

## **AUSTRALIAN COUNCIL OF DEANS OF AGRICULTURE**

### **RESPONSE TO CALL FOR COMMENT ON THE AGRICULTURAL R&D SYSTEM BY THE RURAL RESEARCH AND DEVELOPMENT COUNCIL**

#### **Executive Summary**

Australian agricultural R&D is internationally respected and is largely undertaken in universities, State agencies and CSIRO. Universities have become increasingly important contributors as investments by the other players have declined, and undertake about a third of all agricultural R&D in Australia. Universities undertake not only basic research but are also active in strategic and applied agricultural research, as well as training the next generation of researchers through their PhD programs.

The RDCs are essential to the health of agricultural R&D in Australia and the RDC system is envied internationally. Because the Federal funding schemes for universities are targeted for teaching, and Universities do not achieve full cost recovery for the research they do (as noted by the Cutler review and others), research is subsidised from teaching. This is increasingly difficult for agricultural Faculties due to low demand for undergraduate places. Funding through RDCs, CRCs and other such sources is thus essential to facilitate involvement of universities in agricultural R&D. The Australian Council of Deans of Agriculture (ACDA) supports the continuation of the current funding model for RDCs but believes there are some shortcomings in the RDCs that would benefit from attention. These include a widening of the levy system to include other participants in agricultural value chains (e.g. processors and retailers), a reduction in bureaucracy and transaction costs, a greater focus on longer-term research, more transparent peer-review processes, and improved governance (in some cases). There is also a need to ensure the existence of RDCs is not preventing the ARC from giving appropriate support to grant applications that are of importance to agriculture.

Agriculture has benefited from the CRC scheme but an over-focus on commercialisation of results has been detrimental. ACDA welcomes shifts towards public good as an important consideration for CRC funding. However, other recent changes that appear to mitigate against partners from an existing CRC applying for a new CRC will be detrimental to agricultural R&D in the medium to long-term.

Protection of IP by research agencies and research funders has become a very bureaucratic and time-consuming process that has not brought the benefits commensurate with the costs. Simpler contracts need to be introduced.

Plant Genetic Resource Centres, which collect and curate the raw material on which plant breeding is based, are funded in an ad hoc way and this is to their detriment. A better system needs to be introduced.

There is a welcome investment by multinational companies in Australian agricultural R&D but industrial funding cannot substitute for the RDCs, CRCs and other nationally-based funding schemes. Investment by multinationals can be fickle and is not necessarily focused

on Australia’s unique needs. Australian companies remain too small to support significant research activities.

Universities also have an increasingly critical role in knowledge partnerships and extension to ensure that the results of research are sufficiently adopted to the optimal benefit of agriculture, the environment and society more generally. Unfortunately, universities are not funded to undertake these activities. This increases pressure on limited university resources and delays or blocks the utilisation of research.

## Introduction

The ACDA welcomes the opportunity to respond to the call for comment on the Australian R&D system in agriculture. This system is highly dependent on the R&D Corporations for project funding which in turn depends on the co-investment of Australian primary producers and the Federal Government. The State agencies and CSIRO have been, and continue to be, major investors in agricultural research, albeit at a declining rate, and funds are also provided to a greater or lesser extent by the CRC program, the Australian Research Council and private companies. Australian agricultural R&D is a national strength and is highly respected globally. Australian-trained agricultural scientists contribute to major international initiatives and to leadership in the CGIAR Institutes.

## The Role of Universities in Agricultural Research

Australian universities have had a strong role in agricultural research in Australia. Whilst there may be a perception that they only do basic research, there is a substantial body of strategic and applied research also undertaken, funded by external agencies, particularly the RDCs. In at least some areas of research, the strongest, or only, expertise in Australia resides in Universities. The allocation of funds from the RDCs shows the extent of industry-relevant research in the university sector (Figure 1). Universities earn about 20% of the total funds.

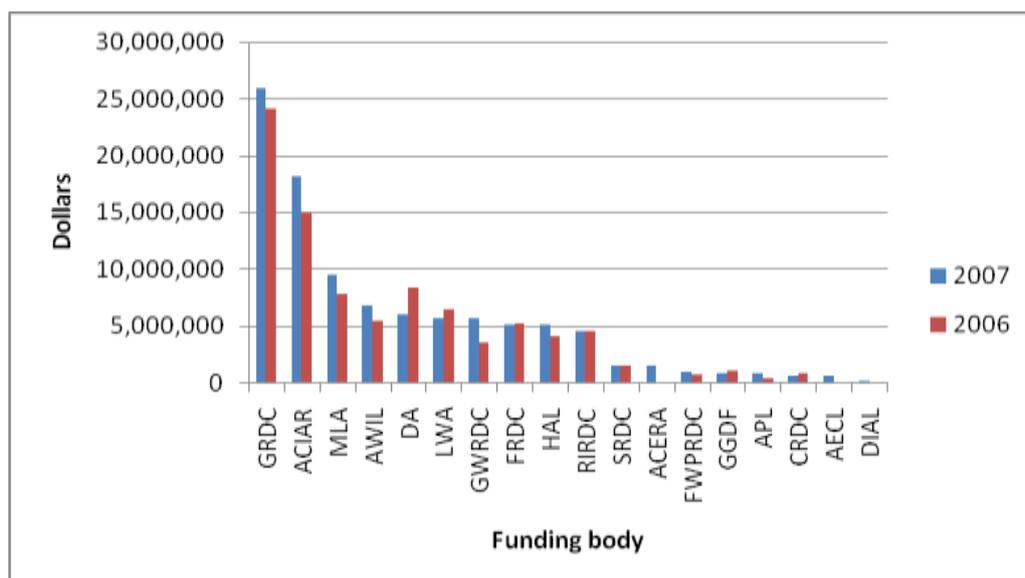


Figure 1. Allocation of research funds from RDCs to Australian universities in 2006 and 2007 (ACDA, 2009 unpublished)

Considerable structural change is taking place amongst providers of agricultural research. Until recently, the capacity of CSIRO was being wound back but welcome policy shifts have seen the establishment of the Flagship program in Sustainable Agriculture, suggesting that re-investment is occurring for the agricultural industry. This is driven in part by the need to address climate change and food security.

The PISC sectoral R&D reviews that are in train will lead to a substantial consolidation of research provision amongst the State agencies and CSIRO. Further, these State agencies are progressively forming close alliances with universities. These can involve integration (TIAR in Tasmania; QAAFI in Queensland), joint venture arrangements (NSW) or collocation (South Australia and proposed for Victoria and Western Australia). Thus, it can be expected that university activity in agricultural R&D will increase, albeit in some cases funded by the State purse. Derived data from ABS indicates that universities provide about 36% of the agriculture research workforce (ACDA unpublished 2009). A gratifying aspect of the PISC R&D reviews has been the active engagement of the universities via an invitation to ACDA to join the PISC R&D Subcommittee, and subsequently to identify appropriate university-sector representatives for each review.

Research outputs are not easy to quantify except perhaps in respect of publications. ACDA research (2009, unpublished) shows the major role that Australian universities play in establishing the public record of basic and applied research. Universities have increased their share of Australian agricultural scientific papers from around 45% of in 1990 to nearly 70% in 2007, although there has also been a tendency towards joint publications with other research organisations over this period. Research impact is even harder to quantify but it is generally substantial and prolonged after a long lag time (estimated to be perhaps 20 to 30 years) between initial discoveries and large-scale on-farm adoption.

Universities are also the training ground for the next generation of scientists with around 200 doctoral students in agriculture, including international students, graduating per year in recent times. This role is fundamental to the provision of the next generation of scientists needed to tackle the great challenges of our time: food security, food safety, climate change, efficient use of inputs and natural resources, and the sustainability of agricultural production both nationally and internationally.

It is thus with this background as a major player in the agricultural R&D system that the following comments are made by ACDA in good faith. ACDA trusts that they are a useful and constructive contribution to the review.

### **The RDC System**

It is the unanimous view of the ACDA members that the RDC system, funded by grower and producer levies coupled with Federal contributions, is a world-class system which is the envy of the agricultural R&D sector internationally. Indeed, it acts as an attractor for talented scientists from other countries to move to Australia. ACDA understands that there are attempts elsewhere to copy the RDC model. The mixture of levies and Federal Government matching funds is appropriate because R&D in agriculture has both private and public benefits. Producers gain private benefit through improved crops, pastures and livestock, new technologies, better practices, and more efficient modes of operation. The public receives the exceptional benefits of an inexpensive, consistently high quality, safe food

supply, better environmental and social outcomes (including employment opportunities in rural areas), and economic benefits from export earnings. Thus the RDC funding model generates high returns thereby providing justification for the investments for all parties. ***The RDC system must continue, with the current co-investment arrangements at least maintained or preferably enhanced.***

However, ACDA is of the opinion that there are some shortcomings which, if addressed, would add strength to the RDC system to the benefit of all its stakeholders. The following points are thus offered for consideration:

1. Whilst the producers and the community at large benefit from agricultural R&D and contribute to the effort through levies and Government co-funding, there are, along the supply chain, beneficiaries who make little or no direct contribution. Thus a system change that also captures R&D investment from processors, retailers and the like would grow the R&D funds available and increase the understanding and appreciation of the role of R&D in agriculture to the whole supply chain. This would need to be accompanied by an extension of the R&D funded by the RDCs to include post-farm gate aspects, but this already happening as sectors seek to understand better their markets and consumers. Currently, however, this occurs without funding from the non-farming beneficiaries.
2. It is clear that levy payers, in many cases, wish to retain ownership and control of their contributions and expect direct measurable short-term benefit to their enterprises from their levies rather than long-term improvements for the industry as a whole. This is seen to some extent in broadacre agriculture but is especially rife in horticulture. HAL is made up of over 40 sectoral subgroups all wanting their contributions to be returned in research of direct benefit to their sectors. As the sectors are each relatively small, only small amounts of research funds can be allocated to individual projects, thereby leading to fragmentation and inhibiting progress. The important generic research agendas that would benefit all, or the majority, of sectors are not pursued. Administering many separate small research programs becomes highly inefficient and costly, and does not provide the national benefit needed for an industry with an estimated gross value of production of \$8.6 billion in 2008/09.
3. RDCs have evolved to become bureaucratic organisations where transaction costs of the organisation and its research programs would appear to be high. This reduces the availability of funds for R&D, the function for which the RDCs were created. These transaction costs seem to be increasing. A review of the extent of transaction costs and a way in which they could be shared across the RDCs would be very useful. ACDA hopes that the Productivity Commission review recently announced will address this issue.
4. In many (if not most) cases there is a short term focus to the research supported by RDCs, because of a perceived need to satisfy producer investors. This often leads to “warm and fuzzy” projects which avoid the harder science questions that may take 5 years or more to solve. There is very little “blue sky” and potentially transformational research funded by RDCs and this is often the first to be stopped if

funding gets tight, so major breakthroughs are unlikely. Thus the tendency is to support research that is derivative of that done elsewhere.

5. Another shortcoming in many RDCs is the lack of transparent peer-review processes for assessing grant applications. This is in contrast to other national funding bodies such as ARC or NHMRC, and is not in line with international best practice. RDCs tend to use their own internal boards to review, assess and select applications often with memberships that do not include scientists who are active in research. Therefore, the final decisions on what to fund are not informed by objective views from other researchers. When coupled with minimal feedback, this leads to a lack of transparency and the view that RDCs do not employ open decision-making processes. This can be further exacerbated when strategic objectives of RDCs are also set without any early reference to the research community, leading to short-term objectives that do not balance industry needs with new research opportunities based on the latest discoveries and technologies. The ACDA is strongly of the view that all RDCs should use internationally-accepted practices for independent peer review of all research proposals as a guarantee that they are funding the best science that meets their strategic objectives. They should also have greater and early engagement with the relevant parts of the research community when setting their strategic objectives.
6. The short term nature of much RDC funding means that researchers are often employed on short-term contracts with no security. This becomes an inefficient process because the last year of a project is compromised whilst the contract researcher looks for the next grant or a new job, the latter frequently out of agricultural research. RDCs do not seem to value the postdoctoral researchers they fund and do little to keep the best and most promising of them in the industry. With the challenges that lie ahead, there is an imperative that the RDCs implement policies to attract the best and brightest into research for their industry to secure its future. This requires a well defined career path for the emerging generation of scientists.
7. In some cases, program managers in RDCs have been employed in the same position for extended periods. They become expert on what research is needed but, at the same time, can lose perspective about the range of expertise available. A scheme where program managers are seconded from industry, universities or other research providers would enhance the system by the injection of new ideas and reduce the complacency and fixed ideas of long-term managers. This approach is used in US funding bodies such as NSF and in the EU Commission.
8. The governance arrangements of some RDCs need to be addressed. A case in point is AWI, which has a popular election annually to determine the membership of its Board, thereby creating difficulties in its continuity of purpose. A skills-based independent board must be a priority in such cases. In the case of AWI, there is an argument for amalgamation with MLA for a Pastoral Industries RDC because there is significant overlap in research activity.
9. The loss of Land and Water Australia was unfortunate and there appears to be no entity to undertake the important work for which it had responsibility. ACDA

suggests that, rather than establish a replacement organisation, with the inevitable extra transaction costs that would be incurred, RIRDC could be modified to have that portfolio as well as its current one for emerging industries.

### **The Australian Research Council**

The ARC is a long serving research funder of basic research. An ARC grant is considered prestigious and such funds are highly competitive. There is certainly a perception within agricultural Faculties that the playing field is not level with respect to agriculture. The perception is that the reviewers see agricultural scientists as having access to RDCs and thus ought not to receive favourable treatment from ARC, whereas the RDCs tend not to fund basic research because it is the responsibility of ARC. This Catch 22 means that much of the basic research that should be funded to underpin agriculture misses out as the buck is passed between research funders. In the university sector, there is a view held by some institutions that agriculture projects need to be disguised as biology projects rather than identify agriculture or productive species associated with agriculture. The paucity of agricultural reviewers for the ARC hinders the case for projects from the sector. To help resolve this, the ACDA provided nominees in agriculture in 2009. Clearly this impasse between ARC and the RDCs needs to be resolved and even joint funding considered.

### **Cooperative Research Centres**

Agriculture has been well served by CRCs since their introduction. However, trends over time have not provided a positive effect. In the first place, the imperative to have commercialisable intellectual property (IP) detracted from the research agenda and in most cases there were disappointing outcomes from unrealistic expectations of the potential of the IP to generate income and industry benefits. Public good issues were put aside. Fortunately this policy has been brought back to a more sensible balance, which the ACDA endorses.

Another issue of concern is the requirement for a skills-based board. Whilst this is not a problem in itself, the implementation of the policy has resulted in the payment of significant sitting fees for inputs that previously were largely provided for free. It is questionable whether the extra transaction and compliance costs have delivered benefits beyond those previously delivered, but there is no doubt that there is less money for the research itself.

Recent changes in the funding rules for CRCs may also work against the contribution of this very important scheme to future agricultural R&D. The new rule is that where partners have been involved in CRCs in a particular area they cannot apply for a new CRC in a similar area, even if the aims, scientific program and overall mix of participants are different from the previous CRC. The best they can achieve is a one-off 5-year extension of an existing CRC after which the research is expected to be self-supporting. This will work to the detriment of agriculturally-based CRCs where the number of potential research partners is relatively small and many have worked together in a number of CRCs. As the current agriculturally-related CRCs come to the end, this restriction will inevitably lead to a decrease in the amount of agricultural R&D undertaken through CRCs, and will undermine the move towards more collaborative activities that the PISC R,D&E reviews are encouraging.

### **Intellectual Property**

In the last decade or two there has been a preoccupation with protecting IP. Most research providers have IP offices and these need to negotiate with their counterparts in funding agencies, and in each research partner if the project is collaborative. The time and cost of the management of IP is astronomical and in most cases there is no commercial outcome realised for funder or researcher, yet the time commitment of those involved is significant and often frustrating. Further, each institution seems to want to have a unique contract thus leading in many cases to prolonged negotiations as the research funders, especially RDCs, seek to drive adoption. There is a case therefore for a simple, standard IP contract to be available for all projects with provision to go to a more comprehensive contract only in those cases where there is a high likelihood of significant IP outcomes. The ACDA recognises that the universities are guilty parties in this.

A specific issue relating to IP is that of transfer of crop germplasm, the basic raw material for crop breeding programs, between States. Currently each jurisdiction tends to legislate for its ownership of germplasm thereby creating a major impediment to the movement of germplasm across Australia. This represents a serious barrier for the development of new varieties and, for example, crop adaptations to climate change. The role of the Commonwealth Government in facilitating free movement of germplasm would have very positive effects on agricultural innovation.

A related problem is the status of the Plant Genetic Resource Centres for which there appears to be no coherent policy or ongoing Federal funding. These centres are the repositories of the genetic diversity that underpin plant breeding and are the subject of international agreements. However, funding for them has largely been left to RDCs and State agencies with the consequence that the support can be withdrawn. A case in point is the Pastures Genetics Resource Centre based in Adelaide which was funded by GRDC. GRDC approached MLA, AWI and Dairy Australia to contribute towards the funding of the Pastures collection. However, these three RDCs decided it was not of strategic importance to them, despite the obvious relevance of pastures to their industries. GRDC decided it was not a sufficiently important grains industry priority for it to provide support without the others. As a consequence the collection was mothballed and a resolution is still to be found although progress is being made through the intervention of DAFF. These national collections are too valuable both to Australia and the international research community to be left to the whims of industries that are unable to commit ongoing support. A long-term funding solution needs to be found and implemented

### **Private Industry**

Most agriculturally-based companies in Australia are small by global standards, many being SMEs, and do not have funds to invest in R&D, other than to support their own in-house needs. Large multinational agricultural companies such as Monsanto, Dupont Pioneer and Syngenta have not traditionally based significant R&D activities in Australia because the market is perceived to be too small. However, there are signs that this is changing with a growing interest of these companies and they have been investing either by buying stakes in local companies (e.g. Syngenta has invested in Longreach, and Limagrain in Australian Grains Technologies) or partnering with research organisations (e.g. Bayer with CSIRO and DuPont Pioneer with the Australian Centre for Plant Functional Genomics). This is a welcome development and is a sign of the acknowledged strength of Australian agricultural research. However, the long-term health of national R&D cannot rely on this private investment because experience shows that changes in corporate strategies can quickly lead to disinvestment, because company priorities are aimed at larger markets and not for the

unique problems of Australia. Therefore the RDC and CRC models must continue to be important contributors to Australian R&D.

### Capacity in Agricultural R&D

The ACDA has already made a submission to the Rural R&D Council on attraction of undergraduates and postgraduates into agriculture programs in Australian universities; the results will not be reiterated here. A recent analysis by ACDA of data from surveys of new graduates by Graduate Careers Australia shows a low uptake of further study by agricultural graduates compared those from other scientific disciplines (Figure 2). Specifically, the data show that only approximately 20% of agricultural graduates stay on at university after their first degree. This contrasts with other science subjects where the proportions are much higher. Further, these trends have been consistent over the last 10 years. While this is probably a reflection of the enthusiasm of vocationally-trained agricultural graduates to use their skills in the industry, it is worrying for the future of agricultural R&D. It is of course possible and probable that students from other subjects switch to postgraduate study or research in agriculture and this would mitigate against the loss of agriculture graduates. Further, the latter may return to university after a period in employment. However, it is an area about which the Rural R&D Council might fruitfully consider obtaining further information in order to see whether there is detriment to agricultural R&D, especially in areas such as agronomy and the more practical aspects of agriculture, which are not taught in the other sciences. The ACDA would be happy to work with the Council on this.

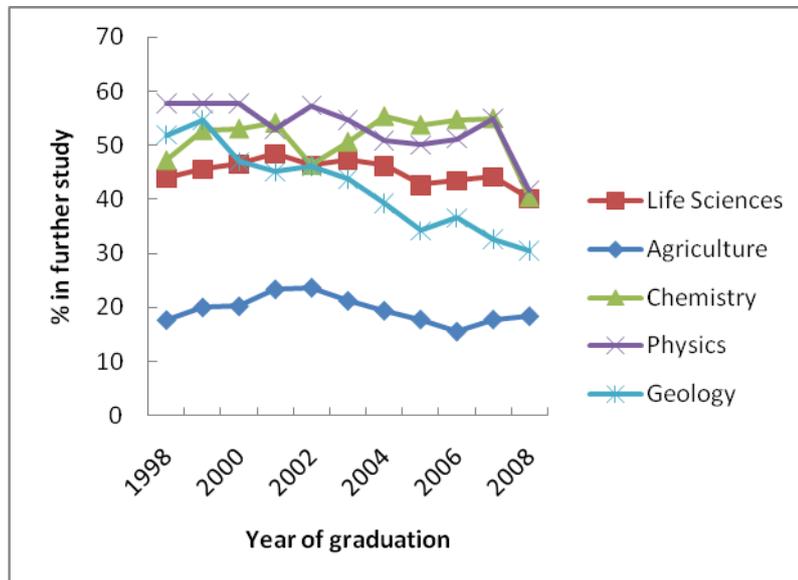


Figure 2. Percentage of graduates in agriculture and other science subjects who were in full time study four months after their graduation. Data from surveys by Graduate Careers Australia.

### Continuity of Research Capacity and R,D&E

Research by Julian M. Alston, Philip G. Pardey, and Vernon W. Ruttan, among others, shows that the lags between agricultural R&D and adoption are much longer than is typically assumed in studies of industrial R&D, with rates of adoption in agriculture generally peaking many years or decades after the research is completed. In many, if not most, cases of agricultural innovation in Australia, adoption has been driven by committed researchers, who continued to advocate for the outcomes of their research. In State Governments and CSIRO, there has historically been at least a small base of internal funding for such knowledge partnerships and extension but there is not such support for extension activities in universities. Further, research grants are neither of long duration nor continuous so cannot support provision of ongoing advice to farmers. With the decline of extension by State and Federal governments, university staff are increasingly called upon to volunteer for grower talks and the like. Although this is a natural extension of the teaching function of academics, and they are good at it, such efforts further stretch very limited university resources, and are often impossible to meet in full because of the need to maintain Faculty income through undergraduate teaching.

This issue has been addressed in the USA for more than 100 years under the Agricultural Land Grant system, where the Federal government provides a direct subsidy to universities of more than US \$1 billion p. a. specifically for extension work, with States contributing additional funds. This is done with rigorous annual reporting requirements, but minimal bureaucracy in distribution, with funding based mainly on academic staff numbers. This has contributed enormously to research adoption. Scaled to Australia's smaller population size and differences in exchange rates, this would equate to some AU\$70-80 million per year. Such a system, even on a smaller scale, ideally funded through the RDCs, with perhaps some Federal and State assistance, would significantly improve the long term returns on agricultural R&D investment and help stabilise and maintain agricultural Faculties and Schools in universities, as it has in the USA.

### **Concluding Comments**

There can be no doubt that Australia agriculture needs a robust and efficient R&D system. The RDCs and CRCs have served the industry well and the ACDA argues for their continuation. In so doing, however, ACDA has put forward several suggestions for improvement, all of which endeavour to maximise the funds for research and minimise those for non-research activities. It asks for procedures to be simplified and for trust to become an important aspect of engagement in place of protracted and complicated negotiation.