



Australian Export Grains Innovation Centre

Submission to the inquiry into technological and service innovation in Western Australia

Executive summary

In agriculture, innovation is essential to support sectoral success. Innovation can take many forms; ranging from developing and using new products or new techniques, embracing incremental or transformative improvements, designing more effective organisational structures and changing policies and laws to protect or boost economic opportunities for the agricultural sector.

Increasingly in globalized agriculture many technologies and products will be first developed outside of Western Australia (WA), with the resultant innovation challenge in WA being how to cost-effectively identify potentially applicable innovations and then rapidly assess and tailor those innovations to the WA agricultural context. Particular challenges for WA agriculture are firstly, how to encourage agricultural innovation when key funders of agricultural innovation in Australia (namely state and federal governments) are gradually and persistently withdrawing their funding support for agricultural research and for their agricultural agencies. Secondly, how can innovation beyond the farm-gate be encouraged, noting that supply chain costs from the farm-gate to the ship comprise up to 30 percent of the FOB price of farm commodities. Thirdly, how can the WA government and agribusiness sector support innovation in markets that consume WA agricultural products in order to increase the demand for WA agricultural products in those markets. Fourthly, noting that some innovation in WA agriculture relies on the future skills and knowledge of agricultural professionals (science, commerce, management, etc), what innovation in the tertiary sector in WA is required to ensure that future professionals who serve the agricultural sector are appropriately taught and trained?

This submission explores these questions. A few potential solutions to some of these questions are outlined.



Department of
Agriculture and Food



GRDC
Grains
Research &
Development
Corporation

AEGIC is an initiative of the Western Australian State Government and Australia's Grains Research and Development Corporation

Funding for agricultural research

Federal and state government funding for agricultural agencies and agricultural research is declining in real terms. For example, the budget for the Department of Agriculture and Food in 2015/16 has been cut by a further \$6.5 million and 100 full-time equivalent staff must leave that department by the end of 2015. At the national level, the Department of Agriculture continues to face a declining real budget (see Figure 1).

Fortunately for agricultural R&D, its legislative underpinning offers some resistance to its erosion of funding. Under statutory arrangements, farmers and the federal government contribute to agricultural research. About 0.5% of the gross value of farm output is devoted to agricultural research. Sheng et al. (2010) have estimated that public agricultural RD&E expenditure in Australia in 2007, for example, was approximately \$1 billion. For farmers who are statutorily obliged to help fund R&D via product levies, their levy payments can be costly, potentially reducing net farm business profit by up to 2% per annum. However, these levy payments are investments inasmuch as the R&D delivers new knowledge, processes and products that boost the profitability of farming in future years. The farmers and governments who supply the R&D funds hope that the research they fund delivers financially worthwhile future benefits. Most studies of R&D investments show that overall the investment is very worthwhile (Hurley et al, 2014; Alston et al, 2000)

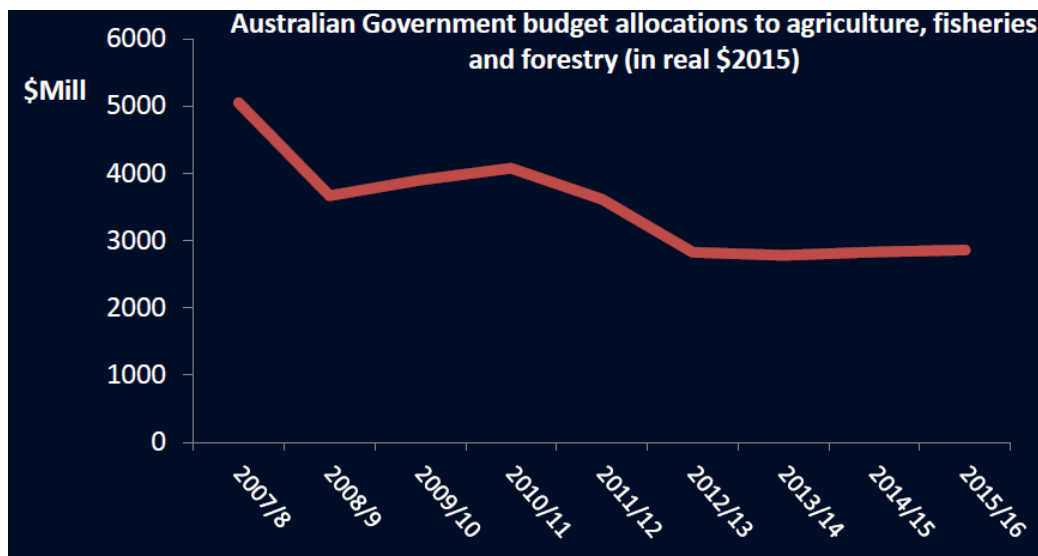


Figure 1: Budget allocations to the Federal Department of Agriculture 2007/8 to 2015/16.

Without worthwhile agricultural R&D the productivity and profitability of Australian agriculture will erode and the nation will gradually lose export market share and export revenues. Already the productivity of Australian agriculture is under threat (see Figure 2). Since the early 1990s Australian agriculture has gone from displaying very high rates of total factor productivity growth to being one of the lesser ranked countries (blue versus red arrows in Figure 2). This decline in productivity indicates that innovation in agriculture is now a pressing need. Yet this need arises at a time when governments, due to enfeebled budgets, are opting to withdraw their support for agricultural agencies and agricultural research which are the principal vehicles for innovation.

The impact of the relative decline in Australian agricultural productivity is already being felt in some of our key markets. For example, although Indonesia remains a major destination for Australian wheat exports, even in that nearby market Australia is losing market share to wheat exports from Canada, the USA and Black Sea region countries (Figure 3).

Agricultural Total Factor Productivity

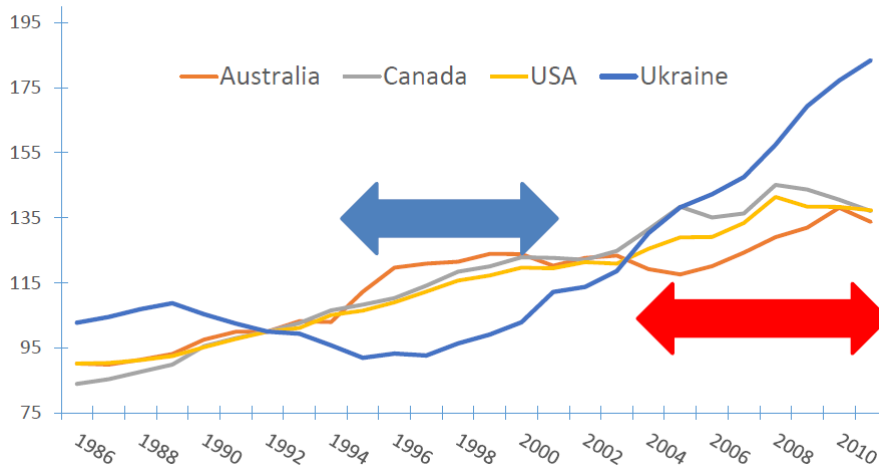


Figure 2: Total factor productivity of agricultural sectors in various countries

List of supplying markets for a product imported by Indonesia in 2014

Product : 1001 Wheat and meslin



Figure 3: Exports of wheat to Indonesia; by country share



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One way of combating the impacts of a decline in public sector support for agricultural R&D is to form new or greater partnerships with R&D funders. The Australian Export Grains Innovation Centre (AEGIC) is one such example of new partnerships in research and industry development. AEGIC is a not-for-profit, private company jointly owned by the Grains Research and Development Corporation and the Western Australian government (through the Department of Agriculture and Food, Western Australia). Its purpose is provide national leadership and coordination in research directed at export grain quality, functionality, processing innovation and market and supply chain analysis.

AEGIC's formation as a not-for-profit, private company provided the opportunity to form a critical mass of effort focused on a nationally important set of grain industry issues. Moreover, given that 'innovation' forms part of AEGIC's name, it signalled to all staff that a culture of innovation was desired and would be supported by AEGIC's funders.

When initiated, AEGIC was the first of the national centres of research to be inaugurated under the national agricultural RD&E strategy, in an effort to reduce the duplication of research in the grains industry across Australia, specifically relating to the grain export industry. AEGIC is a hub that aims to deliver innovative methods of capturing additional value from the export grain industry; delivering as much of that value back to grain growers as possible.

Funding for innovation beyond the farm-gate

Much of the legislated support for agricultural research in Australia primarily focuses on innovation at the farm-level. However, using the example of wheat production, WA's main agricultural industry, costs beyond the farm-gate are a main component of the final wheat price in end-user markets (see Stretch et al 2012; White et al 2015). Many of the services beyond the farm-gate are provided by only a few firms and there are limited competitive forces to drive and support innovation.

Comparing the degree of farm-level innovation in grain production against post-farm gate innovation suggests that the bulk of innovation activity has occurred at the farm-level. In Australia, for example, not only has there been little capital investment in rail infrastructure but there has been little investment in innovation in the rail freight of grain; yet the transport and post-farm gate handling of grain represent major costs in the export of grain from Australia. Perhaps there is a statutory opportunity to encourage investment in post-farm gate innovation?

Supporting innovation in markets that consume WA agricultural products

Potentially, by supporting innovation in markets that consume WA agricultural products, the demand for WA agricultural products can be increased. However, to ensure such support is successful firstly requires knowing which are the growth markets for WA produce and secondly, what innovations are likely to lead to an on-going preference for WA produce. To gather that intelligence requires in-country knowledge of consumption trends, patterns and preferences; competitor analyses and sound industry knowledge about what innovations are likely to be rapidly adopted to deliver benefits back to WA exporters.

Often governments can play a useful role in opening up market opportunities to facilitate trade relationships. However, establishing what innovations need to be developed and promoted in order that WA agricultural exporters benefit usually requires specific and detailed knowledge and skills that are more likely to reside in the commercial rather than the government sphere.

In the case of WA's principal agricultural industry, wheat production, it can be argued that following the de-regulation of wheat marketing many of the market development activities formerly undertaken by the Australian Wheat Board are no longer occurring in any co-ordinated fashion and some opportunities for supporting innovation in markets that consume WA wheat are being overlooked. Noting that WA supplies up to half of the nation's wheat exports, inadequate support of innovation in the end-use of Australian wheat potentially may lessen the demand for WA wheat exports.

Yet Australia's competitors like the USA and Canada heavily invest in supporting innovation, education and training of end-users of their grain. For example, the Canadian International Grains Institute (CIGI) has during its 42 years of operation, trained more than 39,000 people in the use of Canadian grain — 14,000 of whom are in Australia's strategic Asian markets. This represents a vast alumni of grain processing staff skilled and familiar in the use of Canadian grain, and supported through ongoing contact. The Australian grains industry does not have a similar program to support the use of its grain. The lack of an Australian equivalent to CIGI has been noted by grain customers in Asia and CIGI take advantage of this fact.

In Australia there is no coordinated presence regarding grain promotion and training and research in grain processing and innovation. Instead there is overlap, duplication, organisational competition and an inadequate critical mass of expertise. A single Australian entity with a clear mandate in this area, supported by a governance structure representative of the industry – as is CIGI – may provide beneficial outcomes for the Australian grains industry, including exporters of WA grain.

A single body known as Grains International Australia could be an example of organisation innovation that serves the interests of the Australian and WA grains industry. Note this body would not engage in grain trading. Rather its focus and mandate would be:

- (i) create an advantage for Australian grains in overseas markets through the delivery of technical expertise, information, applied research, and customized training to potential users of Australian grain.
- (ii) facilitate the Australian grains industry to pursue new markets and respond to changing market conditions, new policies, technical requirements and grain processing technology change in importing countries.

The Role of the Tertiary Sector in Supporting Agricultural Innovation

In a recent news article in "The Land"¹ and in a recent opinion piece on Australia's agricultural research capacity by Mick Keogh (CEO of the Australian Farm Institute) concerns were raised about the ability of Australia's university sector to adequately train students and provide research services relevant to practical agriculture. Keogh's blog comments attracted a handful of responses from various academics. See http://www.farminstitute.org.au/blog/Ag_Forum/post/will-australian-agricultural-research-capacity-be-sufficient-for-the-food-bowl-challenge/

¹ See <http://www.theland.com.au/news/agriculture/general/news/ag-degrees-missing-the-practical-mark/2740879.aspx>

In the opinion piece; Keogh wrote:

Unlike the USA where academics employed in the Land Grant universities have a defined requirement to spend time engaged with industry, academics employed in Australian university agriculture faculties are becoming increasingly isolated from the sector, driven by the funding imperatives [identified above] which place no value on time spent engaged with industry. This is compounded by research merit systems that reward publications, but do not consider the 'impact' of any research carried out.

....

The solution lies in changing funding models in order to reward industry engagement and research that has industry impact, but no doubt such changes will be resisted.....

The response to Mick Keogh from Prof Snow Barlow (University of Melbourne) is worth reading as it highlights the difficulties faced by agricultural scientists working in Australia's leading universities, including the University of Western Australia, Curtin University and Murdoch University. He writes:

The national excellence in research ranking system, the ERA, concentrates heavily on publication in high impact international journals preferably with international partners and collaborators. High performance under these metrics is not compatible with more applied field based research published in regional journals. These ERA based policy settings are currently being played out strongly in the research intensive Go8 Universities where Agricultural and Food Faculties are being incorporated into larger Faculties of Science. These discipline based faculties are correctly focused on ERA excellence through publishing in high impact international journals. Agricultural researchers despite being very productive in these combined faculties must conform if they wish to succeed.

The risk in fully responding to the incentives provided via ERA or similar rankings is that academics who might be able to more directly beneficially impact on agricultural innovation instead focus their efforts on generating academic publications, mostly with an international rather than local focus. What then arises is that the research and teaching focus of these academics becomes disconnected from supporting practical innovation that enhances the profitability of agricultural production. The end result is that often most university academics have a loose or distant connection with practical agriculture and few of these staff are well-known within the agricultural sector.

Reasons for the Disconnection

The apparent disconnection arises not only from the personal incentives faced by academics (i.e. the need to publish in top-ranked often less applied journals) but also from the way that universities operate as businesses dependent on student numbers. Unfortunately agriculture is an industry that continues to be characterised by technologies and business strategies that are labour-saving.

Effectively this means fewer, larger farms, owned and operated mostly by farm families. Furthermore, the greater ease of electronic communication, when combined with the ease and capability of the electronic storage and retrieval of information, means that the farm sector can be serviced with fewer highly skilled extension and research specialists than otherwise might have occurred in previous decades.

In such an environment there is no burgeoning farm workforce nor are there sustained high growth prospects for employment in support industries. The fact that the Department of Agriculture and Food, the State's main employer of graduates of agricultural and related disciplines, has shed 500 staff over less than a decade is one indicator of the potentially parlous employment prospects in agricultural innovation. Furthermore Rob Delane, the Director-General of that department, announced in June 2015 that due to budgetary restrictions staff numbers would be further reduced from 950 in 2015 to only 700 in 2017. When the agricultural sector's main employer of research staff is so rapidly shedding staff then flow-on effects to graduate training in universities is inevitable. The relatively small population of students each year who select agricultural science as a first career choice is thus of little surprise. When student numbers are small, however, maintaining a diverse and large group of agricultural academics becomes no longer financially viable or justified. Agricultural courses become combined into more general courses that attract sufficient numbers of students to be financially viable. These trends however are not unique to Western Australia, nor Australia.

In his book *Conditions of Economic Progress* (1957) Colin Clark discusses the causes and implications of increased labour productivity in agriculture. He recounts how in the USA between 1849 and 1950 the proportion of the labour force working in agriculture decreased from 65% to 12%. In Australia in 1970 the agricultural sector accounted for 8% of the nation's employment; by 2013 the proportion had fallen to 2%. In 1970 agricultural exports were 41% of the nation's exports, yet by 2012 that share had fallen to 12%. The agricultural sector now forms only around 2% of the nation's gross value of production. In relative terms, but also in absolute terms in many situations, the employment opportunities for agricultural scientists and related disciplines have diminished.

These structural changes arising from labour productivity and economies of size, impact on the nature and quantity of human services required by the agricultural sector and inevitably affect student numbers in agricultural science that in turn affect the demand for agricultural academics. Ensuring funding to support these academics is problematic. Special pleading via political or economic persuasion is not likely to be successful. On-going structural change in agricultural communities and agricultural industries only further erodes their political and economic voice. Amid such weakness, budget pressures limit funding on agricultural research and education in Australia and WA.

To date, there has been inadequate structural innovation in the agricultural tertiary education sector to support the productivity needs of the agricultural sector. The supposedly collegiate ARWA (Agricultural Research (WA)) model of better integrating agricultural R&D across the tertiary sector failed badly. Institutional and personal rivalries and lack of incentives for collaboration scuttled its viability.

The future for agricultural education, research and research training is unlikely to be underpinned by increased support from the public purse. For budgetary and political reasons the future funding of agricultural education, research and research training is more likely to comprise public-private

partnerships. On a positive note, some large private corporations or industry groups are likely to be increasingly persuaded by self-interest that there is some merit in contributing to such public-private partnerships. Hence, the structural innovation changes required that might strategically best serve the interests of Western Australia's agricultural industries and the agricultural academics in its universities are the formation of key public-private partnerships.

As a hypothetical illustration of such a partnership consider the possibility of a pool of private funds (banks, agricultural R&D corporations (e.g. Grains R&D Corporation, Meat&Livestock Australia)) combined with some public funds (probably re-directed funds rather than additional funds) that could form an Agricultural Foundation. Initially this foundation is likely to be a virtual foundation with its funds chiefly being used to develop and maintain Western Australia's human capacity in agricultural education, research and research training. The foundation, for example, would support accredited units in agricultural science that could be offered at a 3rd year undergraduate and/or post-graduate level. Offering such units either virtually or in-situ at one or more universities would increase the likelihood of larger class sizes and keep viable some units that otherwise would disappear. The foundation could pay for the lecturers' time and therefore be of financial advantage to the universities supplying the teaching staff. The units supported by the foundation would count as part of the degree of the student in the institution in which the student was enrolled. Hence, the benefits from granting degrees would be retained by the universities. Depending on the nature and level of its private and public funds, the foundation could support research training (e.g. scholarships, bursaries), research (competitive grants) and promote agricultural education and careers in agriculture. It could also provide fee-for-service professional development courses and provide mentoring services via 'retired' scientists.

In the absence of such a foundation (or some similar more workable equivalent) it is likely that continued institutional rivalries will erode the agricultural science education, agricultural research and agricultural research training in Western Australia. The risk is that the universities will act as proud fish fighting in a diminishing pool.

The formation of such a foundation, however, should not be 'owned' by any one university. Its creation would need to be championed by industry and government, each supplying incentives for beneficial structural change. Through its platform of multiple funding from industry and government sources the agricultural foundation would be well-equipped to supply agricultural education, research training and agribusiness management training. Further through pooling funds it may provide more certain career paths for some agricultural researchers who currently face employment prospects of uncertain short-term research contracts. Currently, agricultural R&D funders mostly only supply funds for research projects that last from 2 to 5 years. Longer term innovative research is often neglected.



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Prepared by:

Professor Ross Kingwell
AEGIC Chief Economist

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