, I, Barry, S, Darragh, L, Darnell, R, George, A, Heath, J, Jakku, E, Laurie, A, Lamb, D, Llewellyn, R, Perrett, E, Sanderson, J, Skinner, A, Stollery, T, Wiseman, L, Wood, G and Zhang, A (2017) Accelerating precision agriculture to decision agriculture: Enabling digital agriculture in Australia. Cotton Research and Development Corporation, Australia.; DAWE (2022) Digital Foundations for Agriculture Strategy: Driving the development and uptake of digital technologies in the Australian agriculture, fisheries and forestry industry. Department of Agriculture, Water and the Environment, Canberra, March. CC BY 4.0.

What would materially strengthen decision-making

Participants identified several enablers to support effective investment and adoption:

- **Clear, decision-ready use-cases:** better evidence on where digital and AI applications deliver measurable value, supported by practical case studies and cost-benefit analysis.
- **Portfolio-level coordination of technology investment:** improved alignment across public and private investments to reduce duplication, manage risk and focus effort on high-impact applications.
- **Workforce and advisory capability development:** targeted investment in skills, training and trusted intermediaries to support confident adoption by producers.
- **Enabling policy, regulatory and tax settings:** clearer rules around data use, access and incentives to lower risk and encourage long-term investment.
- **Infrastructure and access foundations:** continued investment in digital connectivity and foundational infrastructure to support equitable adoption across regions.

Together, these enablers were seen as necessary to move digital and AI technologies from experimentation toward mainstream, trusted use that supports productivity, resilience and competitiveness.

3 Next steps

Decisions that will shape Australia's agricultural system to 2050 are already underway, with near-term choices on standards, investment, coordination and capability locking in long-term outcomes. These include national-level decisions such as: co-development of the National Food Security Strategy,[9] signing of the Australian and EU free trade agreement,[10] and implementation of the Environmental Protection and Biodiversity Conservation Act reforms.[11] These choices influence who can participate, how value and risk are distributed across the sector, and which options remain open. Progress now depends on designing systems that address uncertainty and enable these near-term decisions, through clearer information, shared understanding of trade-offs, and stronger coordination.

3.1 Suggested projects

The projects outlined in this chapter are intended to translate key decision enablers into practical action. They are not proposed as standalone initiatives or comprehensive solutions. The project concepts are illustrative outputs from the Ag2050 Roundtable. They do not represent funding commitments, agreed government positions or endorsed delivery models, and any future implementation would be subject to relevant investment, procurement and governance processes.

Each project is designed to reduce uncertainty for specific, near-term decisions identified through the Ag2050 Roundtable, with a focus on actions that could realistically influence outcomes within the next 12–18 months. Together, they illustrate how targeted synthesis, coordination, capability building and evidence generation could materially improve confidence, alignment and investment across the decision domains explored in this discussion paper.

The project concepts have been summarised on the following page. There are natural overlaps and complementarities in these suggested projects, as participants developed project plans in small groups.

3.2 Next steps: a call to coordinated action

CSIRO sees a clear opportunity to establish a shared, decision-focused agenda for agricultural R&D to 2050 that aligns national priorities, strengthens delivery pathways and accelerates adoption. Roundtable participants identified the potential value of system-level coordination by government (e.g., Department of Agriculture, Forestry and Fisheries; Department of Climate Change, Energy, the Environment and Water), working in partnership with groups such as the National Farmers Federation, the Research and Development Corporations (RDCs) and CSIRO, to provide the governance, coordination and continuity needed to avoid fragmented implementation.

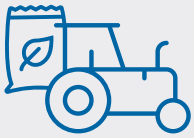
Delivery should be coordinated to align innovation, investment and market settings across Australia's agricultural production and innovation systems, involving the Department of Industry, Science and Resources, Austrade, relevant state governments, and other Commonwealth departments with responsibility for business development, market access and technology adoption. Success will depend on whole-of-system collaboration with producers, regional communities, Aboriginal and Torres Strait Islander organisations, industry, research, supply chain partners, and investors to deliver integrated outcomes that strengthen resilience, competitiveness and returns.

CSIRO welcomes ongoing engagement with stakeholders to further explore and address these opportunities to help shape the decisions and direction of Australian agriculture to 2050.

9 DAFF (2026) Feeding Australia: a national food security strategy. Commonwealth of Australia, Department of Agriculture, Fisheries and Forestry Canberra. <https://www.agriculture.gov.au/agriculture-land/farm-food-drought/food/national-food-security-strategy> (accessed 21 April 2026)

10 DFAT (2026) Benefits for agriculture and fisheries. Australian Government, Department of Foreign Affairs and Trade, Canberra. <https://www.dfat.gov.au/trade/agreements/not-yet-in-force/aeufta/key-outcomes-and-benefits/benefits-agriculture-and-fisheries> (accessed 4 May 2026)

11 Parliament of Australia (2025) Environment Protection Reform Bill 2025. Parliament of the Commonwealth of Australia, Canberra.



Sovereign security, productivity and resilience

1. Critical inputs risk assessment to inform the food security strategy

Support development of the national food security strategy by modelling critical inputs, linkages and gaps, and running an initial risk and sensitivity assessment on input supply/cost vulnerabilities. The work will convene partners to establish data access agreements, clarify dependencies, and generate decision-ready evidence on where contingency planning and mitigation would materially reduce risk.

2. Scoping study for a national product diversification strategy

Scope a national agricultural product diversification strategy to create new products and markets across Australian agricultural production chains. This project will collect evidence on existing models, review relevant regulations, and define a differentiated Australian proposition. It will also identify partnership and investment pathways that accelerate learning, enable cross-sector coordination, and support collaboration between First Nations and non-Indigenous producers.

Trusted sustainability reporting

3. Farmer led framework for consistent, rewarding, on-farm measurement of natural capital and carbon

Develop a nationally consistent, farmer friendly framework for measuring and recognising on farm natural capital and carbon performance. One option discussed was a government-supported tiered model will agree core indicators and measurement protocols. Farm-level economics and case studies will quantify the private benefits ($/ha/year) to show where participation can deliver real value for farmers.

4. Integrated Natural Capital Tracker (tracking national-level impacts over time)

Develop a Natural Capital Tracker that tracks national-scale natural capital trends over time using robust, validated, affordable, and repeatable methods. The project will strengthen data quality and governance, enable interoperability across datasets, and turn the results into trusted, decisionready insights for stakeholders (customers, banks, government, and consumers).

Evolving agricultural innovation

5. Digital, data and decision-support opportunities in Ag & Food

Build an evidence base on where digital, data, automation and AI can lift productivity and profitability in Ag & Food, and where tax, regulation, trust and skills constrain investment. The project will audit current initiatives, scan global technologies, and identify priority enablers to inform FY27 investment, training and policy decisions.

6. AI-enabled Ag Collaborative Concierge

An AI-enabled Ag Collaborative Concierge to improve findability, partner discovery and synthesis across initiatives inside and outside agriculture. Framed as using AI for good, it will break down siloes, reduce complexity and strengthen collaboration and funding by improving visibility of relevant partners and initiatives.

Appendix 1: Participant list

CSIRO would like to thank all organisations for their contributions to this project including attendance at the Ag2050 Roundtable. Listed below are those organisations that consented to being named.

- Adelaide University
- Australian Farm Institute (AFI)
- Australian Food and Grocery Council (AFGC)
- Australian Government – Department of Agriculture, Fisheries and Forestry
- Australian Government – Department of Climate Change, Energy, the Environment and Water
- Australian Wool Innovation
- Bureau of Meteorology
- Council of Rural RDCs
- CSIRO
- Farmers for Climate Action
- Grain Growers
- Grains Research and Development Corporation (GRDC)
- Grower Group Alliance
- JBS Australia
- Meat and Livestock Australia (MLA)
- Metanexus Australia
- Mulloon Institute
- National Farmers Federation (NFF)
- New South Wales Department of Primary Industries
- Protected Cropping Australia
- Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland
- Rabobank
- Regional Circularity Co-operative / BEGA Group
- Woolworths

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