Australian Government

rural R&D CORPORATIONS

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

Cotton Research and Development Corporation

Grains Research and Development Corporation

Fisheries Research and Development Corporation

Forest and Wood Products Research and Development Corporation

Land & Water Australia

Rural Industries Research and Development Corporation

Sugar Research and Development Corporation

Grape and Wine Research and Development Corporation

Australian Pork

australian wool innovation limited

mla MEAT & LIVESTOCK AUSTRALIA

DAIRYAUSTRALIA Delivering for the dairy industry

HAL Know-how for Horticulture™

AUSTRALIAN EGG CORPORATION LIMITED

Response to the Productivity Commission Draft Science and Innovation Report

Table of Contents

Boxes and Tables

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

1 Introduction

This supplementary submission by the Council of Rural Research and Development Corporation Chairs (CRRDCCs) is in response to issues raised in the Draft Research Report on *Public Support for Science and Innovation* (Productivity Commission 2006).

The Draft Research Report, while supporting the Rural Research and Development Corporation (RRDC) model, has questioned the need for the current level of Government support to industry-centred RRDCs. On balance the Commission has assessed that there is little evidence to justify an argument that industry-based RRDCs have greater additionality or spillovers than any other Australian industries. The Draft Research Report said:

> In the case of RRDCs undertaking significant public good research, such as the environmental research sponsored by Land and Water Australia, strong grounds for large public subsidies remain. However, for industry-centred RRDCs this is less certain. Currently, the actual funding formula provides contribution rates per dollar of industry R&D that are between three and ten times that for eligible R&D in the manufacturing, mining and services sectors (see table 9.1). This would imply either:
>
> - much greater prospects for additionality; or
> - significantly higher spillover rates than other industries (Productivity Commission 2006, p.9.34).

The Draft Report concluded:

> There are strong grounds for significant public co-funding of RRDCs that provide spillover benefits beyond industry members where that research would not proceed in the absence of support. But there is a weak rationale for the present substantial co-funding of some industry-centred RRDCs. Any changes to current support arrangements should be delayed until current economic conditions in the rural sector have improved (Productivity Commission 2006, p.9.37).

The CRRDCCs believe that there is evidence that is contrary to the Commission's assessment that agriculture has no greater prospects for additionality or spillovers. This submission, after briefly providing some background on RRDC objects, focuses on these two issues.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

2 RRDC objects

The RRDCs where created under the Primary Industries and Energy Research and Development (PIERD) Act 1989 to manage the mostly compulsory levies collected from producers under the Primary Industries Levies and Charges Act 1991. The levies were introduced to overcome a compelling case of market failure in the funding of research and development in agricultural industries. There are 15 RRDCs, six are industry owned companies and nine are statutory corporations.

The RRDCs objectives require them to produce benefits for the wider community as well as levy payers

Government not only provides the mechanism for the RDCs to address the market failure—the compulsory collection of levies—it also provides funds directly from general revenues. The Government contribution, in part, assists to overcome some of the market failure. However, the other justification for public contributions to the RRDCs is the community benefits that are produced by the RDCs that are required under the RRDCs objects. The PIERD Act contains the following objects clause (which is also reflected in the Statutory Funding Agreements for the industry owned corporations) which specifies that the levy funds collected must be spent for the benefit of the levy payers and the Australian community:

> The objects of this Act are to make provision for the funding and administration of research and development relating to primary industries with a view to:
>
> - (a) increasing the economic, environmental and social benefits to members of primary industries and to the community in general by improving the production, processing, storage, transport or marketing of the products of primary industries; and
> - (b) achieving the sustainable use and sustainable management of natural resources; and
> - (c) making more effective use of the resources and skills of the community in general and the scientific community in particular; and
> - (d) improving accountability for expenditure upon research and development activities in relation to primary industries (PIERD Act).

From these objects it is clear that the RRDCs are obliged to produce benefits for levy payers and the wider community. We are not aware of any other industries which have such an explicit requirement to produce public benefits.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

3 Additionality

Additionality is defined in the Draft Research Report as:

> … the extent to which broad public support makes a difference to the actual amount of R&D that is conducted …. This issue stems from the fact that government support may, directly or indirectly, substitute for R&D that would otherwise be financed by others (*crowding out*). Additionality is important because beneficial impacts can only be generated by truly additional innovation, while the taxation distortions imposed by financing the transfers still produces costs (Productivity Commission 2006 p.4.2)

Thus additionality can be considered as that extra R&D which would not have otherwise occurred (or might be significantly delayed) in the absence of public support. In other words, the public support has not crowded out research that would have occurred anyway.

The Draft Research Report dismisses the additionality issue for the RRDCs as follows:

> The first [greater additionality] seems unlikely to the extent that joint R&D arrangements have been successfully formalised to allow the internalisation of spillovers (Productivity Commission 2006 p.9.34)

There can be no certainty that the RRDC arrangement has internalised sufficient spillovers.

We believe that this is based on several untested and potentially incorrect assumptions. The first assumption is that there are sufficient incentives for producers to invest the additional funds in place of Government contributions should those contributions be reduced. The second assumption is that producers have sufficient capacity to be able to contribute the additional funds in the event that there are sufficient incentives for those producers to make the investment.

The incentives for investment in agricultural R&D lie in the ability of agricultural producers to overcome the free rider problem and capture sufficient benefits to justify the investment. Compulsory levies are successful in reducing free riders and give rise to closer matching of benefits and the incidence of costs (Alston 2002). However, the ability of commodity producers to capture sufficient benefits from R&D investments is a matter of considerable debate in the economics literature and is by no means as certain as the Productivity Commission's Draft Research Report appears to assume.

Central to the ability of producers (in this instance levy payers) to capture the benefits of R&D investments is how the benefits of R&D are shared between the consumers, other stages in the production process (such as processing, retailing and transport) and producers. There is a clear consensus that the consumer receives considerable benefits from agricultural innovation stemming from R&D, which is discussed in more detail in the spillover section of this response. The consumer benefits are usually in the form of a greater diversity of cheaper, safer food and fibres.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

The degree to which benefits are shared between the producer and other stages of the supply chain, and to which these benefits are sufficient to justify the R&D investment is less clear and dependant on a number of factors. Verikious observed:

> Another important factor is the traded nature of the good produced in the stage experiencing research. Where research is localised in a production stage which produces highly traded goods which are highly substituted with foreign production, the member of this production stage, and members of stages close to this production stage, are most likely to gain. For consumers we find support for previous work; consumers always gain from research as it will generally lead to lower prices and therefore higher economic surplus (Verikios 2006).

Verikios (2006) using a global general equilibrium model examined these issues in the context of wool industry R&D and found that there are large external benefits from wool research which justify public support:

> … these results suggest a large external effect (benefit) to wool research, one that far exceeds the effects internal to the wool production system. This suggests that, in this case, it would be inappropriate for members of the wool production system only to contribute to the funding of this wool research, and that some public funding of this research is justified (Verikios, 2006)

The extracts above indicate that the returns to producers are dependant on the stage of the supply chain where the research is carried out, as well as the elasticity of supply and demand. The RRDCs invest across the entire supply chain, where investments are often categorised as either on-farm or off-farm programs or projects. There is general consensus that producers share a greater portion of the on-farm R&D than off-farm R&D (Zhao et al 2001, Alston and Scobie 1983, Verikios 2006). The degree of producer benefits from off-farm R&D is highly dependant on the nature of shifts in supply and demand and the elasticity of factor substitution. For example, Alston and Scobie (1983) found that farmers gain a greater proportion of returns from on-farm R&D compared to research at the marketing level. Indeed they found that farmers in certain circumstances can lose from off-farm research.

Commodity markets at the producer or early stage level are characterised as having a high elasticity of demand. Under these circumstances, the benefits of agricultural R&D off the farm (demand side research) are less likely to accrue to producers but are likely to have significant benefits for consumers. This is particularly so when the nature of the research is basic, strategic or applied.

Therefore off-farm agricultural R&D investments do not necessarily exhibit a high level of incentive for producers to invest but nonetheless such R&D can deliver high levels of consumer benefit. A reduction in Government support will lead to a reduction of producer investment and a subsequent fall in downstream and consumer benefits.

Examples of off-farm R&D where it is difficult for producers to capture sufficient benefits, but where there are large consumer spillovers include:

- Human health and welfare R&D which is conducted by virtually all of the RRDCs, such as:

– Research and promotion of the health benefits of eating more fresh fruit and vegetables (Horticulture Australia Limited)

– Health benefits of dairy products and dairy consumption (Dairy Australia);

⋯ Conjugated Linoleic Acid (CLA) research to develop an experimental model to determine the potential of CLA as a dairy functional food to prevent arterial disease

⋯ Research to better understand the contribution of dairy products, lifestyle factors and response to stress to levels of blood pressure

⋯ Research to improve the nutritional status of institutionalised elderly with the aim of reducing fragility fractures in nursing home and hostel residents

⋯ Research into the role of dairy food consumption in the first year of life in the development of asthma and other allergic disorders in genetically predisposed children

– Health effects of red meat consumption (Meat and Livestock Australia) including the development of the CSIRO Wellbeing Diet book;

– Health effects of seafood consumption (Fisheries Research and Development Corporation);

– Health effects of egg and poultry product consumption (Australian Egg Corporation and the Rural Industries Research and Development Corporation);

⋯ Research to determine if total egg avoidance is necessary for egg allergy treatment;

⋯ Research into the rapid detection of virulent Salmonella in egg and poultry products;

⋯ Research into the development of eggs with increased arachidonic acid for infant formula;

– Other industries

⋯ Honey research projects including research towards effective diet management for consumers of honey, including researching the antioxidant attributes of a range of Australian honeys and producing information on the glycemic index of a range of honeys; and

⋯ Tea tree oil research projects to enhance understanding of the efficacy of tea tree oil for various medical uses, including researching the anti-bacterial and anti-inflammatory effects of tea-tree oil, and researching the impacts of tea tree oil on *Staphylococcus aureus* and the development of tea tree hydrogel dressings in wound care

- Food safety and bio-security;

⋯ Food safety risk management research by the Australian Pork Limited, such as research into the evaluation of molecular techniques for assessing Salmonella “flow through” from farm to carcase evaluating the sensitivity of ESAM sampling against new culture/sampling methodologies for Salmonella; and investigating the use of

> pooled sera to improve the value of the Australian mix-ELISA as an indicator of on farm Salmonella infection.

There is a strong probability that the agriculture sector will reduce rather than increase its R&D effort if Government support is reduced.

A substantial amount of the research conducted in the areas listed above, is in the strategic and applied stages of R&D. The promotion to consumers of the research findings also falls into the category of high consumer benefit with a low probability of producers capturing sufficient benefits relative the cost of the activity.

There is another aspect to this issue that appears to have been omitted from the Draft Research Report. The RRDCs believe that in the absence of current levels of Government support, farmers will be much less inclined to vote to contribute a levy to an RRDC. Furthermore, in the absence of the current levels of on-going public support it will be difficult, if not impossible, to encourage farmers to contribute at current levels, let alone at the higher levels required to maintain existing levels of R&D investment. This was recognised in the Industry Commission's 1995 Inquiry into R&D, which stated:

> …it would also not be appropriate to reduce government support to one dollar for four dollars from industry, to be in line with that for companies receiving the 150 per cent tax concession. As discussed, farmers will generally have less incentive to fund R&D, even with the RDCs, than a company. Rural research is also more basic in nature and there is the likelihood of greater beneficial community spillovers than in manufacturing research (Industry Commission, 1995, p.766).

R&D conducted by the industry-centred RRDCs is more likely to be strategic or applied rather than experimental development

The Industry Commission correctly recognised that R&D conducted by the industry-centred RRDCs is more likely to be applied or basic rather than experimental development. This point is illustrated by the categories of R&D undertaken by eight of the industry centred RRDC (see Table 1). In 2005-06, these eight RRDCs, on average, committed nearly 30 per cent of funds to research which was of a strategic nature, compared to only 2.8 per cent for the manufacturing sector and 3.8 per cent for businesses across all industries (excluding agriculture) in 2004-05. Reflecting this difference is the proportion of experimental development R&D, which is much lower for the industry centred RRDCs compared to wider Australian industry (see Table 1).[1]

In the absence of significant Government contributions, farmers may be more likely to direct their R&D away from applied and basic R&D towards experimental development to promote marketing demand side programs. While this might seem appropriate for individual farmers in the long term it will result in a loss of innovation, which is crucial if Australian agriculture is to remain competitive in highly subsidised international markets (see page 17).

[1] The proportion of R&D which was reported to be of a strategic nature varied between the 8 RRDCs, ranging from 7 to 60 per cent. The proportion of applied research ranged from zero to 74 per cent. Similarly the proportion of experimental development R&D also varied ranging from a low of 10 per cent to a high of 96 per cent.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

Table 1 Australian Industry and Average RRDC R&D by type of R&D (per cent)

Research Category	Non-Agriculture Australian business R&D 2004-05	2005-06 Industry centred RRDCs
Pure Basic	0.88	na
Strategic Basic	3.8	29.5
Applied Research	30.9	37.4
Experimental	64.5	33.1
Total	100.0	100.0

Data source: Personal communication with 8 industry centred RRDCs and ABS Research and experimental development, businesses, 2004-05 Cat. No 8104.0

In considering the issue of additionality it should also be borne in mind that the characteristics of agricultural business are different to businesses in the wider economy – a point that was also recognised in the Industry Commission's 1995 R&D report. For example, on the whole, agricultural businesses tend to be small (family) businesses. In 2005, around 80 per cent of agricultural operations had annual earnings of no more than $499,999 per year (see Table 2). Certainly the latest statistics indicate that there has been some consolidation in the sector since 1995, however small and medium sized businesses continue to make up the bulk of the sector.

Table 2 Number of establishments by estimated value of agricultural operations, selected years

Value range	1995	%	2000	%	2005	%
$50,000-$99,999	27,924	31	25,201	26	20,221	22
$100,000-$149,999	18,882	21	16,951	18	13,438	15
$150,000-$199,999	12,643	14	12,175	13	9,904	11
$200,000-$349,999	17,522	19	19,872	21	20,011	22
$350,000-$499,999	6,175	7	8,634	9	9,866	11
$500,000-$999-999	5,110	6	8,896	9	11,742	13
$1,000,000-$1,999,999	1,408	2	2,639	3	4,659	5
greater than $1,999,999	616	1	1,177	1	1,833	2
Total	90,280	100	95,545	100	91,674	100

Note: data excludes established earning less than $49,999.

Data source: ABS (2006), Australian Farming in Brief, Cat. No. 7106.0

The latest available ABS data also indicates that average income and average profits for agriculture, forestry and fishing businesses tend to be lower than the averages reported for small and medium businesses in the rest of the economy. Average profits are also more volatile than those earned (on average) by other small and medium businesses (see Table 3).

Table 3 Average annual income and profit earned by agriculture, forestry and fisheries and small and medium businesses in all other Industries, 1995-2000.

	1995-96	1996-97	1997-98	1998-99	1999-2000
Average Income					
Agriculture	257	271	279	283	462
Small and medium income other Industries	853	858	900	928	958
Average Profit					
Agriculture	37	32	40	38	75
Small and medium businesses profit in other Industries	57	51	57	65	66

Data source: ABS (2001), Business Operations and Industry Performance, Cat. No. 8140.0. Note: Data beyond 1999-2000 not available.

The vagaries of agriculture, forestry and fisheries business incomes and profitability can make a large and on going commitment of funds to RRDCs problematic for these business. The Government support for rural R&D acts as an incentive for smaller farmers to commit scarce resources to R&D.

It is recognised that the Draft Research Report proposes that the reduction of Government funding to industry-centred RDCs should not take place until after the current drought. However, droughts and volatile income and profitability have been, and will in the future continue to be, a feature of the industry.

4 Spillovers

4.1 Social return and spillovers

The Draft Research Report focuses on the "higher spillover" aspect as the pivotal issue for justifying a higher level of public support for the RRDCs, stating:

> The second is then the pivotal issue. It is clear that there are still mechanisms for spillovers from industry-centred RRDCs. For example, a new grain that reduces pesticide use not only lowers costs and improves productivity, but also reduces pesticide residues in water systems, with environmental benefits. However, the overall evidence does not point to spillover rates for R&D by industry-centred RRDCs that are clearly out of line with the rates estimated for other industries (Productivity Commission p. 9.36).

We understand that this conclusion was based on evidence in a submission from the Western Australian Department of Agriculture and Food and the Council of Chairs submissions was used to help support this claim. The Draft Research Report states:

> The general consensus is that many of the (substantial) benefits from R&D by these RRDCs could be captured by their members. The Western Australian Department of Agriculture and Food, for example, noted that:
>
> > It is possible that almost half the value of agricultural output in Australia in 2003 can be attributed to new technology generated by domestic R&D since 1953. At a real rate of interest of 4%, the compound value of the stream of benefits from domestic research from 1953 to 2003 is $878 billion (in 2004 $s). It is likely that

> Australian producers, processors and consumers have retained about 80 per cent of all benefits generated by this national agricultural R&D. (sub. 44, p. i)

The submission by the CRRDCC cited econometric evidence showing somewhat higher social rates of return (although that evidence was related to basic research) but also noted the results were likely to overestimate the actual return.

> Salter and Martin (2001) in their review of the economic benefits of publicly funded basic research present known estimates of the rate of return to publicly funded R&D in the area of agriculture. The estimates generally range from 30 to 50 per cent, however the author notes that these results should be used with caution as they tended to focus on relatively successful government R&D programs and generally do not take into account the investment in complementary assets needed to bring the technology to market. Consequently, the resulting return on investment may underestimate the true costs of technological development. (sub. 96, p. 14)

On the basis of average social rates of return derived in previous studies, that submission estimated that the **net social benefit from the research activity of the RRDCs was around 30 per cent per annum.** This is not higher than estimates more generally found for R&D (chapter 4). In that instance, the large disparities between high subsidy rates for some industry-centred RRDCs and those applying for other industries may not be justified on economic grounds (Productivity Commission p. 9.36, emphasis added).

However we believe that there are other points raised in these submissions that have not been taken into account in the Draft Research Report.

The Western Australian Department of Agriculture and Food submission does not support: "The general consensus is that many of the (substantial) benefits from R&D by these RRDCs could be captured by their members".

First, the quote used from the Western Australian Department of Agriculture and Food submission does not indicate that substantial benefits are accrued by the RRDCs. Rather the submission states that 80 per cent of benefits of Australian agricultural R&D are enjoyed by three parties namely, producers (contributors to RRDCs), processors and consumers. In addition, the Department's submission suggests that 20 per cent of the benefits are enjoyed by foreigners. The following quote from the body of the Department's submission rather than the one selected from the executive summary makes this point quite cleary:

> Besides the potential erosion of benefits within Australia there is also the potential capture of benefits by non-residents of Australia. Mullen (2002) points out that the benefits of new technology in Australian agriculture are shared with producers, processors and consumers who are non-residents of Australia. He estimates, on the basis of previous research into the distribution of the benefits from research that perhaps Australian producers, processors and consumers retain 80 percent of all benefits. The inference is that investment in agricultural R&D in Australia leads to the capture of most of those benefits by the Australian economy (Western Australian Department of Agriculture and Food submission no 44, p.3).

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

Thus the Western Australian Department of Agriculture and Food submission does not give support to the argument that there is a general consensus that many of the (substantial) benefits from R&D by RRDCs are likely to be captured by their members.

Other research also appears to draw similar conclusions. For example, research undertaken by Qaim and Traxler (2005) found that, at a global level, agricultural producers were not the main beneficiaries of research and subsequent commercialisation of Roundup Ready soybeans. The authors found that this new seed generated more than $US1.2 billion in economic surplus in 2001. Importantly, at a global level the main beneficiaries were consumers, and seed and biotechnology firms, who gained 53 per cent and 34 per cent of the surplus respectively. It was estimated that agricultural producers obtained only 13 per cent of the global economic surplus. This result is not surprising given agricultural products such as soybeans, wheat, fruit and vegetables, which are the focus of industry-centred RRDCs research, are commodities which are sold in highly competitive markets, which in many instances are highly distorted by foreign Government subsidies.

The social returns to R&D reported in the CRRDCC submission were economy wide averages - not agriculture averages. A breakdown of private and social returns from agricultural R&D is not reported in the literature. Hence the conclusion drawn is spurious.

The Draft Research Report acknowledges that the estimation and identification of returns to R&D is complex and it is difficult to be precise about the level of returns. The CRRDCC also found this to be the case when undertaking its literature review of past studies. As noted in the submission the returns reported in the growth accounting literature tend to focus on private returns and the so called “social” returns, which cover the returns to the economy as a whole. Note that these social returns are the returns to the economy and do not include returns to the environment or society, which are often difficult to quantify and which would be in addition to these “social” returns. This point was made in the CRRDCC submission:

> The measurable economic benefit or the rates of return (marginal product) to R&D are restricted to those benefits which show up in increased out put or productivity. There are of course other objectives/benefits of R&D such as national security, environmental protection, health and social cohesion which need to be taken into account in assessing the overall benefits to R&D.
>
> We can thus define the average social rate of return as the total measurable benefit to R&D that results in increased output (GDP). The social rate of return does not include other non-measurable or intangible benefits that do not result in output improvements (CRRDCC submission, p. 49).

To provide an indication of the “social” and private rates of return from RRDC R&D, the CRRDCC in its submission used estimates drawn from the literature review. However, it must be pointed out that these social estimates covered returns to non-agricultural R&D as the information on the breakdown of private and social rates of return for agriculture was not available in the literature. On the basis of the literature review the submission reported that:

- average annual private returns to R&D (industrial and agriculture) are in the order of 34.4%; and

- average annual estimated social returns to R&D are 64.7 per cent.

To provide an indicative estimate of the private and social returns to the RRDCs R&D, these averages were applied to the annual RRDC expenditure. The CRRDCC submission said:

> Applying these averages to the aggregate 2004/05 RRDC expenditure of $511.3 million (both government and industry contributions) implies an expected annual:
>
> - private return of $175.89 million (34.4% per annum); and
> - social return of $330.81 million (64.7% per annum).
>
> This means that the estimated net benefit captured by society, outside of the benefits captured by the industries represented by the rural RDCs, is in the vicinity of $154.92 million or 30.3% per annum (CRRDCC submission p.22).

Based on these assumptions, the "social" return of 64.7 per cent is considerably larger than the 30 per cent reported by the Commission as being justification for its claim that agriculture R&D returns are no different to other industries. That said, the CRRDCC cannot claim that the annual average return of 64.7 per cent reported in its submission is anything more than indicative as it includes returns to industrial R&D.

The RRDCs through the CRRDCC are currently developing a new reporting methodology which will assist in a better understanding of the returns from the industry-centred RRDC's R&D. However, information that would shed a much better light on this issue is currently not available.

Agricultual R&D involves significant returns to the community and the environment, which are over and above the social returns.

Nevertheless, as highlighted in the CRRDCC's original submission to this study, the benefits from the industry centred RRDC's research extend beyond "social" growth accounting measures of benefit and include returns to the environment and society.

4.2 Expenditure on public goods and spillovers

The industry centred RRDCs invest a significant proportion of their funds in projects where a large share of the benefits accrue to society as a whole. Table 4 shows the level of expenditure on R&D for the industry-centred RRDCs (excluding AWI and RRIDC) where there are clearly public benefits and spillovers being are generated.

The expenditure on research which has a strong public good element ranged from around 21% to 62%. The average across the industry centred RDCs is 42% (see Table 4). While it is clear that the RRDCs investment in these areas will return some benefits to industry, the nature of the R&D means that benefits to the wider community and the economy will be high.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

Table 4 Expenditure on R&D with strong public good elements by industry centred RRDCs 2005-06

Category of R&D	Total
	$ '000
Human capacity building and management	35,277
Animal welfare and pest and disease management	35,837
Sustainable natural resource management and environment	61,298
Product integrity and food safety	10,191
Human health	15,685
Biosecurity	10,115
Other	188
Total spending on public goods	**168,592**
Total spending on R&D	**403,339**
Public good as percentage of total	**42%**

Note: Based on estimates from 11 industry centred RRDCs

Data source: Personal communications with RRDCs

The comparison made in the Draft Research Report on the levels of public funding to industry funding, between the industry-centred RRDCs and industry generally, is not accurate as it assumes that a significant proportion of the benefits of investment in R&D by these organisations will be captured by the levy payers. This is clearly not the case.

In many cases spillovers are enjoyed by downstream users of agricultural products as is the case with R&D into biosecurity and food safety (see Box 1). While some of these benefits will flow through to higher GDP (and would thus be incorporated in the so called social measures of impact identified in research papers such as Salter and Martin 2000) others cannot be quantified with a GDP measure as they are benefits to the wider Australian community.

There are also numerous instances where agricultural R&D from industry centred RDCs results in significant spillover benefits to the environment and regional communities which again cannot be measured using GDP indicators. Thus the RRDC model has not and cannot fully internalise spillovers, which are often significant. Importantly, many of these spillovers would not be enjoyed if the level of agriculture R&D investment was significantly reduced.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

Box 1 Industry centred RRDC's R&D spillovers to health outcomes

Rural Industries Research and Development Corporation has funded research which developed an enhanced sequence-based system for differentiating between strains of Salmonella which permits the sources of Salmonella infection in chicken or human populations to be more effectively traced.

Horticulture Australia has provided funding to the Australian Fruit and Vegetable coalition to investigate the benefits to public health of increasing the intake of fruit and vegetables in the Australian diet. The investigations reported that the annual benefits of increased intake of fruit and vegetables would be of the order of $189 million in reduced incidents of cancer and cardiovascular disease. While this benefit could not be all attributed as a spillover benefit, it indicates the order of magnitude of the value of research funding to the wider community.

Dairy Australia addresses public health issues through the provision of independently verified information to health professionals. Dairy Australia's provision of fact based information and its public campaigns to encourage consumption of three serves of dairy a day works to improve the health of Australians. For example, consumption of dairy products has a well known positive impact on osteoporosis reduction. In addition specific work undertaken around dairy, either from Dairy Australia research or by leveraging off the industry, aims to bring a range of dairy products to market which will be of significant benefit to Australian's health, including:

- Diahorrea control;
- Accelerated wound healing products;
- Muscle growth compounds; and
- Tooth decay prevention.

It should also be drawn to the Productivity Commission's attention that Land and Water is not the only RRDC engaged in National Resource Management public good research. Natural resource management is an important cross industry issue as demonstrated by the funds invested and reported in Table 4 above. LWA tends to collaborate with most of the RRDCs in programs and projects dealing with this subject (see table below)

Table 5 Examples of RRDC collaborations involving Land and Water Australia

RDC	Recent Collaboration	Current Collaboration
APL	MEDLI	Land, Water and Wool
AWI	SGS	National Annual Pasture Legume Improvement Program (NAPLIP) Managing Climate Variability Cooperative Venture for Building Capacity Grain and Graze
CRDC	Pesticide BMPs Water use efficiency NPIRD	National Program for Sustainable Irrigation Riparian Guidelines Evaluation Case Studies
DA	National Land and Water Resources Audit	Riparian Guidelines

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

RDC	Recent Collaboration	Current Collaboration
	Climate Variability in Agriculture Oral history Effluent management through the general call Gippsland Riparian project NPIRD (nutrients)	Managing Climate Variability Cooperative Venture for Building Capacity Better Fertiliser Decisions CMA Knowledge Management project Dairy catchment DA workshop
FRDC	Drainage techniques for sugar lands on coastal floodplains Project re: Impact of catchments on estuaries Ord-Bonaparte Program Scoping Study	
FWPRDC	Joint Venture Agroforestry Program	Joint Venture Agroforestry Program
GRDC	Climate Variability in Agriculture Native vegetation project Adoption Program	National Dryland Salinity Program Managing Climate Variability NAPLIP Cooperative Venture for Building Capacity Grain and Graze
GWRDC	National Program for Irrigation R&D (partial root zone drying [PRD])	Acidity Audit Cooperative Venture for Building Capacity
HAL	National Land and Water Resources Audit Pesticide risk assessment NPIRD (PRD, soil/organic matter)	National Program for Sustainable Irrigation Building Capacity for Innovation
MLA	North Australia Program Sustainable Grazing Systems Adoption Program	Grain and Graze Land, Water and Wool (SGSL) Cooperative Venture for Building Capacity Better Fertiliser Decisions Managing Climate Variability (Northern Program) National Dryland Salinity Program
RIRDC	Climate Variability in Agriculture Adoption Program Pesticides project (rice)	Joint Venture Agroforestry Program Managing Climate Variability National Dryland Salinity Program NLWRA outputs Managing Riparian Lands guidelines Cooperative Venture for Building Capacity
SRDC	Climate Variability in Agriculture Drainage techniques for sugar lands on coastal floodplains Riparian Guidelines Acid sulphates project work Trash blanketing project NPIRD (water use efficiency) Nitrogen work at project level	Managing Climate Variability Cooperative Venture for Building Capacity

Data source: Reproduced from

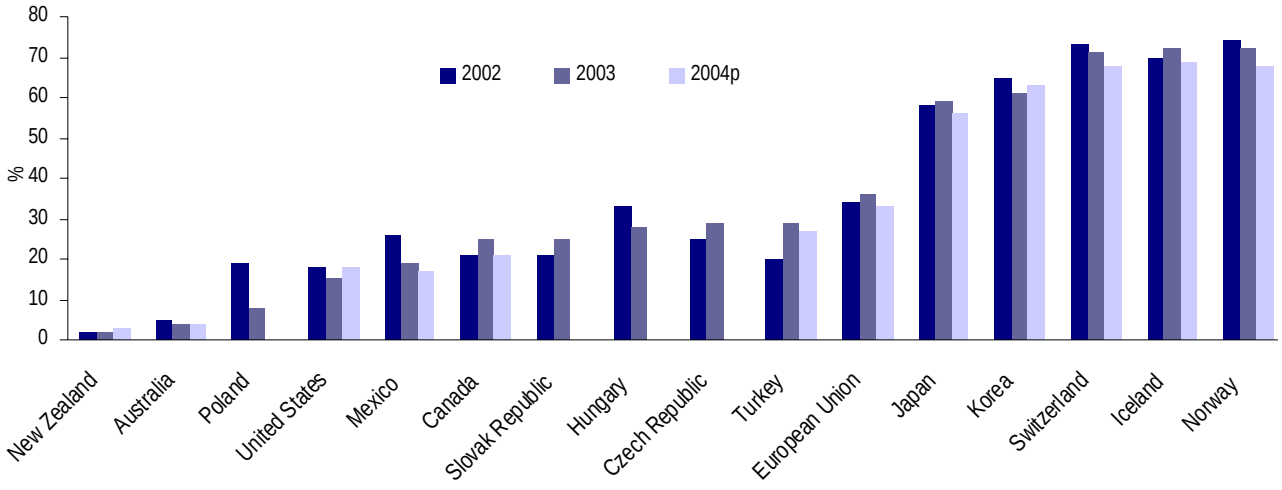
http://www.ruralrdc.com.au/WMS/Upload/Resources/200508_RDC%20NRM%20Report%20FINAL.pdf

5 Agricultural markets are not a level playing field

R&D is an important source of innovation and productivity for all of Australia's industries. However, R&Ds importance to agriculture doesn't only arise from the innovation and productivity gains which can be achieved. As highlighted by OECD producer support estimates (PSEs), Australian agriculture must compete in a market place where its foreign competitors have access to extremely high levels of assistance, which is afforded by a wide range of subsidies and other forms of protection. For example, the OECD estimates that Australian agriculture has a PSE of only 4 per cent while competitors such as the United States, Canada and the European Union have PSEs of 18 per cent, 21 per cent and 27 per cent, respectively. Further, Japan and Korea, two important destinations for Australian rural sector products, have PSEs of 56 per cent and 63 per cent respectively (see Figure 1).

Agricultural R&D is an important means of providing opportunities for Australian agriculture to adjust to these high levels of foreign assistance and find alternative markets and products.

Figure 1 OECD Producer Support Estimate by country



Note: Estimates were not calculated for Czech Republic, Hungary, Poland pr Slovak Republic for 2004.
Data source: OECD 2005

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

6 Concluding comments

Australian agriculture, and the Australian community more generally, is well served by the R&D undertaken by the RRDCs. The Rural R&D Corporation model, and critically the support provided by the Australian Government, has underpinned the delivery of these benefits. Indeed the objects of the PIERD Act (which is also reflected in the Statutory Funding Agreements for the industry owned corporations) specify that the levy funds collected must be spent for the benefit of the levy payers and the Australian community.

The RRDCs dispute the Productivity Commission Draft Research Report's assessment that agriculture has no greater prospects for additionality or spillovers than other Australian industry. There can be no certainty that the RRDC arrangement can internalise sufficient benefits, particularly from off-farm R&D that is of a strategic or applied nature, where the public spillovers can be large. Indeed the issue is a matter of considerable debate in the economics literature.

The need for higher levels of Government support for agricultural R&D was recognised by the Industry Commission in its 1995 inquiry into R&D. The Industry Commission argued that even with the RRDCs farmers will generally have less incentive than companies operating in other sectors to fund R&D. The Industry Commission argued that rural research is also more basic in nature than other industry funded R&D and there is the likelihood of greater beneficial community spillovers. As demonstrated in this submission these facts continue to be true for agriculture R&D.

In the event of a reduction in Government support to agriculture R&D, there would be a corresponding or even larger fall in agricultural R&D investment and the substantial public benefits which flow from it.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au

References

Industry Commission (IC) 1995, *Research and Development*, Report no. 44, AGPS, Canberra.

OECD 2005, Agricultural Policies in OECD Countries: Monitoring and Evaluation 2005, Highlights, http://www.oecd.org/dataoecd/33/27/35016763.pdf

Productivity Commission 2006*, Public Support for Science and Innovation*, Draft Research Report, Productivity Commission, Canberra.

Qaim M and Traxler G (2005). Roundup Ready soybeans in Argentina: farm level and aggregate welfare effects. Agricultural Economics 32, 73-86, retrieved December 2006, http://www.blackwell-synergy.com/doi/pdf/10.1111/j.0169-5150.2005.00006.x?cookieSet=1

Zhao, X, Griffith G, Mullen, J, 2001, Farmer Returns from New Technologies in the Australian Beef Industry: On Farm Research versus Off-Farm Research. Agribusiness Review-Vol. 9-2001, Paper 1.

Alston, J. M., and G. M. Scobie, 1983 “Distribution of Research Gains in Multistage Production Systems: Comment.” *Amer. J. Agr. Econ. 65*(May):353-56.

Verikios, G, 2006, Distribution of Research Gains in Multistage Production Systems: A General Equilibrium Analysis of Wool. Economic Research Centre, Economics Program, The University of Western Australia.

Alston, J, M, 2002, Spillovers, The Australian Journal of Agricultural and Resource Economics, 46:3, pp, 315-346.

Level 1
33 Ainslie Avenue
Canberra City ACT 2600
Australia

GPO Box 1322
Canberra ACT 2601

Phone: 02 6103 8200
Fax: 02 6103 8233
Email: Secretariat@ruralrdc.com.au