



National Farmers'
FEDERATION

**PRODUCTIVITY COMMISSION INQUIRY INTO
THE AUSTRALIAN GOVERNMENT RESEARCH
AND DEVELOPMENT CORPORATIONS MODEL**

NFF SUBMISSION

May 2010



Our Members



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The National Farmers' Federation

The National Farmers' Federation (NFF) was established in 1979 and is the peak national body representing farmers, and more broadly, agriculture across Australia. The NFF's membership comprises all of Australia's major agricultural commodities. Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations form the NFF.

The NFF has recently implemented a re-structure of the organisation. Through an associate category this has enabled a broader cross section of the agricultural sector to become members of the NFF, including the breadth and the length of the supply chain.

Each of NFF's members deal with state-based "grass roots" issues or commodity specific issues, respectively, while the NFF represents the agreed imperatives of all at the national and international level.

Statistics on Australian Agriculture

There are approximately 140,000 farm businesses in Australia (99% of which are family owned and operated), utilising 54% of Australia's landmass. The agricultural sector, at farm-gate, generates approximately 3% of Australia's total Gross Domestic Product (GDP). The gross value of Australian farm production in 2007-08 was \$43.3 billion.¹

Australian farming underpins domestic food consumption with Australian farmers supplying almost 93% of the daily domestic food supply, and agriculture is also a significant export industry. Australian farmers export approximately two thirds of their total agricultural production, demonstrating the importance of the export market to our producers. The importance of the agricultural industry for domestic consumers is also highlighted through these figures. In 2008, Australian farm exports were valued at \$31 billion. Despite deep and widespread drought, over 2007-08, agricultural product accounted for 15% of Australia's merchandise exports.²

Farming operations are complex and extend well beyond just plant and animal husbandry, and take into consideration environmental impacts. Innovation and the use of information extends to almost all facets of farm operations, and this innovation and information is underpinned by active research, development and extension programs across the agricultural industries.

¹ ABARE, 2009 Australian Commodity Statistics, Canberra

² ABARE, 2009 Australian Commodity Statistics, Canberra

Executive Summary

The NFF has identified a series of key issues relating to research and development for the agricultural industries, and the role of the Rural Research and Development Corporations (RRDCs). These issues are:

- Australia must have a clear vision for Rural Research and Development to provide direction and ensure coordination across Government, beyond just the RRDCs;
- Agricultural Industries strongly support the Rural Research and Development Corporation model, and the unique and valuable role these organisations play;
- Government and Industry both derive significant benefit from the joint investment in Agricultural research they make through the RRDCs ;
- Government and Industry must clearly articulate their expectations of research outcomes to be delivered by the RRDCs;
- Public and Private investment both play important roles in rural research and development and further investment must be encouraged ; and
- Government and industry must work together to strengthen rural research and development in Australia.

Rural research and development should be a National Research Priority, underpinned by a National Strategic Investment Plan for Rural Research and Development which clearly articulates the productivity gains required and the environmental and societal challenges that need to be addressed. As a National Research Priority is an opportunity to drive a more coordinated rural research and development effort by ensuring greater coordination of relevant policy and operational agencies across Federal and State Governments, and recognising the various roles and responsibilities of organisations, including the RRDCs, within the rural research and development system.

Introduction

The expenditure made by the RRDCs in research, development and extension is regarded by the Agricultural industries as an investment. It is not merely funding research, but an investment which underpins future growth in the industry and ensures that the agricultural industries have the knowledge and practises that will allow them to adapt to new challenges such as climate change, whilst sustainably managing the 54% of Australia's land mass under agricultural production.

Research and development is recognised for the important role it plays in underpinning future growth in economies. In response to the global economic downturn, countries including the United States of America, Germany, Japan, India and China all announced significant financial stimulus packages which included

investment in research and development investment to underpin future growth in their economies. The Australian Government has recognised the role its investment in research and development plays in supporting and stimulating innovation and growth in the economy in the Commonwealth Government's Innovation Policy "Powering Ideas"³.

Indeed, the 2009 Review of the National Innovation system could be viewed as a missed opportunity in that very little mention was made of Rural Research and Development, despite the Review identifying the need for greater national strategic leadership in the area (see text box below).

Annex 11 to the Report on the Review of the National Innovation System

Rural Research and Development

Innovation is a vital part of maintaining the ongoing growth, profitability and sustainability of Australia's rural industries, especially in the face of increases in competition in domestic and international markets. Investors and providers of rural R&D vary across a wide range of Commonwealth and state/territory agencies, including the 16 rural research and development corporations and companies (RDCs), the CRCs, universities funded through the ARC, and CSIRO.*

Improved overall understanding of the rural innovation system is needed to better align respective efforts and collaboration. The Review consultation process raised a strong consensus need for greater national strategic leadership, a broader framework around prioritisation, and coordination across jurisdictions and institutions.

The Panel sees as a priority that the Australian Government should develop a national rural innovation strategy to:

- Ensure optimal outcomes are gained from public investment in rural R&D including improved delivery of research and development directed at issues of national public concern
- Determine where public investment is needed to achieve greater effectiveness and efficiency in agriculture and food supply chains, taking into account the work being done by the Primary Industries Ministerial Council
- Reduce the duplication of research activity through institutional consolidation to promote administrative efficiency and critical mass
- Review existing rural research and development levy arrangements and contribution levels, including contributions made by both industry and government, to ensure the effective delivery of research and development to meet the demands of both public and private interests.

* The Department of Agriculture, Fisheries and Forestry – Submission No. 661 to the Review of the National Innovation System

³ http://www.innovation.gov.au/innovationreview/Documents/PoweringIdeas_fullreport.pdf

The NFF notes that there is considerable discussion underway within Government related to research and development in agriculture. At present the Primary Industries Standing Committee is developing a rural research, development and extension framework related to human capacity and research facilities, the Minister for Agriculture, Fisheries and Forestry has convened a Rural Research and Development Council to examine the Rural Research and Development System, and there are two expert working groups under the Prime Minister's Science, Engineering and Innovation Council examining subject areas which relate to research in the agricultural industries ("Challenges at the Energy-Water-Carbon Intersection" and "Australia and Food Security in a changing world "). From this work, and the work of the Productivity Commission, a clearer vision and direction must be developed for rural innovation. To be relevant, it is important the findings of the Productivity Commission incorporate and reflect these parallel processes.

Investment in research and development in agriculture is currently the subject of discussion in a number of international forums, particularly in relation to food security and underinvestment internationally in food production research⁴⁵. The observation has been made that globally, agricultural production increases are driven by research and development activities, and that the productivity gains seen are not sufficient to meet global population increases and food demands⁶. The gap in food production and population increases has implications for global food prices, as well as broad implications for global political stability. Australia invests significantly in overseas efforts to improve agricultural production. In his speech to Food and Agriculture Organisation (FAO) of the United Nations' World Food Summit on Food Security in November 2009 the Federal Minister for Agriculture, Fisheries and Forestry, announced that Australia would provide \$464 million to address food security through research and development and action to reduce market failures⁷. It is important that Australia's International strategy on research and development to support global food security is underpinned by and compliments a National rural research and development effort.

In addition to the broader international debate on the quantum of investment in agricultural research, this debate has considered the mechanisms for funding of agricultural research and development and the role of public versus private funding. Concerns have been expressed in a number of forums in which NFF is engaged regarding the declining public investment in research and development in Australia, and questions raised regarding the capacity of the private sector to increase its investment in agricultural research within Australia. Whilst it is possible for the private sector to capture returns where it can secure intellectual property, and re-invest the returns to fund research, the Australian market for crop varieties, chemicals and other technologies is relatively small by international standards. In

⁴ <http://royalsociety.org/Reapingthebenefits/>

⁵ http://www.cgiar.org/pdf/news_transcript_teleconfApr30_final.pdf

⁶ http://www.cgiar.org/pdf/news_transcript_teleconfApr30_final.pdf

⁷ http://www.maff.gov.au/transcripts/transcripts/2009/november/tony_burke_-_country_statement_at_the_fao_of_the_united_nations_world_food_summit_on_food_security

this situation the cost and complexity of Australian regulation may act as a barrier to increased private investment in agricultural research and the transfer of technologies developed internationally. It is also possible that the private sector could increase its involvement in undertaking and 'extending' research to farmers. However, variability in seasonal income, consolidation of farm enterprises and specialisation in farm businesses can act as significant hurdles to farm consultants seeking to establish a private business in the sector. In developing strategies to encourage private investment and participation in Australian agricultural research the nature and structure of the Australian agricultural industries needs to be considered, and care taken when applying assumptions that the experiences of Europe or the United States of America reflect the Australian market.

Whilst the agricultural sector recognises that there are significant private benefits derived by industry from the investment in research and development through the RRDCs, there is also recognition that there are significant public benefits. Ongoing productivity gains and continued profitability of agricultural industries have helped to underpin the economies of regional communities; improvements in farming practises have led to benefits in the environment including improved water use efficiency and air quality which are shared by all Australians; and the level of food and fibre security enjoyed by Australians is taken for granted by the public and Australian Governments. For regional communities, the benefits from innovation and productive agricultural industries include jobs, new industries in rural areas, opportunities for population growth, and continued support for the provision of services to communities.

The NFF understands that in its preparation to undertake this review the Productivity Commission has accessed submissions made to the Rural Research and Development (R&D) Council early in 2010. A copy of NFF's submission to the Council, which was provided to the Commissioners early in the consultation phase, has been attached for record as Appendix 1. The submission made by NFF to the Rural Research and Development Council elaborates on a number of the issues raised in the Productivity Commission's discussion paper, and it should be read in conjunction with the NFF's submission to the Productivity Commission Review.

Rationale for Government Funding Support

The original rationale for Government funding support for agricultural research and the establishment of the RRDCs is still valid. It is important to recognise that the Australian Government has a significant role in directing the investment made to achieve National policy outcomes and the Australian Government leverages the activities of the RRDCs and the relationship that the RRDCs have with their respective industries in a number of ways.

Over their 20 years of operation the RRDCs have become established as key organisations within their respective industries. NFF members have indicated that

the Government and Industry partnership embodied in the operation of the RRDCs is strongly supported. There is strong recognition by industry that the RRDCs continue to address the areas of policy failure identified at the time of their establishment, that:

- the Agricultural sector is characterised by many industries with a large number of producers unable to capture sufficient benefits from R&D they would fund as individuals, which potentially leads to underinvestment;
- the collection of compulsory levies avoids free-riding by some on R&D provided by others; and
- there are spill-over benefits to the wider community that are not captured by the immediate industry.

The policy issues which the RRDCs were established to address still exist. The industry is composed of a large number of individual businesses, with Australian Bureau of Statistics figures indicating 140,704 farms in Australia, of which 125,594 are solely dedicated to agricultural production⁸. Given the large number of farm enterprises which exist, the levy mechanism overcomes the market failures which result from the public goods delivered broadly to the community from the research investment by the RRDCs and allows producers to collectively invest in research. The breadth of the investment undertaken by the RRDCs has generated significant value for both their industry and Government stakeholders.

Through the RRDCs and other public funded research organisations the Australian Government makes a significant investment in agricultural research and development, and provides significant direction on the investment of these funds. As a consequence, the Government is able to leverage industry activities to achieve environmental, social and economic objectives of National significance.

The Australian Government established a set of Rural Research and Development Priorities in 1994, and reviewed these in 2007. The Rural R&D Priorities were established to “ensure R&D objectives of the Australian Government are met” and “to better target agricultural, fisheries, forestry and food industry R&D efforts”⁹. The Rural R&D Priorities were designed to complement the National Research Priorities, which set out to focus the Australian Government’s research effort into those areas that can deliver significant economic, social and environmental benefits to Australia. Given the broad interests that government has articulated in these research activities and the broad expectations described under these priorities, it is difficult to determine what returns the Government expects against the priorities that have been expressed. These public benefits expected by Government and described through these research priorities are not necessarily the same as the public goods that are often discussed and described in the evaluation of outcomes from research and development. The expectations of both industry and Government for the outcomes of rural research and development must be better articulated.

⁸ Australian Bureau of Statistics, Agricultural Commodities 2007/2008

⁹ <http://www.daff.gov.au/agriculture-food/innovation/priorities>

The NFF recognises that the RRDCs have pro-actively sought to quantify the public and private benefits returned from the research funded by these organisations¹⁰. These studies have indicated that significant returns have been derived from this investment in research. The most recent evaluation published by the Rural Research and Development Corporations suggest that for every \$1.00 invested, \$10.51 is returned after 25 years¹¹. This evaluation reported on a range of social, environmental and consumer benefits beyond the economic returns, but these were not quantified in the most recent report.

The difficulties in quantifying public benefits (including environmental and social benefits) derived from research, and the assumptions made in doing this, have been discussed elsewhere. Land & Water Australia undertook significant work to try to quantify the environmental and social benefits derived from its research, and these evaluations have been published¹² and were discussed at a recent conference which reviewed the activities of Land & Water Australia¹³. At different times programs have been discussed within Government to track performance of the rural industries and the returns derived from the activities of the RRDCs. In addition to the evaluation reports delivered by the RRDCs, the "Signposts for Australian Agriculture"¹⁴ project was developed within the Bureau of Rural Sciences, which sought to deliver a reporting framework and indicators on the environmental, economic and social contributions of Australian agricultural industries.

The positive returns determined through economic evaluations of the research undertaken by RRDCs and research institutions have been discussed and debated in a number of forums, including previous Productivity Commission studies on research and development¹⁵. However, a common theme in public discussion and debate associated with rural research and development is that the figures reported suggest that, given the strong returns observed, there is an underinvestment in the area and further value can be extracted by both government and industry from continued investment in rural research and development. Given the broad expectations outlined for research and development by government, and the prospect of strong returns from rural research and development, there is no rationale for reduced investment by Government, and a strong argument for increased investment.

In addition to the value returned to Australians from the investment in research and development, the Australian government leverages rural research and development

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<http://www.ruralrdc.com.au/WMS/Upload/Resources/Evaluation/Rural%20RDC%20Eval%20Report%20low%20res.pdf>

¹¹

<http://www.ruralrdc.com.au/WMS/Upload/Resources/CRRDCC%20evaluation%20report%202009%20final%200.pdf>

¹² <http://lwa.gov.au/land-and-water-australia-corporate/return-investment>

¹³ <http://www.triplehelix.com.au/documents/PeterChudleigh-Evaluatinganappliedresearchportfolio.ppt>

¹⁴ <http://www.nlwra.gov.au/national-land-and-water-resources-audit/signposts-australian-agriculture>

¹⁵ <http://www.pc.gov.au/ic/inquiry/44randd>

undertaken by the RRDCs in other ways. The work of the Australian Centre for International Agricultural Research (ACIAR) leverages the research and human capacity supported by the RRDCs to assist in delivering the International development aid obligations made by the Australian Government. The education and extension programs offered by ACIAR also leverage the capacity and resources developed through the historical investment in rural research and development by the RRDCs. It is important to note that the leveraging of Australian research on agricultural productivity in this way encourages the spill-over benefits of Australian research to the international community. In a similar way, Australia's participation in the Global Research Alliance on Agricultural Greenhouse Gases¹⁶ is designed to ensure that the outcomes and benefits of Australian agricultural research in areas related to soil carbon, methane emissions and nitrous oxide (and which includes work related to improved productivity and production efficiency) are distributed to the partners of the Alliance. Whilst these programs create the opportunity for spill-in benefits from international research, they also limit the opportunities for Australian industries to capture the benefits and efficiencies derived from research investment by the RRDCs. The research, development and extension funding managed by the RRDCs is also accessed and leveraged by other Federal Government Departments. For example the Tropical Rivers and Coastal Knowledge Program managed by Land & Water Australia was fundamental to informing the deliberations of the Northern Australian Taskforce.

Research supported by the RRDCs has also played a major role in shaping Australia's national and international policy position on key issues, with far reaching implications across the economy. Examples include research on soil carbon which has informed domestic policy settings and has had implications for Australia's position in International negotiations on climate change, and research highlighting the gaps in Australia's water accounts which has implications for the management and supply of water in the Murray Darling Basin.

Is the RRDC model fundamentally sound?

The role of the RRDCs is still relevant, and whilst a number of models for RRDC operation exist in different industries, they have proven to be successful mechanisms to achieve outcomes for both Government and the Australian agricultural industries.

As outlined previously, the RRDCs have become established as key organisations within their respective industries and the Government and Industry partnership embodied in the operation of the RRDCs is strongly supported. The RRDCs continue to address the areas of policy failure identified at the time of their establishment.

¹⁶

http://www.maff.gov.au/media/media_releases/2009/december/australia_joins_new_global_research_alliance_on_agricultural_greenhouse_gases

In concert with their work on research and development to deliver returns to industry the RRDCs undertake significant research with public good elements and outcomes. Indeed, this was a clear focus of Land & Water Australia (LWA), prior to its closure. A range of research is undertaken across areas such as the management of native vegetation, reducing environmental impacts and understanding health benefits from food. These areas of research related to issues where the benefits that would accrue to producers would not be sufficient to warrant investment. It is unclear if the closure of Land & Water Australia has signalled a change in priorities for government, and the decision has created uncertainty with researchers and the agricultural industries. It is also unclear as to how the research responsibilities managed by Land & Water Australia will be addressed by other RRDCs, research organisations or segments of Australia's broader innovation system.

Areas of additional value delivered by the RRDCs include: facilitating a strategic view of the challenges and opportunities which face agricultural industries; brokering research in technical areas where industries individual members of industry have limited skills; and navigating a complex operational environment where there are multiple research institution, agencies and partners. The unique function of the RRDCs, along with the combination of skills and resources they possess, do not exist elsewhere in Industry or Government. The loss of these organisations would be a significant blow to the agricultural industries.

Industry groups have found the RRDCs responsive to the strategic challenges which face industry and the broader community. The development of Strategic Research Plans by the RRDCs ensure that programs of research are undertaken that align with the interests of Government and industry, and they account for changes in the operating environments of the various industries. There is also the flexibility within the RRDCs to respond to rapidly emerging operational challenges for industries, such as changes in agricultural spray drift regulations. Programs directly administered through Government tend not to have the continuity of the programs administered by the RRDCs. For example, the 'Australia's Farming Future' 'Climate Change Research Program' commenced in 2008-09 and has a funding commitment for four years¹⁷. There is no obligation for the program to continue past this commitment; or an obligation on the Government to ensure that the legacy of knowledge generated through the program is managed and disseminated to Australia's farmers once the program has completed; or that the research funded by Government recognises, links or builds on research funded previously by the RRDCs. Given the lag periods that exist between research and adoption and the significant body of work funded by the RRDCs, this is a significant deficiency in rural research and development programs administered directly by Government departments.

¹⁷

http://www.maff.gov.au/media/media_releases/2008/may_2008/preparing_for_climate_change_in_rural_and_regional_australia

Within an industry, there is the expectation that the RRDCs will undertake a mix of investment. There is a role for the RRDCs to invest in research to underpin current operations within an industry, such as managing pests and diseases, but also to undertake aspirational and risky research that will position the industry in 10 years time. Whilst other agencies may profess to undertake this research, the approach of working in partnership with industry to understand the challenges, map a research and development strategy for industry and develop an integrated research investment program to address the research and development needs are functions unique to the RRDCs. The management of agricultural enterprises is complex, and requires a systems approach to understand how individual research projects work to develop innovations and solutions within the context of a farm enterprise. This requires strong links with industry and the RRDCs remain best placed to undertake this role.

The role of the RRDCs as ‘technically informed investors’ is also a unique role. The technical capabilities and experience that exist within the RRDCs allow them to understand and negotiate research programs with an awareness of how agricultural industries operate. Anecdotal evidence suggests that the reward structures within Government Departments do not tend to encourage or reward the development of these skills and experience in staff within Government programs. In the past the Government has recognised the value of the skills and capacities held by the RRDCs, delegating the management of programs such as “Defeating the Weeds Menace” and the “National Dryland Salinity Program” to these external agencies. By working in this way the Government was able to leverage the established links with industry held by the RRDCs, and also ensure that the outcomes of these priority areas for government were integrated with other research outcomes delivered by the RRDCs. However, this has changed. The internal review and administration of research project proposals submitted under the “Australia’s Farming Future” Climate Change Research Program, and the ongoing internal administration of this program by the Department of Agriculture, Fisheries and Forestry would appear to be a duplication of the processes, administration and infrastructure of the RRDCs.

The agricultural industries have valued the role that the RRDC’s have played as an ‘honest broker’, using the technical skills and knowledge of their employees and their networks to identify and negotiate appropriate research programs to meet particular government and industry research priorities. As competitors for research funds, different research agencies (including CRCs, CSIRO, Universities and private providers) have different skills sets and the policies around the management of finances, intellectual property and overheads. This makes for complex and difficult negotiations. Industry stakeholders also expect that the RRDCs use their experience and technical knowledge to manage risks, including the underperformance of research projects and programs.

Strengths and weaknesses of the RRDC model

A number of models of operation for RRDCs exist, and these vary between different industries. The industries involved are best placed to provide a review of the effectiveness of the various models of RRDC operation. However, there are some overarching observations that need to be made with regard to the strengths and weaknesses of the RRDC model. As a consequence of the operation of the RRDCs outside of the Government's Innovation portfolio there is the likelihood of poor coordination and policy consistency with other aspects of Government policy and programs on innovation. This may limit the effectiveness and coordination of these programs with rural research and development in Australia, and a significant opportunity exists for Australia to develop a more strategic and integrated approach to research related to food and fibre production and the broader agricultural 'value chain'. The development of a coordinated approach between the Department of Innovation, Industry, Science and Research and the Department of Agriculture, Fisheries and Forestry would seem to be one option to strengthen the policy approach to rural innovation and supporting programs.

The NFF believes that the RRDCs should not be regarded in isolation from other organisations that contribute to rural research and development, and notes that the terms of reference of the Productivity Commission Review includes consideration as to how the current RRDC model compares and interacts with other research and development arrangements. The effectiveness of the current arrangements for rural research and development in delivering outcomes are heavily influenced by the policy settings and reward structures put in place for a number of individuals and organisations. Participants in the Rural Research and Development system include the Federal Department of Agriculture, Fisheries and Forestry; State Departments of Primary Industries; the Department of Innovation, Industry, Science and Research; CSIRO; the Cooperative Research Centers; the Universities; the National Climate Change Research Facility; Agribusiness (from small to multi-national firms); as well as the Rural Research and Development Corporations. An understanding of rural research and development and how it is supported in Australia needs to be informed by an understanding of the operations of these various participants and the various directions they are provided through Government.

In the context of this broader consideration there are a number of opportunities to improve the rural innovation system. Rural research and development should be adopted as a National Research Priority, to ensure a whole-of-government approach is taken to address rural research and development, with the aim to improving policy and funding coordination across levels of government and in different government portfolios. The adoption of rural research and development as a National Research Priority, must be accompanied by the development of a National Rural R&D Strategy to address the whole R&D 'innovation chain', from strategic basic research, applied research, experimental development to pre-commercialization and commercialization, and lead to an integrated approach to understanding these elements of the rural innovation system. This approach would

provide greater clarity on the system and allow for recognition and review of the implications of policy change for rural research and development on agricultural productivity and sustainability. For example the implications of policy changes in: the rules around CRCs; research and development tax concessions; State government funding for extension; and addressing human capacity gaps through education and training need to be better understood and addressed, and this should be considered as part of a National Rural R&D Strategy.

Within the context of a National Rural R&D Strategy, the role of the Rural Research and Development Corporations needs to be maintained and the strengths of the system in linking with industry, mapping research directions and optimising research investment need to be built upon. A National Rural R&D Strategy also needs to consider the role and type of research investment undertaken by agribusiness and private stakeholders in the value chain. This requires an understanding of the opportunities, barriers and incentives to promote private investment in rural research and development in Australia, and action to address the regulatory hurdles and institutional impediments to encourage private investment. These issues need to be considered as part of the broader discussion related to the funding of rural research and development, and need to be discussed with existing and potential private investors in rural research and development.

A National Rural R&D Strategy should also identify areas for international engagement. International engagement on rural research and development provides opportunities to: address gaps in Australia's own research capacity; assist Australian agricultural industries in accessing new technologies and information; and allow Australia to provide international leadership in rural research and development where Australia has internationally recognised expertise. This approach may also provide opportunities to access international funding grants to support this research, as well as encourage investment by international agribusiness.

Whilst the current review has not discussed the role of market information in research and development, it is important to consider and note the role of market information in driving research to underpin industry productivity and profitability, and the strength this has brought to R&D investment by a number of the RRDCs. Market information that accounts for international and domestic consumer demands provides a vital link to informing research and development. This information allows targeted research which can generate innovations that maintain existing markets or develop new markets, and in some cases to extract premiums that may exist in the value chain or niche markets. This market information may lead to innovations which improve the attributes of primary produce for particular end uses, or ensure continued access to markets as the specifications of products change. For example, the work undertaken to understand the properties required for noodle quality wheat, and the use of this information in wheat breeding programs, has led to an ongoing market in Asia for Australian grain farmers. Linking research with market information is a valuable element of the rural innovation system.

There are a number of cross cutting issues relevant to maintaining critical human capacity, investment in extension and coordination and collaboration where there are similar experiences across regions and industries. The example of maintaining Australian research capability, and the role of RRDCs in providing this, is one area which illustrates the poor coordination and lack of clarity around responsibilities which exists in the rural research and development system. A number of NFF members have expressed concerns at the dwindling science expertise available to support the primary industries, in areas including soil science, taxonomy, pathology and agronomy. As investors in research, working on behalf of industry and Government, the RRDCs have an interest in ensuring that there is an appropriate research capacity which can be accessed. However, they do not directly employ scientists. Anecdotal evidence suggests that because of the limited tenure and employment contracts provided to researchers, there has been a move by RRDCs to enter into contracts which support the salaries of key individuals to ensure they remain in employment. Whilst not mentioned in the discussion paper, it seems that similar circumstances or pressures might also occur around the provision and maintenance of infrastructure. The decline in State investment in rural research and development and substitution of funding by the RRDCs has been discussed elsewhere, including papers by Peter Core¹⁸ and ABARE¹⁹.

The need for greater coordination and collaboration in research and development across industry and regional programs has been discussed in a number of forums, and the NFF has been supportive of a number of the cross RRDC initiatives that have been undertaken, for example the National Climate Change Research Strategy for Primary Industries (CCRSPI), the Primary Industries Centre for Science Education (PICSE) and the Managing Climate Variability Research Program (MCVP). Research areas which set out to address cross-industry issues may be characterised by individual industries being unable to capture the benefits from the R&D. There is also the potential for cross-industry research to involve higher transaction costs as a consequence for the need for consultation, and the involvement of multiple stakeholders also has the potential to increase the risk to success of research programs. This has the potential to result in underinvestment and free-riding. Examples of programs which have work across industries include Grain & Graze, the National Program for Sustainable Irrigation and the National Annual Pasture Legume Improvement Program, and the experience of those involved in these and similar programs should be sought by the Review.

The NFF notes that there has been discussion regarding the potential to consolidate the administrative operations of the RRDCs, based on the assumption that this would reduce costs and generate efficiencies. Concerns have been raised with the NFF that rationalisation and centralisation of these organisations would diminish the links the RRDCs have with their industry stakeholders, along with serious concerns that these changes would come at the expense of the outcomes RRDCs generate for Government and Industry. Any proposed changes to the operation of the RRDCs

¹⁸ http://www.daff.gov.au/data/assets/pdf_file/0020/1435331/rd-retrospective-report.pdf

¹⁹ http://www.daff.gov.au/data/assets/pdf_file/0007/1463992/rd-abare-report.pdf

must be carefully considered in partnership with industry, and in the context of how the change will generate improvements in the effectiveness of the RRDCs and delivery of outcomes from their investment.

Funding levels

As mentioned earlier in this submission, the RRDC model and the use of levies and government matching funding remain relevant for the Agricultural industries. The NFF believes that the current funding arrangements for the RRDCs should be continued, and that there should be consideration for increased funding for agricultural research based on the challenges that face the sector.

Despite common misconceptions and the worst drought on record, Government support for Australian farms represents just 6% of farming income. By comparison, according to the Organisation for Economic Cooperation and Development (OECD), support provided to Korea represents 61% of farm incomes, Japan is 49%, the European Union is 27%, Canada is 18%, and the United States is 10%²⁰. Australian farmers are among the most self-sufficient in the world, and the funding partnership provided through the RRDCs between industry and government is critical in driving innovation and maintaining competitiveness in a distorted international marketplace.

The current system of funding for RRDCs is supported by the NFF. The use of levies for industry and government matching funding promotes a partnership approach, and provides an incentive for the agricultural industries to invest in research. Given that drought and variability in world markets alters the value of agricultural production, it is also important that the RRDCs have the capacity to develop and manage financial reserves. These reserves allow long term commitments to be made to research programs, which is a vital component of successful rural research and development programs. The funding model, including the Government matching contribution, is a key element which has contributed to the success and broad industry support for the operation of the RRDCs.

A previous Productivity Commission report suggested that if there is a flaw in the current model, it is that Australia is not investing enough in public good R&D. The report identified Land & Water Australia's portfolio of significant public good research as an area where there are "strong grounds for large public subsidies [to] remain because that research is unlikely to take place in their absence."²¹ With the loss of Land & Water Australia this lack of investment has only become more pronounced.

As mentioned earlier in this submission, current debate on rural research and development funding in Australia is coming at a time of significant international

²⁰ OCED, Agricultural Policies in OECD Countries: Monitoring and Evaluation 2008

²¹ http://www.pc.gov.au/data/assets/pdf_file/0016/37123/science.pdf

debate on the appropriate levels of investment by Governments internationally in rural research and development, and the role of private investment in rural research and development. Through the work of the Primary Industries Standing Committee to develop a National Research, Development and Extension Framework there is significant work underway to rationalise Australian rural research and development assets and capabilities. It has been observed that support for the rural research and development system is already in decline and this needs to be addressed before there is a critical loss of capacity and infrastructure. Australia needs this capacity to generate innovations, as well as to capitalise on innovations and research generated internationally.

The National Research, Development and Extension Framework being developed by the Primary Industries Standing Committee represents a significant shift in the way resources to support rural research, development and extension are being managed. The current research, development and extension system has relied upon a market based model to develop and fund research. The RRDCs, as research “purchasers”, identify industry research needs and the outcomes required by industries and Government, and made a call for proposals from research institutions, the research “providers”. These proposals competed for funding based on innovation, the research methodology, the concepts being developed, the cost of the proposal, and the research outputs. The new framework developed under the Primary Industries Standing Committee is rationalising the number of research providers and infrastructure which can participate in this competitive process. The NFF has concerns about the capacity of the new model to generate competition to deliver new ideas and innovations, as well as the capacity to deliver value from the Government and industry investment made in research.

The trend to move away from publically funded models of extension to communicate the outcomes of research has been questioned by some quarters, and it is not clear if there has been an evaluation undertaken of how current models of extension have performed compared to the publically funded models relied upon to deliver outcomes in the past. Under private models of extension farmers who are new to the industry or who may have limited financial resources, including young farmers, may find it difficult to pay for ‘the best advice’. It is also unclear as to how effectively the outcomes of Government programs and regulation on public good issues, such as chemical use and management of on-farm biodiversity, gets picked up and communicated through private extension services. The move to private extension may also reduce the feedback loop to researchers, which has always been a vital link for researchers to understand industry and target the outcomes of future research.

Whilst the role of private investment in rural research and development is important, there are concerns that the size of agricultural industries in Australia may not be sufficient to attract significant private investment in research by agribusiness. This needs to be better understood when developing strategies to better engage agribusiness and encourage their investment and participation in rural research and

development. For example, there are concerns that the crop varieties developed by international agribusiness and brought to Australia are not as suited to Australian conditions as varieties developed by local programs, and that the size of the Australian market does not justify further breeding effort to adapt the varieties, which may otherwise have superior characteristics, to Australian conditions. In a similar way, regulatory constraints such as State moratoriums on Genetically Modified Organisms and costly or burdensome chemical registration and regulation processes may also reduce investment by international agribusiness in bringing technical innovations, such as biopesticides, to the Australian market.

Funding for rural research and development must continue and be increased if Australian agricultural industries are to effectively meet future challenges. Amongst the emerging issues faced by Australian agricultural industries include dealing with climate change and ensuring ongoing productivity in the face of restricted access to land and water resources. There are also a range of issues which are of public interest, including maintaining land, air and water resource quality in the face of challenges including climate change and effective means for managing on-farm biodiversity. The Australian public will continue to benefit from the outcomes of the fundamental research undertaken by Australian researchers in the primary industries, including areas of emerging science such as biotechnology. Investment in rural research and development and the policy and programs in place which support it clearly need to be strengthened in order to meet these future challenges.

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Appendix 1: NFF Submission to Rural Research and Development Council

17 February 2010

Dr Kate Grenot
Chair, Rural Research and Development Council
Department of Agriculture, Fisheries and Forestry
18 Marcus Clarke Street
CANBERRA CITY ACT 2601

Dear Dr Grenot

The National Farmers' Federation (NFF) is the peak farming lobby group representing producers of all major commodities in relation to issues affecting more than one State or commodity. The NFF's membership comprises State farm bodies, commodity organisations and also members associated with farmers through the agricultural supply chain.

Australian agricultural industries face significant productivity and sustainability challenges, and the capacity of agricultural industries to respond to these challenges is underpinned by research and development. As Australian agricultural industries have developed, Australian farmers have continued to adopt new varieties of crops, changed practices to improve soil fertility, and produced higher yielding livestock – all as the result of research and development. At present Australian farmers produce almost 93% of Australia's daily domestic food supply, and export a massive 60% (in volume) of total agricultural production. These exports represent around 67% of the total gross value of Australian agricultural production.

Australian farmers will continue to rely on research and development to meet future challenges. Growing international populations represent a market opportunity for Australian farmers, but also a challenge for global agriculture. Australia's growing population, estimated to be 35 million in 2050, will also present a challenge for the Nation to achieve domestic food security. Understanding and articulating the productivity gains required from the Australian agricultural industries to meet these challenges will need to be a key component of a National Strategic Investment Plan for Rural Research and Development. A National Strategic Investment Plan for Rural Research and Development also needs to drive a more coordinated research and development effort, and greater coordination of relevant policy, across Federal and State Governments.

Australian agricultural industries remain optimistic that we can meet the productivity challenge as long as priority is given to investment in research and development. Over the last 30 recorded years (1974-75 to 2003-04), Australian farms have consistently achieved average multifactor productivity growth of 2.8%-a-year. No other industry, with the sole exception of telecommunications and information technology, comes close to this achievement. Research and development underpins future productivity of the sector, and along with it the opportunity

for economic growth of the sector. A key element which has contributed to the success of rural research and development in Australia has been the partnership approach taken by industry and government, and industry's central role in prioritizing and designing relevant research programs to address productivity and sustainability challenges.

Australia's farm community is alarmed at the petering out of the benefits of the "green revolution" in the 1960s and 70s, and the decline in productivity growth observed in recent years in a number of the agricultural industries. The Australian Government must reverse the decline in funding for agricultural research and development seen in recent years, and work with the agricultural sector, across government agencies, and with private and international partners to ensure that rural research and development in Australia has the direction and coordination required to deliver the sustained productivity gains the Nation requires.

Investment in research and development has delivered clear benefits to Australian farmers and the broader community. The most recent evaluations undertaken by the Council of Rural Research and Development Corporations showed that \$1.00 invested in research and development returned \$10.51 over the course of 25 years. The NFF looks forward to working with the Rural Research and Development Council as they continue to develop and seek to implement a National Strategic Investment Plan for Rural Research and Development.

Please find a detailed response to the questions posed by the Rural Research and Development Council enclosed. Should you wish to discuss this submission, please do not hesitate to contact me or the National Farmers' Federation Manager Rural Affairs, Dr Sam Nelson on 02 6273 3855.

Yours sincerely



BEN FARGHER
Chief Executive Officer

(encl)

1. The Rural R&D System

1) *What does the system do well?*

Australian agricultural industries face significant productivity and sustainability challenges.

As background to this submission the NFF recognizes that the Rural Research and Development (R&D) System needs to be considered in the context of a number of organizations which are responsible for policy that shapes public R&D investment, institutions and organizations that undertake R&D, as well as those that disseminate and use the outputs of the research. These need to be considered together because of the way in which they influence and rely upon each other. The Rural R&D System include inter alia Farmers; the Federal Department of Agriculture, Fisheries and Forestry; State Departments of Primary Industries; the Department of Innovation, Industry, Science and Research; CSIRO; the Cooperative Research Centers; the Universities; the National Climate Change Research Facility; Agribusiness (from small to multi-national firms); and the Rural Research and Development Corporations.

NFF also recognizes that research and development describes a range of activities. Research and development of particular interest to agriculture includes areas of strategic basic research (research undertaken into broad areas with a view to making useful discoveries), applied research (research undertaken with a specific application in view), and experimental development (work undertaken to create new or improved products or processes). For this reason the NFF believes that research investment must be done in an informed way: mindful of the outcomes required; considering the type of research that needs to be undertaken; and with the technical background to understand and manage the risks. An element intrinsically linked with research and development that also should be considered is the link between the R&D and the implementation of the innovation on-farm, including understanding how to break down the barriers to commercialization of technologies that exist in rural Australia.

To derive value from the Rural R&D System, NFF believes that the rural R&D system must: include a clear feedback loop to recognize farmer preferences for research; link to activities or strategies that allow the extension and communication of research and development to industry; and ensure that policy makers are engaged and act upon the outcomes of research. A successful agricultural sector relies on research to address productivity, sustainability and environmental outcomes, and these outcomes yield both private and public benefits. In this context the NFF believes that there are a number of elements of the Rural R&D System which are working well.

The Rural Research and Development Corporations (RDCs) remain an effective mechanism which ensures that industry beneficiaries contribute to research (addressing the “free-rider” element) and to capture the public benefits from research and development. It is a system that is the envy of many countries. The funding mechanism, which links government matching funds to industry contributions, represents both a valuable incentive for industry to commit to research and development but also a mutual commitment by government and industry to working in partnership to address productivity and sustainability challenges that exist in rural

Australia. The agricultural industries have maintained their strong support and commitment to this model over the 20 years of its operation.

There is continued strong support for the Rural Research and Development Corporations from Australian agricultural industries. Australian farmers understand and value the productivity gains that stem from investment in research and development, and this underpins the future of their industries. Australian farmers also understand that research is a long term investment, and the gains from research are not usually delivered 'overnight'. For these reasons Australian farmers have elected to contribute levies to the Rural Research and Development Corporations. These levies are 'industry funds', and the Australian agricultural industries continue to have significant ownership over how they are invested and an interest in the outcomes from this research investment.

Whilst the current survey has not asked about market information, it is important to consider and note the role of market information in driving research as well as industry productivity and profitability, and the strength this has brought to R&D investment by a number of the RDCs. Market information that accounts for international and domestic consumer demands provides a useful link to research and development. It does this by allowing targeted research to extract premiums that may exist in the value chain or niche markets, improving the attributes of primary produce for particular end uses, and ensuring continued access to markets as the specifications of products change. For example, the work undertaken to understand the properties required for noodle quality wheat, and the use of this information in wheat breeding programs, has led to an ongoing market in Asia for Australian grain farmers.

The National Primary Industries R,D&E framework being developed through the Primary Industries Standing Committee is a significant step forward in dealing with cross-sectoral and cross-portfolio issues. Whilst sectoral research plans are still being developed and funding arrangements are still unclear, this presents an opportunity to develop the 'critical mass' required to address some of the significant challenges faced around issues such as water, the management of carbon and biosecurity. The framework also presents an opportunity to marshal resources and achieve greater coordination between agencies, and ensure there is a national effort to achieve the productivity gains required across the agricultural industries.

2) *What does it not do well?*

The Rural R&D System is often discussed in terms of the Rural Research and Development Corporations alone, but rural R&D and the innovations that drive agricultural productivity and sustainability is the responsibility of a much broader group of organizations and stakeholders. The NFF believes that a whole of government approach needs to be taken to rural R&D and innovation, including coordination across government portfolio areas. As mentioned earlier, elements of the Rural R&D System include Farmers; the Federal Department of Agriculture, Fisheries and Forestry; State Departments of Primary Industries; the Department of Innovation, Industry, Science and Research; CSIRO; the Cooperative Research Centres; the Universities; the National Climate Change Research Facility; Agribusiness (from small to multi-national firms); the Rural Research and Development Corporations amongst others. The policy and regulatory environments generated by these organizations, and the funding made

available, significantly influence the direction and scope of R&D undertaken. However, Australia's rural R&D system is weakened by a lack of coordination across these organizations and agencies in areas of policy development and program implementation.

The policy framework that supports the rural R&D system needs to ensure that resources are coordinated across government departments and agencies, that the best teams and collaborations are identified and supported, and that duplication of research and development activities are avoided. From this perspective components of the rural R&D system have been neglected, and there is the likelihood that significant opportunities for innovation, productivity and sustainability improvement have been missed. It is unlikely that reform focused on the Rural Research and Development Corporations will address these broader issues in the rural R&D system, and the NFF has significant concern that such a move would weaken the innovation system that delivers the productivity improvements relied upon by Australian farmers.

There are examples where policy decisions made outside of DAFF will have a significant impact on the rural R&D system. For example, the revised Cooperative Research Centre guidelines, released in 2009, includes the following guidelines for the operation of CRCs:

"4.4 Transition Arrangements for Existing CRCs to New Funding Model

4.4.1 CRCs established prior to 2009 and seeking a 3rd or 4th funding term are eligible to apply for an extension of funding for varying periods of up to five years in a competitive merit based selection process, but will not be eligible to apply for additional funding beyond that period.

4.4.2 CRCs established prior to 2009 and seeking a 2nd funding term are eligible to apply for an extension of funding. The total number of years of funding available cannot exceed 15 years, including the original period of funding. CRCs will not be eligible to apply for additional funding beyond this period. Any extension to funding will be based on a competitive merit based selection process."

These guidelines have the effect that a series of long standing CRCs in areas related to agriculture have, at best, 5 years before they face their demise. These CRCs include the CRCs related to Beef, eWater, Cotton, Forestry and Invasive Animals. Under the guidelines the Plant Biosecurity and Pork CRCs can only expect to operate for, at most, 8 years. This represents a significant threat to productivity in the industry, as well as Australia's rural R&D capacity.

CRCs have led a significant industry-driven research effort in the agricultural sector, allowing various industry groups to partner collaboratively and work with researchers to address their challenges. There is currently no mechanism to support the CRCs facing closure due to the changed guidelines, leaving successful industry and researcher partnerships to disappear into a black hole without support from either DAFF or DIISR. This is a disappointing outcome for industry and the institutions, and fails to recognize the valued partnerships developed with

industry or the skills and expertise of the staff who have been brought together through the collaboration.

The termination of the research programs underway in these CRCs will impact on the productivity of industries, and will shift research costs onto other parts of the rural R&D system - displacing other research. This is a clear example of policy development in Federal Government portfolios outside of the Department of Agriculture, Fisheries and Forestry having a significant impact on the rural R&D system. Without a clear, across government strategy, the rural R&D system is likely to continue to operate in a piecemeal fashion with the risk that it will not deliver against expectations.

Another example of policy change which has a significant impact on the rural R&D system is the decline in State funding for extension services. In many regions and industries private consultants have taken on some of the roles and functions once delivered by these extension services. However, in practise the decline in government extension services has weakened the link between research and farmer driven research questions, left farmers unaware of research and development being undertaken, and also limited the effectiveness of delivering information on issues such as sustainability and advice on regulatory issues, such as farm chemicals. It should also be observed that market failures may also exist, where aggregation of farms, income variability as a consequence of drought and diversification of farm industries make it difficult for private consultants to operate profitably. In some cases this gap in communicating R&D outcomes is being funded by the Rural Research and Development Corporations, substituting the State Government funding with Federal funds and primary producer levies. Without monitoring and evaluation to understand the implications and effectiveness of this policy shift to withdraw funding from extension services, it is not possible to understand what the long term implications for productivity may be for the agricultural industries, or how effective private sector has been in taking on this new role.

A National Rural R&D Strategy needs to account for domestic and international agribusiness, and seek to promote growth in private research and development activities. Private investment and research activity in Australia's agricultural sector is low by international standards. The private sector plays an important role in the commercialization and marketing of innovation to drive agricultural productivity, and the low level of private investment in R&D in Australia suggests that there is an opportunity for this to improve. There are also benefits from encouraging private R&D activity, including the development of careers for Australian agricultural professionals as well as spin offs to the manufacturing industries and other sectors of the economy. However, it needs to be recognized that hurdles and barriers may exist to private investment, including that Australian agricultural industries are small by international standards and may not present an attractive market for large agribusiness, and regulatory hurdles may act as a disincentive. Differences in State regulation, such as moratoriums on genetically modified crops, may also increase the uncertainty of doing business in Australia and have the potential to increase costs. Experience with the Australian veterinary and agricultural chemical industries suggest that many large international companies are not prepared to pay for the efficacy testing to register products in Australia through the Australian Pesticides and Veterinary Medicines Authority (APVMA), limiting opportunities for productivity improvement by Australian farmers. The NFF believes that a national rural

agribusiness engagement strategy needs to be developed, in consultation with domestic and international agribusiness, to identify opportunities to encourage private R&D and address the barriers to private R&D that exist within the sector.

The rural R&D system, and the activities of the RDCs, State Governments and other agencies has suffered from a lack of clarity on what areas of research are the responsibility of different agencies, and what research delivers public or private outcomes. The development of the National Primary Industries R,D&E framework, through the Primary Industries Standing Committee provides an opportunity for the different research and policy agencies clarify responsibility for research in particular areas, bringing the advantages of greater coordination whilst reducing the potential for duplication of research investment. Clear and agreed direction from government and industry stakeholders on the attribution of public and private benefits from research on basic, applied and developmental research as well as areas of productivity, environmental and social research areas may assist in resolving uncertainty regarding respective roles and functions.

Significant uncertainty exists on the future of rural R&D funding and the priority placed on R&D by government. This has reduced industry confidence in the future of rural R&D in Australia. Research and development funding is limited. Projects are often funded for only 3 to 4 years, and the full suite of challenges facing Australia's agricultural industries cannot be fully addressed with the funding available. The abolition of Land & Water Australia and funding reduction to the Rural Research and Development Corporation has heightened these concerns. In a recent survey, NFF members indicated that research and development ranked as one of their highest priorities for action. This reflects the importance placed on R&D by industry, and their belief that a strong and vibrant rural R&D system is required to underpin the future of Australian agriculture. For farmers research is not 'just another line item' in the budget, it represents the future. Confidence in the rural R&D system could be improved by a clear statement of recognition by Government on the important role of R&D in driving productivity in the agricultural sector, and the public and private benefits derived from investment in rural research and development.

3) What does it need to do better?

The NFF recognizes that there are a number of areas which need to be addressed to improve the rural R&D system, and these have been described earlier. In summary:

- The government needs to develop a whole-of-government strategy to address Rural R&D, with the aim to improving policy and funding coordination across levels of government and different government portfolios.
- A National Rural R&D Strategy needs to address the whole R&D 'innovation chain', from strategic basic research, applied research, experimental development to pre-commercialization and commercialization.

- The implications of policy change for rural R&D and agricultural productivity, including changes to the rules around CRCs and government funding for extension need to be understood and addressed.
- The Rural Research and Development Corporations need to be maintained, and recognized for the valuable role they play within the broader rural R&D system.
- A national agribusiness strategy is required to understand the opportunities, barriers and incentives to promote private investment by agribusiness in rural R&D in Australia.
- That there is a shared recognition by government and industry of the important role of R&D in driving productivity in the agricultural sector, and the public and private benefits derived from research and development investment.

4) *Is the system adapting to current challenges at a rate that is likely to address them?*

From the NFF's perspective individual agencies have been responsive to change, however the broader system has not seen significant change. Changes to the system, and the way agencies interact and work together, requires coordination and broader policy support. For example, the development of the National Primary Industries R,D&E framework through the Primary Industries Standing Committee is a strong example of a potentially positive change for the rural R&D system. However, implementation of the framework relies on the agencies involved to make decisions to coordinate funding, and to provide long term commitments to funding. However, one of the first R&D areas to be addressed under this strategy, the National Climate Change Research Strategy for Primary Industries (CCRSPI), has not progressed, despite strong support. The development of a clear cross-government vision for agriculture and rural R&D would assist policy makers in guiding decisions on priority activities and organizational structures that allow the system to adapt and change.

Over recent years changes to the rural R&D system that have tended to perpetuate the trend towards small parcels of funding being administered in a piecemeal approach. For example, the establishment of the Climate Change Research Program to administer \$46.2m research and development funding under the Australia's Farming Future Program does not have the same transparency as programs administered under the Rural Research and Development Corporations. The program potentially duplicates administrative costs and does not have a 5-year research plan, or program for the evaluation and review of projects as is done by the Rural Research and Development Corporations. Opportunities exist to consolidate funding arrangements and reduce duplication.

The NFF believes that the RDCs are making changes in their research investments that are appropriate in responding to the challenges that face Australian agriculture. The NFF is aware that nature of investing in research and development means that contracts may be in place for three or more years, which means that there is not a sudden significant change in research investment on an annual basis. This is entirely appropriate, as time is required to undertake research which may need to occur over a series of seasons or requires a detailed program of

research. The RDCs also produce 5-year strategic plans which are informed by industry analysis of the challenges that are likely to exist in the next 20-30 years. Whilst funds are limited it is unlikely that all research and development priorities will be addressed, and the challenge of prioritization and investing in research in a strategic way will remain.

5) If not, what policy adjustments could accelerate change without increasing risk?

The most appropriate way of making policy adjustments without risking the system is to have a clear vision of what outcomes are sought, and then implementing policy and making policy changes with a view to achieving this vision. As with all evidence based policy, appropriate research and consultation should be undertaken to ensure the measure is properly targeted, that there are mechanisms in place to monitor the impacts of the policy change and that the measures implemented account for the motivations and interests of stakeholders.

Elsewhere in our response, the NFF has suggested a number of policy adjustments would improve Australia's rural R&D system. A summary of these policy adjustments includes:

- The development of a clear cross-government vision for agriculture to assist policy makers make decisions on priority activities and guide changes in organizational structures to allow the rural R&D system to adapt and deliver the innovation required.
- To avoid costs from administration and duplication of activities, and to improve collaboration and coordination, government should seek to avoid creating new, separately administered research funds or organizations within the rural R&D system.
- That the development of the National Primary Industries R,D&E framework by the Primary Industries Standing Committee continue to be supported by Government, along with new initiatives and research collaborations developed as part of the Framework.
- That government consult with domestic and international agribusiness to examine opportunities and barriers to increased private investment in rural R&D, and from this develop policy measures to encourage greater private participation in rural R&D.
- That any new strategies developed to improve the rural R&D system be appropriately resourced and funded to ensure the measures are properly implemented, and reduce the risk of failure.

As a general observation, the move away from the silo approach of dealing with the rural R&D system as the single responsibility of the Department of Agriculture, Fisheries and Forestry would assist in ensuring linkages to other government programs and mechanisms for assistance and is one way of reducing risk. There may also be opportunities to learn from the experiences in other Government Departments and from this joint work develop or adopt policy that has been successfully applied in other sectors of the economy, which would reduce the risks from policy change.

From the discussion papers issued it is unclear exactly what types of policy adjustments are being contemplated by the Rural R&D Council, and what the associated risks may be. However, given the importance of research to industry, level of investment made by industry through farmer levies as well as the significant investment made by government, it is completely appropriate that the risks from policy change be considered and managed. The NFF welcomes the opportunity to explore changes in policy with Rural R&D Council and Government as these options are discussed and developed.

2. Your perspective

1) *As investors, what principles do you use to balance short-term claims with long-term requirements?*

The National Farmers' Federation does not invest in research. However, we would expect that organizations that are investing in research develop and maintain a balanced portfolio of projects, investing across the areas of strategic basic research, applied research and experimental research. There is also an expectation that a research investor would develop a portfolio of research projects which has a balanced level of risk and timeframe for delivery.

A balanced portfolio of research is required to deliver against short or long term needs of industry. To do this, the research and development investor needs to have links with industry, to ensure the relevance of the research, and the technical knowledge to understand the research issues and manage risks. Research plans to guide investment decisions in research projects need to balance the need for information in the short term with potentially high-return long-term research to address a particular production or sustainability issues. The Government of the United States of America has sought to characterize the type of research and development undertaken by different Government agencies, and recent Science and Engineering indicators published in 2010 by the National Science Board¹ found that funding for R&D within the US Department of Agriculture (total spending of US\$2,357M) was split between Basic Research 42.0%, Applied Research 50.8% and Development 7.2%. Whilst this funding split may not be appropriate for Australia, the NFF is unaware of similar work done that would allow the characterization of the research investment made in rural R&D in Australia.

The NFF notes that research priorities and investment decisions will vary significantly between industries, and between geographic regions, depending on the state of knowledge and the opportunities that exists. For this reason, the development of 5-year Research Strategies which consider and account for the long term (i.e. 20 to 30 year) goals for industry, as used by the Rural Research and Development Corporations, provide a rigorous framework to underpin investment in research and development.

¹ <http://www.nsf.gov/statistics/seind10/>

2) *Do these differ from the principles that balance commercial interests with public good objectives?*

The various institutional and business participants in the rural R&D system will make decisions about their research investment in different ways, and undertake research on different subjects, depending on their objectives and the outcomes they are looking for. In a similar way to balancing short and long term requirements, the research investment needs to be informed by a technical understanding of the issue to ensure the required private or public returns are delivered.

A clear understanding and attribution of private and public returns may not be possible at the outset of a research project. Research, by its nature, is risky and there is the opportunity for unexpected results. For that reason intellectual property could be generated in the pursuit of research in 'public good' areas, and private research may not deliver the intended returns. These risks can be managed through an informed investment process, but it may not be possible to mitigate them entirely.

3) *Where do 'big breakthroughs' come from in your area of interest?*

The NFF is not in a position to specify particular research areas for investment. NFF members, who are involved in a range of agricultural industries across regional Australia should be consulted individually to identify research priorities and significant challenges for their individual industries. However, there are two principles that the NFF would suggest that may help generate breakthroughs. These include work on strategic basic research to better understand the agricultural production systems we are dealing with, but also the need to engage members of the primary industries in identifying priorities and using their knowledge to identify area of research that may be fruitful. This would apply to areas related to both public and private good.

4) *What potential do you see for 'step ups' in system performance and what are the necessary pre-conditions?*

The NFF believes that a significant step up in the performance of the rural R&D system would come from the development of a vision for Australian agriculture, and the elevation of research to achieve productive and sustainable agriculture to a National Research Priority. The development of a vision for Australian agriculture by government, in consultation with industry, should be accompanied by a research strategy that focuses on the challenges that may confound us from reaching this vision.

Australia's projected population of 35 Million in 2050; the need to increase productivity across Australia to 2%; the environmental challenges facing the rural industries; and the international challenges (including global food security) sharpen the focus on the Australian Government to articulate a vision of how Australian agriculture will contribute to the solution of these challenges. Recognition of research to support productive and sustainable agriculture as a National Research Priority would help to develop coordination and collaboration around agricultural research by institutions across government portfolios, and ensure agencies

involved in research and development consider it in their planning activities. At present research to improve productivity and sustainability of Australian agriculture is spread across all four National Research Priorities. The development of a vision for Australian agriculture and the elevation of research to support productive and sustainable agriculture to a National Research Priority would reinvigorate the rural R&D system.

At an operational level there is a range of opportunities to improve the rural R&D system. Three key areas include improving the receptiveness of industry to taking up research and development, improvements in government support and involvement, and encouraging greater business investment in research and developing in the sector.

Preconditions for improved take up of research and development by the farming sector are many and varied. These include the need to ensure that: a viable farming sector exists and is able to make the capital investment in new technology and systems; an educated farming sector exists which can make informed decisions on the adoption of new technology, systems and practices; and ensuring that appropriate rewards exist for the adoption of improved environmental practices where benefits from the research flow to broader society.

Another precondition for improvement in the R&D system performance is greater government support and involvement through improved coordination across government on policy and programs related to rural R&D. This would mean greater coordination between the Department of Agriculture, Fisheries and Forestry and the Department of Innovation, Industry, Science and Resources as well as State governments, and taking an 'innovation-system' view of the agricultural industries. An 'innovation-system' view would look at how the different Government departments, research agencies and private industry supports and undertakes research, as well as how this links to commercialization and barriers to uptake. This would also assist government in ensuring the 'form' of the government institutions that exist are focused on achieving the 'function' required. The "NRM Joint Team" may be a useful model to consider in order to achieve policy and program coordination between departments. The "NRM Joint Team" works across the Department of Agriculture, Fisheries and Forestry and the Department of Environment, Water, Heritage and the Arts to coordinate policy development and implementation in areas where the Departments have shared interests. A similar "Joint Team" between the Department of Agriculture, Fisheries and Forestry and the Department of Innovation, Industry, Science and Research could be tasked with ensuring coordination of policy and programs between the Departments, as well as the development of policy and programs to support innovation and reduce duplication.

There is a significant need for greater investment by government through the existing research and development programs. Since the 1980s research intensity has declined significantly, and public funding for agricultural R&D has fallen by almost one third to about 4%. Agricultural research has demonstrated its ability to provide public and private returns, and deliver productivity benefits that persist for many years after the investment in research has been completed.

The opportunity for private investment in rural R&D should be examined, with a focus on promoting research and development effort by both Australian and international businesses.

This area of 'improved system performance' highlights the need for a broad cross-government approach to research and development which links with business assistance programs and regulatory responsibilities which are managed by a variety of Government agencies. Preconditions for achieving improved investment by business include: understanding the value proposition for agribusiness from investment in rural R&D and ensuring policy addresses the barriers and incentives required to encourage greater private investment in rural R&D; ensuring there was awareness amongst agribusiness of the support available for the development of innovations and investment in research and development; and that government regulation (including areas such as intellectual property rules, biotechnology, nanotechnology and the development and registration of chemicals) provides low cost, worlds best practice pathway to encourage business to invest in research and development in Australia.

5) *What are the implications of these papers for your industry or area of rural R&D interest?*

The papers provided by the Rural R&D Council have provided a useful consolidation of information and an overview of the challenges which must be accounted for in the development of policy to underpin effective rural R&D. The discussion regarding links with international research and development programs and private industries role in research and development are areas which have not tended to be discussed in the context of rural R&D within Australia.

The papers provide clear evidence that innovation in the agricultural sector is dependent on research and development by a range of groups, not just the RDCs. These groups include public and private groups undertaking R&D internationally, the role of private sector businesses in the agricultural sector and related areas of the economy, as well as the Universities, CRCs, CSIRO and others. The papers make it quite clear that a National Rural R&D Strategy needs to recognize and account for these different groups (and work across government Departments), and develop strategies to encourage public and private research and development activity.

The papers make it evident that the existing research dollars are being squeezed. The withdrawal of State funding support of agricultural R&D over time has been clearly highlighted². Along with the observation that this funding gap has tended to be picked up by the RDCs, which has lead to an overall decline in public R&D investment. It was also noted that the funding from RDCs to Universities has also increased³, as they do not require full cost recovery and that this situation was likely to change over time. The development of the National Primary Industries R,D&E framework by the Primary Industries Standing Committee provides a mechanism to secure R&D funding commitments from the various agencies involved in research across the Rural R&D system. However, it is also evident that research and development funding will need to increase, just to keep pace with the rising cost of R&D activities.

² Core, P. (2009) "A Retrospective on Rural R&D in Australia" Information Paper, Rural R&D Council

³ Core, P. (2009) "A Retrospective on Rural R&D in Australia" Information Paper, Rural R&D Council

The observation was made that there was evidence of a negative correlation between public expenditure on R&D and private expenditure, suggesting that government expenditure may be crowding out private investment in rural R&D⁴. Further work is required to understand if this is the case, or if other factors, such as regulatory frameworks, the relatively small size of the Australian market, business risk (e.g. variability of income due to drought) or the cost of servicing the rural industry market also significantly influence these decisions. For example, there is an underinvestment in research by the chemical industry to generate data to support the registration of chemicals for use in Australia agricultural industries. The cost of undertaking the trials and the regulatory policy in place is cited as being the factors which have influenced the decision of the chemical industry. As suggested earlier, Government should consult with domestic and international agribusiness to examine the opportunities and barriers to increased private investment in rural R&D, and from this develop policy measures to encourage increased private participation.

6) *Are there any models in your industry that have been particularly effective and are suited to broader application?*

The NFF is not in a position to specify particular research areas for research investment. As mentioned earlier, the NFF's membership operates across a range of regions and industries and we have observed that there are rarely one-size-fits-all solutions.

3. Evaluation

1) *On what basis do you assess adequacy of investment?*

There are two aspects to assessing the adequacy of research investment; these are the adequacy of the investment value and the adequacy of the investment process.

Earlier in this submission the NFF has discussed the adequacy of the investment value, and observed that the investment is not currently sufficient to address the large scope of issues which face the primary industries, and that research dollars are being squeezed by the increasing price of research and various on-costs which are now being funded through research grants. As was observed earlier, research and development funding will need to increase, just to keep pace with the rising cost of R&D activities – let alone address the additional research required.

The investment process used by the Rural Research and Development Corporations, in which priorities are identified in 5 year Research Plans after consultation with stakeholders, is transparent. As described earlier in this submission, an adequate research investment process should seek to balance risk and return, to achieve the outcomes articulated by stakeholders. To assess the efficiency and effectiveness of the process undertaken to invest in research and development activities, appropriate performance indicators need to be put in place which are meaningful to stakeholders.

⁴ Frontier Economics (2009) "International drivers of rural R&D" Information Paper, Rural R&D Council

At present, it is difficult to make an assessment of the adequacy of research investment process across the entire rural R&D system. For example, the reporting requirements of programs administered internally by DAFF differ from the reporting required from CRCs. The Rural Research and Development Corporations have a very transparent investment process, which comes at the price of a significant reporting burden. It is understood that this reporting requirement currently extends to the production of Annual reports, reports made directly to industry stakeholders, performance reports made to their Boards, the publication of research findings through newsletters and correspondence with industry, reporting through their portfolio budget statements, as well as the development of operational plans including Annual Operational Plans and 5-Year Strategic Research Plans. The NFF welcomes transparency in the rural R&D system, however clearer performance indicators, agreed between government and industry stakeholders could reduce these significant administrative costs in some organizations and improve transparency in others.

The assessment of the adequacy of the outcomes from research investment is difficult, particularly where the assessments attempts to value environmental, social or economic returns, or considers spillovers or the value derived from basic versus applied research. The long term nature of research and the extended period required for farmers to adopt and benefit from research findings means the use of evaluations, such as that produced by the Council of Rural Research & Development Corporations' Chairs, are appropriate. Whilst the assumptions used to generate this type of report can be debated, the method and assumptions used are transparent, and it is clear that the return from investment in rural R&D made through the Rural Research & Development Corporations has been substantial. Benefits of the RDC's portfolio of investment returned \$10.51 for each dollar invested, which is a significant return for the Australian economy and much of the research will continue to produce returns and underpin productivity improvements for a number of years. Indeed, the magnitude of this return has led commentators to observe that there is under-investment in rural R&D, with significant value to be extracted for the Australian economy by increased investment in rural R&D.

2) How do you think a 'national investment plan' should be measured and monitored?

The performance indicators for a 'national investment plan' should be linked to the outcomes of the plan. The 'national investment plan' should be derived from national vision for the agricultural industries, and address the opportunities and impediments that exist in achieving this vision. In addition to broad research priorities, elements that the 'national investment plan' should consider include: the mix of basic, applied and developmental research; the returns to be delivered to public and private stakeholders; the various roles of research institutions and government agencies; the role of the private sector; and the international linkages required.

A mix of performance indicators should be established which can transparently report changes that have been made in government, industry and agribusiness as a consequence of the 'national investment plan'. Short term measurement and monitoring of performance against the plan by agencies and government departments investing in research and development should focus on the efficiency and effectiveness of the processes used to make this

investment. Given the outcomes of the national investment plan may be delivered over 15 to 20 years, it would be appropriate that indicators which link to the performance of the investment be reviewed at longer time intervals to reduce variability in performance by the sector introduced by factors such as drought and international commodity prices.

3) *How do we ensure that major cross-sectoral and cross-portfolio issues are addressed?*

Elsewhere in our response, the NFF has suggested a number of ways in which cross-sectoral and cross-portfolio issues can be addressed. These include:

- Research to support productive and sustainable agriculture should be elevated to a National Research Priority to ensure there is recognition of this priority across-portfolios and ensure government agencies target research to address cross-sectoral issues.
- The development of a clear cross-government vision for agriculture to assist policy makers make decisions on priority activities and guide changes in organizational structures to allow the rural R&D system to adapt and deliver the innovation required.
- That the development of the National Primary Industries R,D&E framework by the Primary Industries Standing Committee continues to be supported by Government, along with new initiatives and research collaborations (such as CCRSPI and water management) which are identified and developed as part of the Framework.
- That any new strategies developed to improve the rural R&D system are appropriately resourced and funded to ensure the measures are properly implemented, and reduce the risk of failure.

4. International

1) *What opportunities and threats do you see for Australia as a result of international drivers?*

Significant opportunities and threats exist from international drivers. Opportunities exist for Australian rural research and development programs to build on international efforts in rural research and leverage this research. However, Australia needs to engage in international research efforts in an informed way. Australia's international rural research and development effort should link with and compliment a domestic rural R&D strategy. International engagement on research and development should leverage and build on the research strengths that exist within Australia; and address gaps in knowledge, capacity and technology that exists in the Australian research community.

NFF has not sought to identify or prioritize the international drivers that exist for agricultural research, but relevant examples include: improving the efficiency and productivity of current agricultural systems; understanding and managing water resources; understanding and managing natural resources, including soils and vegetation; understanding and managing

climate variability; and improving biosecurity and the management of pests, diseases and weeds. A range of opportunities exist to work collaboratively with developed and developing nations, as well as international agribusiness and philanthropic organizations, to address these challenges. Opportunities also exist for Australia to identify areas where it can provide international leadership, and establish research centers in Australia to attract international expertise and funding to the benefit of Australia and the international community.

Significant threats exist in undertaking collaborative international research for Australian agricultural industries. The Australian agricultural sector faces competition in international markets. Where Australia assists countries to develop their agricultural industries through research and development, there is the potential for these countries to compete with Australian farmers in international markets. Whilst Australian farmers will continue to be amongst the most efficient in the world, tariffs and subsidies for agricultural produce from competing countries will distort the markets in which Australian produce is sold. For this reason research and development assistance to assist in food security and rural development should focus on issues from which Australian agricultural industries receive benefit, and development assistance should also focus on promoting free markets and removing trade barriers in countries to which assistance is provided.

Increased funding for international research collaboration to address these international threats and opportunities should not be a substitute for funding domestic research and development to improve the sustainability and productivity of Australian agriculture. Consideration should also be given to the potential loss of members of the Australian rural R&D workforce to international rural R&D programs in response to new funding opportunities, leaving a gap in Australia's research capacity to address domestic rural R&D issues.

2) *How can the flow of foreign knowledge be encouraged and enhanced for the benefit of Australian industry and the community?*

Australian agriculture has benefited significantly in the past from international collaborations in rural R&D. The CGIAR (Consultative Group on International Agricultural Research) Centres, including institutions such as CIMMYT, have been instrumental in the development of Australia's plant and animal breeding programs. The Crawford Fund has been a valuable forum which has ensured that Australia is linked to international debate on agricultural research. Nuffield Scholarships have also been a vital mechanism for encouraging international exchange between industry leaders and innovators. Benefits derived from these activities includes the international exchange of ideas, direct contact between individuals to understand and learn from the experiences of others, exposure in international forums and the development of professional networks and the opportunity to learn from international practice. These initiatives need to be promoted, and provided with ongoing support.

New international opportunities continue to develop, and the Australian agricultural industries need to actively engage with these programs. However, many of these initiatives appear to be driven by Governments with little engagement with the Australian agricultural industries, and it is unclear how these initiatives may align with industry driven domestic research

priorities. A recent example is Australia's membership of the Global Research Alliance on Agricultural Greenhouse Gases, announced in December 2009. Whilst the need for industry driven research is widely discussed, and benefits to adoption from industry ownership of research recognized, there appears to be little industry engagement when decisions are made by Government to participate in these international programs. A set of clear national priorities for international rural research engagement, developed in partnership between Government and industry would assist in creating a level of ownership and greater industry engagement on the outcomes of these partnerships.

Elsewhere in this response, the NFF has identified opportunities which are relevant to improving the flow of knowledge from international R&D to Australia. Examples include:

- The Government needs to develop a whole-of-government strategy to address rural R&D, with the aim to improving policy and funding coordination across levels of government and different government portfolios, and a shared understanding of the knowledge requirements for Australian agriculture.
- From the whole-of-government strategy to address rural R&D, key areas which would benefit from international collaboration should be identified and initiatives put in place to encourage international collaboration and knowledge transfer.
- Australia should identify countries with similar production systems and/or agro-ecological zones where the outcomes of agricultural research may provide benefits for Australian farmers, as well as the international community.
- Opportunities for collaboration should be identified where Australia can provide international leadership, and research centers should be established in Australia to attract international expertise and funding to the benefit of Australian agriculture and the international community.
- Government should consult with domestic and international agribusiness to examine opportunities and barriers to increased private investment in rural R&D, and from this develop policy measures to encourage greater private participation in rural R&D and encourage the transfer of IP developed internationally to Australian applications.

Other potential opportunities include:

- The development of incentives and assistance schemes to assist Australian agribusinesses to grow their international markets should be explored, so that these firms will be able to transfer the experience they develop internationally back to Australia.

3) *What are the implications for the structure and composition of Australia's 'receptive' capacity?*

A greater focus on funding international research and development collaboration should not be a substitute for funding domestic research and development to improve the sustainability and productivity of Australian agriculture. An emphasis on international research and development is likely to distort Australia's domestic rural R&D capacity, causing a shift in researchers away from domestic research as they seek to compete for the new (or re-allocated) funding. This will lead to a gap in the research capacity working on domestic rural R&D issues.

A representative example of the challenges that face the 'receptive' capacity of Australia's rural R&D professionals can be found in the 2008 Discussion Paper "Managing Australia Soils"⁵. The Paper considers the challenges which currently face the structure and composition of Australia's research capacity in the soil science and observed that there was "a loss of momentum in the soils profession and a declining number of talented new entrants into the profession". The Paper goes on to observe that "restructuring of agencies and frequent changes to priorities for natural resource management is widespread and destabilising." Investing in research overseas to the detriment of funding for domestic research has the potential to reduce the critical mass of researchers working in Australia, whilst supporting Australian researchers working overseas has the potential to de-rail research on domestic rural R&D priorities. It is important that any strategy to increase international engagement is not going to destabilise research undertaken to support Australian agriculture. An international strategy for rural R&D should consider capacity gaps and explores opportunities to compliment and strengthen Australia's domestic rural R&D capacity.

As mentioned earlier, there are a number of preconditions for improved take up of research and development by the farming sector, including knowledge and technologies developed internationally. These include the need to ensure that: a viable farming sector exists and is able to make the capital investment in new technology and systems; an educated farming sector exists which can make informed decisions on the adoption of new technology, systems and practices; and ensuring that appropriate rewards exist for the adoption of improved environmental practices where benefits from the research flow to broader society. Without ensuring that these limitations are addressed, increased investment in international rural R&D efforts may have little benefit for Australian agricultural industries.

4) *In developed countries there is a trend towards greater private investment in rural R&D. To what extent is this likely to be a trend in Australia?*

A number of observations and suggestions have been made elsewhere in this submission regarding private investment in rural R&D in Australia. Increased private investment in rural R&D is an opportunity, but measures to encourage private rural R&D activity need to be developed with a clear understanding of restrictions in the business environment that may currently be limiting R&D investment. Australian agricultural industries are diverse, the

⁵ Campbell A (2008) *Managing Australia's Soils: A Policy Discussion Paper*. Prepared for the National Committee on Soil and Terrain (NCST) through the Natural Resource Management Ministerial Council (NRMMC).

farming population is geographically dispersed, droughts can have significant impacts on income and whilst Australian agriculture is a significant exporter, the relative value of the Australian agricultural industries is small by world standards. These are examples of factors that are likely to influence the willingness and capacity of the private sector to invest in rural R&D as they consider the business case to increase their R&D investment.

As mentioned earlier in this response, an increased focus on private rural R&D will require a broad cross-government approach to research and development which links with business assistance programs and regulatory responsibilities which are managed by a variety of Government agencies. Other opportunities and activities to better understand and encourage private investment in rural R&D, identified elsewhere in this paper include:

- Government should consult with domestic and international agribusiness to examine opportunities and barriers to increased private investment in rural R&D, and from this develop policy measures to encourage greater private participation in rural R&D and encourage the transfer of IP developed internationally to Australian applications.
- The development of incentives and assistance schemes to assist Australian agribusinesses to grow their international markets should be explored, so that these firms will be able to transfer the experience they develop internationally back to Australia.
- Policy research is required to understand the value proposition for agribusiness from investment in rural R&D in Australia and ensuring policy addresses the barriers and incentives required to encourage greater private investment in rural R&D.
- The need to ensure there was awareness amongst agribusiness of the support available for the development of innovations and investment in research and development.
- Ensure that Government regulation (including areas such as intellectual property rules, biotechnology, nanotechnology and the development and registration of chemicals) provides low cost, worlds best practice pathway to encourage business to invest in research and development in Australia.
- A whole-of-government approach is required to ensure that there is coordination across levels of government and different government portfolios, particularly in relation to programs which encourage business investment in rural R&D.

5. Education

1) *To what extent is there a shortage of skilled researchers and other professionals to support the agriculture, fisheries and forestry sector?*

Within the agricultural industries, long-term drought has had a debilitating impact on farm employment and has resulted in significant rural adjustment as job-seekers move into the mining industry or into metropolitan areas for work. University of Sydney data shows a

shortfall of approximately 96,000 people over the next six years in agriculture's top seven occupations: livestock farmers (will need another 34,000), farm hands (21,000), crop farmers (18,000), mixed crop/livestock farmers (14,000), general mobile plant operators (4,000), bookkeepers (3,000) and shearers (2,000). These labour shortages are expected to persist despite the Global Financial Crisis, and will force farmers to look for opportunities to improve their on-farm productivity. In the face of these challenges, the demand for information and innovation has never been greater.

Identification of capacity gaps, and areas which require development of R&D capability are fundamental tasks required to compliment the development of a national strategy for rural R&D. The NFF does not have specific information on the gap between the supply and demand for skilled researchers and professionals in the agriculture sector, but from anecdotal evidence there is a clear issue that must be dealt with. Numerous reports have been produced over recent years which have sought to identify gaps in Australia's national rural R&D capacity, including the report mentioned earlier for the National Committee on Soil and Terrain (NCST), work on national capacity related to plant pathology undertaken by the Office of the Chief Plant Protection Officer and work by COAG focusing on water industry skills gaps. These gaps weaken Australia's ability to respond to emerging issues, and reduces the level of advice that can be provided to the agricultural industries.

2) How is this impacting on the sector's productivity?

Productivity in the agricultural sector is driven by innovations derived from the rural R&D system. The development of these innovations relies on skilled researchers and professionals being available, funding being available for these individuals to undertake work, the results of this work to be applied and developed for regional and local applications, and for this information to be effectively communicated to farmers. The availability of skilled researchers and professionals is a fundamental aspect to the 'value chain' of research, but its ultimate impact on the productivity of agricultural industries is influenced by policy and resourcing governing the whole rural R&D system.

The Australian farming community is alarmed at the petering out of the benefits of 'the green revolution' in the 1960s and 70s and the declining trend in productivity growth in many parts of agricultural industries. Rural R&D also provides the opportunity to better manage risks to productivity, including risks such as drought. The availability of skilled researchers and professions is a key aspect to responding to these productivity challenges.

Related to the availability of skilled researchers and professionals in the rural R&D system, is the need to ensure an educated farming sector exists which can make informed decisions on the adoption of new technology, systems and practices. This was discussed earlier as a critical element impacting on the 'receptiveness' of Australian rural industries. The education of farmers, which is a lifelong process, is a critical element in underpinning the sector's productivity. Farmers treat this issue seriously. They seek out information on new technologies and chemicals, research information on climate forecasts and attend field days and seminars to find out about best practices and the outcomes of rural R&D. The availability of quality, reputable information underpins the productivity of the agricultural sector.

3) *What should be done to address this?*

A range of issues have been discussed elsewhere in this submission which would assist in addressing the shortage of skilled researchers and other professionals in the agriculture sector. These include:

- The development of a whole-of-government vision for agriculture, including identification of priority research areas which reflect key strategic areas for agricultural industries.
- Identify key gaps human capacity gaps, including areas where capacity is in decline or needs to be built to meet key challenges.
- The 'national investment plan' for rural R&D should support international collaboration to build capacity in key rural R&D areas, and address private sector involvement in rural R&D to encourage employment opportunities.

Industry has acknowledged the need to attract skilled and passionate individuals into careers in the agricultural industries. The NFF has worked with a range of stakeholders to develop initiatives to address this issue. These initiatives include:

- Primary Industries Education Fund (PIEF). The PIEF was formed to provide educationally-relevant materials about modern agriculture for primary and secondary schools to raising the profile and awareness of modern farming among students, and to encourage more students to consider agricultural-related careers.
- Rural Skills Australia. Rural Skills Australia provides advice, assistance and training to Australian Apprenticeships Centres, Job Network members and Registered Training Organisations on Rural and related Australian Apprenticeships, as well as to industry on training reforms.
- Agrifood Careers website. The Agrifood careers website showcases that range of careers in agrifood industries, from farm to sciences and international business careers.
- Investing in Youth. This new program being offered by the Rural Industries Research and Development Corporation (RIRDC), with support from other RDCs, provides undergraduate students with financial support, a mentor and relevant industry placements to support the students developing a career in the agricultural sciences.

4) *What best practice models for extension and knowledge transfer exist?*

The NFF is not in a position to comment on the relative merits of extension and knowledge transfer models. NFF members, who are involved in a range of agricultural industries across regional Australia should be consulted individually to identify the extension and knowledge transfer strategies that best work for their individual industries and enterprises. It is important

to realize that all farmers are different, and this diversity must be accounted if extension and knowledge transfer strategies are to be successful. Whilst single tools, like the internet, are useful, they do not cater for all learning styles and preferences.

5) *How are they evaluated?*

The NFF is not in a position to provide detailed comment on the methodology for evaluating extension and knowledge transfer programs. The NFF understands that the Rural Research and Development Corporations have undertaken extensive work on extension and knowledge transfer for their respective industries, and Land & Water Australia managed the Knowledge for Regional Natural Resource Management Program. The Rural R&D Council should consult with these groups directly for further information.

6) *Is diversity, including community (indigenous and cultural) and industry diversity adequately provided for in the current model?*

As mentioned earlier, the NFF is not in a position to comment on the relative merits of extension and knowledge transfer models and does not evaluate the performance of these activities by other agencies. Similarly, as observed earlier, single tools, like the internet, are useful but they do not cater for all learning styles and preferences and an effective extension and knowledge transfer should seek to use tools and methods suitable to their intended audiences.