Submission No 44

INQUIRY INTO ARTIFICIAL INTELLIGENCE (AI) IN NEW SOUTH WALES

Organisation: NSW Farmers

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About NSW Farmers

NSW Farmers is Australia's largest state farming organisation, representing the interests of its farmer members in the state. We are Australia's only state-based farming organisation that represents farmers across all agricultural commodities. We also speak up on issues that matter to farmers, whether it's the environment, biosecurity, water, animal welfare, economics, trade, workforce or rural and regional affairs.

Agriculture is an economic 'engine' industry in New South Wales. Despite having faced extreme weather conditions, pandemic and natural disasters in the past three years, farmers across the state produced more than $23 billion in 2021-22, or around 25 per cent of total national production, and contribute significantly to the state's total exports. Agriculture is the heartbeat of regional communities, directly employing almost two per cent of the state's workers and supporting roles in processing, manufacturing, retail, and hospitality across regional and metropolitan areas. The sector hopes to grow this contribution even further by working toward the target of $30 billion in economic output by 2030.

Our state's diverse geography and climatic conditions mean a wide variety of crops and livestock can be cultivated here. We represent the interests of farmers from a broad range of commodities – from avocados and tomatoes, apples, bananas and berries, through grains, pulses and lentils to oysters, cattle, dairy, goats, sheep, pigs and chickens.

We have teams working across regional New South Wales and in Sydney to ensure key policies and messages travel from paddock to Parliament. Our regional branch network ensures local voices guide and shape our positions on issues affecting real people in real communities. Our Branch members bring policy ideas to Annual Conference, our Advisory Committees provide specialist, practical advice to decision makers on issues affecting the sector, and our 60-member Executive Council makes the final decision on the policies we advocate on.

As well as advocating for farmers on issues that shape agriculture and regional areas, we provide direct business support and advice to our members. Our workplace relations team has a history of providing tailored, affordable business advice that can save our members thousands of dollars. Meanwhile, we maintain partnerships and alliances with like-minded organisations, universities, government agencies and commercial businesses across Australia. We are also a proud founding member of the National Farmers' Federation.

Executive summary

NSW Farmers welcomes the opportunity to provide a response the *Inquiry into artificial intelligence (AI) in New South Wales.* A range of socioeconomic, geopolitical, technological, and consumer trends are simultaneously and rapidly changing the food and agribusiness environment. NSW agriculture has a goal of becoming a $30 billion sector by 2030, contributing to a national target of $100 billion. Potential for this growth exists, and it will be a mounting priority as the world's population looks to exceed nine billion people by 2050 and demand for food and fibre grows by 60 per cent.

The future of farming is rooted in the ability to achieve more profitable and sustainable agriculture through significant incentives to upgrade plant and technology for conservation and production, while also improving farm management skills, encouraging youth to enter the industry, and increasing farm returns through improved efficiency. Underpinning this is ongoing innovation in the agricultural industry including technology using Artificial Intelligence (AI).

NSW is already beginning to utilise technologies such as blockchain, artificial intelligence, big data and the Internet of Things (IoT) to increase agricultural productivity. This potential increase for farmers in NSW will also bring opportunities for the regions that are supported by agricultural industries. As farming continues to use more digital technology, new skills and new jobs will be required to support farming systems and equipment.

Key considerations regarding the opportunities, risks and challenges presented by AI to the NSW agricultural community are:

- Innovation and productivity
- Connectivity and infrastructure
- Labour and skills
- Digital literacy and training
- Regulations
- Data privacy and security

Summary of Recommendations

NSW Farmers makes the following recommendations to the Inquiry:

- Recommendation 1: That the NSW Government support research, development, extension and adoption of agricultural technologies.
- Recommendation 2: That the NSW and Australian Governments support both domestic and foreign investment in agricultural technology development in Australia.
- Recommendation 3: That the NSW Government support education and upskilling to encourage uptake and support ongoing use of agricultural technology.
- Recommendation 4: That the NSW Government facilitate improvements to the quality of regional connectivity to support the agricutlural sector realise the benefits of artificial intelligence and other technologies.
- Recommendation 5: That the NSW Government invests to maintain and increase the delivery of education and vocational skills in regional NSW to continually develop and upskill the agricultural workforce.
- Recommendation 6: That the NSW Government prioritises and accelerates funding to stimulate industry and regional digital capacity and capability through investments in infrastructure and skills.
- Recommendation 7: That the NSW Government supports programmes that assist farmers to increase their skills, knowledge and confidence to adopt new digital technologies that meet the needs of their business.
- Recommendation 8: That the NSW Government and Australian Government ensure regulatory frameworks support the commercialisation of emerging technologies rather than hindering, whilst ensuring user safety.
- Recommendation 9: That the NSW and Australian Governments consult industry on artificial intelligence regulations to ensure they are fit-for-purpose and practical to enhance adoption of technology.
- Recommendation 10: That legislation and regulation ensures the privacy and security of user information and data, whilst supporting adoption of technology.

Opportunities, risks and challenges

Australian agriculture is currently predicted to grow by more than $3 billion a year to become a $100 billion industry by 2030[1]. Keeping pace, agricultural technology is one of the fastest growing Australian industries. With the increasing global population, specifically the rising middle class, the opportunity to expand agricultural sectors is significant. Agricultural technology (hereafter *agtech*) will be essential in assisting farmers to increase yields, productivity, and quality to service these markets while relying on fewer resources and inputs, mitigating the effects of the changing climate and an increasing risk of extreme weather.

Agricultural industries are already beginning to utilise technologies such as blockchain, artificial intelligence (hereafter, *AI*), big data and the Internet of Things (IoT) to increase productivity[2]. Productivity gains for farmers will also bring opportunities for regional NSW and local economies that are supported by agriculture. As farming continues to use more digital technology, new skills and new jobs will be required to support farming systems and equipment. Simultaneously, new technologies can help rural and regional communities to stay connected and fulfilled and businesses to realise efficiencies and profitability.

The future of farming is rooted in the ability to achieve more profitable and sustainable agriculture through significant incentives to upgrade plant and technology for conservation and production, while also improving farm management skills, encouraging youth to enter the industry, and increasing farm returns through improved efficiency. However, significant barriers remain to adoption of new technologies for many farmers including awareness, engagement, cost, available time and connectivity. Key opportunities, risks and challenges for the NSW agriculture centre regarding AI, encompassed by digital technology and industry innovation more broadly, are outlined below.

Innovation & Productivity

A key priority for NSW Farmers is achieving a more profitable and sustainable agriculture industry to ensure a prosperous future for NSW primary producers. This is underpinned by innovation and productivity gains, and increasing access and uptake of agtech is one method of achieving this. This includes agtech innovation opportunities for AI-based technologies for agricultural uses.

There is a range of applications of digital technology in agriculture that assist farmers to make decisions and gain efficiencies including water management and maintenance alerts, remote monitoring and management of livestock, crops and soil, precision chemical and fertilizer application, objective measurement and traceability. For example, these technologies can assist increasing the efficiency of stock management, input application, water level monitoring and irrigation management. Future applications will continue to realise data-driven technologies that use automation, robotics, artificial intelligence, machine learning and satellite and remote sensing capabilities. is reliant on improved. Despite some improvement to connectivity, access to internet and data services in many areas continues to be a barrier to the development, growth and uptake of agtech[3].

Agtech such as automation, GPS guidance, yield mapping, sensors and remote imaging were considered to be cutting edge just a few years ago. Australian farmers have always embraced technology as part of agriculture, allowing for the innovation and growth of the industry that we have seen over time. However, Australia does have a relatively immature presence in the agtech ecosystem globally, specifically when compared to competitor markets such as North America and the United Kingdom.

[1] KPMG 2016, Powering Growth: Realising the potential of AgTech for Australia, KPMG, Queensland Government, Commonwealth Bank.
[2] NSW Farmers submission to the NSW Inquiry into Technology and the Agriculture and Mining Sectors - February 2022
[3] NFF submission to Senate inquiry into financial technology and regulatory technology – 17 January 2020.

As the agtech sector continues to mature and grow there are a variety of measures that can be implemented to ensure the increased uptake and full realisation of the value of this industry. Agribusiness, biotechnology, and equipment companies with significant R&D budgets were the first and only users of agtech in Australia. Attracting new participants in non-traditional forms such as entrepreneurs, venture capitalists, investors and developers bringing will bring in different skillsets, networks, and expertise to help advance the industry. As this shift occurs, it also opens new pathways for technological development across the supply chain.

In the recent past, technologies were exclusively available to large corporate farming operations due to the high cost of adoption. Agribusiness, biotechnology and equipment companies with significant R&D budgets were the first and only users of agtech in Australia. As the industry continues to mature, it is also attracting new participants in non-traditional forms such as entrepreneurs, venture capitalists, investors and developers bringing with them different skillsets, networks and expertise. As this shift occurs, it also opens new pathways for technological development across the supply chain. This investment into agtech firms, large and small, will bring with it the capital needed to continue regional growth and establish skilled working opportunities in agricultural settings.

It is essential to create incentives for multinational agricultural corporations to establish major R&D operations in Australia. This would stimulate diversification of agtech segments of focus and leverage Australia's public R&D sector in agricultural sciences through collaboration with industry, to build commercialisation capability. Government departments such as the Department of Primary Industries must continue to support and fund R&D projects that utilise technology for the betterment of productivity.

Important opportunities to promote the continued innovation and adoption of agtech in farm businesses are[4]:

- Increased focus on industry specific R&D projects through government, university and industry projects to ensure the Australian agriculture sector is innovative, resilient, and prosperous into the future.
- Creating attractive opportunities for foreign and domestic investment into agtech development to stimulate the sectors growth.
- Establishing agtech, data, technology, and other related course options for agricultural students, as well as for existing producers to upskill in these areas including digital literacy, business modelling and data analysis
- Programs to increase farmer knowledge, skills and confidence to adopt new digital technology solutions tailored to their needs.

Recommendation 1: That the NSW Government support research, development, extension and adoption of agricultural technologies.

Recommendation 2: That the NSW and Australian Governments support both domestic and foreign investment in agricultural technology development in Australia.

Recommendation 3: That the NSW Government support education and upskilling to encourage uptake and support ongoing use of agricultural technology.

[4] NSW Farmers submission to the NSW Inquiry into Technology and the Agriculture and Mining Sectors - February 2022

Connectivity & Infrastructure

The NSW agriculture sector operates in regional areas where access to digital technology is limited because of the higher cost of developing telecommunications infrastructure and a lack of competition between providers due to natural monopoly characteristics[5]. This means that primary producers are operating businesses under the constraints of low data speeds, small data allowances, poor coverage and unreliable connections. Improvements to rural, regional, and remote telecommunications infrastructure are required to provide fit-for-purpose access to what is increasingly essential services. It is clear that regional, rural, and remote users consider that infrastructure has not kept pace with the expectations of use of telecommunications.

The Australian Farm Institute has estimated that full adoption of digital agriculture could increase Australian agriculture's GVP by about 25 per cent, or $20.3 billion.[6] Yet adoption of digital agriculture is low across the sector, with agriculture receiving the lowest score for digital capabiltiy out of any sector analysed in Mckinsey's Digitisation Index[7] and Telstra's Australian Digital Inclusion Index.[8]

There are a number of NSW Government programs aimed at overcoming this issue. The Regional Digital Connectivity Program uses large-scale infrasturcture invesment to reduce mobile black spots, enable agribusiness to use technologies, and facilitate remote working opportunities. This program also incorporates other intiatives such as Farms of the Future and the Future Ready Regions Strategy from Department of Regional NSW, which plans to construct a Long-Range Wide Area Network in target regions and offer grants for farmers to purchase to purchase agtech applications.

These initiatives are welcome, but do not operate at the scale or speed required needed to tackle the problem. There are important co-benefits from increased connectivity to the regions, as it also a key factor in improving education opportunities, health services and non-agricultural businesses.

Improvements to the quality of regional connectivity are imperative if the ag sector is to retain its competitive edge and to prevent any widening of the opportunity gaps between urban and rural Australia.

Recommendation 4: That the NSW Government facilitate improvements to the quality of regional connectivity to support the agricutlural sector realise the benefits of artificial intelligence and other technologies.

[5] NSW Farmers submission to Securing future innovation and global competitiveness in NSW Green Paper - June 2022
[6] AFI 2018, Digital literacy the key to agtech adoption. Available at: https://www.farminstitute.org.au/digital-literacy-the-key-to-agtech-adoption/
[7] McKinsey Global Institute 2019, Twenty-five years of digitisation: Ten insights into how to play it right. Available at: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/twenty-five%20years%20of%20digitization%20ten%20insights%20into%20how%20to%20play%20it%20right/mgi-briefing-note-twenty-five-years-of-digitization-may-2019.ashx
[8] Telstra 2021, Australian Digital Inclusion Index. Available at: https://www.digitalinclusionindex.org.au/

Labour & Skills

Harnessing the new opportunities identified in Food Innvation Australia's (FIAL) recent report[9] would require a shift in skills held by workers. For example, previous research has shown that there is a major gap in terms of digital skills and capability across the entire agricultural value chain.[10] Technical skills are expected to increase the most in importance from now to 2030, with employees required to manage new technologies such as robotics and big data. These findings are in line with a recent report by the Australian Industry and Skills Committee, that the top generic skills needed in agrciulture are learning agility and self-management, as well as managerial skills, financial skills, and skills related to technology, science and numeracy.[11]

While the mix of jobs is predicted to be relatively stable, the skills needed to do these jobs, and what these workers could be doing in 2030, will look very different from today. This will be driven by digitial technologies such as IoT automating tasks that were previously done manually. For example, administrative workers will need more evaluation and technical skills to interpret data and information as software programmes replace manual tasks. Manual labourers will also need different technical skills so they can oversee drones, monitor IoT systems, and supervise the digitally conencted crop production of the future.

Technology can play a role in making agriculture more attractive career opportunity and by reducing the reliance on workforce where possible. Programs that help stimulate innovation, connectivity, communication, and career prosperity has the potential to increase the number of young people willing to join or stay in agricultural and regional settings. By unlocking the value of new technologies across the entire supply chain, the industry can attract those employees who have the skills and competencies to leverage them.

It will not however be only technical skills that should be hired for. The industry will still require those with generalist skills including human resources, information technology, data science, management, marketing, and trade. Agtech can automate mundane tasks, leaving more important jobs to skilled workers, or reduce the number of general labourers needed to complete high volumes of work. Automation has always played a role in increasing efficiency of the workforce, and agriculture systems will experience the same benefit.

As technology advances, it drives changes in the skills the economy needs, and the need to open pathways for workers to move up the skills heirachy. The VET system, with its focus on practical applied skills could support workers in this upskilling and reskilling. This sytem, however, is facing issues in attracting entrants and funding certainty, just as the agriculture sector is. This has put pressure on the cost of delivering certain services, products and infrastructure and contirbuted to the persistance of widespread shortages of key VET skills.

The maintenance of capacity to deliver education and vocational skills in regional areas is critical. Funding certainty and policy settings that underpin these learning environments are critical to regional health and wellbeing (including schools, TAFE, Registered Training Organsiations and universities). [12]

Recommendation 5: That the NSW Government invests to maintain and increase the delivery of education and vocational skills in regional NSW to continually develop and upskill the agricultural workforce.

[9] FIAL 2020, Capturing the prize: The A$200 billion opportunity in 2030 for the Australian food and agribusiness sector. Available at: https://www.fial.com.au/sharing-knowledge/capturing-the-prize

[10] Farm Policy Journal (2018), Enabling Digital Agriculture in Australia. Available at: https://www.precisionag.com/in-field-technologies/connectivity/enabling-digital-agriculture-in-australia/

[11] Australian Industry and Skills Committee (2019), IRC and Skills Forecast. Available at: https://nationalindustryinsights.aisc.net.au/industries/agriculture

[12] NSW Farmers submission to Securing future innovation and global competitiveness in NSW Green Paper - June 2022

Digital Literacy & Training

Connectivity and digital literacy are key factors for enabling farmers to embrace technology for business decisions and productivity improvements, as well as for scalable food production using technology and robotics. Underpinning this is the continued need to raise famers' awareness of existing digital technologies that offer quality, accessible and affordable data and communications on-farm including tools that utilise AI. Working with farmers to increase knowledge, skills and confidence to adopt new digital technology solutions in their farm businesses is key to uptake and ensuring that this is fit-for purpose to their individual business needs.[13]

Integrating new technologies into production systems and operations requires a different skill set than those traditionally associated with agricultural industries. The digital literacy skills can include the ability to operate digital systems and equipment, the ability to manage and process data effectively and then utilise it for decision making. Many farm businesses may not have the adequate range of skills within their workforce to make the use of new technologies effective on farm. Additionally, advanced use of data and emerging technologies in farm businesses will continue to require additional training and upskilling.

NSW Farmers supports ongoing measures to increase business services in the regions including but not limited to information technology and farm skills training. Ensuring that existing producers have the opportunity to increase their knowledge in these areas, as well as including these pathways in the training for new entries into the industry will establish a baseline of literacy that reduces barriers for adoption.[14]

Prioritising stimulatory funding for the acceleration of industry and regional digital capacity and capability via targeted investment in infrastructure and skills is highlighted as a key recommendation for decision makers.[15]

Recommendation 6: That the NSW Government prioritises and accelerates funding to stimulate industry and regional digital capacity and capability through investments in infrastructure and skills.

Recommendation 7: That the NSW Government supports programmes that assist farmers to increase their skills, knowledge and confidence to adopt new digital technologies that meet the needs of their business.

[13] NSW Farmers submission to the NSW Inquiry into Technology and the Agriculture and Mining Sectors – February 2022.
[14] NSW Farmers submission to the Inquiry into food production and supply in New South Wales - February 2022.
[15] Australian Farm Institute 2021, Stronger ag sector, stronger regions – Research Report August 2021.

Regulations

It is important that regulatory frameworks in relation to AI are fit-for-purpose and ensure safety whilst enabling innovation. The decisions made by tools using artificial intelligence can only be as good as the information and data that the system is processing. Data quality can be impacted if problems arise with software or algorithms, or there are system failures due to sensors, data uploads due to connectivity or third-party data applications.[16] Due to the complexity of these systems, there are potential complications for liability if for example machines operated through decisions made by AI cause unforeseen damage or injury.

Autonomous vehicles and machinery are a key opportunity in agriculture that is underpinned by AI. Examples include the development of fully autonomous fruit and nut picking robots that can assist addressing labour shortages in horticulture, and machinery used in grain farming operation including planting, spraying, fertilising and harvest operations. As these technologies develop and commercialise, it is important to prioritise safety in farming operations.

An example of a proactive industry led project to support and enable access to autonomous vehicles in agriculture in the Australian context, whilst addressing safety, is the Code of Practice for Agricultural Mobile Field Machinery with Autonomous Functions in Australia[17]. This has been developed with input from grain producers throughout Australia with manufacturer support and technical input from Australia, the US and the EU by Grain Producers Australia, Society of Precision Agriculture Australia and the Tractor and Machinery Association of Australia. The Code was designed to enable future access to a rapidly emerging technology aimed at delivering productivity gains for growers and the industry. It guides on mobile machinery semi-autonomous and autonomous functions used in agriculture field operations and developing and evaluating safe work procedures for use of such machinery.

Regulatory frameworks that ensure safety without inhibiting access to emerging technologies is important to ensure continued innovation of AI-based tools in the agriculture sector. Supporting industry input to regulations to ensure they are fit-for-purpose and practical can facilitate enhanced technology adoption, for example industry led Codes of Practice.

Recommendation 8: That the NSW Government and Australian Government ensure regulatory frameworks support the commercialisation of emerging technologies rather than hindering, whilst ensuring user safety.

Recommendation 9: That the NSW and Australian Governments consult industry on artificial intelligence regulations to ensure they are fit-for-purpose and practical to enhance adoption of technology.

[16] RIRDC 2016, Transformative Technology Fact Sheet – Artificial Intelligence, Publication no. 16/038. Rural Industries Research and Development Corporation, Canberra.

[17] 2021, Code of Practice: Agricultural Mobile Field Machinery with Autonomous Functions in Australia, Grain Producers Australia (GPA), Tractor and Machinery Association (TMA) and the Society of Precision Agriculture Australia (SPAA). Available at: https://www.grainproducers.com.au/_files/ugd/cce1a6_7291560d4c624980bb5ebf119560342b.pdf

Data privacy & Security

With the technology adoption expected to play a key role in achieving the sector's goal of $100 billion in farm gate output by 2030, the Australian Farm Data Code has been developed to help farmers embrace new technologies whilst maintaining confidence in how their data is used. The Code can be used to inform policies of service providers who manage farm data on behalf of farmer and provide a framework for farmers to evaluate those providers and inform discussions. NSW farmers supports the Code as the framework for best-practice farm data management in Australia.

Interest in data-driven agriculture to inform farm decisions and automation to carry out the decisions has been increasing across the sector, for example through AI based tools. However, user trust and confidence in AI systems and tools is a key consideration in decisions to adopt these including the quality of data used in these systems. For example, industry led projects such as the GRDC to develop technology to undertake grain quality assessments using AI and computer vision and the Internet of Things. However, gains in the efficiency, accuracy and consistency of assessment results rely on robust and reliable technology, with data and algorithms that are trusted by supply chain stakeholders impacted by the decisions informed through the tool.

Uptake of data-driven emerging technologies is contingent on farmers having confidence in data how their data is being used including security and privacy considerations. Best practice farm-data management can be supported through service providers being compliant with Australia Farm Data Code. Additionally, confidence in AI technologies will be dependent on trust in the underpinning algorithms and data used to generate decisions. Targeted investment in in building user literacy to assess technologies should be priority, in addition to transparency from technology providers in product capabilities and assumptions.

Recommendation 10: That legislation and regulation ensures the privacy and security of user information and data, whilst supporting adoption of technology.