SUBMISSION

Submission to the Queensland Department of Primary Industries

25-year blueprint for Queensland's primary industries

9 June 2025

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

Queensland's primary industries represent a significant opportunity to strengthen Queensland's economy, develop job opportunities, and provide strong action on climate change. The 25-year Blueprint can take advantage of this opportunity, supporting the sector to become more productive and grow. The Draft Blueprint and its supporting five-year action plans would benefit by recognising the key factors that are essential to the future of Queensland's primary industries - the importance of research and development in achieving the Blueprint's aims, the opportunity for the sector to play an important role in emissions reduction, and the need for genuine and respectful engagement with custodians of Traditional Knowledge. ATSE recommends that the Blueprint considers the following opportunities:

Recommendation 1: Continue to provide state government support to the development of Cooperative Research Centres and other industry-research partnerships, to encourage additional investment in agricultural innovation.

Recommendation 2: Uplift biosecurity research, development and monitoring to ensure Queensland's primary industries are protected from pests, diseases and antibiotic resistance.

Recommendation 3: Provide support to farmers, through information, on-the-ground advisors and subsidies, to encourage the adoption of low-methane feedstock for livestock.

Recommendation 4: Invest in nutrient stewardship improvements such as supporting uptake of pre-coated nitrogen fertilisers.

Recommendation 5: Encourage and facilitate the establishment of mentorship and capability uplift programs for farmers, farm workers and service providers to ensure they can make the most of technology-driven opportunities.

Recommendation 6: Coordinate with the vocational education and university sectors to modernise agricultural education and training and improve understanding of technological opportunities.

Recommendation 7: Prioritise elevating Aboriginal and Torres Strait Islander peoples and the application of Traditional Knowledge where practical within Queensland's primary industries.

Research and development as a key enabler for primary industries

The Draft Blueprint outlines an objective to boost the overall value of Queensland's primary industries to $30 billion by 2030. Reaching this objective will require a productivity boost across the sector. Primary industries have been one of the most effective sectors at increasing productivity through the adoption of new technologies and techniques (ACOLA 2014; Verrender 27 May 2025).

These gains are built on the back of high-quality research and development with national and international collaborators to leverage international expertise for Queensland's benefit. Every dollar invested in research and development produces $3.50 for the economy (CSIRO 2021). Industry-academia collaborations help to facilitate the development process, bringing new ideas to market faster. ATSE's *Boosting Australia's Innovation* report identifies options to help facilitate these partnerships, such as tax incentives for investors backing start-ups, procurement policies that support the development of new technologies, and support for commercialisation pathways (ATSE 2025a).

Investment by the Queensland Government into local research and development has a multiplier effect, helping projects to secure industry investment and further federal funding. This drives both productivity growth within the primary industries sector and jobs growth in a thriving research and development ecosystem. Continuing to invest and engage in industry-academia research and development partnerships, like the Cooperative Research Centre (CRC) and Regional Development Corporation (RDC) programs, will bolster Queensland as a global leader in boosting productivity within the primary industries sector. CRCs are one of the major success stories of Australia's research and development ecosystem and supporting them will be vital to growing Queensland's primary industries (ATSE 2025b). The Queensland Department of Agriculture and Fisheries is already making important contributions to the CRC program, through the Zero Net Emissions Agricultural CRC. The Queensland Government also supports agricultural research through the Queensland Alliance for Agriculture and Food Innovation (QAAFI), in partnership with the University of Queensland. These programs bridge the gap between emerging technologies and farming practices, supporting cost-effective rollout of new innovations.

Thriving research and development can also support preparation for disruption to the primary industries sector. A strong research program, combined with effective monitoring programs that work with interstate

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and international partners, will help to keep pests and diseases out of Queensland – protecting commercial interests, the environment and the local population. Antimicrobial resistance is a potential future concern for livestock, with a high anti-microbial resistance scenario likely to lead to a 7% loss of livestock production (CSIRO and ATSE 2023). Vaccines for livestock[1] have lagged behind human applications – largely caused by a lack of research and development investment. Investing in research, development and monitoring will help to protect Queensland's primary industries sector from potential devastating diseases.

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Recommendation 2: Uplift biosecurity research, development and monitoring to ensure Queensland's primary industries are protected from pests, diseases and antibiotic resistance.

Supporting climate friendly primary industries

The Draft Blueprint frames the changing climate as variability, noting the risks to profitability. The Draft Blueprint also suggests sustainability is a constraint, with a goal of reducing regulation by 24%. ATSE recommends emphasising sustainability as an opportunity, rather than a constraint, for the primary industries sector. As the world moves towards a low emissions future, it is likely that low emissions products will receive preferential treatment by importers or international consumers, or that increasing taxes on embedded emissions may be levied by our major trade partners. It is therefore important for the future viability of the sector that emissions reductions and sustainability are embedded into agricultural practice.

As highlighted in ATSE's submission to the Federal Government's Agriculture and Land Sectoral Plan, the agriculture sector has significant opportunities to contribute to meeting climate targets, while improving efficiency (ATSE 2023). The single largest contributor to agricultural greenhouse gas emissions is ruminant methane, at 43% of Australia's agricultural emissions (Climate Council, 2021). Given the dominance of the beef sector in Queensland, this is a key area to address. Methane is far more potent than carbon dioxide as a greenhouse gas – removing just one tonne of methane is the equivalent to removing 28 tonnes of carbon dioxide (IPCC 2014). Methane decays faster than carbon dioxide, meaning methane reductions have a more immediate impact on the climate than an equivalent carbon dioxide emission reduction (noting methane decay leaves carbon dioxide in the atmosphere) (Climate Council 2021). Recent developments in feedstock have seen the emergence of red seaweed (Asparagopsis) and other food additives (e.g., Bovaer, 3-NOP) as potentially viable ways to reduce methane emissions from cattle. There is also promising work to incorporate reduced methane production into the breeding programs for both cattle and sheep. While the percentage reduction in methane emissions from breeding programs is smaller than that of feedstock additives, the effects are cumulative each breeding cycle. Encouraging the uptake of these methane-reducing strategies is vital to the reduction of agricultural sector emissions. Improved manure handling, including biogas production systems, is another area to explore to reduce livestock emissions.

For crop producers, the type of fertiliser used can have a major impact on emissions. Nitrogen-based fertilisers often leak significant amounts of nitrous oxide the atmosphere – both harming the climate and reducing the efficacy of the fertiliser on improving soil quality. Pre-coated fertiliser slows down the release of nitrogen into the soil, increasing soil absorption and reducing nitrous oxide emissions. Supporting farmers to adopt pre-coating nitrogen-based fertilisers would improve their profitability and signal to fertiliser producers to produce this as standard. This would reduce the cost of reducing emissions for farmers while not requiring farmers to adopt any major new practices, resulting in a much faster roll out. There is also promising research on blending fertilisers with additives that could reduce nitrous oxide emissions and optimise nutrient use.

ATSE also encourages the Blueprint to give water stewardship deeper consideration.. Water availability and quality are increasingly threatened by climate change. Improved irrigation technologies and regenerative practices can help farmers adapt to water scarcity. Supporting farmers to adopt new technologies will enable the sector remain competitive and resilient in a changing climate.

Recommendation 3: Provide support to farmers, through information, on-the-ground advisors and subsidies, to encourage the adoption of low-methane feedstock for livestock.

[1] Which help prevent the need to use antibiotics, slowing the development of antibiotic-resistant microbes.

Recommendation 4: Invest in nutrient stewardship improvements such as supporting uptake of pre-coated nitrogen fertilisers.

Securing a strong primary industries workforce

The Queensland agricultural and food sector is poised for major technology-driven growth and transformation, particularly in response to climate change events such as droughts, heatwaves and floods. A future-ready workforce is necessary to take advantage of these opportunities and boost agricultural production. This will require both a steady flow of new skilled agricultural workers and the upskilling and reskilling of the existing workforce, particularly on sustainable practices.

ATSE's report *Our STEM Skilled Future* drew together insights from experts, including from agriculture, exploring capacity development for the technology-driven agricultural transformation (ATSE 2022). The report found that there is an unmet need for capability uplift programs for farmers and farm workers, as well as a need to modernise agricultural education and training. This could include development of a formal collection of up-to-date vocational education and training (VET) courses that help farmers understand and adapt to more complex changes and opportunities in farming best practice. Including sustainability-focused content in technical training not only equips the future workforce with the skills they will need, but can also act as a drawcard for the next generation of the agricultural workforce. ATSE agrees with the inclusion of a 'skilled and agile workforce' priority in the Blueprint, and encourages the Queensland Government to support workforce development through facilitating capability uplift programs and coordinating with education providers to ensure courses are fit-for-purpose.

Recommendation 5: Encourage and facilitate the establishment of mentorship and capability uplift programs for farmers, farm workers and service providers to ensure they can make the most of technology-driven opportunities.

Recommendation 6: Coordinate with the vocational education and university sectors to modernise agricultural education and training and improve understanding of technological opportunities.

Engaging with custodians of Traditional Knowledge

Native Title determinations cover 490,000 km^2 – approximately 29% of the land area of Queensland (Eddie et al. 2021). The Draft Blueprint briefly mentions the opportunity for growth in First Nations agriculture, including native food products. The Blueprint could explore the potential to leverage Traditional Knowledge and increase workforce participation. Aboriginal and Torres Strait Islander peoples have a long history of sustainable agriculture and aquaculture across Queensland. Despite this, the proportion of Aboriginal and Torres Strait Islander peoples working in agriculture is well below what would be expected – representing just 2.1% of the workforce in the last Census (Gilbert et al. 2024). Aboriginal and Torres Strait Islander peoples are more likely to be employed in lower-level positions in agriculture, such as labourers (Gilbert et al. 2024). More work is needed to translate Traditional Knowledge of agricultural techniques and increase workforce opportunities. ATSE suggests making this a priority of the Blueprint, with concrete actions included in future action plans. Options include supporting primary industries to genuinely engage in Reconciliation Action Plans and elevating Traditional Knowledge within the sector through supporting meaningful collaborations between primary producers, researchers, and Traditional Owners.

Recommendation 7: Prioritise elevating Aboriginal and Torres Strait Islander peoples and the application of Traditional Knowledge where practical within Queensland's primary industries.

ATSE thanks the Department of Primary Industries for the opportunity to respond to the 25-year blueprint for Queensland's primary industries. For further information, please contact academypolicyteam@atse.org.au.

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