



**Submission to inquiry by House of Representatives Standing
Committee on Agriculture into *'The role of technology in increasing
agricultural productivity in Australia'***

October 2015



Grain Growers Limited (GrainGrowers) is an independent and technically resourced, grain farmer representative organisation with 18,500 members across Australia. GrainGrowers' goal is a more efficient, sustainable and profitable grain production sector that benefits all Australia grain farmers and the wider grains industry.

We achieve this by:

- Having a strong policies and submissions process which is underpinned by our National Policy Group
- Running education courses and events which help build human capacity and industry leadership skills
- Developing and distributing a wide range of products and services which directly benefit the industry

Further information on GrainGrowers is available at: <http://www.graingrowers.com.au/>

This submission addresses the Terms of Reference for the Committee's inquiry into the role of technology in increasing agricultural productivity in Australia, including:

- improvements in the efficiency of agricultural practices due to new technology, and the scope for further improvements;
- emerging technology relevant to the agricultural sector, in areas including but not limited to telecommunications, remote monitoring and drones, plant genomics, and agricultural chemicals; and
- barriers to the adoption of emerging technology.

GrainGrowers appreciates the opportunity to contribute to this inquiry. Due to the broad-reaching nature of this inquiry, this submission provides a high-level overview of the role of technology in agricultural productivity as it relates to the Australian grains industry. Further information on specific matters canvassed in this submission can be provided on request.

Yours faithfully,

David McKeon

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Technology driving the profitability of cropping in Australia

The Australian grains Industry is Australia's foremost agricultural commodity sector delivering annual farm production of \$15bn, generating employment for more than 179,000 people across Australia and providing grains to Australia's domestic grain processing and livestock sectors. Australian grain growers sustainably manage more than 24 million hectares to produce an average of 40 million tonnes of grain each year across Australia. Underpinning the ongoing success of the Australian grains industry is technology and its application to farming.

The requirement for Australian farmers to be at the forefront of technology uptake must be considered in a global context. Australian grain growers rely on international markets with 65 per cent of production exported, which valued at \$12bn per annum makes it Australia's largest agricultural export. While being an important export industry for Australia the Australian grain industry is a small player in the international market, accounting for just two to three per cent of international production annually. Australia's competitiveness in the global marketplace relies on continual increases in productivity, reductions in costs and the capacity to deliver quality that is valued by the markets to which we export.

The relative size of Australia's grains industry needs to be considered alongside the factors driving international market forces. While international competitors are highly subsidised (many farmers across the world receive more than half their income in the form of government support), at 0.2% of National GDP, Australian agriculture has the lowest level of government support in the world¹. Exposure to market forces and a highly variable climate require Australian farmers to maintain a focus on productivity and to be at the forefront of innovation and technology uptake.

Productivity growth is a key mechanism by which agricultural industries remain competitive and farmers maintain profitability to ensure long-term viability. The continuous adoption and refinement of innovations in crop science, cropping equipment and farm management have helped underpin recent productivity growth in Australian agriculture².

¹ <http://www.oecd.org/tad/agricultural-policies/monitoring-and-evaluation.htm>

² Thompson, T 2015, *Australian grains: financial performance of grain producing farms, 2012–13 to 2014–15*, ABARES research report to client prepared for the Grains Research and Development Corporation.

Investment in research driving farm productivity

Driving the productivity growth of Australian agriculture has been a long-term commitment by government and industry to Research, Development and Extension (RD&E). ABARES analysis has found that Australian public R&D directly accounted for nearly one third of the productivity growth experienced in Australia's broadacre farming sector between 1952–53 and 2006–07³.

In the grains industry, the Grains Research and Development Corporation (GRDC) is the major RD&E service provider. The GRDC received total revenue of \$209.1m in 2013-14, including \$120.2m in grower levies and \$68.6m from the federal government to support the corporation's research work across 25 different grain crops⁴.

Grains RD&E has helped the continual shift of the technological frontier and provided farmers with the tools to enhance their productivity. Successive governments and levy payers have continued to support the Rural Research and Development Corporation system, recognising the important benefits delivered for farmers, their communities and the broader Australian economy.

Grower support for grains RD&E levy

During 2014, GrainGrowers surveyed members' views on the grains levy, specifically if they would vote to have the levy: 'increased', 'remain the same' or 'decreased'. A majority of respondents (62%) voted for the levy rate to stay the same; whilst 5% of growers voted to increase the levy rate (600 members responded). Combined, this result indicates that 68%, or two thirds, of grain growers surveyed support the continuation of the levy rate.

GRDC has been fortunate to have an increased budget in recent years, however this has been due to the increase in the value of the grains production sector, rather than an intentional increase commitment from government. Overall, Australia has had little growth in real agricultural R&D investment since the mid-1970s. ABARES analysis⁵ shows there is a time lag of several decades for the impact of R&D investment to show up in agricultural productivity. Going forward it is important that industry and government regularly revisit the level of investment in RD&E to ensure Australia remains internationally competitive. It is important that short-term cost-cutting measures do not limit the future growth of the Australian grains industry, as a key contributor to Australia's export earnings.

Yield increases, in recent years, have been relatively flat, and as demonstrated below, see Figure 1, the productivity trends in the yields of wheat have historically been closely linked to key public research developments.

In addition to the total quantum of investment, it is also important that the balance of investment is regularly revisited to ensure that both the needs of strategic research, applied research, and extension and adoption are accounted for. GRDC has recently announced⁶ an update of their research investment portfolios to account for these needs.

³ Sheng, Y., Gray, E., Mullen, J., & Davidson, A. (2011). *Public investment in agricultural R&D and extension: an analysis of the static and dynamic effects on Australian broadacre productivity*. ABARES.

⁴ GRDC Annual report, 2013-14 www.grdc.com.au

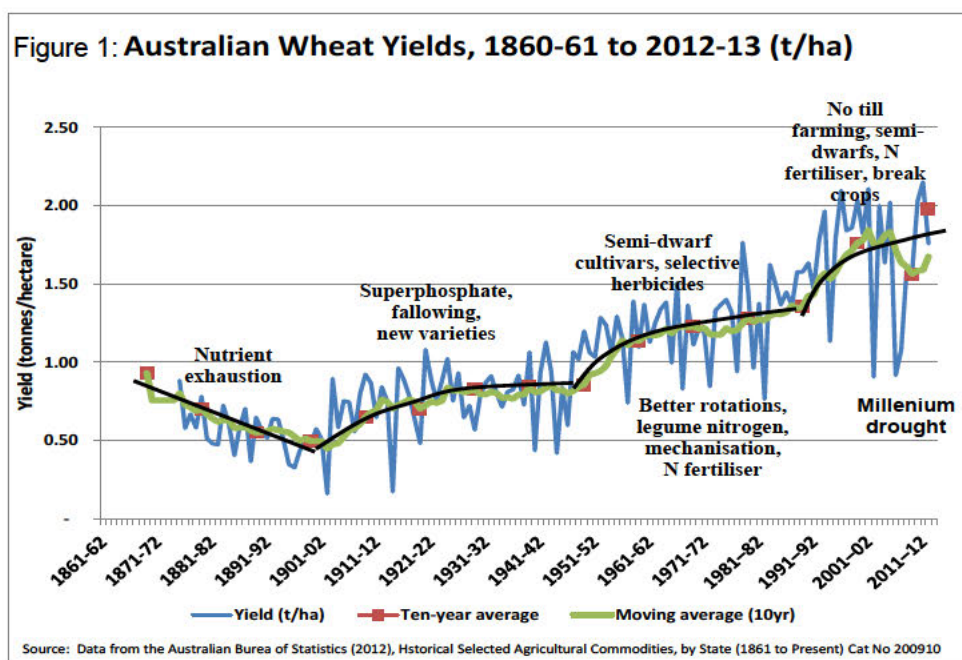
⁵ Sheng, Y., Gray, E., Mullen, J., & Davidson, A. (2011). *Public investment in agricultural R&D and extension: an analysis of the static and dynamic effects on Australian broadacre productivity*. ABARES

⁶ <http://www.grdc.com.au/Media-Centre/Media-News/National/2015/09/2015-GRDC-restructure-research-investments-and-contacts>

It is important that the evolution of agricultural extension systems is closely monitored in Australia to minimise a broadening gap between the high and low performing farm businesses.

While the reduction of public sector involvement in extension could, in theory, create a market for private operators with superior, client-specific services, it could also adversely impact productivity – where quality gains do not justify the increase in cost⁷. Unfortunately, a shift to private-sector dominated extension has also seen an associated shift away from the primary function of extension: providing knowledge and skills to farmers to make their operations more productive and sustainable via an accessible communication system.

Significant commentary and research⁸ exists into the ‘unravelling’ of the agricultural RD&E system in Australia, however, little policy change has been enacted at a national level to address the current and emerging issues. Given the continual change in grains extension and a reduction in investment from state agencies, it would be valuable for government to conduct an independent review into extension services in the grains industry. Such a process should focus on the impact extension is having on the productivity and profitability of farmers across the country.



In summary, successful uptake of innovation in Australian cropping requires sound Government-industry partnerships, such as those maintained within the Rural Research and Development Corporation model.

Growers remain supportive of the investment of levy funds into research, however as advocated through the recent Senate Inquiry into agricultural levies⁹, GrainGrowers believes there is scope for operational and cultural improvement of the GRDC. The levy contribution is an investment which has seen RD&E make a significant contribution to the sustained growth and maintenance of competitiveness in the grains industry.

⁷ ANZ insight, 'Greener Pastures: The Global Soft Commodity Opportunity for Australia and New Zealand', Port Jackson Partners, 2012

⁸ For example, Warren Hunt, Colin Birch, Jeff Coutts and Frank Vanclay (2012): *The Many Turnings of Agricultural Extension in Australia*, The Journal of Agricultural Education and Extension

⁹ Submission available at:

http://www.graingrowers.com.au/images/30_policy/submissions/ggl%20submission%20rde%20levies.pdf

Farming in the digital age

“Smart farm technology will help farmers to make daily management decisions that improve farm productivity, and help create new opportunities for our agricultural products and expertise” (CSIRO Smart Farming White Paper 2013)¹⁰

Opportunities

Information is critical to a farmer's decision making and consequently to a farm's profitability. The ability to monitor and evaluate a farm's operation in real-time can provide huge productivity benefits. GrainGrowers is of the view that digital disruption of the agricultural sector should be viewed as an opportunity, rather than a threat.

Access to fast broadband connectivity and having the digital skills to use this technology can allow farmers to make management decisions using a wealth of information and data about crops, pastures, livestock, machinery and environmental conditions on the farm.

Education opportunities, information exchange and improved efficiencies on farm are some of the immediate benefits of improved access by the agricultural sector to the digital economy. These types of technological innovation are crucial to driving the changes that are needed to underpin the long-term future of Australian agriculture.

The uptake of digital technologies and the application of big data to farming have been strong within Australia, to the extent that telecommunications infrastructure allows. A recent technology survey of GrainGrowers members¹¹ found 82% use GPS auto steer and 45% use harvest yield maps.

However, Australian agriculture is currently at the cusp of a digital revolution, with significant room for growth. An example of this rise in productivity is from the National Committee on Soil and Terrain which predicts improvements in soil management resulting from access to up to date user-friendly soil data could generate benefits to Australia worth at least \$2 billion a year by 2020¹².

Further to this, a recent Nuffield report found low cost, cloud-based technologies engaging in superior analytics could potentially increase agri-business profitability by 10-20% per annum, particularly critical for Australian agri-businesses experiencing increased pressure on terms of trade¹³.

Computing technologies have been used in the agricultural sector for the past two decades, but adoption has been uneven and its full potential unrealised.

According to the CSIRO's 'Smart Farming White Paper' the NBN could support a number of developments that will help drive innovation and transform the way digital services are used.

¹⁰ CSIRO (2013) White Paper. 'Smart Farming: leveraging the impact of broadband the digital economy'.

¹¹ Results available at http://www.graingrowers.com.au/images/30_policy/agriculture%20technology%20micro-survey%20results%202015.pdf

¹² DAFF (2014) The National Soil Research, Development and Extension Strategy. 'Securing Australia's Soil- For profitable industries and healthy landscapes'

¹³ Linda Eldredge (2012 Nuffield Scholar) 'Using low-cost, cloud based technology to assist with innovation and efficiencies in agriculture', Nuffield Australia Project No: 1216

These developments include¹⁴:

- Through the NBN the potential creation of broadband hotspots on all Australian farms;
- Sensor technology that is low cost and ubiquitous to monitor crops, livestock, water, weather and equipment;
- Local wireless systems that make it easier to connect to broadband technologies;
- Smart personal devices and apps to make accessing information on the move easier;
- Cloud-computing technology to simplify access to and sharing of information;
- Analytic capabilities of diverse information sources, and
- Increasing ease of use of video-conferencing systems, making it easier to bring remote veterinary and other agricultural advisory services onto the farm.

Current use and barriers

Grain farming businesses have adjusted both the business and agronomic sides of their enterprises to cope with the financial pressures attributed to this high level of volatility and low margins. Growers constantly strive to increase production, profitability and farm sustainability. This is driving the ever-increasing emphasis on technologic developments through precision farming technology and more informed decision-making tools such as GrainGrowers' online ProductionWise (<https://www.productionwise.com.au/>). However, these changes will only accrue benefits for the grains industry, regional communities and Australia's economy if underpinned by adequate telecommunications infrastructure.

There are multiple barriers, perceived and actual, that are hampering the spread of technological advances in agriculture. Critically, in a recent GrainGrowers recent technology survey¹⁵, respondents highlighted that cost and internet connectivity are the two major limitations to adapting new technology on the farm. Other interesting observations from the survey included:

- 55% of growers surveyed regarded their mobile speed and coverage as marginal, poor or non-existent
- 83% of those surveyed said the NBN scheme hadn't benefitted them in any way
- 75% said a lack of quality telecommunications services were impeding their business operations and,

There are serious limitations with the current speed, reliability and price of the internet in regional Australia. Farmers are often thought of as 'technophobes' that are unwilling to keep up with technology, when in fact the opposite is true, most growers go to extraordinary lengths just to try and maintain a basic level of connectivity.

The rollout of NBN (in its multi-technology mix) will significantly contribute to enhanced opportunities for farm businesses to take up emerging digital technology. The investment must be applauded.

However, before the rollout (particularly of the Long Term Satellite Service) can be hailed a success, farmers need further information on potential costs, data allowances and scheduled

¹⁴ CSIRO (2013) White Paper. 'Smart Farming: leveraging the impact of broadband the digital economy'.

¹⁵ Results available at http://www.graingrowers.com.au/images/30_policy/agriculture%20technology%20micro-survey%20results%202015.pdf

timeline for individual properties to be connected. The Interim Satellite Service has fallen well short of expectations and delivered a poorer service than what was previously available for many farming families. The National Farmers' Federation modelling¹⁶ has shown that even modest growth in demand for digital farming practices may exhaust the available bandwidth proposed by the NBN's Long Term Satellite Service.

Whilst GrainGrowers welcome the new investment from the Government, Telstra and Vodafone through the Mobile Black Spot Programme, the proposed new mobile towers are largely not located in the grain belts of Australia. Apart from Western Australia (where 58% of new towers are located in the grainbelt) and Victoria, other states' major agricultural areas have not benefited to the extent of other sectors. Continued investment by Government and the telecommunications sector on improved mobile coverage is a must, with modern agricultural practices requiring not just broadband, but also the ability to access data in the paddock. This issue, along with a range of others was highlighted in GrainGrowers recent submission¹⁷ to the Australian Government Regional Telecommunications Review.

More directly, the CSIRO's 'Smart Farming: White Paper' highlighted a number of challenges that still need to be addressed before the potential for digital services to assist the rural sector can be realised. These include¹⁸:

- Extending telecommunications connectivity from the NBN premise-based connections and mobile phone coverage to reach across farms and the natural environment through the use of local wireless networks.
- Making the provision of low-cost plug and play sensor systems for farmers simple to install and maintain.
- Adoption of open standards for sensor networks and data services making it easier to manage.
- Support for open data policies and practices by both governments and private enterprises to encourage sharing of data.
- Greater understanding of how decision support tools will be adopted and how they can enhance the capabilities of farmers and other users to be more productive.
- Developing greater maturity and scale for Australia's software and services industry for agricultural Applications.
- Detailed cost-benefit analysis of the benefits of smart farming specific to each agricultural sector at both farm and industry level, as well as understating broader benefits related to other industry sectors, environmental sustainability and quality of life for Australia's rural communities.

If Australia is going to remain globally competitive as a nation, we must ensure that a clear strategy is in place where sectors such as agriculture can work cooperatively with government to capture the benefits offered by the emergence of big data and digital technologies.

¹⁶ Submission available at:

<https://communications.govcms.gov.au/sites/g/files/net301/f/National%20Farmers%20Federation%20-%20Public%20Submission%20RTIRC%202015.pdf>

¹⁷ Submission available at

http://www.graingrowers.com.au/images/30_policy/submissions/graingrowers%20submission%20to%20rtirc%20july%202015.pdf

¹⁸ CSIRO (2013) White Paper. 'Smart Farming: leveraging the impact of broadband the digital economy'.

Emerging plant science technologies

The advancement of science in fields such as biotechnology and agricultural chemicals has been a key factor in maintaining productivity growth in Australian agriculture. For both biotechnology and agricultural chemicals it is important that R&D continues into improved products and also that regulatory hurdles do not place unwarranted barriers to use.

Biotechnology

Future R&D into biotechnological improvement of grains and genetically modified (GM) crops is essential to the sustainability of the industry particularly with increasing challenges around natural resource management and changing climate conditions. The responsible and strategic application of biotechnology by the agriculture sector can result in significant benefits for Australian farmers, the environment, consumers and the Australian economy as a whole¹⁹.

Scientific bodies and regulators around the world (including the Office of Gene Technology Regulator - OGTR) have continued to declare GM crops and the food they produce as safe. However, the challenge for uptake continues with community and market acceptance. Unfortunately, this is the case for many emerging agricultural technologies.

Recent research²⁰ undertaken on behalf of the OGTR has dissaopintingly found that there has been a drop in both awareness and support for gene technologies in Australia since 2012. However, the research also found that most support or rejection of GM foods was conditional, and is likely to move based on knowledge of regulation or scientific evidence of safety.

Each day farm businesses battle through a myriad of difficult-to-understand, complex or duplicative regulations, making it difficult for farmers to ensure Australia has an ongoing, reliable and sustainable source of domestically produced food and fibre²¹. An increasingly important area is regulations and standards that respond to community concerns about various aspects of agriculture, such as environmental sustainability and new technologies.

For example, an issue that is likely to have ongoing implications on agricultural productivity is the moratoria on commercial release of genetically modified (GM) crops, which have prevented farmers from adopting GM crops with regulatory approval, as well as reduced private sector investment in developing GM varieties adapted to Australia's conditions²².

This divide between Federal approval of a technology and state regulation of its use is reducing the potential for increased private-sector agricultural R&D investment in Australia²³. More importantly, these regulatory barriers are limiting the ability for farmers to choose the way in which they farm.

Opportunities in plant breeding also extend beyond biotechnology and investment in this field must also increase. Adopting improved non-genetically modified varieties to boost yield and/or assist in product differentiation is one option. Promising examples include salt-tolerant wheat and herbicide-tolerant oil seed varieties with improved yields²⁴.

¹⁹ Blueprint for Australian Agriculture, 2013-2020

²⁰ Instinct and Reason, Prepared for the Office of Gene Technology Regulator (June 2015) Community Attitudes to Gene Technology

²¹ NFF Issues Paper, *Red Tape in Australian Agriculture*, 2013

²² Gray, EM, Oss-Emer, M and Sheng, Y 2014, *Australian agricultural productivity growth: past reforms and future opportunities*, ABARES research report

²³ Australia Farm Institute, (March 2011) *Private Sector Investment in Agricultural Research and Development (R&D) in Australia*.

²⁴ ANZ insight, 'Greener Pastures: The Global Soft Commodity Opportunity for Australia and New Zealand', Port Jackson Partners, 2012

Agricultural chemicals

Grain farming businesses require safe access to a full range of effective chemical products to run profitable farms. While the Australian grains industry is a major exporter, it is relatively minor on a world production scale, and therefore is only a small market for the sale of agricultural chemicals. Due to small market size and strict regulatory requirements, market failure can often exist and Australian farmers miss out on products available to their international competitors.

In addition to indigenously-generated knowledge, Australian agricultural productivity is likely to be influenced by spillovers of technology from other countries. R&D carried out overseas can be a source of spillover productivity gains, whether as ideas gained from the research of others or through foreign technology adapted to suit local conditions²⁵. This presents an opportunity for the Australian grains industry to benefit from international knowledge development, but also provides a challenge for policy makers – to ensure that Australian policy settings actively encourage transfer of international R&D for the benefit of Australian farmers.

When considering collaboration with international partners in agricultural R&D, it is critical to ensure that the investment provides benefit directly to Australian producers and does not provide a greater benefit to international competitors. For example, each project invested in international agricultural development (for example through Australian Centre for International Agricultural Research) should be able to adequately demonstrate a benefit to Australian farmers.

Australia must play a proactive role to ensure that safe and effective products are suitable for the Australian environment and can be brought onto the Australian market. The current cost of weeds to the grains industry in Australia alone is estimated at almost \$3.3 billion a year. Australia has the second highest number of herbicide-resistant weeds in the world and collaborative partnerships, such as that recently announced²⁶ between the GRDC and Bayer CropScience will become increasingly important.

However, ‘non-drum’ solutions are also an integral solution to profitable farming systems in Australia, underpinning the importance of the partnership between farmers and government with the GRDC. Within this RD&E model, there is a need to maintain a focus on a variety of farming system options, allowing individual farming businesses to make the decision regarding the most appropriate farming methods for their operation.

Conclusion

Technology can and does play a significant role in driving Australian agricultural productivity. The Australian grains industry has continued to demonstrate an ability to develop and adopt game-changing technologies to remain internationally competitive. This submission does not cover all the factors contributing to increases in agricultural productivity, but explores a number of the items identified in this Inquiries Terms of Reference.

GrainGrowers would be happy to provide further details on any of the matters outlined through this submission or other factors that the Committee sees as valuable in exploring throughout the inquiry.

²⁵ Sheng, Y., Gray, E., Mullen, J., & Davidson, A. (2011). *Public investment in agricultural R&D and extension: an analysis of the static and dynamic effects on Australian broadacre productivity*. ABARES

²⁶ Collis, Brad. (June 29, 2015). *GRDC joins major global assault on crop weeds*. Grains Research Development Corporation. Retrieved from: - <http://www.grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-117-July-August-2015/GRDC-joins-major-global-assault-on-crop-weeds>