Rural Research and Development Corporations

A submission from the University of Adelaide to the Productivity Commission Inquiry

June 2010

As a research-intensive institution with a significant role in agricultural research, the University of Adelaide welcomes the opportunity to comment on matters raised in the Productivity Commission's Issues Paper of March 2010. We believe that the Rural Research and Development Corporations (RDCs) continue to play an important role in providing long-term support for the gamut of agricultural research activities, from basic to applied, which has seen significant outcomes for rural industries and the wider community.

Before addressing some of the major questions raised in the Issues Paper, we would like to provide you with some background information on the University of Adelaide to illustrate the importance of our ongoing relationships with RDCs. This submission also includes a number of examples of successful research outcomes at this University, which have been made possible by RDC investment (see attachment 1). Please note that throughout this submission, the generic term RDC is used to cover both RDCs and IOCs, unless otherwise indicated.

This submission is based on input from the University of Adelaide School of Agriculture, Food and Wine, the School of Animal and Veterinary Sciences, the Research Branch, and the Australian Centre for Plant Functional Genomics.

THE UNIVERSITY OF ADELAIDE: BACKGROUND INFORMATION

The University of Adelaide has a strong research record and we continue to attract one of the highest levels of per capita research funding in Australia. We are a member of the 'Group of Eight' (Go8) research-intensive universities, the institutions of which account for 70% of competitive research income in Australia, produce over 60% of Australian university research publications and two-thirds of patents, generate over 80% of the most highly cited Australian university publications, and account for half of Australia's higher degree by research completions.

One of our enduring, primary research strengths lies in Agricultural Science, with a particular emphasis on Plant Science and Genomics; Food Security; Oenology and Viticulture; Animal Sciences; Soil and Land Systems. Building on a long research tradition, we are making multi-million dollar investments these areas, combining basic and enabling research to deliver new opportunities for "added value farming".

The University of Adelaide is the site of the southern hemisphere's largest concentration of expertise in sustainable agriculture, cereal breeding, plant and animal biotechnology, wine and horticulture, and dryland farming, spread across our Waite and Roseworthy campuses.

The Waite campus is at the leading edge of world research in the field of plant breeding and biotechnology. In collaboration with its collocated research partners, the University is one of the largest centres for wheat and barley breeding in Australia, with more than 50% of Australian barley plantings dedicated to varieties bred at the Waite campus, alongside a long tradition of successful wheat varieties

(including Yitpi), and other crops. Collectively these crops contribute billions of dollars of value to Australia's economy.

Since its establishment as Australia's first agricultural college in 1883, Roseworthy (which became part of the University in 1991) has been recognised by the Australian agricultural industry as a premier teaching facility for the sector. Roseworthy is continuing its pioneering role with a new strategic vision that focuses on integrating resources with campus partners and rural industries. The Livestock Systems Alliance, based at Roseworthy and involving collaboration with the SARDI, PIRSA and Murray Institute of TAFE, is the largest gathering of livestock researchers in Australia. Researchers from the University and SARDI are playing a pivotal role in the $30 million national Sheep Genomics Program, a joint initiative of Australian Wool Innovation, and Meat and Livestock Australia. The Program is one of the largest research initiatives ever mounted in Australia to address specifically the discovery of genes that are vital to wool and meat production.

Research income from RDCs to the University of Adelaide comprise a significant proportion of our National Competitive Grants ('Category 1') research income. In 2008, grants from RDCs accounted for 17.6% of our Category 1 income (and 8.5% of our total research income). This percentage was even higher in the previous year (22%). The GRDC is by far the University's largest RDC funding body. We have also received funding over the last few years from the GWRDC, HAL, AWI, RIRDC, LWA, CRDC, AECL and FRDC.

The following are examples of some of our most recently (2009) funded RDC research projects:

- 'Improved phosphorus use efficiency in wheat and barley' (GRDC - $1,498,508)
- 'Improving weed management in conservation farming systems' (GRDC - $1,199,892)
- 'Developing chemical methods to mobilise fixed nutrients in cropping soils' (GRDC - $899,999)
- 'Moving towards co-creation branding partnerships with consumers' – (GWRDC - $165,000)
- 'Cell death in Shiraz berries: consequences for harvest timing, extractability and grape/wine quality in warm regions (GWRDC - $120,000)
- 'Development of native bees as pollinators of vegetable seed crops' (HAL - $254,069)
- 'Emu oil and prevention of intestinal damage' (RIRDC $122,000)

RDCs AND RESEARCH: THE MAIN ISSUES

The Inquiry Paper raises a significant number of questions on the current performance and structure of RDCs, as well as possible future options. In this submission, we address what we perceive to be are five of the most important points relating to productive research outcomes.

1. The Funding Model

We believe that the RDC model, funded by grower and producer levies coupled with Commonwealth Government co-contributions, is a world-class system which is the envy of the agricultural R&D sector internationally, providing Australia with a strong advantage in the marketplace. It also acts as an attractor for talented scientists from other countries, and has helped to provide a stability to agricultural R&D in Australia which has not been enjoyed in other developed countries. Indeed, the wide recognition that declines in agricultural productivity worldwide are, in part, due to smaller public investments in agricultural R&D since the 1980s, highlights the need for governments to re-invest in the sector. See for instance "*Reaping the Benefits: Science and the Sustainable Intensification of Global Agriculture*", The Royal Society, London, October 2009[1].

[1] http://royalsociety.org/Reapingthebenefits/

This remains particular important in addressing food security as one of the world's major global challenges. In a recent report[2] by Professor Mark Tester and Professor Peter Langridge of the Australian Centre for Plant Functional Genomics (ACPFG), they state that:

to meet the recent Declaration of the World Summit on Food Security target of 70% more food by 2050, an average annual increase in production of 44 million metric tons per year is required, representing a 38% increase over historical increases in production, to be sustained for 40 years. This scale of sustained increase in global food production is unprecedented and requires substantial changes in methods for agronomic processes and crop improvement (p.818).

While awareness of the seriousness of climate change has permeated society, this has not yet been the case for the challenges of food security, although it will need to happen.

One of the options proposed in the Issues Paper is to remove the matching Commonwealth Government's co-contribution from RDC funding. At a time when global sentiment is moving towards greater public investment, this would place Australia at a disadvantage by weakening an internationally recognised and highly productive research sector. It would also harm the attraction of students into the study of agriculture, and lead to a decline or loss of agricultural schools within the university sector. Furthermore, it would exacerbate the deleterious effects of reductions in agricultural R&D that are now occurring due the decreasing level of States and Territory investment in this area.

If the Commonwealth Government co-contribution were removed, it could impose significant imposts on industry, in the tens of millions of dollars annually. While we have raised a number of other reasons above why such a proposal would be not be in the best interests of applied agricultural research outcomes, there is another important point to consider. If RDC research funding were no longer to be counted as Category 1 Research Income, it would have adverse effects on infrastructure renewal and research support.

As the Productivity Commission may be aware, universities receive Commonwealth funding for research infrastructure under the 'Research Infrastructure Block Grants Scheme' (RIBG). The RIBG allocations reflect the relative success of each institution in attracting Category 1 funds. Beginning this year, we also receive funding under the Sustainable Research Excellence (SRE) Scheme, to augment the RIBG program. The national RIBG funding pool is currently valued at approximately $220m and the SRE will eventually add a further $300m.

If our access to infrastructure funding were reduced, then it would need to be met by industry and government in other some fashion, if we were to continue meeting the demand for high-quality research productivity. Furthermore, Category 1 research is competitive and peer-reviewed (as a measure of quality), characteristics which remain significant drivers in the Commonwealth Government's approach to the funding of research more generally.

The current model, with its mixture of levies and Commonwealth Government matching funds, provides an appropriate basis for agricultural research as this is an area with both private and public benefits. The producers gain private benefits 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 and safe food supply, better environmental and social outcomes (including employment opportunities in rural areas), and considerable economic benefits

[2] Mark Tester and Peter Langridge, 'Breeding Technologies to Increase Crop Production in a Changing World', *Science* 12 February 2010: Vol. 327. no. 5967, pp. 818 – 822.

accruing from export earnings. This successful funding model generates high returns on investments for all those concerned. The RDCs provide a valuable link between growers and producers, with their considerable expertise and business knowledge, and research providers.

As addressed further in point three below, scientific research is very expensive, and agricultural research in particular is often of a very long-term nature which requires on-going support into the future. We do not believe that there is currently any other funding model that would provide the surety and long-term support for agricultural research if the RDC budgets were to be reduced or abolished. For example, the Co-operative Research Centres are unable to provide the same support as they often rely on investment from the RDCs themselves, and they have only a limited lifespan.

The Australian Research Council (ARC), as another proposed alternative, is predominately focussed on providing support for basic research, while RDCs cover the gamut from basic to applied research (in a similar funding model to that of the National Health and Medical Research Council in its own disciplinary area). Therefore, we do not feel that transferring funds to the ARC or into special programs run by Commonwealth Government departments is likely to ensure the necessary ongoing support for agricultural R&D. For example, some areas of research, while essential for agricultural development (e.g. basic research on crop species or livestock), might not be viewed by the ARC as sufficiently 'cutting-edge' to succeed in funding rounds, and Government departments might well feel unable to continue to support research in times of fiscal hardship. The RDCs as legislated bodies are in a much stronger position to give continuity and to ensure that appropriate R&D is funded.

The Issues Paper also raises questions in regard to 'free-riders' benefiting from the current system. Certainly, while 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. For instance, one example are millers and bakers who benefit from improvements in wheat quality resulting from GRDC-supported projects, yet do not directly contribute financially to the GRDC. It would be useful if the Commission were to consider advocating a system change that captures R&D investment from processors, retailers, etc. This would not only increase the amount of research funds available, but would also increase the understanding and appreciation of the benefit of R&D to the whole supply chain. Any extension of the levy system to other supply chain members would need to be accompanied by an appropriate extension of RDC-funded research to include post-farm gate aspects. While the latter is already occurring to some extent as individual agricultural sectors seek to understand better their markets and consumers, the RDCs receive no funding from the non-farming beneficiaries.

Finally, it is fair to say that the RDCs have not been particularly good at cooperating to address cross-cutting issues that affect all sectors of agriculture. (This point is addressed in more detail below). However, if any change to the RDC funding model is made, one suggestion would be to set aside some of the Commonwealth funding into a pool that is only available for cross-RDC collaborative research. This funding could be used for research into issues of general significance, for example the efficient use of water or adaptations to climate change. There may also be a case for including a proportion of the industry levies into this pool, so that growers/producers have a greater incentive to see that such work is addressed.

2. Governance and administration

Governance arrangements for RDCs vary across the sector, and some reform is needed in this area. We believe that an independent, skills-based Board should be a requirement for all RDCs, with members who understand the industry, research principles and the research providers. While this practice does exist in some Boards, it is not uniformly practiced. A case in point is Australian Wool

Innovation, which has a popular election annually to determine the membership of its Board, thus making it a highly political process and creating difficulties for continuity of purpose and direction. Certainly we believe that all RDC Boards should include at least one senior, practicing researcher undertaking work for the sector. This would provide essential input into new research opportunities, and counter unrealistic expectations of what research can deliver.

Another area in which the operations of some RDCs may be improved relates to the importance of transparent peer-review processes for assessing grant applications, which must include active researchers. These review processes need to be open and include the provision of detailed feedback. This would bring the RDCs into line with other national funding bodies such as the ARC or NHMRC, as well as with international best practice. It would also assist with ensuring that funding is directed towards the best science to meet the strategic objectives of the particular RDC; objectives which need to balance industry needs with new research opportunities based on the latest discoveries and technologies.

In considering the administration of the RDCs, it is important that transaction costs are kept within reasonable limits (and a 10% figure does not seem excessive), so that the maximum amount of funding is directed at research and development. It may that there is a case for considering whether some common administrative activities might be merged into a central provider which serves all RDCs. However, this would have to be given careful consideration to determine the extent of possible savings and efficiencies, as well as ensuring administrators are not excessively distanced from those they are serving. While our experience has been mixed, it is worth noting that our major partner, the GRDC, is seen as having an efficient administration and understands the different research providers with whom they deal, e.g. government departments, universities, the CSIRO, etc. This is important for project flow, transparency, and getting the results out to the community.

The specific budgetary arrangements practiced by the RDCs, where surpluses are accrued, should be seen as a positive aspect of RDC administration. This prudent approach is necessary, as much of agricultural research is weather-dependent, and researchers will rarely achieve any outcomes within a single year.

Finally, the overall reporting requirements associated with RDCs are generally realistic, reasonable and, with an outcomes-based orientation, produce quite useful documents.

3. Research and Development Activities

While the overarching RDC model provides a good long-term source of research funding, unfortunately there are concerns that support for individual projects can sometimes be too short-term due to a perceived need by the RDCs to satisfy the levy payers. This can lead to projects which avoid potentially transformational research, the related questions of which may take 5 years or more to solve. This type of research is often the first to be stopped if funding gets tight, so major breakthroughs are less likely.

As argued above, we do not see a solution to this problem in simply transferring research support to the ARC. However, there would be some value in encouraging greater cooperation and joint funding opportunities between the ARC and the RDCs. The Australian Centre for Plant Functional Genomics (ACPFG), which is headquartered on the University of Adelaide's Waite Campus, is a good example of such cooperation. The ACPFG is funded by the ARC, GRDC, State Governments and its member universities. As a result, it is able to undertake longer-term research of international quality with a focus on outcomes for the cereal industry, thus meeting the requirements of both the ARC and GRDC.

The short term nature of some RDC project funding also means that postdoctoral researchers are employed on short-term contracts with no long-term security. This becomes an inefficient process when, during the last year of a project, the contract researcher is required to look for the next grant or a new job, the latter frequently out of agricultural research. There is a strong perception that RDCs undervalue their postdoctoral researchers, and do little to keep the best and most promising of them in the industry. It is imperative that the RDCs help in attracting the best and brightest into research for their industries, and thus help to secure future innovations. This requires a well defined career path for the emerging generation of scientists, as well as developing fellowship schemes or professional development activities, as just two examples.

It is also worth mentioning the tendency of the IOCs to undertake marketing and other non-research activities, which are conducted with varying degrees of success. While it is important to promote the outcomes of publicly-funded research, the main focus of an IOC or RDC should remain on the actual research and development. Therefore, there may be some value in separating out marketing and R&D functions. This could be achieved by the amalgamation of some of the IOCs into new RDCs, leaving the industries to set up their own marketing operations funded from the additional levies they pay at present.

4. Agricultural Extension Services

Agricultural extension services, connecting farmers with new innovations, is an important aspect of the research and development process. The lag time between agricultural R&D and adoption are much longer than is typically associated with industrial R&D, with rates of adoption in agriculture generally peaking many years or even decades after the research is completed. In many cases of agricultural innovation in Australia, adoption has been driven by committed researchers who continued to advocate for the outcomes of their research.

State Governments and the CSIRO have historically retained some internal funding for such knowledge partnerships and extension, but there is no such support within universities. RDCs themselves often require researchers to promote the outcomes of their work and may provide some funds to achieve this. However, once the project is completed, this activity may cease unless the researcher is personally committed to undertaking it without funding. With the decline of extension by State and Commonwealth governments, university staff are increasingly called upon to volunteer for these activities. There would be some value in requiring RDCs to provide ongoing support for this activity to the researchers who conducted the work and who can best represent it. This would be a positive way in which to demonstrate the value of levy-funded research outcomes to the producers themselves.

5. RDC Coordination and Collaboration

As a University we are strongly supportive of collaboration and multi-disciplinary research to address broad issues, such as food security. However, while we believe that there are numerous opportunities for cross-sector collaboration by RDCs, we do not see much evidence of this being done at the moment. In fact, there is a strong feeling that there are probably too many RDCs at the moment, and that some consolidation may be beneficial and warranted.

For instance, there is an argument for amalgamation of AWI, MLA and DRDC into a single Pastoral Industries RDC, due to the significant overlap in the research activities they support (e.g. the growth in animal genomics research). Similarly, there may be a case for the merger of HAL and the RIRDC, which often fund similar projects. However, other RDCs such as GRDC and GWRDC serve defined industries, so there would be less to gain form a merger with another RDC. Such mergers would also assist in reducing administrative overheads.

I trust that this submission will assist the Commission in its deliberations, and I look forward to seeing your completed Report. If you wish to attain any further information, please do not hesitate to contact me. Finally, I would like to reiterate the University's strong support for our positive relationships with the RDCs, which I believe has been of considerable benefit to all those involved in this area of fundamental research for Australia and beyond.

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ATTACHMENT 1: CASE STUDIES – RDC FUNDING AND RESEARCH OUTCOMES

Case Study 1: Wheat

This example highlights innovation in plant breeding, and highlights the importance of publicly-funded research, in this case the GRDC, as an essential impetus for longer-term developments. Australian Grain Technologies Pty Ltd (AGT), the largest wheat breeding company in Australia, was established in 2002 as part of a national initiative to re-focus and re-position Australia's wheat breeding efforts in a rapidly changing, highly competitive, global economy. The original shareholders of AGT were the University Adelaide, the GRDC and the South Australian Research and Development Institute. AGT consolidated more than 100 years of wheat breeding activities formerly managed by the University at both the Waite and Roseworthy Campuses with those undertaken in Victoria. These programs have dominated the area sown to wheat in Australia for more than 30 years and royalties from the sales of the wheat varieties now provide a revenue to sustain AGT's R&D activities. The success of AGT was recognised by Limagrain, a French-based multinational which is the fourth largest seed company in the world, who purchased 25% of AGT in 2008.

Case Study 2: Barley

The University of Adelaide leads the southern node of the nationally coordinated barley breeding venture, Barley Breeding Australia (BBA). BBA is supported by growers and the Australian Government through the GRDC, the University of Adelaide and a number of State Government Departments across Australia. Commercialisation of varieties developed through the southern node of BBA is conducted by ABB Grain: one of the largest marketers of barley and malt in the world. The 5 year, $23.5 million research program is developing new barley varieties, expected to be worth billions of dollars to domestic and export markets. The deal ensures that our barley breeding program will remain at the forefront of agricultural research and development in Australia, for the benefit of industry and the community. It will strengthen our already strong links with industry and government.

Case Study 3: Faba Beans

Pulse Breeding Australia (PBA), launched at the University of Adelaide in 2007, coordinates Australia's pulse breeding efforts and create a world-class breeding and germplasm enhancement program. PBA is a collaborative venture between the GRDC, Pulse Australia, the University of Adelaide, the SA Research and Development Institute (SARDI) and State departments of primary industries in Victoria, NSW, Queensland and Western Australia. In 2007, Dr Jeff Paull and his colleagues were awarded $2.8M from the GRDC for an Australian Faba Bean Breeding Program. Its focus is on delivering a range of faba bean varieties that will increase the production and profitability of the Australian faba bean industry. The fact that farmers will adopt the crop, provided appropriate varieties are available, is demonstrated by the enthusiastic response to several varieties with a higher level of disease resistance that have been released in recent years. The Program will help to maintain Australia's position as one of the major exporters of faba beans, through delivery of high quality varieties with regionally specific adaptation incorporating resistance and tolerance to biotic and abiotic stresses.

Case Study 4: Sustainable control of mildew diseases of grapevines

This was a GWRDC-funded project, reporting in 2007, conducted by a group of researchers at the University of Adelaide, the University of Tasmania, Charles Sturt University and SARDI. Powdery and downy mildew can reduce both yield and quality of the fruit and wine produced from affected grapes, and has been estimated to cost the Australian grape and wine industry about $30 million each year. Powdery mildew is controlled mainly by sulfur and synthetic fungicides in conventional vineyards and by sulfur in organic vineyards. Downy mildew may be controlled by a range of fungicides, including the phenylamide group and copper-based chemicals, in conventional vineyards and by copper in organic vineyards. Reducing inputs of sulfur and copper in both organic and conventional systems will reduce

the possible risk of environmental contamination, and assist in responding to large, unmet demand for organic wine in Europe. The research project found that, when disease pressure is low to moderate, commercially acceptable control of grapevine powdery mildew on cultivars that are not highly susceptible can be achieved using a range of novel materials including milk, whey and mixtures of canola oil plus potassium bicarbonate.

Case Study 5: Tuna research adds value to industry (2007)

In 2007, a University of Adelaide PhD student, Quinn Fitzgibbon, produced research findings to demonstrate that Bluefin tuna use three times as much oxygen as other fish their size, making them more difficult to culture. The research also found that tuna use twice as much energy processing their food as any other fish, and so need to eat more to grow. While tuna farming has quickly grown to be Australia's most valuable aquaculture industry (worth about $300 million annually), until now little has been known about these large, strong fish because of the difficulties of studying them. The information will help tuna farm managers ensure the health of their fish, and assist in the design of feeding strategies, helping to maximize productivity and profitability. Funding for the project was provided by the Fisheries R&D Corporation, as well as the Aquafin CRC, its participants and the SA Government.

Case Study 6: Sheep Genomics

Researchers from the University and SARDI are playing a pivotal role in the $30 million national Sheep Genomics Program, a joint initiative of Australian Wool Innovation, and Meat and Livestock Australia. The Program is one of the largest research initiatives ever mounted in Australia to address specifically the discovery of genes that are vital to wool and meat production. Professor Phil Hynd leads the Wool Genomics subprogram which aims to unlocking the secrets to sheep genes and their functions, and give producers the tools to develop new ways for managing internal and external parasites, new technologies such as the introduction of vaccines to combat diseases, and will allow them more accurately to select animals for production efficiency, wool quality, carcase type, meat eating quality and a range of other desirable characteristics.

Case Study 7: Development of novel eucalypt hybrids

In 2004, the RIRDC provided funding to Dr Kate Delaporte and Professor Margaret Sedgley to finalise optimal clonal propagation methods for selected superior eucalypt varieties from a previous project, and to continue with selection of superior varieties for both the floriculture and nursery and garden industries; with a focus on bright colours and a range of varieties for year round production, including summer months. The outcome of the project saw a further 23 varieties selected, resulting in a total of 36 varieties under development. These varieties underwent testing for clonal propagation by grafting and cuttings. The demand for new varieties of ornamental eucalypts for the Australian floriculture and nursery and garden industries has continued to grow. The potential for new varieties in these market sectors is high, given the demand for the few varieties currently available, and the ongoing water restrictions have opened the door for water-miser native plant varieties in the home garden.