AIA Submission into Innovation in Agriculture

Ag Institute Australia (AIA)[1] is pleased to make a submission on Innovation in Agriculture.

AIA is the peak body representing the professions of agricultural and natural resource management. AIA members include research and extension scientists, advisers, policy managers, consultants, agribusiness and farmers. The majority of our members live and work in rural communities.

AIA provides strong, independent, balanced and factually based representation and advocacy on a wide range of issues affecting the profession and agriculture generally. In recent times these have included agricultural education, rural communication, the Murray Darling Basin Plan, farmer response to greenhouse gas emissions policy, and rural research, development and extension (RD&E).

This submission makes use of our substantial background and experience in all areas of agricultural development as well as the outcomes of a recent Conference held by AIA in Western Australia which are provided at Attachment 1.

Terms of Reference

The inquiry will have particular regard to:

- 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.

Introduction

Productivity gains in agriculture depend on innovation. While productivity gains in certain agricultural production systems have been substantial (over 1.5% per annum), they have been more modest in others. Over the last three decades, for example, the cotton industry gains in productivity have exceeded 1.5% per annum, but the gains in grains and sugar have been less than 1% per annum. In the grains, sugar and animal production industries, gains in the efficiency of water use and labour efficiency have been substantial.

These gains in productivity and efficiency are directly related to innovation.

[1] Ag Institute Australia is the business name for the Australian Institute of Agricultural Science and technology.

Productivity and efficiency gains have been derived from a mix of transformational and incremental innovations and the source of these innovations has been varied and unpredictable. However, they have all depended on strong strategic investment in public sector and private sector research, effective collaboration between the public and private sector and close engagement with producers.

In many cases, the transformational technologies have been created in the public sector, often at Universities and organizations like CSIRO and State Departments of Agriculture, then they have been developed and commercialized by the private sector and subsequently embraced by farmers.

Significant examples include the use of Genetically Modified (GM) crop varieties, the development of Global Positioning System (GPS) technologies and the widespread adoption of Zero Till, Controlled Traffic farming systems. Examples for the livestock industries include advances in genetics such as estimated breeding values and meat eating quality, including Meat Standards Australia (MSA).

These transformational innovations have had their origins in basic research, have depended heavily on commercialization within agribusiness and have been readily adopted by agriculture.

We use these examples to highlight the need for collaboration between the public and private sectors and the need to engage with farmers and their advisers throughout the development and adoption process.

Recommendations

1. Because innovation is essential to improving productivity in agriculture, the Government should continue to invest public funds into RD&E. Increased investment of public funds will also protect the contribution agriculture makes to the overall economy and increased funding should be targeted at improving the rate of productivity gain and maintaining competitiveness of Australian agriculture in global markets. Public funds invested in RD&E have excellent returns on investment (usually in excess of $9 for each $ dollar invested).

2. The Government should focus some of its investment in RD&E into enabling and supporting collaboration between the public institutions, the private sector and primary producers. This collaboration is essential in delivering benefits from investment in RD&E and requires specific attention. A re-invigoration and enhanced funding of new Cooperative Research Centres is warranted.

3. Because innovation from research is difficult to predict, investments must be made carefully, but not prescriptively. While some RD&E is aimed at problem solving, the innovations that have had a major impact on agriculture in the last two decades have often originated from "blue-sky" research that has originated in the public sector (Universities, CSIRO, State Government institutions) and effectively commercialised by the private sector. A concerted effort is required to reduce micro-management of over-prescriptive projects funded by R&D Corporations.

4. R&D Corporation and other Government funds should be invested in people as well as projects. The current Rural Research and Development Corporation model encourages a high level of accountability and focuses on projects with defined milestones. AIA accepts the need for accountability, but this closely managed project approach stifles innovation. In addition, CSIRO and State Departments of Agriculture have suffered from reduced funding, leading to reductions in staff numbers and greater reliance on R&D Corporation funding.

5. The Government should insist that adequate telecommunications be provided to rural Australia as well as to highly populated regions. Current technologies related to machine guidance and performance recording and new opportunities offered by technologies such as robots and drones depend on high-quality telecommunications technology. Much of rural Australia has poor access to adequate telecommunications.

6. The Federal Government should secure agreement from State Governments to have a single national regulatory framework for agricultural biotechnology and not limit innovation by scientists and farmers with countervailing state legislation. Advances in biotechnology are enabling faster advances in crop and animal breeding but Australian farmers and scientists are constrained by different legal barriers in various States.

7. Metrics for University performance must be reset to include industry impact as well as recognised publications. While universities have a crucial role in education, they

also have an essential role in research and they should be provided with incentives to deliver outcomes for industry in addition to incentives to deliver scientific findings. This will require a change in the current metrics of university performance with a focus on publications and citations to a culture of rewarding research impact.

8. Additional public funds should be invested in Extension to secure the greatest advantages from innovation. Agricultural Extension is an essential component of innovation and although the private sector is well placed to provide farm advisory services wherever they can derive benefit for their investment, a strong need for public sector extension services remains in those areas where the private sector cannot derive a profit from their activities with farmers. The areas which do not readily provide an income for the private sector include managing our landscape for future generations, regional approaches to pest and weed management, biosecurity, empowering producers with better knowledge and early stage innovation. State and Federal Governments continue to have an essential role in these areas.

9. Funding should be specifically applied to advanced training in Extension Methodology. Advanced skills in extension must be fostered and supported and should be provided to train extension professionals in both the public and the private sectors.

10. The re-establishment of a Land, Water and Climate R&D Corporation is warranted. Because of the unique nature of the Australian Landscape, the scarcity of our water resources for agriculture, the risks of drought, flood, frost, fire and other impacts, Australia must continue to invest in RD&E related to our landscape, our climate and our water resources. The continued support for farmer groups focussed on Landcare is also supported.

11. A specific effort by Government agencies and the R&D Corporations must be made to ensure close engagement with farmers in the processes of RD&E. This close engagement is an essential component of innovation in agriculture. While farmers must be involved in the process of priority setting for investments in RD&E, the process must be collaborative with scientists and other participants in the RD&E process. The reason for this is that farmers bring an understanding of the problems they face and the scientists bring an understanding of the current and recent research related to the topic and ideas on possible solutions.

12. The Federal Government should explicitly support Professional Accreditation for Agricultural Professionals. Because of the essential delivery of professional, sound, up-to-date technology to agriculture, a process of professional accreditation is required. AIA will be providing such a scheme but the AIA professional accreditation scheme would benefit from strong Government support.

Case Studies of Transformational Innovation in Agriculture

Modern Australian GM cotton varieties have delivered an 89% reduction in use of pesticides (comparing five year averages for the periods 2008-13 and 1998-2003) and a 40% increase in water use efficiency (1.1 bales/ML in 2000-2001 to 1.9 bales/ML in 2009-2010). The origins of this transformational technology began with the discovery of the structure of DNA. This has been attributed to Watson and Crick who first published their work in *Nature* 1953. This was "blue-sky" research. Later, in the early 1970s, the first genetic transformations were made, again, with university research, and in 1986, the first field trials of genetically engineered plants were grown in France and the USA.

Although Monsanto did not discover the genes for insect resistance and herbicide resistance, they licenced this technology and in Australia they worked with the CSIRO cotton breeding program and Cotton Seed Distributors who produced the seed for farmers to plant. The CSIRO cotton breeding program provided the regionally adapted, disease resistant varieties with high quality fibre attributes into which the insect resistant genes were introduced. Local Australian research and extension provided the essential knowledge to deliver Integrated Pest Management to the industry, as well as the insect and weed resistance management strategies. Crop consultants provided the necessary farm advice to enable rapid farm uptake.

Initially the first Bt cotton varieties were released in Australia in 1996 (Ingard cotton containing the Cry1Ac gene). We now have commercial cotton varieties with two Bt genes (Cry1Ac and Cry2Ab) and two genes for glyphosate resistance (RoundUp Ready Flex). Varieties with a third gene for insect resistance (Vip3A) will be commercially trialled in the 2015-2016 summer.

We use this example of transformational innovation because it highlights the role of Universities and CSIRO in the "blue sky" research, the role of agribusiness (Monsanto and CSD) in the commercialisation of the technology, the local publically-funded research and extension effort in delivering the field technology and the private consultants in enabling farmers to make full use of the technology. The collaboration of all the necessary parties in the innovation was essential.

The second case study is the transformational innovation of minimum tillage and controlled traffic farming in Australia. Machinery guidance, based on GPS (Global Positioning System) technology has its origins in the military use of the technology. The United States Government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver, but the use of GPS technology for tractor guidance had it origins in various US and Australian Universities (e.g. http://sydney.edu.au/agriculture/pal/publications_references/educational_resources.shtml). This was then taken up by machinery manufacturers who now market their machinery with advanced GPS systems. Zero tillage initially relied largely on the effective grass and broad-leaf herbicide, glyphosate. The herbicide was discovered by a Monsanto chemist in 1970 and marketed as Roundup. Monsanto produced and marketed the herbicide until 2000 when its patent expired. The herbicide is now produced and marketed by a large number of

manufacturers in addition to Monsanto. A range of other herbicides are also now used in zero tillage production systems.

For farmers to make use of the technology they needed to solve a number of technical problems. They needed planters that could plant a crop under standing stubble and they needed effective and efficient spraying systems that effectively controlled weeds but did not produce a drift hazard for neighbouring crops. They required harvesting systems that matched their planting and spraying wheel tracks and distributed stubble evenly to enable planting of the following crop.

Weeds with herbicide resistance have emerged and the public sector agencies (State Departments, Universities etc.) have developed strategies to manage the change in the genetics of the weed population. Farm advisors have provided the advice farmers need for herbicide selection and crop establishment, and farm machinery firms have marketed the GPS guided machines that enable the overall system to work effectively.

We use this case study to again reflect on the role of the publically-funded research to develop the fundamental ideas (and in this case, government support for the satellite guidance systems), private sector investment to market the herbicides and machinery, and farm advisors who have accelerated the adoption process. The publically-funded RD&E has been essential to the delivery and maintenance of the technology, and on-farm innovation has enabled refinements and advances that have been adopted across Australia.

It is worth noting that farmers have been involved in the guidance innovation from the outset. The Mailer family in northern NSW developed the "Beeline" guidance system which ultimately transformed into the guidance system which now uses GPS technology.

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

The use of new technologies has always been a feature of agriculture, but the past 40 years has seen a revolution.

We will cite just a few examples:

1. No till or minimum farming has revolutionised crop farming systems in terms of productivity and in the care of land resources. These practices have increased productivity, improved water infiltration and reduced soil erosion. They have also reduced farm risk. Because these practices require increased reliance on herbicides they have resulted in a build-up of herbicide-resistant weeds and these production systems require on-going RD&E.

2. Variable rate technologies provide for more effective application of fertilisers according to land capability and crop need. They provide efficiency but require continued work in equipment engineering and electronics, land capability survey, as

well as farmer training in their use. Similarly the timing of fertiliser application has been improved through the use of within-season forecasts and yield prediction models. These technologies can certainly improve efficiency but do come at a cost. We have seen in recent years some farmers and consultants returning to alternative systems using crop legumes and pastures as a source on N and a disease break. Farm Systems groups along with consultants, industry and government agencies are well suited to this work, but again need direction and encouragement.

3. The regulatory and societal requirements of livestock farming are growing in complexity, and as a result there is a significant need for ongoing technological development to both underpin productivity gains and to protect animal welfare and environmental values. Precision Livestock Management (PLM) is in an early stage of development and application in Australia, and offers the opportunity to move away from intuitive decision-making. Automation, the use of sensors and detectors, agricultural robotics (e.g. http://confluence.acfr.usyd.edu.au/display/AGPub/Welcome+to+Agriculture+at+ACFR) laser imaging technologies, use of unmanned aerial vehicles and satellite and infrared/thermal remote sensing imagery, all offer the opportunity to collect fine-scale data on animals and farm resources, and to also monitor and manage production systems at the landscape scale, to facilitate productivity gains, to enhance resource-use efficiency, to lead to more precise herd and land management decision-making, and produce better sustainability outcomes. Continued support must also be provided to understand diseases and disease control, epidemiology and disease management to underpin biosecurity.

4. At the unit of production scale, PLM is made possible by monitoring each individual animal, and will become more effective by continuing research efforts to target genetic, disease control and nutritional outcomes in order to optimise animal production. At the farm level, efforts are needed to rekindle pasture breeding and agronomy, and farming systems integration. Tools to automatically and remotely measure and monitor the live weight and condition of livestock, and be able to predict future pasture and range condition would allow producers to make more accurate, informed and timely decisions.

5. At the landscape scale, research is being undertaken to improve the understanding of animal and herd behaviour so that impacts on the environment are better understood. Improved livestock management decisions at this scale can significantly and positively impact on environmental values such as land condition and biodiversity. Continuing research funding is needed to build these robust and reliable technologies, and to integrate them into management systems, so that Australia can continue to benefit from the large export earnings contributed by the livestock sector.

6. In the southern Murray Darling, there has been a revolution in irrigation methods in the last 30 years with systems such as micro irrigation, laser levelling, and water applied according to crop requirement. This has not only improved irrigation and

crop water use efficiency and productivity but reduced salinity and water use. This has had enormous environmental benefits. It is still a key component of the Murray Darling Basin Plan and has been a real success story with much of the technology developed in Australia. With the loss of the Land and Water Corporation some years ago, and the conclusion of the Irrigation Futures CRC, the emphasis has gone out of irrigation RD&E (as well as soil and land management generally), and needs urgent Commonwealth attention. These are areas which have broad rather than specific industry application and are often long term, both of which make them unattractive to industry-based Research and Development Corporations (RDCs). In the northern Murray Darling, research and extension emanating from the Irrigation Futures CRC has had an enormous impact on irrigation efficiency and crop water use efficiency. Funding for this work needs to be re-established.

7. Linked to this is the need for increased capacity in agricultural engineering. Apart from Southern Queensland and small cells elsewhere, Australia has let this area slide and needs to rebuild it. This is not just in machinery (as it is often seen to be) but in electronics, water hydraulics, etc. Frequently agricultural engineering has been combined with general engineering at University level, with resultant loss of emphasis on agricultural issues and opportunities.

8. GM technologies have had a major impact on industries such as cotton and canola. Research continues on genetic solutions to drought and salinity but the concern remains that some government policies, will put such research and its subsequent adoption at risk. This is hardly an environment which will encourage continued development, either by public agencies or private companies (where most of the capacity exists). States such as South Australia already see this impact. Continued joint development is essential given Australia's unique environment and agricultural systems which make it difficult to apply research results from overseas without substantial adaptation. Whilst adoption is a State issue the Commonwealth needs to provide reassurance of its commitment to GM technology development and adoption.

9. Horticulture is an area with enormous potential for further improvement and yet the capacity for teaching and RD&E across Australia is seriously lacking. There are few courses at University level, major research facilities have closed and overall capacity at public and private levels has diminished. The industry itself is divided and lacks overall vision, partly because horticulture is comprised of a large number of relatively small industries, many of which lack critical capacity to conduct programs of the size required. With the loss of capacity in CSIRO and State Departments of Agriculture there is now a lack of capacity to develop and extend innovation across a major industry sector. What is at stake is much of Australia's potential to meet its own and world food targets for years to come, as well as effectively manage its scarce land and water resources deployed in horticulture.

Recommendation 1. Government should continue to invest public funds into RD&E

Because innovation is essential to improving productivity in agriculture, continued investment of public funds in RD&E is required. Increased investment of public funds will also protect the contribution agriculture makes to the overall economy and increased funding should be targeted at improving the rate of productivity gain and maintaining competitiveness of Australian agriculture in global markets. Public funds invested in RD&E have excellent returns on investment (usually in excess of $9 for each $ invested).

Recommendation 2. Government should focus some of its investment in RD&E into enabling and supporting collaboration

Collaboration between the public institutions, the private sector and primary producers is essential in delivering benefits from investment in RD&E. This requires specific attention. A re-invigoration and enhanced funding of new Cooperative Research Centres is warranted.

Recommendation 3. Because innovation from research is difficult to predict, investments must be made carefully, but not prescriptively

While some RD&E is aimed at problem solving, the innovations that have had a major impact on agriculture in the last two decades have often originated from "blue-sky" research that has originated in the public sector (Universities, CSIRO, State Government institutions) and effectively commercialised by the private sector. A concerted effort is required to reduce micro-management of over-prescriptive projects by R&D Corporations.

R&D Corporations should be setting directions and funding research, but they should not be managing the research as they are tempted to do. R&D corporations must develop a more inclusive process of priority setting, involving not just farmers and officers close to today's markets, but also drawing on research personnel capable of exploring future and emerging needs.

Recommendation 4. R&D Corporation and other Government funds should be invested in people, not only in projects

Invest in people, not only in projects. The current Rural Research and Development Corporation model encourages a high level of accountability and focuses on projects with defined milestones. AIA accepts the need for accountability, but this closely managed project approach stifles innovation. In addition, CSIRO and State Departments of Agriculture have suffered from reduced funding, leading to reductions in staff numbers and greater reliance on R&D Corporation funding.

Fortunately, some of the R&D Corporations have acknowledged this and have invested in positions within these organisations and within consultancy businesses. Because there has been a decline in capability to undertake RD&E, more funding needs to be directed to employing personnel, not just investing in operational aspects of projects.

Emerging technologies

Some of these have been covered above. There is no doubt that the use of robots, drones, telecommunications etc. will grow. Much of this new technology depends on high-quality telecommunications technology, and much of rural Australia is not sufficiently well covered by mobile phone networks. For example, the latest model tractors with GPS guidance, field mapping etc. rely on telecommunications for data upload and access. Good mobile phone coverage for data is no longer a luxury, but a necessity for modern business.

Recommendation 5. The Government should insist that adequate telecommunications be provided to rural Australia as well as to highly populated regions.

While advances in biotechnology are enabling faster advances in crop and animal breeding, Australian farmers are constrained by different legal barriers in various States. Clearly, we have a single, effective, national regulatory authority. This should not be compromised by individual State political decisions and countervailing legislation. Farmers must be afforded the choice to use these modern technologies provided the national regulatory approvals are in place.

Recommendation 6. The Federal Government should secure agreement from State Governments to have a single national regulatory framework for agricultural biotechnology and not limit innovation by scientists and farmers with countervailing state legislation.

One of the other emerging technologies stems from the current availability of data from various electronic devices now used on farms. This data must be effectively analysed and interpreted to make useful management decisions. Not only must we have effective data collection systems, but useful analytical tools. "Big data" also must be analysed in the context of understanding natural variability (which is present in all biological systems) and for this reason, farmers and their advisors must be offered more training in biometrics as it applies to their use of on-farm data.

We need to be cautious not to be captured by the "new" without getting the greatest benefit from what already exists. Researchers and their agencies are by their nature (and reward systems) attracted to the new rather than explore the further development and adoption of existing technologies.

Barriers to Adoption of Emerging Technology

Given that much of the improvement comes from improvements in management rather than from individual technologies, an understanding of the farming systems within which farmers make decisions is critical. Too often we concentrate on the benefits of individual technologies and we do not appreciate the multiplier impact of a number of such technologies in the system. The combination of new varieties, no till, time of sowing, and timely application of herbicides and fertilisers is a case in point. Farmers are now realising

the importance of this interaction not just in terms of production but in profits and the management of risk. This has important implications for research and extension in the manner in which information is presented, and highlights the importance of collaboration involving farmers, scientists and consultants from both the public and private sectors.

Achieving adoption requires an understanding of the sequence of the adoption process – awareness > information > trial > adoption. Information only assumes a value when there is a perceived need and when it is presented in a form on which decisions are made. This is really no different from marketing any product. As scientists we often assume that because we provide information that the client will adopt it (and is often criticised if they do not). Much of the output from research that we see covers only awareness and mainly information. Even then it frequently does not hit the farmer or adviser target.

A good case in point is articles in scientific journals which whilst they might be a yardstick for success by Universities and some other research bodies, are rarely read by anyone else or are in a form that is difficult to understand. This applies to advisers who often need to be the first audience to be convinced.

While universities have a crucial role in education, they also have an essential role in research and they should be provided with incentives to deliver outcomes for industry in addition to incentives to deliver scientific findings. This will require a change in the current metrics of university performance from a focus on publications and citations to a culture of rewarding research impact.

Recommendation 7. **Metrics for University performance must be reset to include industry impact as well as recognised publications**

AIA recognises the inherent difficulties in measuring industry impact, and that it can take time for activities to produce change and for this change to become a measurable benefit. None-the-less, various well-established metrics can be used to assess impact and likely impact along the chain of innovation.

The key to success is to engage farmers and their advisers in determining the issues of importance to them and then involving them in the process of development. This is where farmer groups have been so successful and need to be fostered.

However there is now an important problem in the system. With the substantial withdrawal of State Departments from field applied research, development and extension, the private consultants and commercial firms have been left to fill the gap. Frequently they lack the capacity to do so given that their key priority is to serve the clients who pay fees. This limits validation of research in the field. This in turn limits access to research information and limits its application in the farm system especially in terms of the profitability and risks involved.

A lack of farmer adoption is not a lack of research information per se, but a weakness in field adaptation and extension of the RD&E process. The Commonwealth (through Standing Committees) needs to urgently address this issue with the States and the R&D Corporations.

Recommendation 8 **Additional public funds should be invested in Extension to secure the greatest advantages from innovation**

Extension is an essential component of innovation in agriculture and requires investment of public funds. The private sector is well placed to provide farm advisory services wherever they can derive benefit for their investment. A strong need for public sector extension services remains in those areas where the private sector cannot derive a profit from their activities with farmers. The areas which do not readily provide an income for the private sector include managing our landscape for future generations, regional approaches to pest and weed management, biosecurity, empowering producers with better knowledge, early stage innovation etc. State and Federal Governments continue to have an essential role in these areas.

Advanced training in Extension Methodology must be fostered and supported. Advanced skills in extension are applicable in the public and private sectors.

A number of R&D Corporations have observed the reductions in critical RD&E positions in State Departments of Agriculture. This reduction in staffing has had the direct impact of reducing the capacity to accelerate adoption of new technology but has the "knock-on" effect of the Departments of Agriculture no longer serving as a "training ground" for professional consultants. This has led to a shortage of young professional consultants and the appointment by some agribusiness firms of under-qualified field staff.

MLA for example, has addressed the shortage of consultants with a Future Livestock Consultants program. This program enables the appointment of new graduates within consultancy firms for two years of mentored professional development. AIA strongly supports this program.

Likewise, the Grain Research and Development Corporation has funded positions in State Departments of Agriculture to make appointments in crucial professional areas. AIA strongly supports this program.

Recommendation 9. **Funding should be specifically applied to advanced training in Extension Methodology**

Effective Extension is the key to adoption of innovation by farmers and their advisers, yet there is very little extension training capacity left in Australia. This is an area we suggest be taken up by the Inquiry with recommendations that the Commonwealth/States/RDC's jointly fund the development and delivery of a range of extension training initiatives across Australia.

Because of the unique nature of the Australian Landscape, the scarcity of our water resources for agriculture, the risks of drought, flood, frost, fire and other impacts, Australia must continue to invest in RD&E related to our landscape, our climate and our water resources. Individual R&D Corporations have invested in this area and in some cases have done so collaboratively. However, the focus on our natural resources and management of farming systems within our constraints of water shortage and climate variability must be sharpened.

The continued support for farmer groups focussed on Landcare is also supported as is the recent economic appraisal of the benefits of the investment in Landcare.

Recommendation 10. The re-establishment of a Land, Water and Climate R&D Corporation is warranted

Farmers can have an instrumental role in innovation, by helping define the problem or by contributing their own creativity. As mentioned previously, farmers were intimately involved in guidance technology for farm machinery. Other examples are the biopesticide "Vivus" where an innovative farmer working closely with field entomologists found a new way to mass produce this insect virus biopesticide. This product is now marketed in Australia and internationally.

The involvement of farmers in the innovation process is an essential step which is a balance between technology pull and technology push. Care must be taken not to focus on short-term projects or on projects that are really "re-inventing the wheel". It could be argued that the current decline in productivity growth is a result of too much effort being put into immediate problem solving at the farm level, at the expense of more strategic, mission-oriented research aimed at responding to the drivers and emerging trends that shape future productivity.

AIA believes the balance can only be effectively achieved if the users of the new technology are closely engaged with the producers of the new technology….or they work on projects together.

Recommendation 11. A specific effort by Government agencies and the R&D Corporations must be made to ensure close engagement with farmers in the processes of RD&E

Related to this is the training and accreditation of agricultural professionals, especially field researchers and advisers. Agriculture is one of the few professions where accreditation is not a prerequisite to providing advice and yet such advice can have a large impact on the business. A useful comparison is financial advisers who must be licensed. The maintenance of professional standards through accreditation is critical to the provision of facts based, quality, reliable advice to agriculture. Such a scheme is being established by AIA and we seek the strong support of this Inquiry for its universal adoption.

Because of the essential delivery of professional, sound, up-to-date technology to agriculture, a process of professional accreditation is required. AIA will be providing such a scheme but the AIA professional accreditation scheme would benefit from strong Government support.

Recommendation 12. The <u>Federal Government should explicitly support Professional Accreditation</u>

Collaboration between the public and private sectors is essential for the on-going advancement of innovation in agriculture. The CRC model was very beneficial for agriculture and should be re-established. A model for agriculture similar to the NHMRC has substantial merit, especially in encouraging basic "blue sky" research, much of the capacity for which has been lost. At present agriculture competes with other industries for ARC funding.

Other Important Issues

Agriculture has always been a fertile ground for innovation, but the impetus in recent times seems to have slowed. To rebuild this sense of innovation requires encouragement and the right environment which excites the minds and rewards ideas.

We need to renew our history and change the culture. This could be achieved by the formation of an Agricultural Innovation Council with membership from academic, public, private and farming sectors. It would appoint high profile "champions" and have a (very small and independent) secretariat and some funds to assist in forming productive collaborations, and for such things as Innovator Awards. It would be jointly funded by the public and private sectors.

The Influence of Government in Rural Adjustment can unwittingly act as a serious impediment to adoption of technology. When adjustment in *impeded,* the most significant adverse impacts are often on the capacity of the most talented and able in a district or an industry to innovate. Social welfare issues should be handled separately outside the rural adjustment policy (including drought). Governments need to understand and recognise these, often unintended consequences of their policies, which are often in response to emotional and political imperatives such as drought.

Innovation can be a "long term" business where the first elements of a good idea take years of testing and development before a useful practical innovation is adopted. This means long-term investment in RD&E. The "Transformational Innovations" mentioned above took years to develop and refine, but the investment in these technologies had paid very substantial dividends. Relevant to this is the need for young Australians to identify a career in science as a worthwhile endeavour. This means that they must see the opportunity for a

well paid career with rewarding job opportunities and the opportunity for professional advancement.

The reductions in funding to CSIRO and to State Departments of Agriculture diminishes career prospects for young scientists. This is exacerbated by R&D Corporations focussing solely on short-term project funding. This approach leads to temporary appointments, unhelpful career changes and diminishes the attractiveness of Agricultural Science and Natural Resource Management Science to capable young people interested in a career in science.

This situation has led to a shortfall of professionally qualified applicants seeking jobs in the sector, and then in turn, has encouraged some employers to employ under-qualified staff in professional roles. This is a serious risk to the future of Australian agriculture.

ATTACHMENT 1

AIA WA Division

Innovation in Agriculture Forum, 19th August 2015

Summary of Findings and Conclusions

For Producers

With the severe reduction in public sector extension services, adoption of technology and better farm management could be greatly improved by more collaboration within the supply chain to facilitate the flow of information:

- Fostering peer group networks in the form of discussion groups and social media to share information and set physical and financial indicators of achievable performance targets;
- Strengthening communication between producer and researcher to capture the strengths of the different players and to understand the benefits of innovation;
- Using local validation of innovation to give risk-averse producers confidence in new technology; and
- Recognising the role of accredited private sector extension services as part of the innovation adoption process, especially in the (higher risk) mixed farming zones, in interpreting, sorting and applying the more complex business management options.

For Researchers

The messages for the researcher community were quite strident with the overarching sentiment being the need for much greater collaboration involving all stakeholders in the supply chain, especially by the scientists, whose work underpins innovation. The litany of recommendations to improve collaboration included:

- Listening to farmers to understand the application context of research and ensure it is relevant and practical, and make research results readily available to the extension system by their publication in appropriate, less obscure journals;
- Invest in base science to benefit applied science; being prepared to integrate with industry; and
- Researchers need meaningful engagement, be passionate and prepared to think outside the box, challenge the established paradigms.

For Policymakers

- Retaining valuable scientific wisdom and knowledge by reducing short-term project-duration employment strategies, especially in the public service agencies, through better funding policies so less time is lost through fund-seeking and career structure more secure; need of an NHMRC equivalent.
- Framework for investment needs to be in the long term, with flexibility needed to allow for project deviation and lead times for outcomes can be very long.
- Acknowledge value of growers taking charge of the agenda.
- Need to attract more students from primary school on, and develop youth through mentoring networks.
- Improve the funding model to encourage collaboration across disciplinary silos, and avoid duplication.
- Resource the “blue sky” work, embrace risk in investment, and seek and support entrepreneurship and space to innovate.