LAND GRANT UNIVERSITIES – THE AUSTRALIAN VERSION

Jim Pratley, 2015

BACKGROUND

Much has been written in recent years about the land grant university model in the US agricultural system. This is due in large part to the demise of the traditional extension services provision by the state departments of agriculture or primary industries. It is clear that the US system is not transposable to Australia in its entirety and so it raises the question as to what an Australian version might be. Firstly some consideration of what has been written recently in this space is needed.

A. The NSW Government's Agriculture Industry Action Plan (AIAP)

The AIAP taskforce also considers there is an opportunity for government to support an enhanced model for extension and uptake of R&D; and that a range of international models for the delivery of agricultural education and extension warrant further investigation with a view to developing and piloting an appropriate system.

Recommendation 11*: Industry and government to investigate different models in the tertiary education sector (for example the 'land grant university' model) for application to NSW*.

B. The Australian Council of Deans of Agriculture response to the Australian Government's Green Paper on Agricultural Competitiveness

"In respect of extension the ACDA noted in its response the concern about the future role and capacity of agricultural extension and that lack of effective support will limit the take-up of R&D and limit productivity gains. ACDA is also concerned that private advisory services will 'cherry-pick' those services for which there is a financial benefit and that public good and market failure issues will not be addressed. ACDA supports incentives for Universities to participate (in partnership with industry/other RDE organisations) in the innovation function. The University sector has at several roles in agricultural innovation:

- Educate and train future agricultural advisory workers and people in the RD&E system (e.g. researchers) in R&D adoption theory, professional practice and skills (including private sector, not for profit sector, public). This should be further supported by undergraduate scholarships to specialise in innovation education;

- Active participation in R&D implementation – in partnership with other organisations (public and private); and

- Undertaking R&D in novel and redefined adoption methodology in collaboration with public and private entities.

Extension and innovation, as well as associated research, are still not recognised as legitimate activities at Australian universities. This needs to change. The Government could facilitate change quickly by making some resources for agricultural innovation available under Category 1 education funding. Strong policy statements about the importance of, and support for, public-private partnerships (PPPs) that include the university sector would help considerably.

Example: Pilot of Drought Reform Measures in Western Australia

This project was guided by innovative adaptive extension, governance and research methodology through direct engagement with the university sector driving a PPP. The pilot delivered major and unprecedented producer response and outcomes, including significantly improved understanding and actions relating to the impacts of increasing volatility in: business and financial environments; markets; natural resources; personal wellbeing; and weather events

While the US has invested considerable resources into their universities via the much talked about Land-Grant University System, Australian universities cannot draw on such resources. However the model deserves closer scrutiny as aspects of the Land Grant system might still be applicable to the way university farms, for example, are or could be governed. Adequately resourced with modern technology and well-trained staff, these facilities could effectively link R&D implementation with research and education and provide further opportunity for PPPs.

The notion of regional centres of excellence that serve broad agricultural regions based around regional universities deserves additional attention. These institutions often have the breadth to address scientific and technical challenges as well as socioeconomic issues. However their resources are spread thinly across the landscape and this limits the effectiveness of the services and outcomes and often makes it difficult to attract staff. Collocation is likely to provide synergistic opportunities and a critical mass of professionals in regions where the issues occur.

ACDA considers that expectations on new graduates to have the wisdom, breadth of knowledge, experience and network to be a proficient advisors are unrealistic. The professional development and mentoring of extension officers previously provided in state departments no longer exist as extension services have declined. These roles are increasingly provided by private operators. Professional development opportunities such as short courses or a professional Masters should be developed to encourage and enable mid-career professionals to move into an R&D implementation role. This would include the role of the internet as it is increasingly important to monitor and advise on rural production. Further, as they give advice on matters that could have significant economic implications (just like other professionals e.g. accountants, financial advisers, engineers, teachers) agricultural providers should be accredited or registered.

ACDA thus supports a national strategy for agricultural innovation education across Australia (focusing on both the private and not-for-profit sectors) to boost the currently *ad hoc* and under-resourced efforts. In higher education, a University network could coordinate offerings in undergraduate and postgraduate innovation education, in partnership with organisations such as the Australasia-Pacific Extension Network (APEN) and their education sub-committee. Of concern is that some private providers now offer short-courses in extension with no background theory or professional practice credentials.

Recommendation*: Government fund a coordinating study of innovation services, including a comprehensive evaluation of all services currently provided by state agencies, the applicability of the US land-grant model in Australia, the innovation services that could be offered by universities, the prospects for PPPs and the delivery of holistic R&D implementation outcomes."*

C. Australian Farm Institute Report: Optimising future extension systems in the Australian grains industry

This report provides the following extract:

"Initially, each US State established a Land Grant College under the provisions of the Morrill Act of 1862, and the system was further expanded under subsequent legislation enacted in 1890 and then several further pieces of legislation enacted throughout the twentieth century. The Hatch Act of 1881 resulted in the development of agricultural research stations in each state, and subsequently the Smith-Lever Act of 1917 tied the Colleges and the state agricultural experimental stations into the Cooperative Extension Service (CES).

Agricultural research and extension activities at Land Grant Universities are supported by a range of different funding mechanisms administered by the USDA. These include formula funds (funds allocated on the basis of specific formulas defined in the various pieces of federal legislation that dictate the annual federal appropriations for this purpose), competitive grants and special-purpose grants.

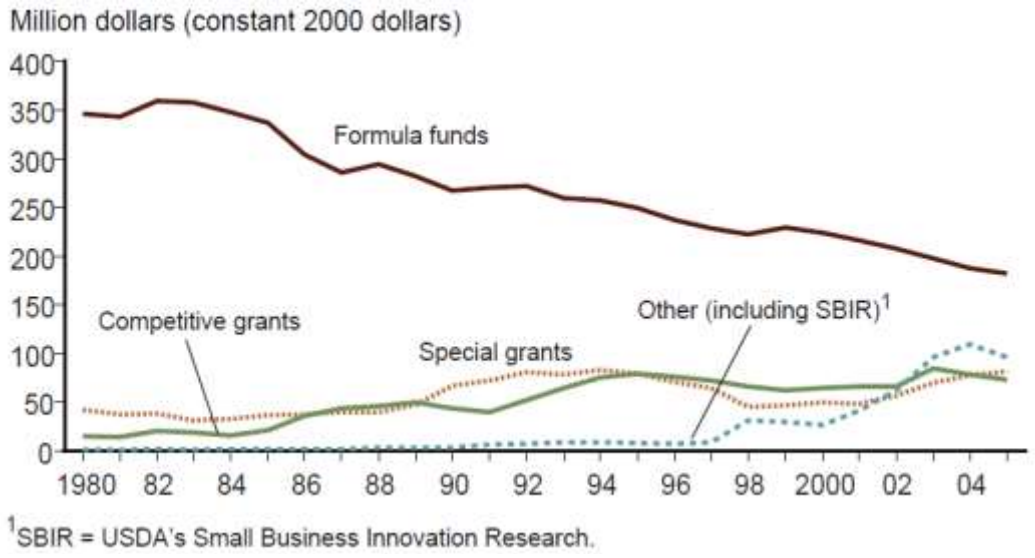

Figure 1 USDA NIFA funding programs for agricultural R&D 1980-2005 (Source: Schimmelpfenning and Heisey, 2009)

In most instances, the respective state governments have an obligation to contribute between fifty cents and one dollar for every dollar of formula funds received from the federal government.

The extension activities of land grant institutions vary, depending on their location, and the nature of farm enterprises at that location. Throughout the corn/soybean belt the main activities appear to be 'advising the advisors' through workshops and training days dealing with specific crop production

issues, and also providing information to farmers via field trials and regional conferences. The information provided at these farmer events includes economic and farm business information, in addition to some crop production advice. The University extension personnel do not generally provide one-on-one advice to farmers, although on occasions they appear to become involved in specific disease or pest outbreaks.

Across the wheat states, the role of university extension personnel appears to be more hands on, and involves the provision of crop production advice as well as other farm production and business information. University extension staff appears more likely to be involved in delivering crop production workshops for small groups of farmers, as well as managing and reporting on the results of field trials via publications aimed at farmers and at field days. University extension personnel also appear to be more closely engaged with individual farmers and small farmer groups, in conjunction with other CES staff.

The various state CESs all have extensive websites which provide access to libraries of factsheets, as well as detailed reports on trial results and variety trials (see http://www.oces.okstate.edu/crops for example). Some of the CES have developed decision support tools and smart-phone applications for use by farmers. The CESs also have training programs available to enhance their extension skills.

Recommendation 4: ***The Grains Research and Development Corporation should develop a requirement that, as part of the obligations on university researchers who are the recipients of major grains research funding, the researchers be required to allocate a minimum period of time annually working on the ground with grower groups, providing them with advice and support.***

Total public-sector funding for agricultural research and extension activities in the US was estimated in 2009 to be approximately $US 5.2 billion, of which $US 1.5 billion was funding for intramural (internal) research conducted by the USDA's Agricultural Research Service. Total funding on cooperative extension services was estimated to be $US 1.8 billion in 2006 (the last year for which complete data are available), noting that extension services deal with information about a range of different government policies and services, and are not just confined to agriculture (Pardy *et al.* 2013)."

COMPARISON OF THE US AND AUSTRALIAN SYSTEMS

In the United States, the Land Grant University model has provided a strong link between University research and teaching about research from all sources and extension and adoption. University skills and assets in teaching provide a strong and natural base for the continuing adult education that we often call extension. Academics often hold joint or partial appointments specifically in extension with percentages allocated for research, teaching and extension. Personal relationships are typically established by academics with future leaders while they are students that last for decades, enhancing the knowledge transfer process.

Historically, the US Department of Agriculture has provided cash support to US Land Grant Universities of the order of US$1 billion annually (see second to last page of http://www.csrees.usda.gov/about/offices/budget/08 budget brochure.pdf). This is summarised in Table 1.

Table 1 Examples of Government Funding for Land Grant Universities

EXAMPLES OF US LEGISLATION FUNDING FOR LAND GRANT UNIVERSITIES	ANNUAL VALUE
The Hatch Act 1862 – formula funding; as amended by the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and other bills http://www.csrees.usda.gov/business/awards/formula/hatch.html http://www.csrees.usda.gov/business/awards/formula/allocationltrs/06_hatch.pdf	~$170m
The Smith-Lever Act of 1914 established the Cooperative Extension Service (Federal and State authorities working in knowledge transfer) and provides federal funds for cooperative extension activities http://www.csrees.usda.gov/business/awards/formula/smithlever.html http://www.csrees.usda.gov/business/awards/formula/allocationltrs/06_smithlever.pdf	~$270m
McIntire-Stennis formula funds support state designated institutions' cooperative forestry research programs http://www.csrees.usda.gov/business/awards/formula/mcintire_stennis.html (http://www.csrees.usda.gov/business/awards/formula/06_mcintire_stennis.pdf)	~$22m
Evans-Allen formula funds support agricultural research at the 1890 land grant institutions (which began as mostly African American colleges) http://www.csrees.usda.gov/business/awards/formula/evansallen.html http://www.csrees.usda.gov/business/awards/formula/allocationltrs/06_evansallen.pdf	~$38m

Table 2 Comparison between US Land Grant system and the Australian university system

US LAND GRANT SYSTEM	APPLICABILITY TO AUSTRALIA
USDA provides cash support of around $1billion annually to Land Grant Universities - Formula based, cash non-competitive grant - Normalised for Australia's population this would be around $75 million to Australian universities	No funding scheme exists federally Budget in universities derived from student teaching load Never been a scheme to fund on-going extension support. Extension is an extra unfunded activity for staff and it is not recognised internally or externally

	Limited grants are short term and project based
States provide cash contributions to their own state universities Matching funds by State of 50c to $1	No funds are provided by state governments No matching arrangements in place
State and federal agriculture departments contribute substantially to teaching	Limited and spasmodic at best
USDA funds National Research Initiative Competitive Grants	Occasional short-term programs funded by Federal Department (e.g. climate change)

As discussed further below, most of this is in formula funds, i.e., a straight cash non-competitive grant. It does not include cash contributions by the states to their own state universities or informal contributions from state or federal agriculture department staff to teaching, both of which are substantial. Normalised for Australia's smaller population, the federal cash support alone is still on the order of AU$70-75 million.

About US$53 million of the $1 billion annually historically has been used specifically and explicitly for higher education (see third to last page of "08 USDA Uni budget"). Much of the USDA funding is nominally directed toward research or "Cooperative Extension" (Federal and State staff working together in knowledge transfer), but clearly supports the kinds of activities commonly undertaken by Australian agriculture and land management faculties without the benefit of the US Land Grant model.

For example, Hatch Act funds are provided for on an annual basis under the Hatch 'Bill' of 1862, as amended by the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and other bills. These funds are distributed according to a statutory formula. Although nominally for agricultural research, the scope of the agricultural research which may be conducted under the Hatch Act is very broad. It includes research on all aspects of agriculture, including soil and water conservation and use; plant and animal production, protection, and health; processing, distribution, safety, marketing, and utilization of food and agricultural products; forestry, including range management and range products; multiple use of forest rangelands, and urban forestry; aquaculture; home economics and family life; human nutrition; rural and community development; sustainable agriculture; molecular biology; and biotechnology.

Thus, there is a broad and long standing appreciation across the US and in both major political parties that agricultural higher education deserves support not only from the federal Department of Education, but also from the Department of Agriculture, whose portfolio the agriculture and life science college system supports. Further, the USDA has appreciated and helps pay for the critical and often basic research undertaken by universities (see the National Research Initiative Competitive Grants total), as well as the knowledge transfer activities undertaken by University staff.

An Australian Focus

Abundant research by Australian economists Pardey and Alston has demonstrated that the lag between research and broad-scale adoption in agriculture is on the order of 10-20 years. Adoption of research requires persistent effort by champions of the technology, often closely linked to researchers, to demonstrate benefits against years of entrenched experience. Delays in the adoption of new practices represent a substantial lost opportunity cost to the efficiency and competitiveness of our agriculture. The nexus between productivity and research, education and extension is an important one as demonstrated below.

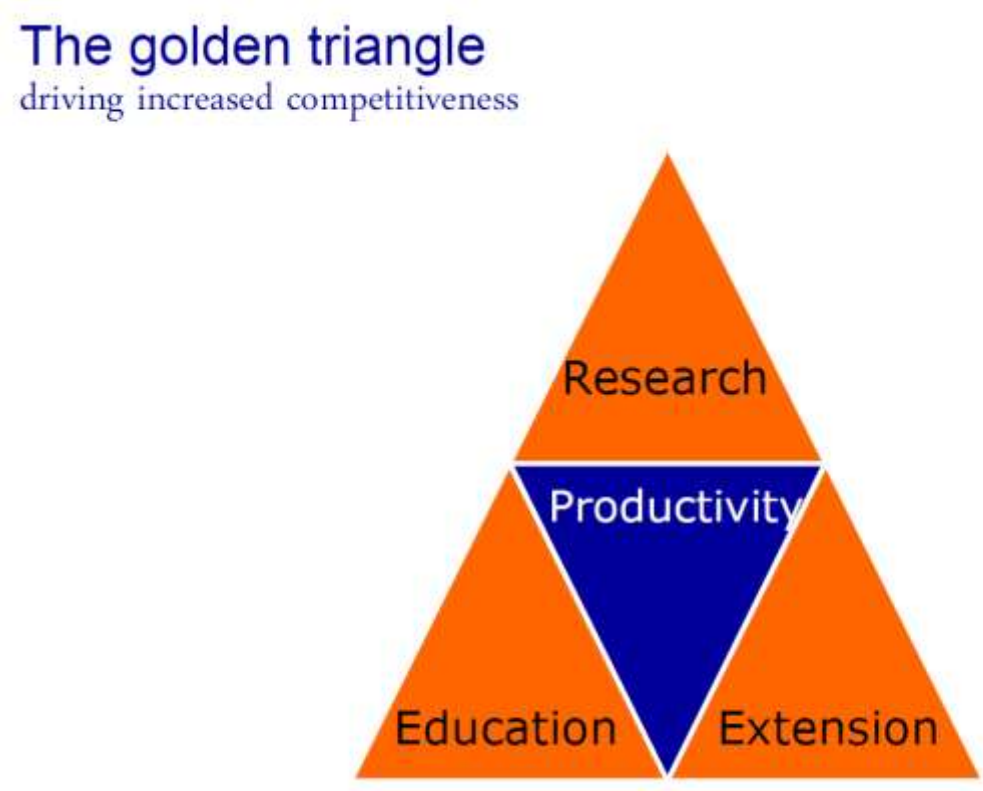

Figure 2. The golden triangle of productivity (Rabobank, undated)

Since universities undertake the education and training of the sector's professional workforce and perform about 30% of agricultural research in Australia it follows that continued links with the implementers of that research is an imperative. With the demise of much of the public extension system in Australia and the incomplete extension delivery of the private providers, there is a strong argument for ensuring the agricultural universities are involved in and contribute to the implementation phase of the process. This however should not be in isolation but rather through the development of strong public/private partnerships.

A key problem however is that no such US-style funding exists in Australian universities. Universities are funded primarily for teaching by student numbers, and any grants are short term for specific projects. Budgets in agricultural faculties and schools are constrained, typically in deficit. In contrast to state agencies and CSIRO, there has never been a funding scheme to facilitate continued contact post grant funded research between academics and research users; no funds exist for travel and accommodation, brochures, videos, websites, field demonstration sites, and related needs.

Australian universities, to be on par with US counterparts, therefore need a scheme to fund more extensive contact between academic researchers and primary producers. A simple proposal is to modify the US model and commit specified funding (at least $20 million) direct to agriculture departments on the basis of full time academics (continuing appointments at Level B and above) who are documented to be engaged in agricultural research, with annual concise reporting on accomplishments. Such funding could then be used to as leverage to attract private investment for greater impact.

Alternative approaches: It is opportune to review the range of options available that could be available to the sector in terms of R&D implementation support for universities. These include:

1. Funding of specialist extension personnel within the universities – these would have student teaching responsibilities but have the requisite expertise to provide formal training courses to the range of advisers to primary producers. As well they would be expected to undertake research in implementation practices relevant to the regional, national and international sectors.

2. The option exists for postgraduate courses in R&D Implementation. This could provide the basis for accreditation of advisers. It is interesting to note that such courses existed in times past but the transformation of the sector in this regard in recent times suggests that consideration of the provision of postgraduate courses could be revisited, perhaps with inter-university cooperation.

3. Industry buy out of academic time to ensure availability of subject expertise for short workshops focused on local issues and applications. A network of universities would be involved. Such courses could be part of an accreditation process. This has the advantage of creating the links between local practitioners/advisers and the academic expert for ongoing mutual benefit and applies to all universities working in their environment. RDCs should invest over a reasonable term to ensure a sustainable relationship with the universities of relevance to each RDC.

4. Development of a university smart farms network whereby such farms are geared up with the latest technology including remote sensing. Producers and advisers could undertake regular visits and could remotely access the progress of demonstrations and attend webinars. Most agricultural universities have farms or farm access. A further advantage is that such sensing technology could be used for primary and secondary school education as well.

   An attempt at preliminary costs is given in Table 3. The contents are based on 15 agricultural universities relating to the membership of the Australian Council of Deans of Agriculture.

   Table 3 Provisional costs for university extension capability

EXTENSION OPTION	ACTION	BY WHOM	BASIS OF COSTING	TOTAL COST
US model for	Specially directed	Federal Department of	$20m +	$20m+

Australia	formula funds	Agriculture perhaps in conjunction with state governments		annually
Funding of specialist extension academics	Special funds	Federal Departments of Agriculture, Education and Innovation perhaps in conjunction with state governments	15 universities x $150K	$6.25 m annually
Introduction of formal postgraduate courses	Fee paying &/or Industry sponsorship	Student &/or industry	Standard university fees	As needed
Industry buyout of specialist staff	Contractual arrangements	Industry, presumably RDCs	15 universities by 0.3 FTE per speciality Assume minimum of 3 specialities per university	$2.03 m annually
Smart farms	Special grants	Federal Department of Agriculture perhaps in conjunction with state governments	Average $3 million per university based on applications over 3 years	$15m annually for 3 years.

In summary therefore the following can be said:

- Adoption of R&D has an extensive lag which can be shortened by effective innovation support
- Universities do about one third of agricultural R&D in Australia but there is market failure with the lack of ongoing innovation capacity in the universities
- There is a national network of agricultural universities which could operate as an adapted version of the US Land Grant System

- A source of funding for innovation in universities is needed as there is no such funding at present
- Ideally an annual sum of $20m would enable the university sector to deliver an R&D implementation program
- Alternatively the annual provision of $8.3m would enable the appointment of specialist innovation staff and buy out of specialist staff to provide the basic suite of R&D implementation activities
- A special grant (e.g. $45m over 3 years) to bring university farms up to leading edge operations for demonstration and education would have significant outcomes for the industry and agricultural education in general.