



*Advancing Australian Cotton*

Committee Secretary

House of Representatives Standing Committee on Agriculture and Industry

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2<sup>nd</sup> October 2015

To The Committee Secretary,

**RE: The role of technology in increasing agricultural productivity in Australia**

Thank you for the opportunity to comment on the Department of Agriculture's inquiry into the role of technology in increasing agricultural productivity in Australia, September 2015. In addition to this submission, Cotton Australia would be happy to present to the inquiry to further discuss any issues contained in this document.

Cotton Australia is the peak representative body for the Australian cotton growing industry worth over \$1.25 billion in export earnings in the 2014–15 season and supporting up to 10,000 people in the workforce. Cotton Australia collaborates with R&D providers and growers to foster innovation and implement change across the industry.

The Australian cotton industry is internationally recognised as innovative, dynamic and hugely successful. Australian cotton is world leading for yield and quality and is underpinned by a world-class best management practice system that aligns with global initiatives for delivery of responsibly produced cotton. This success is due to industry investment in world-class research and rapid adoption of emerging science, innovations and technology to drive profitability.

However, the environment in which the industry operates at a farm, industry and international scale is rapidly evolving. Increased volatility in production, prices and climate, combined with rising input costs, shortages of skilled staff, cotton's declining share of the global fibre market, and rapidly emerging technologies all suggest that the future for the industry is going to be increasingly complex. Flexibility and innovation will be at the very heart of meeting these challenges. Key areas that will drive innovation and ensure that the cotton industry meets upcoming challenges include:

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- Strong relationships between R&D providers, researchers, policy staff, extension staff and local grower/industry groups
- Established R&D framework underpinned by compulsory and voluntary levies as well government co-contribution
- Significant guidance from local grower and industry groups driving research, stewardship activities and policy direction
- An established extension network to drive adoption of innovation
- A world-leading best management practice program that facilitates global market demand for responsibly produced fibres and fabric.

### **Improvements in the efficiency of agricultural practices due to new technology, and the scope for further improvements**

#### ***Best management practice***

The Australian cotton industry has continued to embrace and implement innovation strategies since its inception in the 1960s. However, the development and delivery of a recent Best Management Practice (BMP) strategy for cotton has transformed the way that cotton is grown in Australia. The delivery of user-friendly digital (web and mobile based) platforms has delivered significant efficiencies for streamlining whole farm management options and availability of information, ranging from legislative requirements through to emerging scientific advances. Government support and recognition of these initiatives including consideration of incentives/decreased regulatory burden for growers certified to auditable best management programs will aid in increasing farm efficiency, and increasing outreach of such programs within agricultural communities. It may also encourage a greater number of agricultural industries to invest in a best management program, thus increasing the overall social and environmental responsibility of Australian agriculture and providing access to premium markets.

#### ***Whole farm approaches for production efficiency***

Significant efficiencies have been gained through implementation of technologies enabling whole-farm approaches to maximising yield while minimising inputs and losses. The research underpinning these approaches has been largely derived from R&D levies. Some components of this whole farm efficiency-maximization approach include;

- Digital (particularly mobile) platforms have enabled delivery of decision support tools for rapid and science-based real-time decision making. These platforms empower consultants and growers to implement strategies that maximise yield and quality while minimising chemical, energy and labour inputs.

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- Yield loss minimisation through adoption of technologies and novel approaches for plant breeding for disease, pest and abiotic stress resistance.
- Delivery of integrated management strategies for insect and herbicide resistance, including use of transgenic technologies. For example, implementation of an integrated pest management system (including transgenic insect resistant cotton), has decreased pesticide use by 95%, resulting in significant efficiency gains in chemical usage, labour requirements and environmental stewardship.
- Nutrient and water use efficiency strategies including incorporation of rotation crops, tillage and holistic soil management. For example plant-based irrigation scheduling, planting/row configuration and minimisation of evaporative losses have increased the water-use efficiency of cotton by 40%. Nitrogen use efficiency currently sits at approximately 50% and is thus still a major challenge for the industry.
- Increased picking efficiency including labour, time and cost savings through adoption of integrated picking solutions such as the John Deere 7760 picker
- Smarter ginning technologies that decrease contamination without compromising yield or quality.

### Recommendation 1

Continued support of government initiatives to promote adoption of innovative agricultural practices including;

- Continued support for R&D levies;
- Continued support for non-traditional funding mechanism (e.g. the Rural R&D for Profit programme);
- Consideration of incentives for investment in research, to stimulate investment in research;
- Consideration of recognition and support for industry Best Management Programs and;
- Consideration of provision of incentives (including reduced regulatory burden) for growers compliant to auditable Best Management Programs, particularly around biotechnology and agricultural chemicals.

### Emerging technology relevant to the agricultural sector, in areas including but not limited to telecommunications, remote monitoring and drones, plant genomics, and agricultural chemicals

#### Multi-peril insurance

The advent of multi-peril insurance products provides a new tool for growers to manage their risk profile. Available advice indicates that yield potential may be restricted as a consequence of risk aversion of farmers due to climate uncertainty and limitation on capital.

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The use of multi-peril products provides a buffer for growers to manage production uncertainty through compensation in the event of crop loss. The factors that are covered through an insurance product (and triggers for compensation) are determined through negotiations between growers and insurance companies.

With increasing variability as a consequence of climate change, risk management through many mechanisms including:

- Risk mitigation: farm diversification, provision of farm management deposits / cash reserves, best practice management (optimisation of inputs, timing of sowing / harvest / irrigation)
- Risk transfer (multi-peril or index insurance)

will become increasingly important.

Cotton Australia acknowledges an opportunity to investigate customization of multi-peril insurance products for cotton dryland and irrigated cropping systems and to provide growers with more opportunities to fully explore the potential of multi-peril and other risk mitigation products for the purpose of risk-transfer.

#### **Recommendation 2**

Cotton Australia is highly supportive of the initiatives announced by the Federal Government that will reduce the level of uncertainty in cotton production. These include Government support for;

- Uptake of insurance and risk management advice;
- Accelerated depreciation for on-farm storage and water facilities;
- Improved climate forecasting and investment in an expanded weather station network and;
- Facilitation and encouragement of Farm Management Deposits.

#### **Energy**

The energy space is highly dynamic with technology advances leading to large shifts in traditional modes of supply and demand. Given the highly regulated market in Australia, which dictates prices paid for electricity and gas across the majority of States and Territories, the ability for innovation to be adopted by the sector is restricted.

Cotton Australia has observed individuals changing their energy consumption patterns as a direct result of high electricity prices, in particular network charges. Change, being led at this individual level, is resulting in reactive responses by network companies. We believe that without significant innovation and change to the status quo the networks will be severely underutilised thus, penalising those users who remain connected, and feeding a network “death-spiral”.

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The advent of mass manufacture of Tesla batteries, delivered as a patent free technology, represents a significant shift in the energy space. Solar, previously unable to meet electricity demand outside radiation hours, will now be able to be drawn upon at both a household and manufacturing scale. The shift this will cause cannot be underestimated. Tesla has announced it will target the Australian market due to existing high levels of photovoltaic installation in both New South Wales and Queensland.

Cotton Australia participated in the *Review of Governance Arrangements for Australian Energy Markets*. Given the Governance structures in place, we believe it is the role of the COAG Energy Council to drive change and innovation within the Australian Energy Market. The network companies have demonstrated an underwhelming drive to invest in innovative and future thinking solutions and as such Government should provide this leadership. We believe encouragement of demand management solution and innovation to drive down operating costs is needed to sustain a viable electricity network.

Continued Government investment in ARENA and the Clean Energy Finance Council will also serve to drive alternative energy and energy efficiency solution to meet ongoing energy demand. Cotton Australia is highly supportive of the Government continuing to support these agencies.

#### **Recommendation 3**

COAG Energy Council to drive change and innovation within the Australian Energy Market through encouragement of demand management solutions and innovation by network companies to drive down operating costs to sustain a viable electricity network.

#### **Recommendation 4**

Government to continue investment in ARENA and the Clean Energy Finance Council to drive alternative energy and energy efficiency solutions

#### **Precision Agriculture**

Soil is a largely untapped resource in Australian agriculture with potential to enhance productivity with precision based management.

During the 2015 conference *Soil and Big Data* it was stated that existing decision support tools have indicated that there are 40 key decision making points in each cropping season of which 30 are soil related.

Case studies have highlighted what can be achieved when the soil resource is managed from the ground up. Where return on capital was employed as a metric for decision making as opposed to yield, with soil potential used to

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drive input decisions, improvement of \$2.7 million to the bottom line was made over a period of five years for one farming enterprise.

Australian soil researchers have a large amount of existing information available through the *Soil and Landscape Grid of Australia*. There has been significant investment in determination of priorities for soil research in Australia to drive agricultural productivity.

Cotton Australia would commend the Government to invest in the priorities identified within the Soils Research Development and Extension strategy, particularly

- Finding solutions to soil-based constraints to agricultural productivity
- Capture, verify and communicate innovation in soil management.

It is acknowledged that the analytics of available data is key to delivering productivity outcomes from the information currently collected by growers. Given the importance of soils within this decision making process, research and understanding around best practice will be key to delivering ongoing productivity gains.

#### **Recommendation 5**

The Australian Government invest in key priorities of the Soil Research, Development and Extension strategy through the Rural R&D for Profit programme as a means to drive agricultural productivity.

#### **Biosecurity**

Quarantine controls at the Australian border currently serve to protect our \$32 billion agricultural industries as well as our communities and environments.

An established framework exists for responding to exotic pests and diseases through the Emergency Plant Pest Response Deed. The response of industries to eradication through this framework is based on intra-commodity funded R&D for detection, preparedness and response plans.

Efficiencies could be gained from strategic collaboration on key multi-commodity pests including early detection and preparedness. Implementation of cross-sectoral contingency plans may be particularly important as development continues to move north, toward the Torres Strait.





#### **Recommendation 6**

The Government increase investment in key priorities of biosecurity through the Rural R&D for Profit programme as a means to protect agricultural production systems and market access.

#### ***Agricultural chemicals***

Application of agricultural chemicals is a complex and ever-evolving space. The Cotton industry welcomes recent industry consultation for APVMA pesticide reform and requests that the government continue to prioritise industry consultation in the agricultural chemicals space.

The cotton industry's Best Management Practice holds growers accountable to legislative requirement, best practice standards as well as innovative practices for storage, handling and disposal of agricultural chemicals through an auditable accreditation program. Cotton Australia would commend the government to acknowledge and support these programs through consideration of incentives including decreased regulatory burden to encourage uptake of innovative and efficient processes for implementation of on-farm best management practice.

Innovations in biotechnology, particularly transgenic cotton crops for increased herbicide and insect resistance have drastically improved productivity whilst minimising chemical inputs. Since 1996, the production area sown to transgenic crops has risen to 99% and has been accompanied by a 95% decrease in insecticide application.

The current regulatory systems for registration and compliance auditing of transgenic crops and over-the-top herbicides sufficiently service the current industry where the number of trait providers and traits is limited. However this regulatory system is limiting to further innovations for transgenic herbicide resistant crops including crops stacked for resistance to a number of herbicides with different modes of action. Streamlining the regulatory process for registering and auditing transgenic herbicide resistant crops would enable the industry to embrace future transgenic innovations, held accountable to science-based and industry endorsed resistance management plans.

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#### **Recommendation 7**

Australian government to consider supporting processes that decrease regulatory burden including;

- Supporting availability of incentives (including reduced regulatory burden) for users of agricultural chemicals registered to an auditable accreditation program;
- Consideration of streamlining the process for registration, auditing and compliance for over-the-top herbicides for transgenic herbicide resistant crops and;
- Continued industry consultation for review of agricultural chemicals and their application.

#### ***Autonomous farming***

Significant research and development is currently being undertaken in the robotics space, with elegant solutions already designed for application in agriculture. A recent presentation by representatives from the Australian Centre for Field Robotics highlighted the use of robots for precision pest management and yield prediction, as well as the use of autonomous small vehicles to reduce the prevalence of soil compaction.

Cotton Australia encourages the government to do what it can to facilitate investment within the robotics space as labour remains a significant cost and introduces aspects of human error whereas automated decision making will provide movement on some of these issues whilst continuing to improve productivity and reduce volatility in an efficient manner. We also encourage government to consider how they would operate in the robotics space and monitor developments in this space but caution against premature regulation.

#### **Recommendation 8**

Cotton Australia would commend the government to consider;

- Any options for facilitation of investment within the autonomous farming space and;
- Operational options for this space (without encouraging regulation at this point in time).

#### ***Agri-intelligence systems and big data***

Advances in agri-intelligence systems are complementary with advances in the autonomous farming and precision agricultural spaces mentioned above. Agri-intelligence Systems target the increasing complexity of farming enterprise operations arising from both increasing volumes of data and looking to optimise operations more tightly, and at finer scales, than ever before.

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Agri-intelligence Systems that combine information infrastructure, risk analytics and modelling in an interoperable way help to deal with different scales of variability in the production system in space and time, reduction and optimisation across all inputs including labour, transport, energy, water and chemicals and improved decision-making under uncertainty.

Efficiencies would be gained by development of a common framework that supported industries to collectively own, share and use information with an initial focus on integrating and leveraging existing data sets to benefit growers, which are currently limited by their fragmentation

#### **Recommendation 9**

The Australian Government to do what it can to

- Facilitate investment within the agri-intelligence systems and big data space and;
- Encourage co-ordination and collaboration across agricultural industries.

#### ***Investment in R&D levies***

Through investment in R&D levies, the cotton industry will be able to deliver on the following emerging innovative approaches and technologies;

- Derivation of income from all biomass produced on farm including (but not limited to) natural resources and agricultural by-products.
- Biotechnological and genomic techniques and applications for improved plant resilience
- Nutrient use efficient plants with more efficient photosystems and capacity for nitrogen fixation
- Low input crops that are stress resistant, insect resistant and self defoliating
- Innovative approaches for integrated pest management
- Renewable energy and atmospheric water-harvesting resources
- Water use efficient and drought prepared production systems under imposed water constraints
- Innovative fibres and fabrics including mosquito repellent clothes and functional garments
- Derivation of value from non-lint fractions of the cotton plant including seed oil, food, pharmaceuticals and energy.
- Innovation and expansion of existing systems for improved traceability between the farm and customer
- Transforming the product manufacture process including 3D printing of cotton fibres

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#### **Recommendation 10**

The Australian government maintains the current funding R&D structure and level of investment to enable identification of innovative approaches and technologies that improve productivity in a responsible manner.

### **Barriers to the adoption of emerging technology**

#### ***Digital infrastructure***

The cotton industry recognizes significant prioritisation of telecommunications in regional areas by the Australian Government. Investment in the black spot program and the national broadband network will significantly improve capacity of regional industries to capitalise on innovative technologies for efficient and productivity gains. Access to large data sets through digital platforms is a key driver for innovation in agriculture and this functionality relies on upload capacity. Hence we would encourage the Government to prioritise upload capacity for current and future digital infrastructure reform.

#### ***Regulation and regulatory platforms***

The cotton industry views streamlined and transparent regulatory processes as essential for attracting investment in agriculture as well as adoption of innovative technologies and processes. Significant industry consultation for the reform of regulatory processes for agricultural chemicals and biosecurity serves as an initial step in providing transparency and decreased regulatory burden in these spaces. Transparency and low regulatory burden are key drivers for delivery of innovative chemical and transgenic approaches for integrated pest management. Hence, we would encourage the government to continue to evaluate regulatory systems including intellectual property, licencing fees & processes, incentives and the length and complexity of regulatory processes as incentives for investment in Australian agriculture.

#### ***Collaboration***

Collaboration between research agencies, funding bodies and businesses provides an efficient and effective delivery mechanism for innovation in agriculture. The Rural R&D for Profit programme grants have a distinct requirement for collaboration and are hence a significant step forward to improving collaboration between research providers and private firms. We would like the Australian Government to continue to support initiatives that encourage coordination and collaboration of R&D across agricultural industries and also in conjunction with a

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variety of researchers, research agencies, funding bodies, businesses, producer groups and not-for-profit organisations.

### ***Managing for transformation***

Continuity of human capacity and corporate/research knowledge allow agricultural industries to implement long-term strategic research programs for incremental yet sustained productivity gains. Commitments to funding through R&D levies provide reliance and longevity for strategic research programs and development of human capacity. However succession planning and is a key challenge for agricultural R&D. Consideration of support for investment in sector-wide programs for education, leadership, mentoring and career support would greatly increase the capacity of the R&D sector as well as the efficiency of long-term strategic research efforts.

#### **Recommendation 11**

The Australian government consider evaluation of barriers to the adoption of innovation in agriculture including;

- Capacity to upload data for regional areas.
- Regulatory burden as a disincentive for investment in agricultural innovation.
- Capacity and willingness for collaborative and coordinated R&D efforts and;
- Succession planning and continuity of corporate/research knowledge.

Sincerely,

**Nicola Cottee**

Research Direction & Stewardship Policy Officer

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