

Memo



Australian Government

Department of Agriculture Fisheries and Forestry

Department of Climate Change

**Submission to the House of Representatives Standing
Committee on Primary Industries and Resources Inquiry –
the Role of Government in Assisting Australian Farmers
Adapt to the Impacts of Climate Change**

June 2009

Executive Summary

Australia's agricultural sector is particularly vulnerable to the impacts of climate change because of its dependence on favourable weather conditions, natural resources and systems. The International Panel on Climate Change predicts that climate change will bring major challenges for our primary industries including higher temperatures, longer and deeper droughts, and more intense extreme weather events such as tropical cyclones. It will be critical that Australia's farming sector adapts to climate change if it is to remain competitive, sustainable and profitable into the future.

Australia's farmers and rural industries have a long history of innovation and change to cope with climate variability, pest, disease and weed problems or declining natural resources among other things. This capacity to cope will be an important asset in dealing with the future impacts of climate change.

Many farmers are testing and using different farming practices so their businesses are better able to withstand drought and other extreme events. However, this will not be sufficient to manage the future impacts of climate change, and farmers will need support and guidance to do this.

Coordinated national effort by governments, agriculture industries, regions and individual producers will be required to put in place sound climate change strategies to ensure that agriculture is able to effectively manage the risks associated with climate change.

The Australian Government's response to climate change adaptation in agriculture is therefore to focus on providing fundamental information and knowledge, and the decision support tools that will allow farmers and rural industries to manage the risks of climate change.

This reflects the government's preference for markets to operate with minimal intervention, concentrating its role on situations where there is market failure, where there is a clear need to intervene to protect or maintain a public good, or where there is a high risk to assets of national significance.

The government has implemented a number of programs that provide research, extension and training which will assist the agricultural sector adapt to climate change. The Australia's Farming Future (AFF) initiative will play a key role.

Under AFF the government has also established a comprehensive research framework to find innovative solutions to adapting to a changing climate, managing agricultural emissions and better soil management. This will assist the sector to adapt to the impacts of climate change while increasing productivity.

The government has recently adopted a new National Climate Change Science Framework which sets out climate change research priorities for the coming decade. The Framework will deliver better higher resolution predictions of future climate, knowledge which is central to the development of adaptation policy for agriculture.

Australia's high agricultural productivity growth is largely attributed to the sector's culture of innovation, investment in research and adoption of findings.

This research has been underpinned by the government's rural research and development corporations and companies (RDCs), which are one of the government's main vehicles to support and assist primary producers to adapt to the impacts of climate change through rural research and development (R&D).

With their extensive industry networks, the RDCs create a critical link between the science and producers enabling research to be appropriately targeted and more effectively extended to end users. The RDC model has provided farmers greater options in adapting to climate change by developing cropping systems that are more adaptable to climate change, practices that minimise on-farm greenhouse gas emissions and plant varieties with improved water-use efficiency or drought tolerance.

RDC investment plans are guided by the Rural Research and Development Priorities, a shared set of high level objectives across sectors and jurisdictions. One of the priorities is "building resilience to climate variability and adapting to and mitigating the effects of climate change".

Preamble

This submission to the Inquiry has been prepared jointly by the Department of Agriculture, Fisheries and Forestry (DAFF) and the Department of Climate Change (DCC).

DAFF is responsible for providing policy advice and administering programs aimed at the development of internationally competitive and sustainable primary industries.

DCC leads the development of Australia's climate change policy. DCC advises on emissions reduction policies, including carriage of Australia's international climate change negotiations and design and implementation of a domestic emissions trading system, and policies on adaptation to the impacts of climate change.

Introduction

Climate change poses a significant challenge for all sectors of the Australian economy and society. Australia's agricultural sector is particularly vulnerable to the impacts of climate change because of its dependence on favourable weather conditions, natural resources and systems. The impacts will be varied, and will be experienced to different degrees by different producers and industries.

Many farmers are testing and using different farming practices to build the resilience of their farms and farming systems, so their businesses are better able to withstand drought and other extreme events. However, there is a reasonable expectation that the lessons learned from coping with present-day climate variability will not be a sufficient basis for action to address impacts of climate change. Farmers will need support and guidance to deal with climate change.

The Australian Government places high priority on national action to address the impacts of climate change. It is moving ahead with action on adaptation¹ for climate change, including in the agricultural sector.

¹ The Intergovernmental Panel on Climate Change glossary defines adaptation as 'adjustment in natural or *human systems* in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities'.

1 Adapting to the impacts of climate change

1.1 Climatic impacts

The International Panel on Climate Change (IPCC) Fourth Assessment Report 2007² predicts that climate change will bring major challenges for our primary industries including higher temperatures, longer and deeper droughts, and more intense extreme weather events such as tropical cyclones.

The IPCC report projects changes in Australian rainfall patterns, with northern Australia receiving more rainfall while south and south-eastern Australia will likely receive less. As a result of reduced precipitation and increased evaporation, water security problems will intensify by 2030 in southern and eastern Australia. Annual streamflow in the Murray Darling Basin is likely to fall 10 to 25 per cent by 2050 and 16 to 48 per cent by 2100. Water supply and quality are also likely to be affected by higher temperatures, increased evaporation rates and changes in amount and patterns of rainfall.

Some other general impacts on Australian agriculture are likely to include significant crop and pasture reductions by 2070 in southern Australian regions, reduced grain and grape quality, increased thermal stress on stock reducing productivity, increased incidence and distribution of weeds and diseases and increased fire risk.

Further information on the IPCC Fourth Assessment Working Group II report on climate change impacts, adaptation and vulnerability can be found at www.ipcc.ch/ipccreports/ar4-wg2.htm.

1.2 Economic impacts

Agriculture and food industries are significant for the economies of rural and regional Australia. This is due to the income it brings into communities in the form of direct spending on goods and services and on employment, both directly and through service industries.

In its *Australian Commodities December Quarter 07.4* report, ABARE presented an analysis of the potential medium to long term economic and agricultural trade impacts of potential changes in climate on Australian and global agriculture sectors (Box 2). The ABARE report can be found at www.abareconomics.com/publications_html/ac/ac_07/a1_dec.pdf.

² Hennessy, K., Fitzharris, B., Bates, B.C., Harvey, N., Howden, S.M., Hughes, L., Salinger, J. And Warrick, R. 2007. Australia and New Zealand. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of working Group II to the Forth Assessment Report of the Intergovernmental Panel on Climate Change*. M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Editors. Cambridge University Press, Cambridge, UK.

Box 2 - The possible economic impacts of climate change on Australian agriculture (*Australian Commodities December Quarter 07.4*).

The ABARE analysis indicates that future climate changes and associated declines in agricultural productivity and global economic activity may affect global production of key commodities: for example global wheat, beef, dairy and sugar could decline by 2 to 6 per cent by 2030 and by 5 to 11 per cent by 2050, relative to what otherwise would have been without the climate change impacts (that is, the reference case).

ABARE estimates that Australian production of these commodities could decline by an estimated 9 to 10 per cent by 2030 and by 13 to 19 per cent by 2050, relative to the reference case. Australian exports of key commodities (e.g. wheat, beef and sheep) are projected to decline by 11 to 29 per cent by 2030 and by 15 to 33 per cent by 2050. Tables 1 and 2 provide further detail about possible changes to agricultural production and exports assuming that no mitigation and adaptation actions are undertaken.

Table 1. Decline in production of key Australian agricultural products as a result of climate change (no adaptation or mitigation assumed), relative to the reference case:

% change	2030	2050
Wheat	9.2	13
Beef	9.6	19
Sheep meat	8.5	14
Dairy	9.5	18
Sugar	10	14

Table 2. Decline in key Australian agricultural exports as a result of climate change (no adaptation or mitigation assumed), relative to the reference case:

% change	2030	2050
Wheat	11	15
Beef	29	33
Sheep meat	15	21
Dairy	19	27
Sugar	63	79

A changing climate will also have implications for downstream food processors. While ever farmers effectively adapt to maintain product quantity and quality, the impact on processors will likely be minimal. However, transformational change (that is, change to or relocation of commodity production) may have significant implications for both the processors and the surrounding communities.

The infrastructure necessary for food processing often requires significant capital investment and may be difficult to relocate. Further, as processors are likely to be important to local economies, potential social impacts will also need to be carefully managed.

1.3 Current and prospective adaptation options

It will be critical that Australia's farming sector adapts to climate change if it is to remain competitive, sustainable and profitable into the future.

Australia's farmers and rural industries have a long history of innovation and change to cope with climate variability, market forces, pest, disease and weed problems or declining natural resources and to take advantage of emerging market opportunities.

The resultant productivity gains have buffered them against vagaries in demand and declines in commodity prices. This capacity to cope will be an important asset in dealing with the future impacts of climate change.

A comprehensive assessment of existing adaptation options across several major agricultural industries was undertaken by CSIRO in 2008³. Examples of adaptation measures identified in the CSIRO report as already widely adopted by producers to manage climatic risk include:

- zero tillage and other minimum disturbance techniques, such as stubble retention and controlled traffic approaches
- use of drought tolerant crop varieties
- water use efficient technologies and techniques
- improved breeding and management of animal heat stress, particularly where livestock are handled intensively
- diversifying production systems and income sources.

The full CSIRO report is available at www.csiro.au/files/files/plhg.pdf.

While Australian farmers have a demonstrated capacity for coping with the vagaries of seasonal climate variability, it is unlikely that current coping strategies alone will be sufficient for the types and magnitude of changes that are projected under a changing climate.

Managing the risks these changes will pose to the agricultural sector will require strategic business planning. Planning will be necessary at the individual farm level, as well as at regional and industry-wide scale, because it is highly likely that transformational change will be necessary in some regions and across some industries.

As an example of the kinds of transformational changes that might be required across regions and industries, the peanut farming industry has recently established new farms near Katherine, Northern Territory, as a hedge against declining rainfall in its main production areas in south east Queensland. Industry leaders have identified that climate change poses a risk to peanut supply and so have diversified geographically to maintain production. Further information on this can be found at www.pca.com.au/whatsnew.php?subaction=showfull&id=1214186251&archive=&start_from=&ucat=44&.

Coordinated national effort by governments, agriculture industries, regions and individual producers will be required to put in place sound climate change strategies to ensure that agriculture is able to effectively manage the risks associated with climate change.

The key areas of effort will include:

- improving knowledge and information provided to the sector, including the fundamental climate change science, the downscaled climate change projections and the decision support tools that will facilitate use of the climate change data for risk assessment and management

³ Stokes, C.J and Howden, S.M. (Editors) 2008. *An Overview of Climate Change Adaptation in Australian Primary Industries – Impacts, Options and Priorities*. Report prepared for the National Climate Change Research Strategy for Primary Industries. CSIRO, Canberra.

- facilitating a new approach by producers beyond the incremental change with which they are familiar
- early consideration of the necessary transformations in regional and sector wide planning processes
- developing and applying adaptation response options.

2 The role of government

The Australian Government has a strong preference for markets to operate with minimal intervention. In this context, the role of government should be concentrated on situations where there is market failure, where there is a clear need to intervene to protect or maintain a public good, or where there is a high risk to assets of national significance.

Therefore, the government's response to climate change adaptation in agriculture is to focus on providing fundamental information and knowledge, and the decision support tools that will allow farmers and rural industries to manage the risks of climate change.

Industry is best placed to respond to market drivers. Governments' responsibility is to ensure consistency in policies, regulation and incentives to facilitate adaptation, particularly so that these do not inhibit market signals or encourage maladaptation.

2.1 Climate change research

The Australian Government has adopted a new National Climate Change Science Framework which sets out climate change research priorities for the coming decade. The focus of the Framework is fundamental climate system science, which provides essential system knowledge to understand climate change impacts, develop adaptation strategies, and manage carbon emissions. The scientific research proposed under the Framework is designed to interact closely with the adaptation response agenda, with mitigation science and technology, and with efforts to develop more effective policy to deal with the climate change challenge.

The Framework will deliver improved higher resolution predictions of future climate, knowledge which is central to the development of adaptation policy for agriculture. There will be specific focus on future rainfall, evaporation and other climate features that affect our water resources and dry land agriculture. The Framework will also deliver improved knowledge on extreme events such as drought, heatwaves, storms and fire weather, information which will assist in policy development around the management of carbon in the landscape.

There is scope to substantially enhance the Framework. In particular, the capacity of the agriculture sector to plan for climate change will require extension of our predictive capability for weather and climate from short term forecasts through to monthly, seasonal and decadal predictions of climate. There is also a need for research infrastructure investments, including the renewal and maintenance of supercomputing, ocean research vessels and earth observation networks to underpin this work. The outcomes from these investments would allow farmers to factor the

longer-term climate and weather predictions into farm planning and so be better prepared for unusual and extreme events.

2.2 Augmenting the shift towards farming practices which promote resilience

The Australian Government's policy for tackling climate change is built on three pillars—reducing Australia's carbon pollution, adapting to the impacts of climate change that we cannot avoid, and helping to shape a global solution.

The National Climate Change Adaptation Framework has been developed by the government and all State and Territory governments to build Australia's capacity to respond effectively to climate change, and outlines action to reduce regional and sectoral vulnerability, including for primary industries.

The National Climate Change Adaptation Framework recognises the government has an important role in establishing optimal conditions for adaptation across Australia, including in the agricultural sector. Consistent with the Framework, the government is assisting agriculture adapt to climate change by addressing market failures. Investment is being made in research that can deliver information needed to assist the sector manage future climate risk through the establishment of a new National Climate Change Adaptation Research Facility (www.nccarf.edu.au) and an Adaptation research Flagship at CSIRO (www.csiro.au/org/ClimateAdaptationFlagship.html). Information needs encompass climate change science to deliver improved projections at scales and timeframes relevant to producers; decision support tools that inform a range of production systems; and adaptation options readily adoptable by producers to manage climate risk.

National Adaptation Research Plans (NARPS) are being developed for areas such as primary industries, water resources and freshwater biodiversity. The NARPS will set out national priorities for applied research to underpin the development of Australia's adaptation capability. NARPS will have a central role in guiding investment in R&D activities.

In order for farmers to be able to manage climate change risks, they need to have information with a high degree of certainty and at a relevant scale. This information, particularly the detailed climate change science information, is not currently available. Present climate change projections are at a coarse scale of resolution and do not reflect the fine scale variability in climate and weather across the Australian landscape. Nevertheless, farmers need to develop practices within a risk management framework to improve their resilience. As climate projections are improved this will feed into the program of adjustment.

2.3 Promoting research, extension and training

The Australian Government has implemented a number of programs that fund research, extension and training which will assist the agricultural sector adapt to climate change.

Australia's Farming Future

The Australia's Farming Future (AFF) initiative is the government's key initiative for assisting primary producers adapt and adjust to the challenges of climate change. The initiative consists of several elements that help build adaptable and resilient producers and industries and strengthen their ability to manage climate change into the future.

Climate Change Research Program

The \$46.2 million Climate Change Research Program is funding research projects and on-farm demonstrations to help prepare Australia's primary industries for climate change and build the resilience of the agricultural sector into the future. Initially focusing on reducing greenhouse pollution, better soil management and climate change adaptation, the program will involve projects that provide practical management solutions to farmers and industries.

The Climate Change Research Program is supporting large scale collaborative projects that involve a range of organisations such as research providers, industry groups, universities and state governments. It is encouraging the development of solutions for producers that will make a real difference in building their adaptability and resilience to climate change.

The Climate Change Research Program and its outcomes will improve opportunities for primary producers to respond to the challenges of climate change and improving their productivity while managing emissions.

To June 2009, the Government has committed \$37.9 million for research under the Climate Change Research Program, leveraging \$61.7 million from partners, including state government, industry and research organisations. This includes:

- the Soil Carbon Research Program (\$9.6 million from the program over four years as part of a \$20 million package) will be established in all states and the Northern Territory to investigate carbon changes in soil across Australia in response to farm management practices. A separate project has been established for biochar research (\$1.4 million from the program over three years from 2009–10)
- the Nitrous Oxide Research Program (\$4.7 million from the program over four years as part of a \$11.9 million package) will develop a national system for measuring nitrous oxide emissions from Australia's agricultural soils
- the Reducing Emissions from Livestock Research Program (\$11.3 million from the program over four years as part of a \$28.7 million package) focuses on reducing methane emissions from livestock
- the Adaptation Research Program (\$11 million over four years as part of a \$37.6 million package) will develop knowledge and management strategies to assist primary producers to adapt to a changing climate while promoting productivity.

Further details on the research funded under the Climate Change Research Program can be found at www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research.

FarmReady

Within the Australia's Farming Future framework, the FarmReady program provides \$26.5 million over four years to improve adoption of risk management and business management skills, increase adoption of new technologies and best practice management to enable primary producers, Indigenous land managers and agricultural industries to adapt and respond to the impacts of climate change.

The program runs until 30 June 2012 and consists of two separate elements:

- FarmReady Reimbursement Grants of up to \$1500 per person per financial year to individual primary producers and Indigenous land managers to attend approved climate change training activities
- FarmReady Industry Grants to industry organisations of up to \$80 000 per financial year to industry organisations, farming groups and natural resource management groups to undertake projects that will enable their members to adapt to the impacts of climate change.

Under the first round of the FarmReady Industry Grants, \$6.3 million has been provided for 46 projects. Further details on these projects can be found at www.daff.gov.au/climatechange/australias-farming-future/farmready.

Community Networks and Capacity Building

Community Networks and Capacity Building will build on the leadership and representative capacity of women, youth, Indigenous Australians and people from culturally and linguistically diverse backgrounds to strengthen community resilience and the productivity of primary industries. With increased access to tools and resources, these target groups can improve their leadership and management skills, increase participation in industry and more effectively contribute to government and industry decision making.

Climate Change Adjustment Program

The Climate Change Adjustment Program is assisting low income, low asset farmers who may be affected by climate change, including those experiencing financial hardship caused by drought. The program provides financial assistance to farmers with the aim of adjusting their farm business to manage the impacts of climate change.

Assistance under the program includes:

- Adjustment advice and training grants of up to \$5 500—available for specialised professional advice (where the advice is linked to managing the impacts of climate change) and training
- Re-establishment assistance of up to \$150 000—enables farmers to exit the industry and pursue other employment opportunities or retire.

Rural Financial Counselling Service Program

The Program provides grants to regional and state level not-for-profit organisations to employ rural financial counsellors to provide free and confidential financial counselling services to farmers, fishers and small rural businesses who are in financial difficulty and have no access to other forms of impartial support.

The objectives of the Program are to:

- make sure clients have access to financial information, options, decision support and referral services
- allow clients to consider information and options to implement decisions to manage industry adjustment and climate change
- provide a needs-based service that is free, effective, responsive and flexible.

Transitional Income Support

Short-term income support is available to farmers in serious financial through the Transitional Income Support program while they manage and adapt their farm business to change.

Farmers that qualify for Transitional Income Support also have access to professional advice and training opportunities under the Climate Change Adjustment Program to meet the mutual obligation requirements for income support.

Caring for our Country

Caring for our Country commenced on 1 July 2008 and aims to develop an environment that is healthier, better protected, well managed, resilient, and provides essential ecosystem services in a changing climate.

The Caring for our Country outcomes contribute to climate change adaptation by improving environmental management and assisting farmers and land managers to adopt sustainable farm practices.

Sustainable Farm Practices is one of six priority investment areas under Caring for our Country. The 2009–10 sustainable farm practices targets aim to increase the adoption of sustainable farm practices such as those that maintain or increase soil carbon, groundcover and vegetation on-farm as well as reduce the risk of erosion and soil acidification.

From 1 July 2008, the activities of the former National Landcare Program have been encompassed in the government's Caring for our Country initiative. Most landcare activity is undertaken within the sustainable farming practices priority area.

3 The role of rural research and development

Much of the nation's current capacity for primary production has been created over the last 50 years. While structural change and improved allocative efficiency have been significant contributors, much of agriculture's current productive ability has been built on the innovation performance of our primary industries.

Despite volatility imposed by seasonal variation and international competition, broadacre agricultural productivity has shown strong growth, averaging around 2.5 per cent per year over the period 1953-2004.

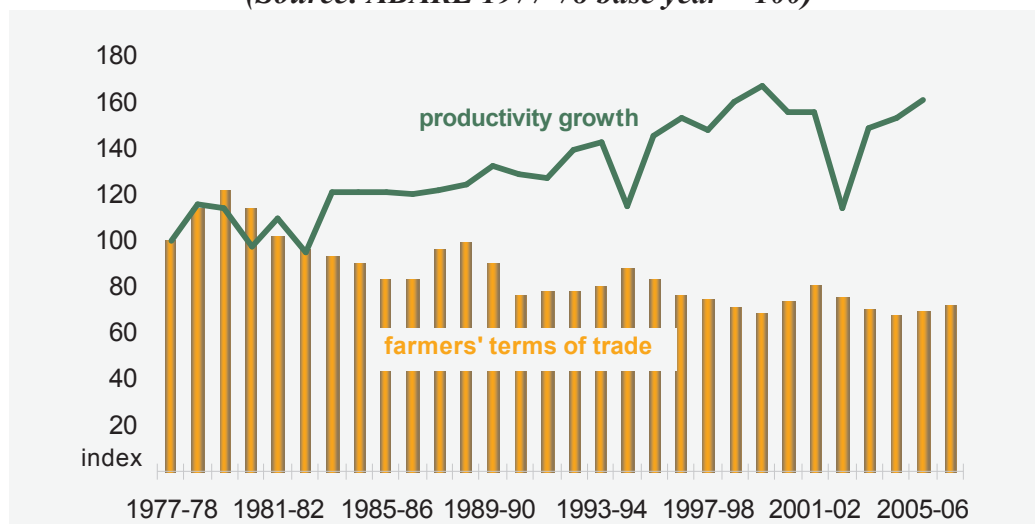
This high level of Australian agricultural productivity growth is largely attributed to the sector's culture of innovation, investment in research and adoption of findings. This has led to continued improvements in the performance of farm inputs (e.g. seed,

stock, fertilisers), farm machinery, sustainable farm management practices, improved use of farm, climate and market information and has allowed farmers to manage the impacts of declining terms of trade (down 2.3 per cent each year over 1953-2004).

Australia's primary industries are projected to be significantly affected by climate variability and climate change. Impacts will be complex, both biophysically and socio-economically, and will vary greatly by production activity and region.

It is critical for managing climate change that the sector's preparedness and decision-making be based on sound, world's best practice research and resultant adoption and uptake. Our farmers need to understand and build knowledge of the implications of climate change and greenhouse gas management in order to minimise risk, adequately manage threats, and maximise opportunities.

Graph 1: Broadacre productivity growth & terms of trade
(Source: ABARE 1977-78 base year = 100)



The high level of Australian agricultural productivity growth is shown above in Graph 1. Notwithstanding, there is still a need to continue to improve productivity to assist with the management of impacts such as climate change.

The current cross-jurisdictional policy environment for the rural sector, including that for rural R&D, is being led by the Primary Industries Ministerial Council (PIMC) and its sole subcommittee, the Primary Industries Standing Committee (PISC).

A subcommittee of PISC on R&D has a role to develop a national approach for future rural R&D in Australia. Ensuring jurisdictions firmly place climate change at the top of their policy agenda is also a key priority currently for PISC.

PIMC is working to develop and implement a National Primary Industries Research and Development & Extension Framework. The Framework will establish a stronger culture of collaboration and cooperation to address key cross sectoral and resource issues.

3.1 Rural Research and Development Council

The Australian Government has established a Rural Research and Development Council to provide high level advice and co-ordination to better target and improve the effectiveness of the government's investment in rural R&D, including climate change adaptation.

The Council will have a central role in facilitating more effective use of public resources to address priority issues of importance to Australia's primary industries and associated value-chains, enhance the speed of delivery of research outputs to Australia's primary producers and the uptake of R&D by them, and to enhance domestic and international cooperation and collaboration. The Council will work closely with the rural RDCs, industry sectors, research providers, state and territory jurisdictions and relevant government agencies to strengthen rural R&D through improved collaboration, facilitation and prioritisation of investment, and performance measurement and reporting. The Council membership list is at Appendix A.

3.2 Rural Research and Development Corporations and Companies (RDCs)

The RDCs are one of the Australian Government's main vehicles to support and assist primary producers to adapt to the impacts of climate change through rural R&D. A list of the 15 RDCs and their objectives is at Appendix B.

The government's rural RDC model addresses the potential for significant under-investment in rural R&D through market failure and recognises the substantial 'spill over' benefits to others in the industry and the wider community. Responding to concerns over 'free riders' and the public benefits that arise from rural R&D, the government collects compulsory industry levies for rural R&D and matches industry R&D expenditure up to a limit of 0.5 per cent of an industry's gross value of production.

Most of the rural RDCs were established in 1990–91 as statutory, single-focus corporations with the intention of improving the performance of the national R&D effort for rural industries. Since then, some rural RDCs have been transformed into industry-owned, companies responsible for managing rural R&D and/or in some cases, involving marketing and promotion, regulation and industry representation, as marketing activities are outside the scope of the *Primary Industries and Energy Research and Development Act (1989)*.

R&D responsibilities in these latter companies continue to be funded by industry levies and matching government funding up to the limit of 0.5 per cent of the industry's gross value of production.

Recognising their broader public interest research roles, the Fisheries Research and Development Corporation and the Rural Industries Research and Development Corporation receive limited unmatched government funding. In some sectors, downstream suppliers and other stakeholders provide additional funds through voluntary levies and contributions to fund research to meet particular needs.

While industry contributions vary, total industry contributions now outweigh the amount of Australian funding provided thereby demonstrating considerable industry commitment to R&D. In 2007–08, the government contributed approximately \$224 million in matching government funding with total expenditure through the RDCs on R&D exceeding \$510 million.

RDCs are partners in Climate Change Research Program activities, including research on livestock and nitrous oxide emissions.

To guide RDCs' investment strategies, industry and stakeholders are consulted and their input helps to develop three to five year strategy plans that reflect both the National Research Priorities and the complementary Rural Research & Development Priorities.

3.3 Rural Research & Development Priorities

It is important to have broad agreement on national priorities for innovation and rural R&D which public investors are prepared to support. As priorities change over time, government policy needs to keep pace to ensure issues of strategic concern like climate change are being addressed adequately through innovation and to ensure that resources are used effectively.

Rural R&D is being guided by both the National Research Priorities (NRPs), established in 2002 and last updated in 2003, and the complementary Rural Research & Development Priorities (Rural R&D Priorities). Reflecting the fact the RDCs are jointly funded by government and industry, it has been a practice of successive agriculture Ministers since 1994 to issue statements of Rural R&D Priorities to ensure that the priorities of government, as well as industry, are incorporated into RDCs' investment decisions.

The Rural R&D Priorities were updated in 2007, in consultation with industry, research funders and providers and state and territory governments, and represent a shared set of high-level objectives across sectors and jurisdictions.

The review took place in order to refocus and refresh the national understanding of critical R&D investment needs to better target agricultural industry R&D efforts and to reflect the changing external environment. As part of this review, *climate variability and climate change* was elevated to become an independent, stand alone priority.

Rural R&D Priorities aim to foster rural innovation and guide rural R&D in the face of continuing economic, environmental and social change. As such, they include social, environmental and commercial issues, which are becoming increasingly interconnected as industries respond to community concerns in both their products and production methods.

While the priorities fall within broad categories, within each category more detailed guidance is provided on the types of activities investors should be focussing on in the short to medium term environment. Rural R&D Priorities enable issues of common concern to be explored in a coordinated and cost effective way and they also

complement the NRPs. Two ‘supporting’ priorities supplement the Rural R&D Priorities.

Each of the 15 Rural RDCs factor the Rural R&D Priorities and the NRPs into their R&D investment strategies and plan and report against both priorities annually in various Operational Plans and over the longer term in Strategic R&D Plans. The Rural R&D Priorities are as follows:

- *Productivity and Adding Value:*
Improve the productivity and profitability of existing industries and support the development of viable new industries.
- *Supply chain and markets:*
Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole supply chain, including to consumers.
- *Natural resource management:*
Support effective management of Australia’s natural resources to ensure primary industries are both economically and environmentally sustainable.
- *Climate variability and climate change:*
Build resilience to climate variability and adapt to and mitigate the effects of climate change.
- *Biosecurity:*
Protect Australia’s community, primary industries and environment from biosecurity threats.

These are accompanied by two ‘supporting’ Priorities:

- *Innovation skills:*
Improve the skills to undertake research and apply its findings.
- *Technology:*
Promote the development of new and existing technologies.

RDCs commission and manage targeted investment in research, innovation, and knowledge creation and transfer on behalf of their major stakeholders, their industries and the government. To guide RDCs’ investment strategies, industry and stakeholders are consulted and their input helps to develop three to five year corporate plans that reflect Rural R&D Priorities.

With the extensive industry networks the model provides, RDCs create a critical link between the science and producers. This enables research to be appropriately targeted and more effectively extended to end users. The RDC model has provided farmers greater options in adapting to climate change through recent R&D by, for example, developing cropping systems that are more adaptable to climate change, practices that minimise on-farm greenhouse gas emissions and plant varieties with improved water-use efficiency or drought tolerance.

3.4 Cooperative Research Centres (CRC)

Linking research with end users is also a key feature of the Cooperative Research Centres (CRC) Program which falls within the Innovation, Industry, Science and Research portfolio. The CRC Program links researchers with industry to focus R&D efforts on progress towards utilisation and commercialisation. Another feature is industry contribution to CRC education programs to produce industry-ready graduates.

There are currently 48 CRCs operating in six sectors including the environment (10), agriculture and rural-based manufacturing (14), information and communication technology (five), mining and energy (four), medical science and technology (eight) and manufacturing technology (seven).

Since the commencement of the CRC Program in 1991, parties have committed more than \$12.3 billion (cash and in-kind) to CRCs. This includes almost \$3 billion from the CRC Program, \$3.1 billion from universities, \$2.5 billion from industry and \$1.2 billion from CSIRO.

APPENDIX A

Rural Research and Development Council

Membership List

- Dr Kate Fairley-Grenot (Chair)
- Professor Rob Clark
- Ms Cathy McGowan
- Mr Mark McHenry
- Professor Jim Pratley
- Dr Robert Rose
- Dr Frances Shapter
- Mrs Anne Stünzner
- Professor Beth Woods
- Professor Penny D. Sackett

Further information on the Rural Research and Development Council is available at www.daff.gov.au/agriculture-food/innovation/council.

Rural Research and Development Corporations and Companies

Statutory R&D corporations	
Cotton (CRDC)	<p>CRDC’s mission is to invest and provide leadership in research, innovation, knowledge creation and transfer through:</p> <ul style="list-style-type: none"> – A ‘Triple Bottom Line’ approach to planning, implementation and reporting that seeks to ensure economic, environmental and social benefits for the Australian cotton industry, cotton valley communities and the Australian people – A holistic, integrated and systematic approach to research and development. <p>For more information, visit www.crdc.com.au</p>
Fisheries (FRDC)	<p>FRDC's mission is to increase economic and social benefits for the fishing industry and the people of Australia, through planned investment in research and development, in an ecologically sustainable framework.</p> <p>For more information, visit www.frdc.com.au</p>
Grains (GRDC)	<p>GRDC's mission is to invest in research and development for the greatest benefit to its stakeholders – grain growers and the Australian Government.</p> <p>For more information, visit www.grdc.com.au</p>
Grape and Wine (GWRDC)	<p>GWRDC’s mission is to enable a sustainable, innovative and profitable future for the Australian wine industry through strategic investment in research and development.</p> <p>For more information, visit www.gwrdc.com.au</p>
Rural Industries (RIRDC)	<p>RIRDC’s mission is to maximise the knowledge outcomes from our R&D investments for Australian industries and government in established, new and national rural industries.</p> <p>For more information, visit www.rirdc.gov.au</p>
Sugar (SRDC)	<p>SRDC’s aim is to foster an innovative and sustainable Australian sugar industry through targeted investment in research and development and is firmly committed to maximising the return on industry and Government investment into research and development.</p> <p>For more information, visit www.srdc.gov.au</p>

Industry-owned R&D companies	
Australian Egg Corporation Ltd (AECL)	<p>AECL's mission is to create an industry operating environment that assists to minimise barriers and costs for Australian egg producers and to maximise benefits and revenue for the industry and the community through integrated marketing and research. AECL will achieve this by focusing on the following objectives:</p> <ul style="list-style-type: none"> – Growing demand for eggs in the Australian market – Enhancing the competitiveness of stakeholder businesses – Creating and nurturing the capability of AECL. <p>For more information, visit www.aecl.org</p>
Australian Meat Processor Corporation	<p>AMPC aims to promote, protect and further the rights and mutual interests of all processors active in the red meat processing industry, including, but not limited to:</p> <ul style="list-style-type: none"> – the receipt of funds from the Australian Government in accordance with the Funding Agreement for the purpose of investing in and financing projects for either the benefit of individual meat processors or the meat industry – the promotion of Australian meat in the domestic and international market – the improvement of red meat quality – the economic, environmental, health, safety and social well-being of the meat processing industry – the financing of commercially based research and development. <p>For more information, visit www.ampc.com.au</p>
Australian Pork Ltd (APL)	<p>APL aims to enhance opportunities for the sustainable growth of the Australian pork industry by delivering integrated marketing, innovation and policy services along the pork industry supply chain. APL pursues opportunities for the industry at both the domestic and international level.</p> <p>For more information, visit www.australianpork.com.au</p>
Australian Wool Innovation Ltd (AWI)	<p>AWI's mission is to drive research, development, innovation and marketing that will increase the long-term profitability of Australian woolgrowers</p> <p>www.woolinnovation.com.au</p>
Dairy Australia Ltd	<p>Dairy Australia's mission is to develop and drive industry services and innovation for the ultimate benefit of levy payers.</p> <p>For more information, visit www.dairyaustralia.com.au</p>

<p>Forest and Wood Products Australia Ltd (FWPA)</p>	<p>FWPA's mission is to enable a sustainable, innovative and profitable future for the Australian wine industry through strategic investment in research and development. For more information, visit www.fwpa.com.au</p>
<p>Horticulture Australia Ltd (HAL)</p>	<p>Investment across HAL's programs are aligned with the Australian Government's Rural Research and Development Priorities that aim to foster innovation and guide R&D effort in the face of continuing economic, environmental and social change. Each of HAL's member industries, acknowledging the environment in which they operate, has developed a vision for the future and strategies to invest in R&D and marketing programs to help make this vision a reality. For more information, visit www.horticulture.com.au</p>
<p>LiveCorp Ltd</p>	<p>LiveCorp's mission is to support the maintenance of a sustainable, commercial and political environment for growth and development of the Australian Livestock Export industry, through excellence, integrity and innovation. For more information, visit www.livecorp.com.au</p>
<p>Meat and Livestock Australia Ltd (MLA)</p>	<p>MLA's mission is to deliver world-class services and solutions in partnership with industry and government. For more information, visit www.mla.com.au</p>