



Australian Government

Grains Research and
Development Corporation

GRDC Annual Report 2011–2012



GRDC Grains Research &
Development Corporation

Your GRDC working with you



The GRDC

The Grains Research and Development Corporation is a statutory authority established to plan and invest in R&D for the Australian grains industry.

Its primary objective is to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and sustainability.

Its primary business activity is the allocation and management of investment in grains R&D.

GRDC Vision

Driving innovation for a profitable and environmentally sustainable Australian grains industry.

GRDC Mission

To invest in innovation for the greatest benefit to its stakeholders. This will be achieved by being a global leader in linking science, technology and commercialisation with industry and community needs.

GRDC Values

- Commitment and action in meeting the needs of our stakeholders and exceeding their expectations.
- Winning as a team.
- Achievement of superior results.
- Creativity and innovation.
- Openness and trust in dealing with people.
- A performance-driven culture.
- Ethical behaviour in all our activities.

Highlights of 2011–12

- The GRDC invested \$150.2 million in more than 1,200 projects across 265 organisations, employing approximately 3,000 researchers, administrators and agribusiness personnel. [Pages 148–174](#)
- Financial analysis of selected GRDC project clusters showed positive benefit-to-cost ratios, ranging from 1.2:1 for National Variety Trials to 7.2:1 for Grains Industry Research Scholarships. [Page 22](#)
- In consultation with researchers, government agencies, industry and growers, the GRDC developed a new five-year strategic R&D plan, based on investment themes and associated investment strategies designed to achieve a balanced portfolio of short-, medium- and long-term objectives to meet the grains RD&E needs of the industry and wider community in 2012–17. [Page 4](#)
- The GRDC made significant progress in implementing the National Grains RD&E Strategy. The GRDC announced a co-investment with the Government of Western Australia, through the Department of Agriculture and Food, Western Australia, to establish the Australian Export Grains Innovation Centre, a national research hub identified under the National Grains RD&E framework, to undertake analysis of grain quality and activities underpinning the export grains market.
- The GRDC worked towards the establishment of a joint venture with the CSIRO and Bayer CropScience to further research and potentially commercialise a gene which increases grain yield in wheat by around 30 percent in the glasshouse. [Page 56](#)
- Agreement was reached between the GRDC and the University of Sydney for major infrastructure and capability investments to be based at the Plant Breeding Institute at Narrabri, New South Wales. The investments underpin R&D undertaken at the site and provide linkages to commercial companies and national R&D programs.
- The Predictive Ocean Atmosphere Model for Australia was upgraded and is demonstrating useful skill for forecasting rainfall and temperature two weeks in advance. [Page 29](#)
- Projects with the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Agricultural Research in the Dry Areas (ICARDA) provided Australian breeders with targeted access to wheat, barley and pulse germplasm containing traits of value to Australian grain production systems. [Pages 32 & 46](#)
- The GRDC launched the Farm Business Management (FBM) Update program, which delivers events and resources designed to give grain growers and their advisers greater confidence in farm decision making, risk management and general business management. [Page 38](#)
- The National Variety Trials program delivered technical workshops to help agronomists and other farm business advisers understand the science behind variety performance. [Page 49](#)
- The Australian oat-breeding program was accepted into the Collaborative Oat Research Enterprise program, a global collaboration developing molecular markers for accelerated breeding. [Pages 47–48](#)
- An independent review of the National Mungbean Improvement Program found that the program had achieved a benefit-to-cost ratio of 18:1 between 2003 and 2011. [Pages 52–53](#)
- All GRDC-supported Australian genetic resources databases were merged with the internationally coordinated database GRIN Global, and an in-principle agreement was reached to establish a national genebank for Australia. [Pages 50–51](#)
- The Crop Biofactories Initiative successfully developed a safflower line with seed oil containing 93 percent oleic acid, the world's highest level of acid in a seed oil, that has potential to compete with petrochemical inputs for specific industrial applications. [Page 57](#)
- The GRDC reached a commercial agreement to take the Harrington Weed Seed Destructor technology to market; the company is planning to have machines ready for the 2012 harvest season. [Page 82](#)

Figure 1: Total grain production and cropping area, 2001–02 to 2011–12

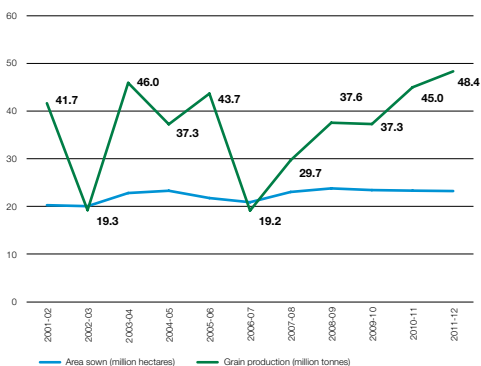
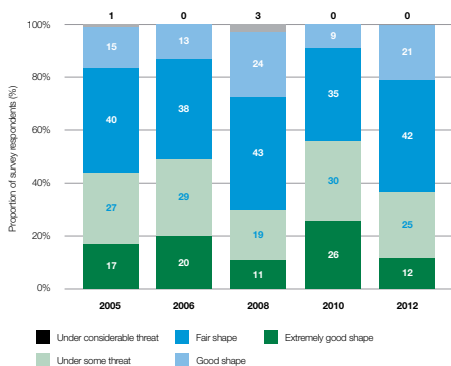


Figure 2: Grower mood towards the state of the Australian grains industry



- The GRDC reached a commercialisation agreement to manage the DGT (diffusive gradients in thin films) soil-testing product and its introduction into laboratories; the company will educate laboratory staff, consultants, agronomists and farmers on the benefits of using the technology for testing phosphorus levels in soil. [Page 59](#)
- Thousands of copies of more than 104 different GRDC information products were distributed around Australia and made available in electronic formats. [Pages 179–181](#)
- The GRDC launched its first mobile phone app, making Weeds: the Ute Guide even more portable and user-friendly for growers in the Southern Region. [Page 41](#)
- The GRDC sponsored 36 Grower Updates, attracting more than 2,700 growers, and six Adviser Updates, attracting more than 1,600 advisers; and ran more than 170 'issue-specific' workshops attracting more than 3,500 growers and advisers.
- The GRDC's website was redeveloped, to deliver a new look and feel, improved navigation and search functionality, improved linkages to GRDC's multimedia and social media content, and an improved capability to see regionalised and timely information via personal computer or smartphone/tablet devices. [Page 65](#)
- The GRDC launched a new corporate brand, based on the concept of 'Your GRDC working with you', to reflect the collaborative approach that underpins the Strategic R&D Plan 2012–17.
- The GRDC implemented a restructure that streamlined the organisation into three operational business groups and one enabling business group. [Pages 10–11](#)

Challenges in 2012–13

The following factors are expected to influence the GRDC's business environment in 2012–13:

- A long-term decline in the rate of total factor productivity growth will continue, caused by a range of factors, including rising input prices and the limiting effects of climate variability on yields.
- Climate variability will continue to affect grains production, requiring an industry response based on greater innovation, resilience and risk management.
- Carbon pricing will impact on the price of carbon-intensive inputs, requiring that they be applied more efficiently, or that alternatives (such as pulses as a source of nitrogen) be identified.
- The number of grain farms is likely to continue to decline, and the average farm size to increase, because of scale effects. Corporate involvement in farming is likely to increase.
- The Australian and global grain markets are likely to be affected by
 - changes in grain marketing
 - the rate of recovery from the global financial crisis
 - global food security issues, including policies affecting the availability of grain to the export market
 - global oil shortages
 - volatility in grain prices and the cost of inputs relative to grain prices
 - changing demand for grain and grain products.
- If the volatility of the exchange rate of the Australian dollar continues, it will be difficult for growers to make planting decisions with confidence, because of the impact of the volatility on gross margins.

Figure 3: GRDC income in 2011–12

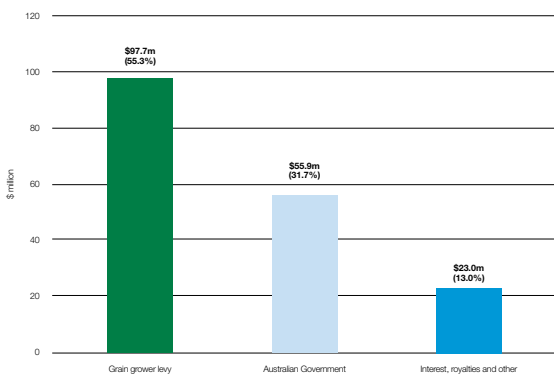


Figure 4: GRDC grain grower levy by crop type in 2011–12

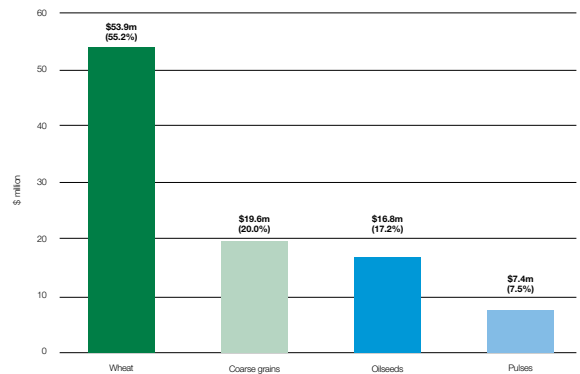


Table 1: Five years at a glance

	2011–12		2010–11	2009–10	2008–09	2007–08
GRDC						
Revenue	\$177.5m	▲	\$175.5m	\$143.8m	\$150.4m	\$127.2m
Expenditure	\$165.1m	▲	\$154.1m	\$133.4m	\$121.3m	\$102.5m
Operating surplus/(deficit)	\$12.3m	▼	\$20.8m	\$9.8m	\$28.5m	\$24.1m
Total assets	\$230.7m	▲	\$206.0m	\$176.7m	\$159.1m	\$117.5m
Total equity	\$162.2m	▲	\$149.3m	\$128.5m	\$118.7m	\$89.7m
Industry contributions	\$97.7m	▼	\$104.5m	\$74.1m	\$89.1m	\$76.6m
Commonwealth contributions	\$55.9m	▲	\$53.4m	\$50.1m	\$43.9m	\$37.6m
R&D expenditure	\$150.2m	▲	\$140.7m	\$116.8m	\$106.3m	\$89.1m
Employee benefits	\$7.2m	▲	\$6.9m	\$6.4m	\$6.1m	\$5.8m
Suppliers	\$6.7m	▲	\$5.7m	\$5.6m	\$5.2m	\$5.1m
Number of full-time GRDC staff ^a	46	▼	48	50	49	47
Number of projects	1,305	–	900	868	771	611
Grains industry						
Estimated number of grain farms ^b	19,556 ^c	–	19,556	20,989	22,370	22,006
Number of grain crops covered by R&D levies	25	–	25	25	25	25
Estimated gross value of production ^d	\$12,429m	▼	\$12,559m	\$8,573m	\$10,744m	\$10,796m
Total grain production—summer and winter crops ('000 tonnes) ^e	48,383	▲	45,042	37,330	37,609	29,748

- a Number of full-time GRDC staff as at 30 June each year.
- b Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) estimates for the number of broadacre farms planting at least 100 hectares for grain, oilseed or pulse production. Figures for 2007–08 to 2010–11 restate the estimated numbers of grain farms shown in previous GRDC annual reports following ABARES advice that previous estimates had included non-grain crops.
- c No updated estimate for 2011–12 was available at the time of publication.
- d Latest ABARES estimates for the gross value of production of grains and oilseeds, excluding rice—from the June 2012 *Agricultural Commodities* report.
- e Latest ABARES estimates for total summer and winter crop production, excluding cotton seed and rice—from the June 2012 *Australian Crop Report*.

Figure 5: GRDC expenditure in 2011–12

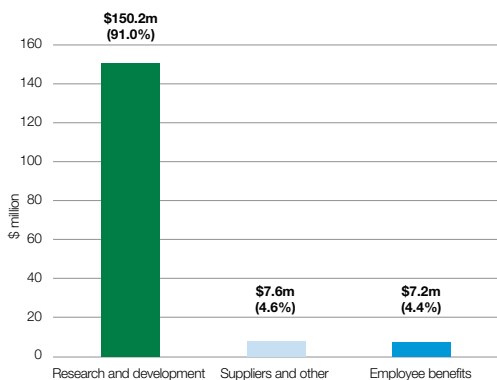
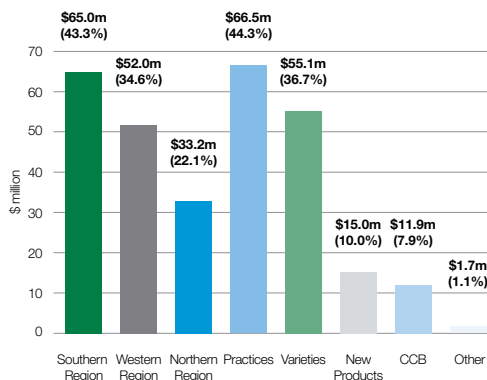


Figure 6: R&D investment by line of business and region in 2011–12



Letter of Transmittal

GRDC

**Grains
Research &
Development
Corporation**



Australian Government
**Grains Research and
Development Corporation**

15 October 2012

Senator the Hon. Joe Ludwig
Minister for Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Minister

I have pleasure in presenting the annual report of the Grains Research and Development Corporation (GRDC) for the year ended 30 June 2012, in accordance with section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act) and section 28 of the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act).

The GRDC is confident that its performance in 2011–12 contributed to the industry's and the government's vision for a profitable, internationally competitive and ecologically sustainable Australian grains industry. This achievement is consistent with the GRDC's responsibility to plan, execute and report against the:

- objects of the PIERD Act as they apply to the GRDC
- planned outcomes of *Prosperity through Innovation*, the corporation's Strategic R&D Plan 2007–12
- outcomes and outputs described in the annual operational plan
- outcome and deliverables described in the portfolio budget statements.

This annual report complies with the planning and reporting requirements prescribed by the CAC Act. GRDC directors are responsible, under section 9 of the CAC Act, for the preparation and content of the report of operations in accordance with the Commonwealth Authorities (Annual Reporting) Orders 2011 (Finance Minister's Orders).

The attached report of operations was made in accordance with a resolution of the corporation's directors on 18 September 2012 and presents fairly the information required by the Finance Minister's Orders.

Yours sincerely

Keith Perrett
Chair

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About the GRDC

Purpose

The Grains Research and Development Corporation (GRDC) is a statutory corporation, operating as a research investment body on behalf of Australian grain growers and the Australian Government.

The GRDC was established in 1990, under the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act), to assist the Australian grains industry to:

- increase the economic, environmental and social benefits to members of primary industries and to the community in general by improving the production, processing, storage, transport or marketing of grain
- achieve sustainable use and management of natural resources
- make more effective use of the resources and skills of the community in general and the scientific community in particular
- improve accountability for expenditure on R&D activities.

The Australian grains industry operates across the Australian landscape and makes a major economic contribution at the national, state and regional levels. Geographically, the grains industry is defined by three broad agroecological regions, as described in Figure 7.

The GRDC assists the Australian grains industry by investing in R&D and related activities across a portfolio spanning temperate and tropical cereals, coarse grains, pulses and oilseeds.

This involves coordinating and funding the activities; monitoring, evaluating and reporting on their impact; and facilitating the dissemination, adoption and commercialisation of their results.

The GRDC also contributes to the development of strategic national approaches to grains industry research, development and extension (RD&E), to reduce fragmentation and duplication, and to help address industry-wide issues such as biosecurity and climate change.

As part of the Australian Government's Agriculture, Fisheries and Forestry portfolio, the GRDC delivers one outcome towards the portfolio's goal of achieving more sustainable, competitive and profitable Australian agriculture, food, fisheries and forestry industries:

New information and products that enhance the productivity, competitiveness and environmental sustainability of Australian grain growers and benefit the industry and wider community, through planning, managing and implementing investments in grains research and development.

Funding

The GRDC is principally funded by a grower levy and Australian Government contributions.

The levy is based on the net farm gate value of the annual production of 25 crops: wheat; coarse grains—barley, oats, sorghum, maize, triticale, millets/panicums, cereal rye and canary seed; pulses—lupins, field peas, chickpeas, faba beans, vetch, peanuts, mungbeans, navy beans, pigeon peas, cowpeas and lentils; and oilseeds—canola, sunflower, soybean, safflower and linseed. Farm gate value of production differs from the gross value of production, as farm gate value deducts costs of storage, handling, freight and 'free on board' costs.

The Australian Government will match the levy up to a limit of 0.5 percent of the three-year rolling average of the gross value of production of the 25 leviable crops.

Figure 7: GRDC regions

Northern Region

The Northern Region, encompassing Queensland and northern New South Wales, has generally high inherent soil fertility, although there is increasing evidence that this has been run down over time. It has relatively high seasonal rainfall and production variability compared with the other two regions.

Both summer and winter crops are important for profit. Yield depends, to a significant degree, on conservation of soil moisture from summer-dominant rainfall. The Northern Region has the highest diversity of crop production, including maize, sorghum and tropical pulses as well as wheat, barley, winter-growing pulses and oilseeds.

The Northern Region is the largest source of Australia's premium hard high-protein wheat for export and domestic use. Demand for feed grains from the region's important livestock industries is a key driver of grain production.



Dave Daniels of Clermont, Queensland, has achieved higher yields by conserving soil moisture and nutrients through weed control. *Photo: Clarisa Collis*

Southern Region

The Southern Region encompasses south-eastern Australia, including central and southern New South Wales; Victoria; Tasmania; and south-eastern South Australia.

It has a diverse suite of soils of generally low fertility and with many subsoil constraints, such as salinity, sodicity and toxic levels of some elements, although there are also some areas with very productive soils. Yield potential depends on seasonal rainfall, especially in autumn and spring, and there is less dependence on stored soil moisture than in the Northern Region.

Crop production systems are varied and include many mixed farming enterprises with significant livestock and cropping activities.



Third-generation grain grower Rob Heinrich rotates pulses with cereals on his property in the Mallee region of Victoria. *Photo: Brad Collis*

Western Region

The Western Region comprises the cropping areas of Western Australia, where soil fertility is generally low to very low and yields depend on winter and spring rainfall.

In many areas, yields are low by world standards; this is compensated for by the large scale and degree of mechanisation of the enterprises. Long-term variability in seasonal rainfall and production is lower in the coastal areas than in the Northern and Southern regions.

Wheat, barley, canola and lupins are the dominant crops, with livestock enterprises in mixed farming systems often of less importance. The Western Region has a relatively small population and feed industry, and consequently exports more than 85 percent of its grain production.



On his property in Western Australia, Andrew Kenny sowed early in 2012, making the most of rainfall through a diversified cropping and grazing program. *Photo: Evan Collis*

Planning and reporting

The GRDC has performance reporting obligations set out in legislation, as well as a strong commitment to being accountable to grain growers, the Australian Government and the broader community.

Table 2 outlines the elements of the GRDC's planning and reporting framework.

Detailed information on the GRDC's accountability is provided in Part 3. The following sections describe the core elements of the annual cycle of reporting on performance against planned objectives.

Table 2: Elements of the planning and reporting approach

Element	Purpose
Strategic R&D plan ^a	Sets out the GRDC's high-level goals, strategies and performance measures for a five-year period, developed in consultation with stakeholders and approved by the Minister.
Annual operational plan ^a	Specifies the annual budget, resources and research priorities that give effect to the strategic R&D plan during a given financial year.
Annual report ^a	Provides information on RD&E activities and their performance in relation to the goals set in the annual operational plan and portfolio budget statements for a given financial year.
Stakeholder report	Meets legislative requirements for reporting to the grains industry's representative organisation, Grain Producers Australia.
Growers' report ^a	Provides performance information to growers on RD&E activities for a given financial year.
Annual procurement plan	Makes procurement information publicly available through the Australian Government's AusTender procurement management website.
Investment plan	Informs potential research partners about some of the GRDC's new investment priorities for the next financial year and invites interested parties to submit research proposals.
Portfolio budget statements ^a	As part of the Australian Government budget process, summarise the planned deliverables, outcomes, performance information and financial statements for a given financial year.

a Available at www.grdc.com.au/About-Us/Corporate-Governance.

Strategic R&D plan

In line with section 19 of the PIERD Act, the GRDC Board communicates its strategic directions and performance objectives through a five-year strategic R&D plan. The plan states the GRDC's objectives and priorities and outlines the GRDC's strategies to achieve them.

The GRDC's Strategic R&D Plan 2007–12, *Prosperity through Innovation*, took effect from July 2007. The plan provided a framework for investment and delivery of outputs and outcomes to address the Australian Government's National Research Priorities and Rural R&D Priorities, as well as the priorities of Australian grain growers, over the five financial years to 2011–12. Those priorities, and the GRDC's achievements in meeting them in 2011–12, are discussed in more detail in Part 2.

The GRDC's new strategic R&D plan, for 2012–17, was developed during 2011–12. The new plan is designed to achieve a balanced portfolio of short-, medium- and long-term objectives, and describes six themes for

investment to achieve those objectives.

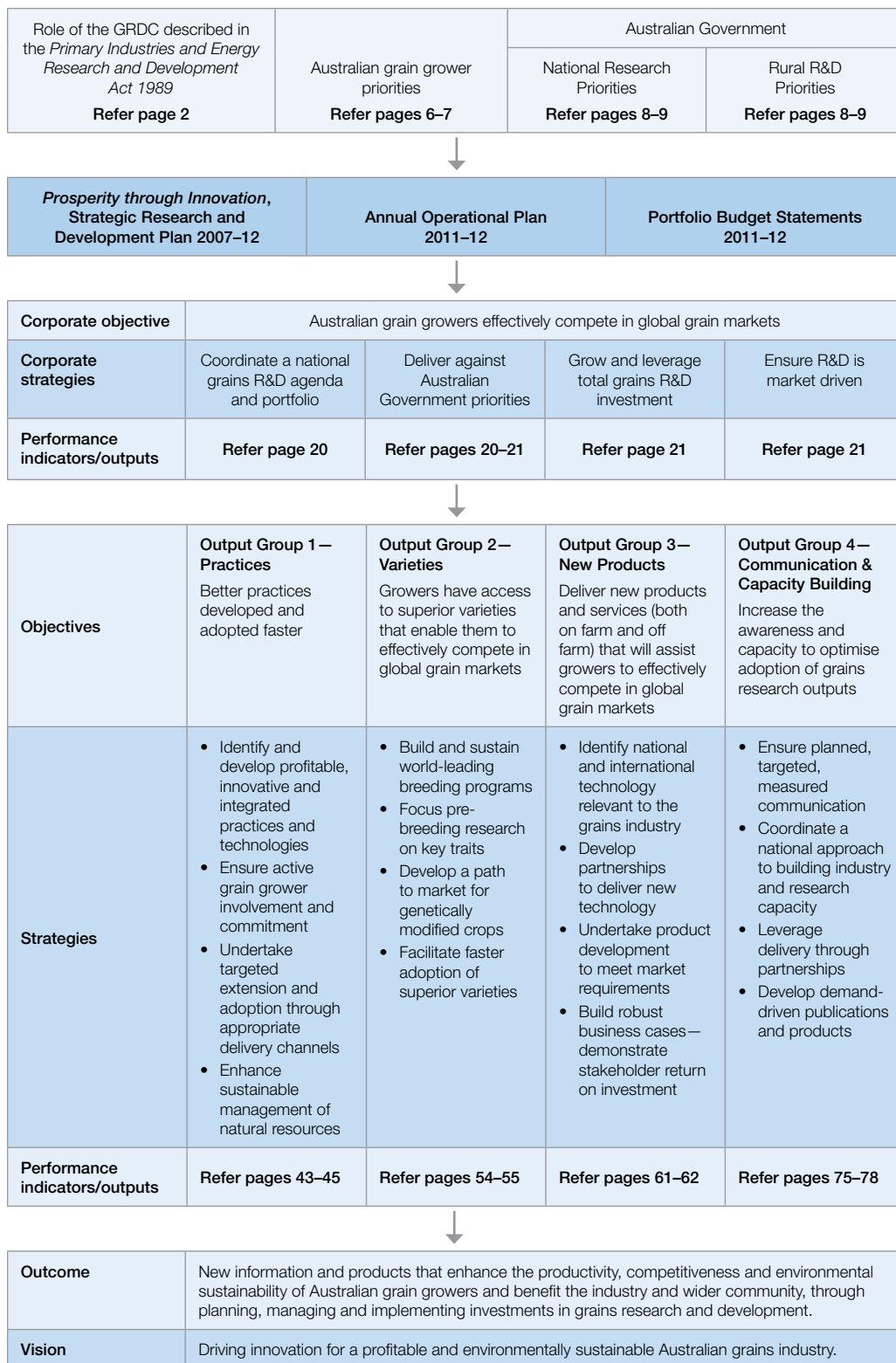
The plan also describes the performance indicators that will be used to measure the success of the strategies and their impact on the grains industry and the wider community. The new plan will take effect from July 2012.

Annual operational plan

Each year's activities are outlined in an annual operational plan, as required by section 25 of the PIERD Act. The annual operational plan describes the activities that the GRDC will undertake to implement the goals of the strategic R&D plan in the financial year ahead. It includes an outcome-based performance measurement framework that is consistent with the outcome, objective, deliverables and performance indicators set out in the portfolio budget statements.

Figure 8 summarises the performance framework laid out in the Annual Operational Plan 2011–12, including the GRDC's drivers for action, corporate and output group objectives, strategies and planned outcome.

Figure 8: Overview of the GRDC performance framework, 2011–12



Annual reports

At the end of the financial year, the GRDC publishes an annual report that addresses legislated performance reporting requirements, including those of:

- section 28 of the PIERD Act
- section 9 and Schedule 1 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act), and the Finance Minister’s Orders under that Act (*the Commonwealth Authorities (Annual Reporting) Orders 2011*)
- Schedule 2, Part 4, of the *Work Health and Safety Act 2011*
- section 516A of the *Environment Protection and Biodiversity Conservation Act 1999*
- Part II of the *Freedom of Information Act 1982*.

The annual report also meets the GRDC’s responsibilities for reporting against the budget framework of the Agriculture, Fisheries and Forestry portfolio. In addition to the audited financial statements, it includes assessments of performance against operational and corporate performance indicators.

This Annual Report 2011–12 details the GRDC’s achievements against the performance framework set out in the Annual Operational Plan 2011–12 (as shown in Figure 8).

Research priorities

Through the five-year strategic R&D plan and the annual operational plan, the GRDC tailors its investment portfolio to best address the RD&E priorities identified by Australian grain growers and the Australian Government.

Australian grain grower priorities

Australian grain growers’ R&D priorities were identified in consultations held during the development of the Strategic R&D Plan 2007–12 and ratified through the GRDC’s ongoing consultations with Grain Producers Australia, local research advisory committees, grower groups and grower organisations and individual grain growers.

Table 3 shows the identified priorities of Australian grain growers and provides examples of activities supported by the GRDC to address those priorities in 2011–12.

Table 3: Investments and activities to meet grain grower priorities in 2011–12

Grain grower priorities	Examples of relevant GRDC investments and activities
Environmental	
Responses to climate change	<ul style="list-style-type: none"> • Research to examine the impact of elevated atmospheric carbon dioxide levels on critical aspects of cropping in Australia, including whether elevated carbon dioxide will affect grain quality and marketability, pest and disease dynamics, and cultivar performance. • A modelling project to provide growers with access to cost–benefit data indicating the best combination of management practices, for each agroecological zone, to build resilience and maintain or increase profitability and productivity in a range of possible future climates. • The establishment of a national frost program, with an initial focus on identifying sources of frost tolerance and developing frost tolerance ratings for wheat and barley. The program will be expanded to pulses and oilseeds once reliable phenotyping of cereals has been achieved.
Improved water use efficiency	<ul style="list-style-type: none"> • Research at the Australian Centre for Plant Functional Genomics to identify genes and gene networks underpinning a range of abiotic stress tolerance traits. This includes work to improve water use efficiency and enhance responses to climate change, salinity and other environmental degradation. • A project to improve photosynthetic traits of sorghum germplasm for higher water use and nitrogen use efficiencies.
Sustainability and resource management	<ul style="list-style-type: none"> • The development of a pesticide and fertiliser stewardship program for Australian grain farms, to secure the use of chemicals and fertilisers key to profitable grain production while providing the wider community with confidence that the industry is using such inputs safely and wisely.
Soil health and biology	<ul style="list-style-type: none"> • New research to identify and describe the impacts of tillage on soil properties and its biological processes, the dynamics of soil recovery, production responses, economic outcomes and the risks for the soil resource. • A project to improve the adaptation of barley to acid soils.

Table 3: Investments and activities to meet grain grower priorities in 2011–12 (continued)

Grain grower priorities	Examples of relevant GRDC investments and activities
Farm management	
Integrated farming practices and technologies Integrated management of weeds, diseases and pests Herbicide resistance management	<ul style="list-style-type: none"> • Work to develop improved crop performance monitoring methods, especially in the use of satellite and microsensor array technologies. • Work to deliver new integrated approaches for the management of the root rot fungus <i>Rhizoctonia</i>, including the integrated use of strategic monitoring, crop rotation and fungicide application technologies. • A number of projects looking into biological approaches to crop protection, including: <ul style="list-style-type: none"> – a virus-based insecticide and 'attract and kill' technology for the control of diamondback moth in canola – biological suppression of fusarium crown rot – nematode-suppressing microbes. • A project to improve integrated weed management practice in the Northern and Southern regions. • Investments in the Australian Herbicide Resistance Initiative and the Australian Glyphosate Sustainability Working Group.
Variety development	
Biotechnology for improving genetic gain	<ul style="list-style-type: none"> • Work to provide single-nucleotide polymorphism (SNP) marker resources through the Australian Wheat and Barley Molecular Marker Program. The program will expand to include new barley-related projects to produce the tools to breed for: <ul style="list-style-type: none"> – acid soil tolerance – reduced severity of net form net blotch disease – improved end-use quality. • Coordinated national screening of barley parental material and elite lines for resistance to foliar pathogens, to improve understanding of the genetics of resistance in host crops and evolution of virulence in pathogens. • A project to develop a reliable system for identifying blackleg resistance genes in Australian canola, based on the development of a differential set of virulent/avirulent blackleg isolates. • Reverse genetic analysis of novel genes for resistance to necrotrophic pathogens in wheat and barley.
Superior new varieties	<ul style="list-style-type: none"> • Work to monitor the performance of three commercial wheat-breeding companies—Australian Grain Technologies Pty Ltd, InterGrain Pty Ltd and HRZ Wheats Pty Ltd—in developing and commercialising improved varieties for Australian wheat growers. • A project to expand the brassica germplasm base in Australia through collaboration with China and India.
New and innovative product development	
	<ul style="list-style-type: none"> • The engagement of commercial partners to bring ultra-low gluten barley and high-amylose wheat to market. • The identification of improved safflower germplasm that can serve as a base platform for the launch of products from the Crop Biofactories Initiative. • Work to produce urea and other fertiliser-based products from waste streams and biological processes. • Work to test a new enzyme additive that improves the digestibility of sorghum in ruminants.
Capacity building	
Improving skills, training and education in agriculture	<ul style="list-style-type: none"> • The delivery of GRDC technical workshops. • The production of Crop Update DVDs and online video presentations. • The development of a website to provide information on GRDC-supported field trials.
Farm business management	<ul style="list-style-type: none"> • The establishment of a farm business management initiative to bring together skills, resources and assets, in new combinations from various networks, to help growers and their advisers to manage risk and make better business decisions. • The delivery of farm business management updates for advisers and growers, with associated newsletters, articles and fact sheets.

Australian Government priorities

The relevant Australian Government R&D priorities are identified in:

- the National Research Priorities outlined by the Prime Minister in December 2002, and their associated priority goals
- the Rural R&D Priorities announced to the rural R&D corporations (RDCs) by the Minister for Agriculture, Fisheries and Forestry in May 2007.

Table 4 shows the relationships between the government’s research priorities and the associated goals.

Table 5 shows how GRDC investments and activities addressed the priorities in 2011–12. The total expenditure allocated to each of the Australian Government’s priorities is shown in detail in Appendix A.

Table 4: Australian Government research priorities and associated goals

National Research Priorities				
<i>An environmentally sustainable Australia</i>	<i>Promoting and maintaining good health</i>	<i>Frontier technologies for building and transforming Australian Industries</i>	<i>Safeguarding Australia</i>	
A1: Water—a critical resource	B1: A healthy start to life	C1: Breakthrough science	D1: Critical infrastructure	
A2: Transforming existing industries	B2: Ageing well, ageing productively	C2: Frontier technologies	D2: Understanding our region and the world	
A3: Overcoming soil loss, salinity and acidity	B3: Preventive healthcare	C3: Advanced materials	D3: Protecting Australia from invasive diseases and pests	
A4: Reducing and capturing emissions in transport and energy generation	B4: Strengthening Australia’s social and economic fabric	C4: Smart information use	D4: Protecting Australia from terrorism and crime	
A5: Sustainable use of Australia’s biodiversity		C5: Promoting an innovation culture and economy	D5: Transformational defence technologies	
A6: Developing deep earth resources				
A7: Responding to climate change and variability				
Rural R&D Priorities				
<i>Productivity and adding value</i>	<i>Supply chain and markets</i>	<i>Natural resource management</i>	<i>Climate variability and climate change</i>	<i>Biosecurity</i>
Improve the productivity and profitability of existing industries and support the development of viable new industries	Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the supply chain, including to consumers	Support effective management of Australia’s natural resources to ensure primary industries are both economically and environmentally sustainable	Build resilience to climate variability and adapt to and mitigate the effects of climate change	Protect Australia’s community, primary industries and environment from biosecurity threats
Supporting the Rural R&D Priorities				
<i>Innovation skills</i>		<i>Technology</i>		
Improve the skills to undertake research and apply its findings		Promote the development of new and existing technology		



On farm storage silos at Wellington in western New South Wales. Photo: Paul Jones

Table 5: Investments and activities to meet the Australian Government priorities in 2011–12

Priorities	Examples of relevant GRDC investments and activities
<p>RRDP: Productivity and adding value</p>	<ul style="list-style-type: none"> • A study to investigate and identify requirements along the value chain—including breeders, growers, government and marketers—to take narrow-leaved lupins from traditional feed markets into higher value food markets. • A diagnostic agronomy project that will provide a framework to allow growers to diagnose limits to crop performance, and respond effectively to that diagnosis. • Work to develop dual-purpose wheat (grazing and grain) for the high-rainfall zones. • Further development of the proof-of-concept for the yield gene technology in wheat and sorghum.
<p>NRP: Promoting and maintaining good health</p> <p>RRDP: Supply chain and markets</p>	<ul style="list-style-type: none"> • Collaboration with Indonesian flour milling companies to: <ul style="list-style-type: none"> – understand Indonesian requirements for bread wheat qualities – provide breeders with breeding targets for the Indonesian bread wheat market – develop baking and other testing methods for variety assessment in Australia – provide Wheat Quality Australia Limited with information for use in wheat classification. • Work to provide Australian barley breeders with the necessary knowledge of genes and molecular markers to enable a targeted improvement in ‘malt extract’ levels to maintain Australia’s competitiveness in overseas markets. • A project to better understand the economic value of functional characteristics of Australian wheat in selected Asian markets. • Work to commercialise ultra-low gluten barley.
<p>NRP: An environmentally sustainable Australia</p> <p>RRDP: Natural resource management</p>	<ul style="list-style-type: none"> • New research to identify and describe the impacts of tillage on soil properties and processes, the dynamics of soil recovery, production responses, economic outcomes and the risks of the soil resource. • The development of a pesticide and fertiliser stewardship program for Australian grain farms, to secure the use of chemicals and fertilisers key to profitable grain production while providing the wider community with confidence that the industry is using such inputs safely and wisely.
<p>NRP: An environmentally sustainable Australia</p> <p>RRDP: Climate variability and climate change</p>	<ul style="list-style-type: none"> • A major program of work to examine the impact of elevated atmospheric carbon dioxide levels on critical aspects of cropping in Australia, including whether elevated carbon dioxide will affect grain quality and marketability, pest and disease dynamics, and cultivar performance. • A modelling project to provide growers with access to cost–benefit data indicating the best combination of management practices, for each agroecological zone, to build resilience and maintain or increase profitability and productivity in a range of possible future climates. • Research at the Australian Centre for Plant Functional Genomics to identify genes and gene networks underpinning a range of abiotic stress tolerance traits. This includes work to improve water use efficiency and enhance responses to climate change, salinity and other environmental degradation. • The establishment of a national frost program, with an initial focus on identifying sources of frost tolerance and developing frost tolerance ratings for wheat and barley. The program will be expanded to pulses and oilseeds once reliable phenotyping of cereals has been achieved.
<p>NRP: Safeguarding Australia</p> <p>RRDP: Biosecurity</p>	<ul style="list-style-type: none"> • Investments through the Cooperative Research Centre for National Plant Biosecurity to deliver a post-incursion quarantine strategy for the currently exotic Russian wheat aphid, including the hypervirulent biotypes, in Australia. • Work to improve surveillance for and management of insecticide and fungicide resistance. • The coordination of the registration of grain storage chemicals.
<p>NRP: Frontier technologies for building and transforming Australian industries</p> <p>RRDP: Innovation skills</p>	<ul style="list-style-type: none"> • Increased focus on international collaboration and capacity building by Pulse Breeding Australia, including a postgraduate training stream to increase the skills and breadth of pulse researchers in Australia. • A project to develop a decision support tool for the strategic use of tillage within conservation farming practice, to: <ul style="list-style-type: none"> – replace uncritical adherence to a specific tillage philosophy with a rational decision process based on a wide range of relevant variables – inform and empower the farming community, through involvement in the development of the tool and through a communication program covering tillage options, to improve grain farming sustainability.
<p>NRP: Frontier technologies for building and transforming Australian industries</p> <p>RRDP: Technology</p>	<ul style="list-style-type: none"> • Work to develop improved crop performance monitoring methods, especially in the use of satellite and microsensor array technologies. • Work to establish a business case for the development of a novel soil-wetting agent to increase the initial penetration of rainfall and improve water-holding ability in the upper soil layers.

NRP = National Research Priority, RRDP = Rural R&D Priority

Structure

The GRDC’s organisational structure is designed to most effectively apply the organisation’s resources to achieve its operational and strategic outcomes.

At 1 July 2011, the GRDC’s structure was based on four ‘lines of business’ — Practices, Varieties, New Products and Communication & Capacity Building—under the oversight of the Executive Management Team. In this annual report, for the purposes of reporting performance against the annual operational plan and portfolio budget statements for 2011–12, each output group corresponds to one of those lines of business.

During 2011–12, the GRDC’s structure was revised, to:

- recognise that the delivery of benefits to our stakeholders requires an integrated approach across business groups and tailored investment strategies with clearly defined outcomes
- increase our emphasis on listening and delivering outcomes to grain growers
- recognise the specialist management and governance requirements of commercial investments
- facilitate greater global interaction to source new ideas and technologies that can be adapted for the benefit of the Australian grains industry

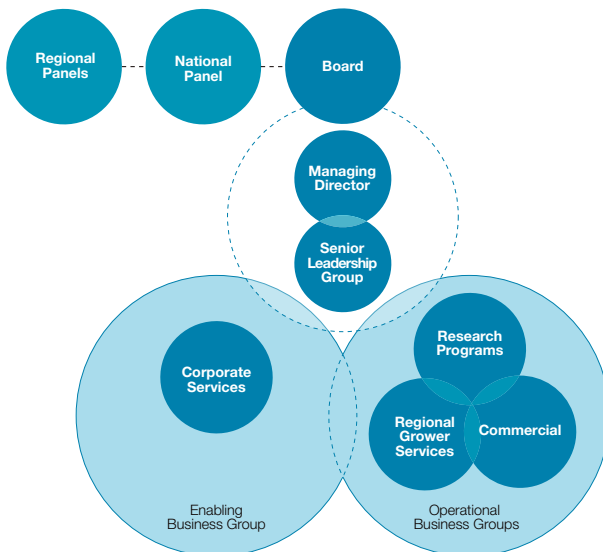
- ensure greater coordination between the finance, procurement and corporate strategy functional areas.

When the revised structure came into effect on 9 August 2011:

- the Executive Management Team decreased by two and became the Senior Leadership Group (described in more detail later in this section)
- the staff of the former lines of business and enabling functions were reallocated to one of four business groups
 - the Research Programs business group, which brought together most of the functional areas that made up the former Varieties and Practices lines of business
 - the Commercial business group, which was created from the New Products line of business combined with company equity ownership activities of the Varieties line of business and some components of the Practices line of business
 - the Regional Grower Services business group, which was created by merging communication, publications and webmaster functions with responsibilities for regional communications
 - the enabling business group Corporate Services, which took over the enabling functions.

Figure 9 shows the GRDC’s organisational structure at 30 June 2012.

Figure 9: GRDC structure as at 30 June 2012



Business groups

The GRDC's business functions are shared between:

- three operational business groups, Commercial, Regional Grower Services, and Research Programs

- one enabling business group, Corporate Services.

Table 6 summarises the functions of each business group. The roles of the business groups in achieving the GRDC's strategic objectives are set out in Table 25 in Part 3.

Table 6: Key functions of GRDC business groups

Business group	Functional areas
Operational	
Commercial	Commercial enterprises Farm technology products Grain technology products
Regional Grower Services	Brand management Information management and delivery North, south and west communication and coordination North, south and west regional program development Publications Technical/scientific communication Webmaster
Research Programs	Agronomy Capacity building Climate change Crop protection Farming systems Gene discovery Germplasm enhancement Oilseeds, pulses and summer crop breeding Resource management Soils and environment Statistics Theme coordination Trial operations Winter cereal breeding
Enabling	
Corporate Services	Business processes Compliance Finance Human resources and industrial relations Impact assessment Information technology Legal Office management Planning, strategy and reporting Procurement Records management



Regional Grower Services business group. Left to right: (back row) Sharon O'Keeffe, Tom McCue, Kyle Thoms, Andrew Rice; (front row) Darren Hughes, Nikki Bricknell, Stuart Kearns (Executive Manager), Tom Riethmuller, Maureen Cribb.

Photo: Geoff Comfort

Senior Leadership Group

The Senior Leadership Group (SLG) leads the GRDC’s business activities, advises the GRDC Board and implements the Board’s decisions. To ensure that the GRDC’s operations are monitored and managed efficiently and effectively, the SLG meets regularly and maintains and updates an annual business schedule.

The SLG has five members: the Managing Director, John Harvey, and the executive managers from each of the four business groups. At 30 June 2012, the executive managers were Leecia Angus (Corporate Services), Stuart Kearns (Regional Grower Services), Vince Logan (Commercial) and Stephen Thomas (Research Programs).

From 1 July 2011 to 9 August 2011, when the GRDC restructure took effect, the executive managers of the lines of business were Leecia Angus (Corporate Services), Stephen Thomas (Practices and Communication & Capacity Building), and Vince Logan (New Products). Leadership of the Varieties line of business (and associated aspects of Communication & Capacity Building) was shared between program managers in an acting capacity.

Information on the roles and backgrounds of the SLG members is provided in Part 3.

Board

The GRDC Board is responsible for the stewardship of the GRDC and sets the strategic direction of the corporation. Its functions include overseeing corporate governance and monitoring the performance of the business and of the Managing Director.

At 30 June 2012, the Board comprised nine directors: Keith Perrett (Chair), John Harvey (Managing Director), Richard Brimblecombe, Jeremy Burdon, Jenny Goddard, Kim Halbert, Robert Lewis, Sharon Starick and John Woods.

More details on the composition and activities of the Board are provided in Part 3.

Advisory panels

The Board makes decisions with the support of the National Panel, which in turn is informed by the knowledge and experience of three regional advisory panels. This network helps to ensure that GRDC investments are directed towards the interests of all its stakeholders and the strategic objectives of its programs.



GRDC Board. From left: (back row) Jeremy Burdon, Kim Halbert, Richard Brimblecombe, John Woods, Rob Lewis; (front row) Jenny Goddard, Keith Perrett (Chair), John Harvey (Managing Director), Sharon Starick. *Photo: Geoff Comfort*

The Northern Regional Panel, Southern Regional Panel and Western Regional Panel represent Australia's three grain-growing regions. Each regional panel:

- identifies and monitors regional and national grains industry issues that are relevant to the region
- interacts with grower groups, research advisory committees and other interested parties in the region to exchange information
- identifies and develops priorities for RD&E investment and recommends these to the National Panel
- keeps growers and advisers in the region informed about the GRDC's strategic direction, investment portfolio and research projects
- assists staff in monitoring the effectiveness of the investment portfolio.

The regional advisory panels are composed of grain growers, agribusiness representatives, researchers and the GRDC's executive managers, with provision for other industry experts to participate as appropriate. Panel members are contracted to carry out their role and are not employees of the GRDC.

The National Panel:

- addresses national RD&E priorities across the GRDC's investment portfolio and makes recommendations to the Board
- assists the Board to maintain links with grain growers, the Australian Government, state and territory governments and research partners.

The National Panel is composed of the three regional panel chairs and the GRDC's Managing Director and executive managers.

More details on the composition and activities of the advisory panels are provided in Part 3.

Relationships

The GRDC fosters productive relationships with its stakeholders and with other organisations that have a common interest in improving knowledge, information and market effectiveness for rural industries.

Stakeholders

As well as Australian grain growers and the Australian Government, the GRDC's stakeholders include many groups and organisations that play important roles in achieving the Australian grains industry's outcomes. These may be involved in uncovering new knowledge through RD&E, integrating knowledge in the form of innovative regional farming systems, or promoting the adoption of new products, services or systems.

These stakeholders include:

- state and federal government agencies, other RDCs, cooperative research centres, universities, plant-breeding organisations, grower groups, farm advisers and agribusinesses
- bulk grain handlers, marketers and exporters; seed companies; and millers, brewers and other end users
- the wider Australian community, which expects the grains industry to produce quality food and feed, to contribute to export income and employment, and to assist in the sustainable management of Australian landscapes.

Communication

The GRDC seeks out opportunities to communicate with its stakeholders, because exchanging information and ideas is vital to meeting stakeholders' needs—and exceeding their expectations.

In addition to Grain Producers Australia, the GRDC consults a wide range of grower and representative bodies, such as farming systems groups and state farming organisations. Industry representative groups for particular sectors also liaise with the GRDC, through the national and regional agribusiness reference groups.

The GRDC also communicates regularly with many Australian Government and state government agencies, while working closely with the Department of Agriculture, Fisheries and Forestry. Access to these agencies, as well as CSIRO and the university sector, is both provided through the activities of the Primary Industries Standing Committee of the Primary Industries Ministerial Council and sought directly by the GRDC.

Collaboration

Collaboration is at the heart of the GRDC's approach to adding value to the Australian grains industry. The majority of the GRDC's investment in RD&E is with partners that co-fund the work as well as conduct many of the activities. Examples include government agencies; cooperative research centres, universities and other research organisations, including RDCs; commercial plant breeders and seed companies; agricultural companies and advisers; and grain marketers, exporters and end users.

Australia's R&D investment is only a small part of the global effort, so the GRDC collaborates with overseas organisations to build and access new technologies and intellectual property that would otherwise be unavailable to Australia. Notable examples of such organisations include the International Maize and Wheat Improvement Center (CIMMYT), the International Center for Agricultural Research in the Dry Areas (ICARDA) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Commercial partnerships

Usually the GRDC is only one of a number of public and/or private organisations investing in the development of a new technology. Investment partnerships are desirable and necessary because they bring together complementary skills and reduce the risk to the GRDC in the funding of new technologies.

Partner organisations can bring benefits such as market knowledge and access to proprietary technologies, as well as financial resources.

Where the GRDC is a member of a research consortium using public and private sector funds, the investors collaborate to determine the terms of commercialisation, to ensure that a proper balance is struck among the needs of all members of the consortium.

While the most usual path to market for commercial research products from GRDC research investment will be through licensing to suitable partners, investments in joint ventures and companies to deliver the products will be considered, based on the merits of business cases that demonstrate that this will deliver the best outcome for the industry.

Location

Most GRDC staff are located in offices at the following Canberra address:

Grains Research and Development Corporation
Level 1, Tourism House
40 Blackall Street
BARTON ACT 2600

The GRDC owns one floor of Tourism House. The GRDC does not own any research facilities.

The Manager Grower Services North is located in Boggabri, New South Wales; the Manager Grower Services South is located in Parkes, New South Wales; and the Manager Grower Services West is located in Perth, Western Australia.



GRDC technical consultant John Sheppard (left) discusses the International Maize and Wheat Improvement Center (CIMMYT) wheat-breeding program with CIMMYT scientist Ravi Singh in Obregon, Mexico. *Photo: GRDC*

Report from the Chair and Managing Director

As harvest approaches, Australian grain growers are gearing up to take advantage of what were generally reasonable conditions over the past winter growing season. The economic potential arising from the positive crop outlook is boosted by strong demand from export markets.

In times like this, when national and international conditions look positive, the GRDC works to make sure that local production issues are not hindering growers in a particular region from fully accessing the opportunities presented.

One of the key aims of the GRDC's Strategic R&D Plan 2012–17, launched in August 2012, is to ensure that national research, development and extension (RD&E) programs better align with growers' regional needs. The new five-year plan was developed following extensive consultation with grain growers, the wider grains industry, the research community and government agencies.

In addition, the GRDC has been engaging more with private sector research organisations and identifying and accessing overseas technologies that can be adapted to Australian production systems. Our strong relationships with private sector research bodies and international research alliances ensure that Australian growers have access to advanced technologies and crop improvements from around the world.

These new areas of focus in grains research management build on the successes achieved, and lessons learned, under the GRDC's previous five-year strategic plan, *Prosperity through Innovation*, which concluded on 30 June 2012. As this annual report demonstrates, the GRDC successfully addressed the targets of that plan, providing the leadership and delivering the resources needed to enhance the productivity, competitiveness and sustainability of the grains sector in Australia.

This was reflected in responses to the GRDC's 2012 Grower Survey, which saw strong improvements across several key indicators, including a 9 percent increase in the proportion

of 'Growers rating GRDC performance very or fairly high', and a 22 percent increase in 'Growers directly benefiting from GRDC activities or initiatives'—both measures were endorsed by three out of four growers surveyed.

The following sections provide a snapshot of grains industry production and the GRDC's performance in 2011–12, highlighting some of the key achievements.

Grains industry production

In 2011–12, a strong year for grain production saw the Australian grains industry produce its biggest crop ever, with production increasing 7 percent or 3.3 million tonnes to a record 48.4 million tonnes (from 45.1 million tonnes in 2010–11) with an estimated gross value of production of \$12.4 billion.

This impressive performance was largely the result of a major turnaround in winter crop production in Western Australia, which more than doubled from 8 million tonnes in 2010–11 to 17 million tonnes in 2011–12. This offset lower winter crop production in New South Wales, South Australia and Victoria.

Other grains production data released by the Australian Bureau of Agricultural and Resource Economics and Sciences show that in 2011–12:

- the production of winter grains, oilseeds and pulses increased by 7 percent or 3 million tonnes, to 45.5 million tonnes from 42.5 million tonnes
- the production of wheat and barley increased by 6 percent and canola production rose 18 percent, while chickpea and lupin production collectively rose 14 percent
- summer crop production increased by 16 percent or 0.4 million tonnes, to 2.9 million tonnes from 2.5 million tonnes.

GRDC projects

Over the past year, GRDC-supported projects led to several exciting developments across the grains value chain, from crop production to end uses.

Pre-breeding research into frost tolerance is addressing a major production constraint. It is estimated that radiant frost damage and the implementation of frost minimisation strategies cost the grains industry in excess of \$360 million each year. In 2011–12, the GRDC invested around \$1.3 million in pre-breeding research on frost-tolerance in wheat and barley. As part of a new national program, a number of projects were established to develop robust frost phenotyping protocols and frost tolerance ratings. In addition, the GRDC supported a range of projects to raise the effectiveness of management options for frost, from research into trends in extreme weather events to a regional communications campaign.

Water use efficiency is a vital attribute for crops across Australia, and increasing wheat yields under Australia's water-limited environments is a major driver for GRDC investments. GRDC-supported research has shown that 'switching off' a particular gene in wheat can significantly increase yield—in the glasshouse, yields were lifted by up to 30 percent. In 2011–12, the GRDC, CSIRO and Bayer CropScience formed a partnership to further develop the technology.

One of the constraints that overlaps almost all production activities, where it occurs, is salinity. This area of research saw a true breakthrough in 2011–12, when a GRDC-funded project was the first of its kind to fully develop a salt-tolerant agricultural crop. The researchers used a conventional but highly sophisticated strategy to breed a sodium exclusion gene, derived from an ancestor of modern wheat, into durum wheat. In salinity-affected trials conducted in New South Wales and South Australia, the strains with the added gene delivered 25 percent yield gain, and actual yield gains of 1.6 tonnes per hectare were achieved.

The GRDC also supports projects to improve understanding of, and options for, optimising crop nutrition. Successful outcomes of this work in 2011–12 will soon see new technology delivered to the Australian grains industry. For example:

- The GRDC and Back Paddock Company reached an agreement to commercialise the diffusive gradients in thin films (DGT) soil-testing technology, which will enable growers to accurately and reliably measure plant-available phosphorus in soil for the first time.
- The Australian Centre for Plant Functional Genomics (ACPF), CSIRO and international seed company Vilmorin and Cie reached an agreement on the further development, deregulation and delivery of nitrogen use efficiency gene technology.

Optimising production through the effective management of weeds, pests and diseases requires an approach that integrates technologies and management approaches. Examples of achievements in 2011–12 reflect the diversity of our RD&E investments in this area:

- The Australian Herbicide Resistance Initiative achieved a first by delivering results on the potential resistance risks of a new herbicide before the new product was released.
- Research began to develop a standard protocol for determining soil disturbance by disc seeders and tine seeders, to improve the effectiveness of soil-incorporated herbicide.
- A project was established to develop a database that will support the use of drift reduction technologies for the application of pesticides using ground boom sprayers.
- Experiments in areas of the Darling Downs, Queensland, the southern region of New South Wales, and the Stirling Range, Western Australia, all found measurable benefits of native vegetation in suppressing pests.
- The Pathways to Registration program helped to facilitate label improvements and expedite the registration of the outcomes of GRDC investments in pesticide R&D.
- The Australian Cereal Rust Control Program greatly reduced both the probability and the likely impact of occurrences of rust diseases in cereals, by helping to ensure genetic diversity and enable rapid response to sudden pathogen changes.
- Work continued to determine the extent and impact of fungicide resistance on pathogens that cause diseases in major crops, such as *Stagonospora nodorum* blotch, tan spot, net blotch, powdery mildew, ascochyta blight and botrytis.

Looking to the future, the GRDC also supported projects to strengthen Australian grain producers' access to emerging markets. The GRDC–CSIRO Crop Biofactories Initiative reached a significant milestone with the development of a safflower plant that produces oil that contains more than 90 percent oleic acid, the highest level of purity of any individual fatty acid available from any current plant oil. This offers the possibility of a renewable and sustainable source of oil that could replace petroleum-based feedstock in the manufacture of a number of industrial products.

Other areas of research with the potential to extend the reach of Australian grains included:

- the development of a prototype dough-sheeting line to process high-moisture, low-protein wheat flour, which looks promising as a way for low-protein Australian wheats to access the growing Asian bakery market
- work to demonstrate that Australian raw barley is ideally suited to the beer-brewing process based on the Odena Pro™ enzyme product that has been embraced by the Asian brewery market.

GRDC partnerships

Despite the extraordinary success of Australian grains researchers, we still represent only about 2 percent of global grains research, and international partnerships are necessary to ensure that Australia has access to the best available information and technology. For example, a research collaboration between the ACPFG and international seed company DuPont Pioneer was significantly expanded during the year, providing Australian researchers with increased access to research and plant production technologies.

The GRDC's significant alliances with the International Maize and Wheat Improvement Center and the International Center for Agricultural Research in the Dry Areas deliver important germplasm, information and expertise to the Australian industry. In 2011–12, a performance review confirmed that those alliances provide Australian breeders with targeted access to wheat, barley and pulse germplasm containing traits of value to Australian grain production systems. We are negotiating a similar alliance with the International Crops Research Institute for the Semi-Arid Tropics.

At the same time, national and regional partnerships are also vital to ensure that GRDC-supported RD&E delivers the outcomes that the Australian grains industry needs, where and when it needs them. In 2011–12, our Regional Cropping Solutions initiative established networks to assist growers, consultants and researchers to connect with the GRDC and share their knowledge of local cropping issues and the RD&E activities needed to address them. The new networks—four in the Southern Region and five in the Western Region—play a similar role to the Grower Solutions Groups in the Northern Region, and complement our system of regional advisory panels.

In 2011–12, we re-emphasised our commitment to working with our grains industry partners by adopting a new brand: 'Your GRDC working with you'. To expand opportunities for communication, our website was extensively updated, and we opened new channels such as interactive displays at field days, interactive live webcasts, fax and SMS information services, and our first phone app. Our wide range of information products and targeted communication campaigns—including support for the Australian Year of the Farmer—helped to deliver research outcomes and other information to the grains industry and the wider community.

We also expanded our range of resources to assist growers and their advisers to make decisions, manage risk and optimise profit in their farm businesses. New programs supported by the GRDC in 2011–12 included specialised workshops on grain marketing, and the Farm Business Management (FBM) Update program.

We also continued to promote the long-term resilience of the Australian grains industry by building R&D capability in the industry and related research sectors. Our support for training and development opportunities ranged from the Primary Industry Centre for Science Education, which delivered locally relevant information on GRDC-supported research to more than 6,500 students in years 11 and 12, to the Nuffield Australia Farming Scholarships, which funded five highly motivated grain growers to travel the world to undertake research with potential to benefit to their local communities.

The year ahead

As we reflect on 2011–12 we see a clear picture of a grains industry that is working hard to secure a profitable, sustainable future through astute RD&E. Through the GRDC and its research partners, our industry is demonstrating a capacity to respond quickly and thoughtfully to production challenges and opportunities. The GRDC has narrowed the gap between research outcomes and grower adoption through constant dialogue with growers and grower groups, keeping grains research both relevant and highly effective.

This will continue under the Strategic R&D Plan 2012–17, supported by six core themes: Meeting market requirements; Improving crop yield; Protecting your crop; Advancing profitable farming systems; Improving your farm's resource base; and Building skills and capacity. Within each theme, RD&E investment strategies are being developed to deliver practice change on farm, for the benefit of both growers and the grains industry as a whole.

The GRDC's organisational structure and processes have been streamlined to most effectively apply our resources to achieving the outcomes identified for each theme. Our goal is to make the industry research levy the best investment that grain growers can make.

We look forward to working with you in 2012–13.



Keith Perrett
Chair



John Harvey
Managing Director



Managing Director John Harvey and Chair Keith Perrett launch the GRDC's Strategic R&D Plan 2012–17 at the Australian Grains Industry Conference 2012. Photo: GRDC

Part 2—Our Performance

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Corporate performance

The GRDC's corporate performance is assessed on the basis of formal surveys and analysis. It is measured against the corporate strategies and performance indicators established in the Strategic R&D Plan 2007–12; the Annual Operational Plan 2011–12; and the Department of Agriculture, Fisheries and Forestry's Portfolio Budget Statements 2011–12.

This section describes the GRDC's corporate performance in 2011–12, in terms of:

- evidence of effective implementation of the corporate strategies set out in the Strategic R&D Plan 2007–12
- feedback obtained from grain growers

- results of the impact assessments of four R&D project clusters
- findings on farm financial performance and total factor productivity in the grains industry, collated through regular surveys by ABARES
- results of the third year of information gathering under the GRDC–ABARES Harvesting Productivity initiative.

Corporate strategies

Table 7 provides examples of how the GRDC progressed against its performance measures for 2011–12 and its objectives and strategies for 2007–12.

Table 7: Corporate overview

Indicator	Performance
Strategy: Coordinate a national grains R&D agenda and portfolio	
Significant evidence of the GRDC taking a lead role in coordinating and facilitating a national grains R&D agenda, which has major impact on grower profitability and sustainability	<p>The GRDC played an integral role in implementing the <i>Grains Industry National Research, Development and Extension Strategy</i> (Grains Industry National RD&E Strategy), including by:</p> <ul style="list-style-type: none"> • co-chairing the steering committee • having two GRDC executive managers participate in the implementation committee meetings • supporting three grain growers' participation in the steering committee and the implementation committee • funding 50% of the salary and expenses of the executive officer.
Key GRDC investments demonstrate national coordination with research partners	<p>The GRDC invested significantly to increase grains industry RD&E infrastructure and capacity, including through:</p> <ul style="list-style-type: none"> • the Australian Export Grains Innovation Centre, a joint venture with the Western Australian Agriculture Authority • an upgrade of facilities at the IA Watson Research Centre at Narrabri, New South Wales • leadership of the cross-sectoral soils RD&E strategy endorsed by the Primary Industries Standing Committee.
Strategy: Deliver against Australian Government priorities	
Ongoing endorsement by the Minister for Agriculture, Fisheries and Forestry on meeting the Australian Government priorities	<p>The GRDC's Strategic R&D Plan 2007–12 was approved by the Minister for Agriculture, Fisheries and Forestry on 7 July 2007. The GRDC's investments in 2011–12 addressed the Australian Government's:</p> <ul style="list-style-type: none"> • National Research Priorities—an environmentally sustainable Australia, promoting and maintaining good health, frontier technologies for building and transforming Australian industries and safeguarding Australia • Rural R&D Priorities—productivity and adding value, supply chain and markets, natural resource management, climate variability and climate change, biosecurity, innovation skills, and technology.^a <p>The GRDC's Strategic R&D Plan 2012–17 and Annual Operational Plan 2012–13 were approved by the Minister on 19 June 2012.</p>

Table 7: Corporate overview *(continued)*

Indicator	Performance
Strategy: Grow and leverage total grains R&D investment	
Significant evidence of leveraging total grains R&D investment	<p>The GRDC continued to act as a catalyst in growing and leveraging total grains R&D investment in Australia. For example, for every dollar the GRDC invested:</p> <ul style="list-style-type: none"> • in the national lupin breeding program, it leveraged \$1.60 from research partners • in the Australian Cereal Rust Control program, it leveraged \$3.96 from research partners • in the Climate Champions program, it leveraged an additional \$1.00 from research partners. <p>The majority of the GRDC's investment attracts contributions from either the research partner contracted or other agencies. The most common sources of leverage are universities, state government departments and CSIRO.</p>
Strategy: Ensure R&D is market-driven	
Significant evidence of market signals being taken into account in R&D investments	<p>The GRDC considered grower RD&E needs and priorities in detail while developing the annual operational plan. This was assisted by interaction between the GRDC's three regional panels and growers, advisers and researchers.</p> <p>In addition, the GRDC sought direction from the grains industry's formal representative organisation, Grain Producers Australia; regional advisory committees; and link groups. These processes ensure that investments are designed to meet the needs of growers and the wider Australian grains industry.</p> <p>The GRDC structure and processes ensured engagement with the supply chain by:</p> <ul style="list-style-type: none"> • engaging representatives from various parts of the supply chain as GRDC panel members • connecting with supply chain members through the GRDC panels and regional agribusiness reference groups • engaging consultants with expertise in the grains supply chain to provide investment advice. <p>For investment where there will be significant benefit for supply chain participants, the GRDC seeks contributions from those expected to benefit. The contributions help the GRDC to establish that the particular project is definitely needed, and the involvement of supply chain participants helps to keep investments on track, highly relevant and likely to produce outputs that will be adopted.</p> <p>Examples of projects in which the GRDC worked with co-investors from the supply chain during 2011–12 include:</p> <ul style="list-style-type: none"> • developing omega-3 canola with Nuseed • participating in the Grains & Legumes Nutrition Council with other food industry participants, including Kellogg (Australia), George Weston Foods and Sanitarium, in the identification and communication of the health benefits of grain food products • collaborating with CSIRO and Bayer CropScience to further research and potentially commercialise a new yield-enhancing gene • supporting Wheat Quality Australia Limited, a joint venture with Grain Trade Australia that provides wheat variety classification services.

a Table 5 shows examples of how GRDC-supported projects addressed Australian Government priorities; Appendix A details how GRDC investment dollars were apportioned to meet Australian Government priorities.

Grower Survey

In 2012, the GRDC obtained detailed feedback from 1,200 growers across Australia, covering the GRDC's three production regions and key agroecological zones, through its Grower Survey. The GRDC commissions the Grower Survey once every two years. The survey helps the GRDC to assess and improve its performance, particularly in terms of ensuring that research outcomes are being communicated effectively to growers.

The survey results in Table 8 present the GRDC's track record of achievement against selected key performance indicators over the period from 2004 to 2012. More results are provided in the grower survey snapshots in the reports on performance for output groups 1, 2 and 4.

Impact assessments

The GRDC undertook impact assessment studies of four clusters of projects in 2011–12. The studies assessed the economic, social and environmental benefits arising from GRDC investments. They were undertaken through an independent consultant, in accordance with the guidelines developed by the Council of Rural Research and Development Corporation Chairs.

Table 9 summarises the costs and benefits of the project clusters in dollar terms, while Table 10 summarises the economic, environmental and social benefits of the project clusters.

The GRDC also undertook a consolidated analysis of the 33 project clusters which have been evaluated since 2007. The key financial results of this analysis are highlighted in Table 11.

Table 8: GRDC performance against selected key performance indicators, 2004 to 2012, by proportion of growers surveyed (percent)

Key performance indicator	2004	2005	2006	2008	2010	2012
Growers rating GRDC performance very or fairly high	68	72	71	68	69	75
Growers directly benefiting from grains R&D activities generally in the past five years	82	77	77	76	67	76
Growers directly benefiting from GRDC activities or initiatives	67	66	68	61	55	67
Growers confident that grains R&D is addressing threats to long-term sustainability of their farm	76	76	76	73	70	78
Growers adopting actions to ensure longer term sustainability of farm	92	88	89	86	89	92
Growers adopting actions to ensure longer term sustainability of farm as a result of GRDC-specific activities or initiatives	40	40	45	40	42	48
Growers influenced in a major way by GRDC information in motivating change on farm	21	21	18	30	31	25
Grower awareness of regional panels	42	50	58	55	60	68
Growers having direct contact with regional panel members	16	20	23	23	23	27

Note: The Grower Survey was suspended in 2007 as part of the GRDC's drought response and is now conducted every second year. The next survey will be conducted in mid-2014.

Table 9: Financial benefits identified by impact assessments

Project cluster	Benefits \$m (1)	Costs \$m (2)	Benefit to cost ratio (1/2)	Net value \$m (1-2)
Climate Champions Program	1.6	0.6	2.9:1	1.0
Grains Industry Research Scholarships ^a				
• National benefits	25.2	3.5	7.2:1	21.7
• Grains industry benefits	8.4	3.5	2.4:1	4.9
National Lupin Breeding Program	21.7	5.9	3.7:1	15.8
National Variety Trials	24.3	20.2	1.2:1	4.0

a National benefits arise purely from capacity building; grains industry benefits emanate from the specific work carried out under the scholarship projects themselves.

Note: Dollar amounts are calculated in present value terms.

Table 10: Benefits identified by impact assessments of GRDC projects

Economic benefits	Environmental and social benefits
Climate Champions Program	
<ul style="list-style-type: none"> Productivity gains by farmers resulting in higher average profits. Improved research resource efficiency. 	<ul style="list-style-type: none"> Greater adoption of farm practices that improve farm environmental stability. Improved industry viability due to greater industry preparedness and capacity to adapt to climate change. Improved community viability due to greater preparedness by farmers.
Grains Industry Research Scholarships	
<ul style="list-style-type: none"> Improved crop yields. Reduced costs. Increased demand. Efficiency gains in research resource allocation. 	<ul style="list-style-type: none"> Increased future research capacity. Improved natural resource management. Increased future research capacity of other plant-based industries. Increased future research capacity of other sectors of the economy. Increased future research capacity of foreign economies due to researchers taking knowledge and skills overseas.
National Lupin Breeding Program	
<ul style="list-style-type: none"> Contribution to future releases of new higher yielding varieties with disease and aphid resistance and herbicide tolerance. Potential for increased area of lupins grown in cereal rotations with associated productivity and sustainability benefits. Increase in capital value of lupin germplasm in the program between 2009 and 2014. Small contribution to promotion of Jenabillup^Q in the eastern states. Increased area of lupins grown on mixed enterprise farms with benefits to livestock industries. 	<ul style="list-style-type: none"> Reduced use of chemicals (herbicides and fungicides) in lupin crops and crops with lupins in the rotations. Improved farmer wellbeing through reduced chemical use by farmers. Reduced chemical use resulting in reduced potential impact on regional wellbeing.
National Variety Trials	
<ul style="list-style-type: none"> Increased profitability from increased yields, and disease resistance due to earlier use of superior varieties. 	<ul style="list-style-type: none"> Minor reduction in fungicide use. Enhanced skills and capacity in statistical analysis contributing to more efficient variety testing.

Table 11: Financial results of consolidated analysis of project clusters, 2007–08 to 2011–12

Assessed group	Benefits \$m (1)	Costs \$m (2)	Benefit to cost ratio (1/2)	Net value \$m (1–2)	Rate of return %
32 project clusters (excludes Australian Cereal Rust Control Program)	2,079.0	343.5	6.1:1	1,735.5	38.2

Farm performance

This section looks at farm financial performance and productivity growth in the grains industry to assess the industry-wide impact of the GRDC’s corporate strategies.

In order to monitor farm performance and productivity trends in the grains industry and other broadacre industries, the GRDC—along

with other RDCs and the Department of Agriculture, Fisheries and Forestry—funds a range of surveys and analytical research conducted by ABARES, in particular its annual Australian Agricultural and Grazing Industries Survey.

Financial performance

The Australian Agricultural and Grazing Industries Survey results for 2011–12 showed that, although grain production levels reached a new record high, lower prices for most grains together with increases in farm costs resulted in a fall in overall cash income for grain-producing farms in the past year. In particular:

- Farm cash income averaged \$161,400 per grain-producing farm in 2011–12, showing an 11 percent decrease compared with the average grain-producing farm cash income of \$182,000 in 2010–11.
- The average farm cash income of cropping specialist farms fell to \$213,000, down 12 percent from \$241,300 in 2010–11, but still 35 percent above the industry average for the previous 10 years.
- For mixed livestock–cropping farms, average farm cash income fell to \$107,000, down 16 percent from \$127,900 in 2010–11, but still 25 percent above the industry average for the past 10 years.

A regional breakdown shows that average farm cash income for grain-producing farms fell by around 30 percent to \$79,000 per farm in the Northern Region; declined by 17 percent to \$171,500 per farm in the Southern Region; and rose by 21 percent to \$238,200 per farm in the Western Region.

Western Australia was the standout as a result of the marked turnaround in winter crop production in 2011–12 compared with the drought-reduced production of 2010–11. In contrast, average farm cash income for cropping specialist farms declined in New South Wales, South Australia and Victoria because of lower winter crop production and lower grain and oilseed prices.

Farm costs for grain-producing farms increased by around 2 percent in 2011–12, mainly as a result of the increased costs of harvesting and marketing the larger crop in Western Australia and Queensland, together with a general increase in expenditure on fertiliser, fuel, crop chemicals and repairs and maintenance. Expenditure on interest payments fell during 2011–12, mainly because of lower average debt and a reduction in interest rates.

Total factor productivity

Total factor productivity (TFP) measures outputs relative to total inputs used to produce the output. Technological advances, improvements in management, and efficient exploitation of economies of scale all influence the rate of growth in productivity. Accordingly, productivity growth can be driven by producers generating the same amount of output with fewer inputs, increasing output with the same amount of inputs, or increasing output at a faster rate than inputs.

The latest TFP results for broadacre agriculture available from ABARES are for the period between 1977–78 and 2009–10. Results to 2011–12 will become available in two years time.

As shown in Table 12, cropping specialists and mixed livestock–cropping farms achieved average annual TFP growth of 1.6 percent and 1.1 percent, respectively, while the broadacre industry average was 1.2 percent.

Over the past 30 years, productivity in the grains industry has been driven by:

- technological advances, such as larger machinery, GPS guidance systems, new herbicides and pesticides, the ability to make genetic improvements to varieties, and new crop varieties
- improved farming practices, such as precision agriculture and ‘cropping packages’ that bring multiple technologies together in readily adoptable farming systems.

During that 30-year period, the productivity of cropping specialists has grown more strongly in the Western Region (2.0 percent a year) than in the Northern Region (1.7 percent) and Southern Region (1.5 percent), as shown in Table 12. In general, Western Region growers face less variable climate and topography and manage larger, more homogeneous cropping systems.

Table 12: Average total factor productivity growth by broadacre industry, 1977–78 to 2009–10 (percent per year)

Industry	Input growth	Output growth	Total factor productivity growth
Industry			
Total broadacre	-0.8	0.4	1.2
Cropping specialists	1.2	2.8	1.6
Mixed livestock–crops	-1.7	-0.5	1.1
Beef	0.0	1.5	1.4
Sheep	-2.4	-1.9	0.5
Region			
Northern	-0.4	1.3	1.7
Southern	1.6	3.1	1.5
Western	2.3	4.3	2.0
All regions	1.2	2.8	1.6

Source: Based on data from the Australian Bureau of Agricultural and Resource Economics and Sciences report *Australian Grains: Financial Performance of Grain Producing Farms, 2009–10 to 2011–12*, August 2012, Canberra.

Harvesting Productivity

The GRDC–ABARES Harvesting Productivity initiative was established in 2009–10 to significantly increase understanding of the drivers and constraints of productivity growth in the Australian grains industry and identify where GRDC investments should be targeted to improve industry productivity over the long term.

The objective of the latest study under the initiative was to evaluate the economic effect of publicly funded agricultural R&D and extension by investigating the relationship between public investments in R&D and extension and broadacre TFP growth in Australia over the period from 1952–53 to 2006–07. The average short-run (year-to-year) and long-run effects of public investment in R&D and extension on broadacre TFP were also examined.

Key findings in 2011–12 included the following:

- The analysis of the dynamic relationship indicates that public R&D strategies that invest over the long term eventually result in higher returns than strategies that invest over the short term.
- Although slowing broadacre productivity growth could prompt policymakers to consider a temporary increase in R&D funding, a short-term response is not efficient and will not yield the highest payoff.

- Notwithstanding the nature of ongoing debates concerning the extent to which government should fund R&D, even plausible and immediate increases in public investment are unlikely to improve broadacre productivity growth significantly for many years, given the lag effects of adoption of R&D outputs.
- In comparing alternative strategies to increase productivity growth, it is important to consider the likely trade-offs between investing in R&D and investing in extension. Increased investment in extension in the short run can enhance TFP growth by enhancing the adoption of currently available technologies and knowledge. Although individual projects should be evaluated on their own merits, at an aggregate level, reallocating existing R&D funding toward extension is unlikely to maximise long-term productivity growth.

During 2012–13 the initiative will investigate whether state moratoria delaying the introduction of genetically modified (GM) crops are in the best interest of the grains industry, taking GM canola and GM wheat as case studies.

Like any industry that depends on natural resources, the Australian grains industry is exposed to the environmental and economic effects of climate change. Recognising the need for an informed and coordinated response, the GRDC applies a climate change strategy across its business.

The GRDC invests in R&D:

- to better understand how natural resource management may help the grains industry to reduce greenhouse gas emissions
- to identify options and develop technology to assist the industry to adapt to climate change and variability.

This work is translated into awareness raising and practical resources to help grain growers respond to climate change and mitigate greenhouse gas emissions in the short, medium and long terms.

Nitrous oxide emissions

The Nitrous Oxide Research Program has a network of automated greenhouse gas-measuring systems situated in all major agroclimatic zones and farming systems in Australia. It is the most comprehensive agricultural nitrous oxide monitoring network in the world.

The network has captured a wide range of emissions data typical of the diverse natures of Australian soils and agricultural systems. For example, coarse-textured cropping soils of Western Australia have been shown to emit 50 grams of nitrous oxide nitrogen per hectare per year, while high-rainfall fertile pastures of southern Victoria experience episodes in which more than 1 kilogram of nitrous oxide is emitted per hectare per day when cultivated for cropping.

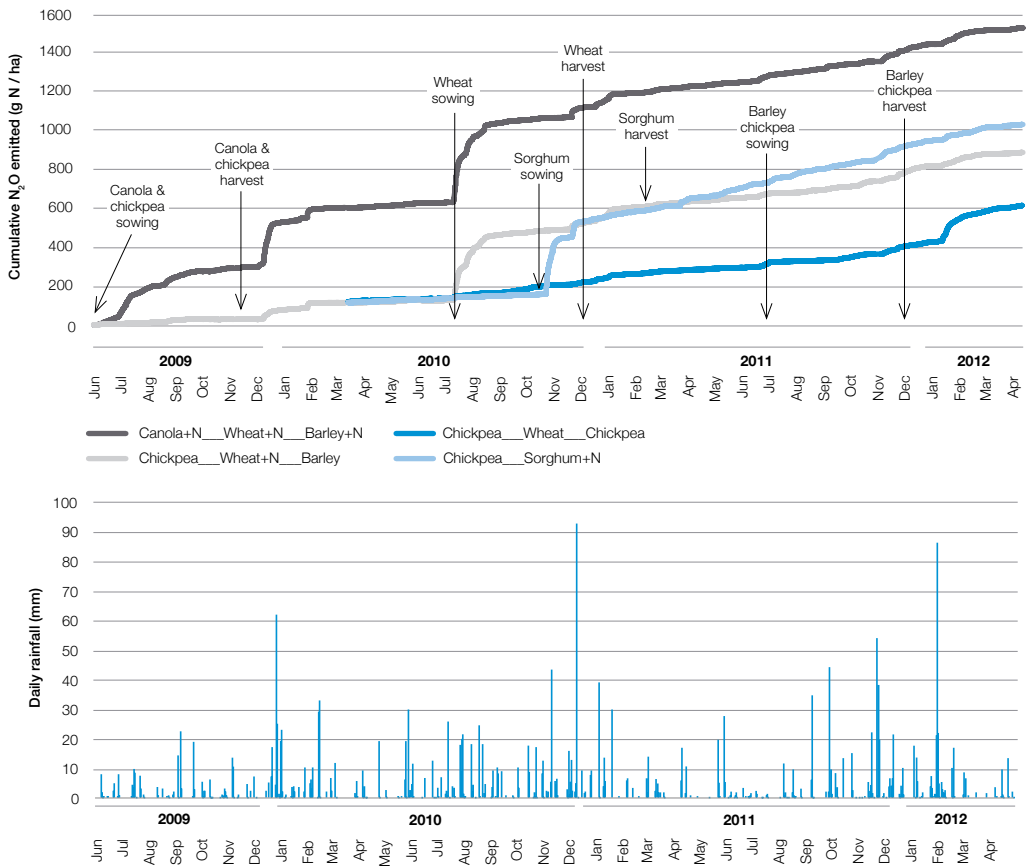
The data have also shown that land use and farming systems history have a major impact on nitrous oxide emissions, especially when soil moisture levels are high (and conducive to denitrification). For example, in high-rainfall southern Victoria, annual nitrous oxide emissions from cropped soils which have just come out of pasture may exceed 35 kilograms (in the absence of nitrogen addition). Similarly,

in residue-retained cane systems of northern Queensland, annual nitrous oxide emissions average 16 kilograms per hectare.

Specific findings of the program in 2011–12 include:

- In the western grain-growing region, incorporating a grain legume in a crop rotation can lower greenhouse gas emissions by up to 35 percent per tonne of wheat, by reducing the need for production, transport and hydrolysis of urea. This effect has also been confirmed in rain-fed cropping studies in eastern New South Wales. The extent to which incorporating grain legumes in cropping rotations lowers emissions depends upon the amount of urea that is saved by substituting grain legume-fixed nitrogen for synthetic nitrogen fertiliser.
- Liming acidic cropping soils in Western Australia may decrease nitrous oxide emissions resulting from the nitrification process following summer/autumn rainfall events, and increase methane uptake throughout the year. Liming will decrease total greenhouse gas emissions from wheat production only if decreased soil nitrous oxide emissions and increased methane uptake are not offset by increased carbon dioxide emissions resulting from the production, transport and dissolution of the applied lime.
- During the growth of three different crop legumes (chickpeas, faba beans and field peas) in the medium-rainfall northern grain-growing zones, nitrous oxide emissions from soils were found to be very low. All were significantly less than the emissions from canola crops treated with urea fertiliser.
- At the program's site at Tamworth, New South Wales, based on nearly three years of continuous measurement in four cropping rotations, a fourfold difference in the cumulative nitrous oxide emissions was observed between the rotation with no added nitrogen and the rotation with high nitrogen inputs (as shown in Figure 10). Heavy rainfall immediately after both wheat and sorghum sowing events led to significant nitrous oxide emissions in crops treated with nitrogen (applied as urea).

Figure 10: Cumulative nitrous oxide emissions from crop rotation treatments at Tamworth, New South Wales, plotted against daily rainfall



Gas collection chambers measure nitrous oxide in a canola crop at a trial site at Buntine, Western Australia. Photo: GRDC

Soil carbon sequestration

A partnership between the GRDC, CSIRO, the Department of Agriculture, Fisheries and Forestry, state government departments and universities, the Soil Carbon Research Program has quantified the soil carbon stocks that exist under various management practices across Australia's agricultural regions.

The program collects soil samples to develop a snapshot of the stock of soil organic carbon in cropping soils across Australia. In 2011–12, the program also looked at evidence of relationships between agricultural management practices and stored carbon stocks.

The research found that, within the top 30 centimetres of the soil, statistically significant differences in stored carbon stocks were often not detected despite strong variations in the management practices assessed (for example, continuous pasture versus continuous cropping). The inability to detect statistically significant effects may occur where the variability between the samples collected for specific management treatments is high.

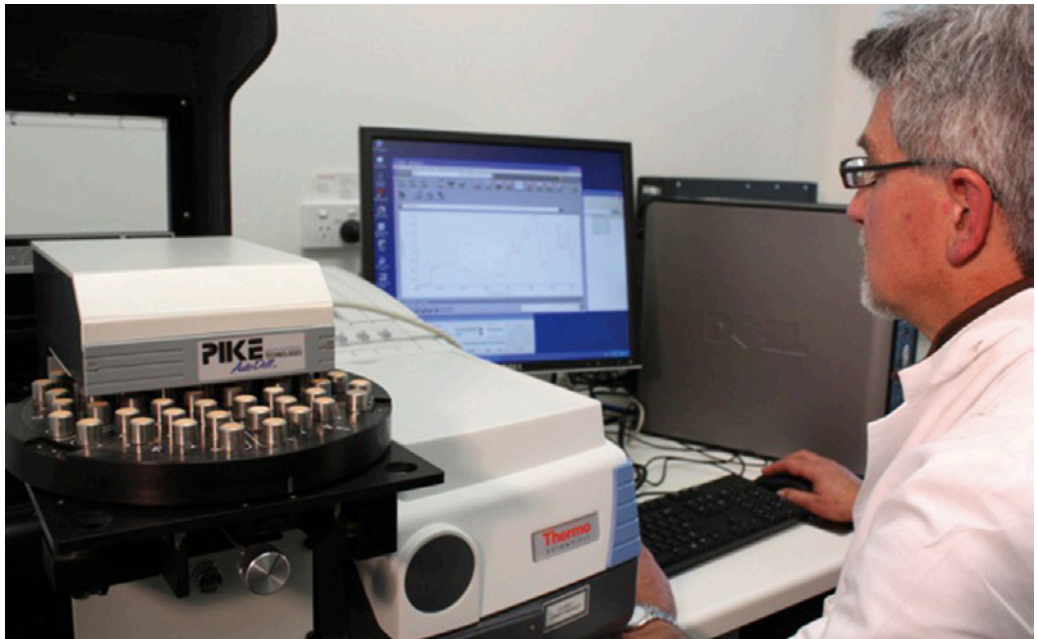
The evidence also showed that differences in how individual landowners implement management practices, in response to personal preferences or business requirements, may contribute significantly to the distribution of



A neutron density meter allows researchers to assess soil bulk density within minutes. *Photo: CSIRO Land and Water*

stored carbon. For example, within a given region the water use efficiency of continuous cropping systems may range from 60 percent to 90 percent because of landowner abilities and preferences. Under these conditions, differences in the input of carbon to soil will result and soil carbon values will vary, even under similar soil, climate and topographic conditions.

A particular management practice that has the potential to increase soil carbon may result in a loss of soil carbon if poorly applied. Equally, very good application of a practice that has been shown to decrease soil carbon on average may result in increased soil carbon stocks if levels of carbon capture and return to the soil are high enough.



A researcher uses diffuse reflectance mid-infrared spectroscopy to analyse soil samples as part of the national Soil Carbon Research Program. *Photo: CSIRO Land and Water*



A researcher uses a vehicle-mounted hydraulic soil sampler to obtain cores for testing soil carbon.
 Photo: CSIRO Land and Water

Since soil organic carbon stocks represent the balance between inputs and losses, net productivity, rather than management practices, is most likely to be the primary driver of carbon stocks. The program is considering future research projects aimed at providing landowners with targets for carbon capture (production) and carbon return to soil within defined management practices, rather than just suggestions about the adoption of particular practices.

Managing Climate Variability

The Managing Climate Variability program is now in its third five-year phase. The program aims to help farmers to manage risk and make business decisions using reliable climate forecasts, tools to translate the forecasts into applications, and the necessary knowledge to use forecasting resources effectively.

In 2011–12, gains were made in improving weather forecast accuracy, particularly for multiweek forecasting. With the support of the program, the Bureau of Meteorology is developing the science and associated products necessary to form a multiweek forecast service for Australia. Such a service would fill the

prediction capability gap between weather forecasts and seasonal outlooks.

As described in the GRDC's Annual Report 2010–11, the Bureau of Meteorology and CSIRO have developed a dynamic climate model, the Predictive Ocean Atmosphere Model for Australia (POAMA), which shows potential as a multiweek prediction tool. In 2011–12, POAMA was successfully upgraded to a new version, POAMA 2, which includes enhancements specifically aimed at multiweek forecasting.

POAMA 2 shows indications of useful skill for forecasts of rainfall and temperature for the impending fortnight, and even the subsequent fortnight for certain regions and at certain times of the year. For forecasting two weeks in advance, the most skilful periods are winter and spring for rainfall and spring for maximum temperature, and the skill tends to be focused over eastern Australia.

Forecast skill is found to be increased during extremes of the El Niño Southern Oscillation, the Indian Ocean Dipole and the Southern Annular Mode (SAM). Compared to those of the previous version (POAMA 1.5), the multiweek forecasts of temperature and rainfall over Australia are more skilful and reliable, and there is higher skill in predicting the Madden Julian Oscillation, the SAM and atmospheric blocking.

The multiweek experimental products and skill assessments can be viewed via the POAMA website, poama.bom.gov.au.

Also in 2011–12, the Managing Climate Variability program supported work to improve the forecasting of heat waves and prediction of the onset of the wet season in northern Australia.

Adapting wheat to changing patterns in frost and heat events

Extreme temperatures, which can severely reduce wheat yield, have been shown to be increasing. In 2011–12, with support from the GRDC, CSIRO conducted an analysis of past and projected future climates that highlighted the substantial spatial variability in frost and heat events across Australia's grain-growing regions.

As projected, the last frost and first heat events occur earlier in the season over time. It is predicted that, by 2050:

- the target window for sowing, defined as risk lower than 10 percent for frost (below zero degrees Celsius), will occur up to two months earlier
- the target window for flowering, defined as lower than 30 percent risk for extreme heat (above 35 degrees Celsius), will occur up to one month earlier.

Short-season varieties had a bigger shift in predicted target sowing windows and fewer changes in phenology than did medium-season and long-season varieties. Increasing temperatures also shortened the wheat-growing season by four to six weeks, especially during preflowering, as warmer winters accelerated crop development.

The analysis suggests that, as far as favourable rainfall and modern technology allow, early sowing and selection of genotypes with longer growing seasons could be the best strategies to adapt to future climates.

National Adaptation and Mitigation Initiative

The National Adaptation and Mitigation Initiative, which concluded in June 2012, was jointly funded by the GRDC and the Climate Change Research Program managed by the Department of Agriculture, Fisheries and Forestry.

The specific objectives of the project included:

- demonstrating practices that reduce net greenhouse gas emissions in the form of nitrous oxide
- assessing the emissions implications of demonstrated adaptations, to identify possible maladaptations
- increasing farmers' awareness and understanding of the viability of mitigation strategies and practices to manage them.

To achieve its objectives, the project established a network of growers and farming groups to demonstrate farming systems strategies that address adaption to climate change impacts and mitigation of greenhouse gases, including established techniques and new research outcomes.

In 2011–12, as part of the initiative, the Department of Primary Industries, Victoria, conducted a national survey of 1,743 grain and mixed farming businesses to gain an understanding of grain grower knowledge and attitudes regarding climate change.

The survey results show that many respondents have made changes on farm to manage the impact of climate, the most common being maintaining stubble over fallow ground (88 percent of respondents) and using no-till systems (80 percent).

Attitudes to climate change showed a considerable amount of diversity among farming businesses. Many respondents indicated that they consider climate variability to be part of natural variations and do not acknowledge changes in climate at all. Most agreed that they do not take climate change into account when thinking about the future. However, when asked specifically about particular effects of climate change (such as effects on rainfall, temperature and seasonal variations), a large proportion (47 percent) agreed that water supply on farm concerns them.

Attitudes to greenhouse gases varied. Only a minority of respondents (14 percent) believe that their farm is a net emitter. A third of respondents are unsure whether their farm is a net emitter, a storer or neutral.

Overall, lack of information was identified as the most common reason for not planning on-farm changes related to climate change. Some respondents said that they have already implemented what changes they can (26 percent), while others said that they do not intend to change because they are sceptical about climate change (12 percent) or about the potential benefits to their operation (10 percent).



Farm-specific temperature and rainfall records can assist growers to respond to seasonal variations.

Photo: Emma Leonard

As described in Part 1, collaboration is at the heart of the GRDC's approach to enhancing the profitability and sustainability of the Australian grains industry.

Strategic approach

Table 13 describes how the GRDC used effective collaboration to implement the four corporate strategies set out in its Strategic R&D Plan 2007–12.

Table 13: The GRDC's collaborative approach to achieving corporate goals

Partners	Approach
Strategy: Deliver against Australian Government priorities	
Research bodies; government agencies; participants from all sectors of the Australian grains industry; rural R&D corporations (RDCs) and participants from other rural industries	<p>Work with partners to identify and respond to major rural issues, such as climate change, water use efficiency and soil health.</p> <p>Share information on management issues such as project management, legal agreements, records management and intellectual property.</p> <p>Support and participate in cross-sectoral programs such as:</p> <ul style="list-style-type: none"> • Grain and Graze 2 • National Integrated Weed Management Initiative • National Invertebrate Pest Initiative • National Working Party on Pesticide Applications • Managing Climate Variability • Crop Sequencing • Water Use Efficiency • National Adaptation and Mitigation Initiative • Nitrous Oxide Research Program • Soil Carbon Research Program • cross-RDC evaluations of project clusters.
Strategy: Coordinate a national grains R&D agenda and portfolio	
Research bodies; government agencies; participants from all sectors of the Australian grains industry; RDCs and participants from other rural industries	<p>Play a leadership role in implementing the <i>Grains Industry National Research, Development and Extension Strategy</i>.</p> <p>Work with partners to tackle industry-wide issues such as:</p> <ul style="list-style-type: none"> • plant genetic resources and pre-breeding • crop breeding and variety trials • farming practices, including conservation farming and precision agriculture • integrated management approaches for weeds, pests and diseases • environmental issues, including climate change, salinity, water use efficiency and soil health • value chain issues, including end point royalties • capacity building and extension of R&D outcomes.
Strategy: Ensure R&D is market-driven	
Research bodies; pre-breeding and breeding companies and peak bodies; grain growers and grower groups; agribusinesses; commercial companies; participants from other rural industries; end users	<p>Consult carefully and widely when designing investments, to ensure that resources are allocated to projects with clear paths to market for technology and extension pathways for knowledge.</p> <p>Facilitate communication between parties, especially pre-breeding researchers and breeders, to ensure that commercial drivers are reflected in pre-breeding programs.</p> <p>Develop more effective tools for identifying and meeting market preferences, such as variety classification.</p>

Table 13: The GRDC's collaborative approach to achieving corporate goals *(continued)*

Partners	Approach
Strategy: Grow and leverage total grains R&D investment	
Research bodies; government agencies; participants from all sectors of the Australian grains industry; RDCs and participants from other rural industries; commercialisation partners, including breeding companies, agribusiness, biotech companies and other public and private organisations	<p>Find and engage with potential investors, in Australia and overseas, including by:</p> <ul style="list-style-type: none"> conducting communication activities to raise awareness of Australia's excellent reputation in rural RD&E and the successful outcomes of GRDC investments supporting scientific exchanges, such as conferences, travel awards and research scholarships, to strengthen relationships among researchers, growers and advisers. <p>Cooperate with research partners, and promote cooperation within the grains industry, to optimise economies and synergies.</p> <p>Provide capital at crucial stages in the development of technology and intellectual property.</p> <p>Invest in technology that would not be available to Australian growers without the support of a partnership approach, such as the Long-chain Omega-3 Canola Oil Research Collaboration.</p> <p>Ensure that the Australian grains industry has access to important technologies in cases where the technology owners might not otherwise bring them into Australian markets.</p> <p>Make use of Australia's intellectual property protections, such as plant breeder's rights, as an incentive for investment.</p>

International activities

Because Australia possesses few indigenous plant species related to its primary grain crops, collaborations with key international research centres are essential for ensuring that Australian plant breeders are able to obtain the genetic material necessary to produce superior varieties.

The GRDC has long-established strategic research alliances with two centres of the Consultative Group on International Agricultural Research (CGIAR): the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, and the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria.

Together, the three organisations deliver the CIMMYT–Australia–ICARDA Germplasm Evaluation (CAIGE) program, which:

- coordinates joint research projects designed to deliver benefit to Australian grain growers as well as to farmers in the developing world
- facilitates Australian access to valuable germplasm and expertise
- improves information flow between Australian and overseas plant breeders
- coordinates annual visits by Australian wheat breeders to CIMMYT or ICARDA for the purpose of selecting germplasm of relevance to the Australia production environment.

In 2011–12, the GRDC conducted a performance review of the projects it funds at CIMMYT and ICARDA, assessing performance against project objectives and fit with Australian strategic research objectives.

The review found that all GRDC-supported CIMMYT and ICARDA projects were fulfilling contractual obligations and providing Australian breeders with targeted access to wheat, barley and pulse germplasm containing traits of value to Australian grain production systems. Targeted pre-breeding activities funded by the GRDC in the CIMMYT had identified wheat germplasm



An International Center for Agricultural Research in the Dry Areas (ICARDA) visit to the GRDC in September 2011. From left: Vince Logan (GRDC Executive Manager Commercial), Omid Asari (GRDC Project Manager Traits), Mahmoud Solh (ICARDA Director General), John Harvey (GRDC Managing Director), Kamil Shideed (ICARDA Assistant Director General International Cooperation & Communication), Jorge Mayer (GRDC Manager Yield and Quality Traits). *Photo: GRDC*



A CIMMYT–Australia–ICARDA Germplasm Evaluation (CAIGE) Meeting in October 2011. From left: (back row) Imtiaz Muhammed (ICARDA), Keith Perrett, Omid Ansari and John Harvey (GRDC), Richard Trethowan (University of Sydney), Jorge Mayer (GRDC); (front row) Brondwen MacLean (GRDC), Sandra Micallef (University of Sydney), Francis Ogonnaya (ICARDA), Julio Huerta (CIMMYT). *Photo: GRDC*

with crown rot resistance superior to current Australian resistance benchmarks, while ICARDA wheat lines had provided enhanced yield under severe water deficit conditions in Western Australia.

The review also identified opportunities for collaboration to significantly raise wheat yield potential through involvement in the CGIAR's strategic initiatives, such as the Wheat Yield Consortium and the Wheat program.

The GRDC also hosts visitors from overseas, as an opportunity to reinforce cooperative relationships and improve understanding of the drivers of the global grains industry. In 2011–12, noteworthy visitors included:

- the Chief Executive Officer and the Director of Research and Extension of the Foundation for Arable Research, New Zealand, on 8 September 2011
- five guests from ICARDA—the Director General; a senior research scientist and the Assistant Director General International Cooperation & Communication on 30 September 2011; and a wheat breeder and a chickpea breeder on 18 October 2011
- a wheat pathologist from CIMMYT, on 18 October 2011
- two directors of wheat-breeding activities for Bayer CropScience, from France and the United States, on 31 October 2011
- a professor of molecular genetics and plant biology from the University of Alberta, Canada, on 20 December 2011
- an 11-person Chinese delegation from the Henan Academy of Agricultural Sciences, Henan Agricultural University, Luohe Academy of Agricultural Sciences,

Kaifeng Academy of Agricultural Sciences, Zhoukou Academy of Agricultural Sciences and Henan Tianmin Seed Co. Ltd, on 2 March 2012

- an emeritus professor of plant sciences from the University of Saskatchewan, Canada, on 21–26 May 2012
- a research geneticist from the United States Department of Agriculture Grain Legume Genetics and Physiology Research Unit, on 18–22 June 2012.

Collaborative projects

Most of the RD&E activities described in this annual report were supported by the GRDC in collaboration with research partners, such as government agencies, research organisations, plant breeders, seed companies, agricultural companies and advisers, and grain marketers, exporters and end users.

In particular:

- Tables 3 and 5 provide examples of collaborations that directly addressed the R&D priorities of Australian grain growers and the Australian Government.
- Table 7 provides examples of collaborations that helped the GRDC to achieve its strategic corporate objectives.
- The reports on performance for the four output groups describe collaborations that assisted the GRDC to fulfil its performance objectives and achieve its outcome.
- Appendixes B and C provide details of the GRDC's RD&E investments.

Output Group 1 – Practices

The integration of natural resource management practices into cropping systems is essential for the long-term viability of the grains industry. The Practices output group developed and promoted innovative and integrated practices and technologies to increase the grains industry's capacity for on-farm change, particularly in the areas of soil constraints, water and nutrient use, crop threats, environmental variability, agronomic improvements, and biosecurity. Through the Practices output group, the GRDC aligned sustainable production systems research at a farm level with broader, community-based land use initiatives.

The output group was focused on improving the timeliness, relevance and quality of information packages on offer to customers. Alliances between growers and advisers have become increasingly important in ensuring that new and improved varieties, practices and technologies are integrated into farming systems.

Recognising that information needs and preferred delivery mechanisms differ according to production region, enterprise mix and individual circumstances, the Practices output group packaged and tailored regionally specific information and delivered it to growers and advisers through appropriate networks. The further development of research and delivery platforms and relationships with extension networks will continue to accelerate RD&E outcomes.

Table 15 summarises the achievements of the Practices output group against its performance measures for 2011–12 and its objectives and strategies for 2007–12. The following sections describe some of the results of the output group's investments during the year.

Dual-purpose crops

In the past decade, the emergence of long-season, high-value, disease-resistant wheat varieties that can be grazed by stock in winter with minimal impact on grain yield has created a significant opportunity for mixed farmers in the high-rainfall zones to increase farm income by increasing winter stocking rates while maintaining or increasing the grain production area on farm. The recent

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demonstration that canola can also be managed as a dual-purpose crop in these systems has presented further opportunities to increase the productivity of mixed farming systems within the high-rainfall zone.

With support from the GRDC, a team of CSIRO scientists has been investigating new strategies to capture synergies in crop and livestock production by integrating dual-purpose crops into mixed farming systems.

The project has combined previous work on dual-purpose cereal and canola in an attempt to derive new farming systems in which pasture, dual-purpose cereal and dual-purpose canola are integrated to provide producers with extra options and, ultimately, increased profit. As well as defining new productive mixed farming systems for high-rainfall areas, the project has provided robust guidelines for the management of livestock, crops and pastures, including managing the resource base (protecting the soil) by resting pastures during critical periods.

The results of the team's work have been rapidly adopted, with significant effect, in south-eastern Australia. The project has been extended to other areas, including the high- and



Jen and Rob Egerton-Warburton of Mobrup, Western Australia, check the growth of a crop before moving sheep onto the paddock for grazing. *Photo: Nicole Baxter*

medium-rainfall zones of Western Australia and parts of the Northern Region such as Armidale, New South Wales, and the Darling Downs, Queensland.

Weed management

The Australian Herbicide Resistance Initiative, led by the University of Western Australia and supported by the GRDC, the Rural Industries Research and Development Corporation and the Australian Research Council, has helped the grains industry to improve weed management strategies by increasing knowledge and understanding of herbicide resistance. This is a significant contribution towards sustainable cropping systems and a profitable future for the grains industry.

In 2011–12, the initiative delivered results on the variability between weed populations in developing resistance to the new selective herbicide Sakura®. It was the first time that studies on the potential resistance risks of a new herbicide had been completed before the product was released. The findings have been incorporated into the resistance management program for the product.

The program's research on the evolution of herbicide resistance through recurrent selection at sublethal herbicide doses has established that:

- cross-pollination is a significant factor
- ryegrass can rapidly evolve polygenic herbicide resistance, but this effect can be minimised using herbicides in conditions and doses that cause high mortality.

Research on resistance at sites targeted by ACCase (acetyl coenzyme A carboxylase) herbicides provided insight into resistance evolution in polyploid species versus diploid species. Further work, on ALS (acetolactate synthase) resistance mechanisms, provided mutation identification tools as well as molecular markers for rapid diagnosis of resistance.

Research is underway in the Southern Region to identify the reasons why emerging weed issues are arising, through targeted biological and ecological studies on emerging weed species, and to recommend practical solutions where possible. The project has begun to develop a standard protocol for determining soil disturbance by disc seeders and tine seeders, to improve the effectiveness of soil-incorporated herbicide use.

Through the Australian Glyphosate Sustainability Working Group, of which the GRDC is a member, GRDC-supported research is underway to support greater adoption of strategies likely to delay or manage the development of resistance to glyphosate, paraquat and Group I herbicides. The project consists of a combination of glasshouse research and field research.

Pest management

Integrated pest management

With support from the GRDC, the cross-sectoral National Invertebrate Pest Initiative focused on delivering new strategies to improve the effectiveness of integrated pest management—and, in turn, the commercial return from the adoption of integrated pest management—during 2011–12.

To help growers and advisers improve their pest management decisions, the initiative also:

- completed a review of pest thresholds for several control and beneficial species
- provided significant intelligence updates and advice through services such as The Beat Sheet, in the Northern Region; PestFacts, in the Southern Region; and PestFax, in the Western Region
- improved materials for invertebrate identification training by revising the publication *I Spy: Insects of Southern Australian Broadacre Farming Systems, Identification Manual and Training Resource*.

Insecticide resistance

In 2011–12, the GRDC supported research to deliver baseline data on insecticide sensitivity for several key invertebrate pests, and to develop a strategic surveillance program to monitor insecticide resistance in green peach aphid across all Australian grain-growing regions. The results will contribute to the development of resistance management guidelines, incorporating improved knowledge of resistance mechanisms to prevent resistance development in green peach aphid and other pest species.

During the year, redlegged earth mite populations in South Australia, Victoria and Western Australia were screened for insecticide resistance. This work aims to improve understanding of the current distribution and potential for future spread of resistance in this species. At this stage, resistance has been detected in Western Australia only, and it appears that management practices rather than environmental factors are limiting the spread of resistance. The findings from this project will lead to improved control options for target mites and lucerne flea.

Pest-suppressive landscapes

Two observations have triggered interest in developing natural pest control as part of integrated pest management strategies at the scale of field, farm and landscape:

- Mobile pests do not recognise field or farm boundaries, and attempts at controlling them using field-based approaches have often failed.
- Some landscapes appear less prone to invertebrate pest infestations than others, suggesting that there are features of landscapes that may be managed to create more pest-suppressive landscapes.

A project funded by the GRDC in conjunction with CSIRO, the Department of Agriculture and Food, Western Australia, and the Department of Employment, Economic Development and Innovation, Queensland, has conducted field experiments to study the sources of habitats for pests and their natural predators, assess the movement of pests and predators between habitats, and determine the time to colonisation of pests and predators during crop emergence.

The experiments were conducted in areas of the Darling Downs, Queensland, the southern mixed farming region of New South Wales, and

the Stirling Range, Western Australia. Each experiment monitored two landscape types, one low in native vegetation (less than 10 percent) and the other high in native vegetation (greater than 10 percent). The findings included:

- Pests are consistently found in native vegetation in low numbers throughout the year. Even in peak periods, the populations in native vegetation are smaller than the populations in some of the crops monitored, such as cotton or sorghum.
- In New South Wales, large numbers of pests are found in lucerne (up to 70 per square metre) and grass pasture (approximately 30 per metre). Lower pest densities are found within and near to native vegetation, demonstrating the ecosystem service that having native vegetation strategically placed near crops can provide.
- In native vegetation, beneficial predator populations remain consistently high throughout the year, whereas in crops they fluctuate and are not generally present over winter. In landscapes with either high or low proportions of native vegetation, predators are present at higher densities than they are within the crop. The presence of predators in native vegetation creates spillover pest control effects into nearby crops.

The finalisation of the project will include modelling to determine how much vegetation is needed to provide a level of beneficial pest control, and how vegetation should be placed within the cropping landscape to optimise the benefits.

Disease management

Supported by the GRDC, the Australian Cereal Rust Control Program contributes to the protection of Australian cereal crops against rust diseases by providing:

- timely warnings to growers of the threat of new rust pathotypes
- new genetic sources of rust resistance and technologies to allow the introduction of these resistances into cereal germplasm suitable for growing in Australia
- support to entities involved in improving cereal crops through breeding for rust resistance.

The program has helped to reduce dependency on pesticides, and greatly reduced both the probability and the likely impact of occurrences of rust diseases in cereals, particularly in areas of high risk, by ensuring genetic diversity and enabling rapid response to sudden pathogen changes.

Banding of new fungicides is likely to be an important tool to help growers to protect their crops from root disease caused by *Rhizoctonia* fungal pathogens. The program expects to develop label recommendations to enable growers to use this technology within four years. The use of new fungicides to reduce yield losses caused by rhizoctonia disease in wheat and barley is expected to save millions of dollars for growers in the Southern Region. The greatest benefits are expected to be achieved by growers using minimum-till seeding systems in districts with low to medium rainfall.

To help the grains industry respond to future fungicide resistance risks, the program is developing tests to measure fungicide sensitivity and determine the presence of known mutations associated with fungicide resistance. This research has been applied to strobilurin, triazole and benzimidazole fungicides and to *Stagonospora nodorum* and the pathogens that cause tan spot, net blotch, powdery mildew, ascochyta blight and botrytis. It will determine the extent and impact of fungicide resistance on major pathogens of major crops to all registered at risk fungicides. The program will use the results to develop strategies that will limit the damage caused by fungicide resistance.

Pesticide application

In 2010, the Australian Pesticides and Veterinary Medicines Authority (APVMA) introduced new label requirements designed to reduce the unwanted effects of spray drift in pesticide application. The provision of additional spray application technology requirements was recognised by most stakeholders as constructive and informative. However, the requirement for significantly larger downwind buffer areas raised concerns, particularly regarding the application of pesticides in areas where geography, established boundaries and field size prevent the practical adoption of such drift mitigation techniques.

In response to these developments, the industry-based National Working Party on Pesticide Applications was established with

support from the GRDC. The working party includes representatives from the grains, horticulture, viticulture, cotton and sugar industries. It provides its members with an opportunity to gather further information on constructive options for the management of pesticide spray drift, review industry current best management practice, and engage with all stakeholders on the development of spray drift management policy.

In 2011–12, the University of Queensland, with funding from the GRDC, completed a new assessment of Canadian research to support the generation of deposition curves for nozzles that produce very coarse and extremely coarse droplets. As shrouds are a recognised viable method for reducing the spray drift emitted by boom sprayers, this project also entailed an independent wind tunnel and field evaluation of a commercial spray shroud. This work has been submitted to the APVMA for evaluation with the approval of the National Working Party on Pesticide Applications.

A three-year research project has been established at the University of Queensland to develop a database accommodating nozzles, formulations and adjuvants that will support the use of drift reduction technologies for the application of pesticides using ground boom sprayers. In addition, this project has begun to develop wind tunnel spray deposition curves that can be used to establish spray quality boundaries and assess the effectiveness of drift reduction technologies.

Farm business management

In 2011–12, the GRDC implemented a number of key activities to help Australian grain growers to manage farm risk in a diverse and unpredictable business environment.

Resources

The Farm Gross Margin and Enterprise Planning Guide 2012 is a tool to assist grain growers in the Southern Region to plan their broadacre farming enterprises. It includes information on product and input costs as well as blank templates for planning cash flow and calculating margins.

The GRDC worked closely with the South Australian Grains Industry Trust to develop the revised edition of the guide in 2011–12.

The publication was made available through the GRDC's website and 6,600 hard copies were distributed free of charge to grain growers across South Australia.

The GRDC also provided regular commentary and analysis on farm business management issues in the 'Dollar\$ and \$en\$e' column of its newspaper, *Ground Cover*. The GRDC's series of fact sheets for 2011–12 included topics relevant to farm business management, such as grain storage. (The GRDC's publications are discussed in the report on performance for Output Group 4—Communication & Capacity Building and listed in Appendix D.)

Farm Business Management Update program

In response to the challenges facing grain growers and their advisers in optimising profit, equity growth and risk management, the GRDC launched the Farm Business Management (FBM) Update program in 2011–12. The program is designed to instil greater confidence in decision making, risk management and general business management among growers and their advisers.

The update program recognises that although every grain grower has their own individual approach to optimising performance, growth and profit, there are inherent business dilemmas that are relevant to most farm businesses.

Two types of event are offered through the program: FBM Grower Updates, designed specifically for grain growers; and FBM Adviser Updates, designed for advisers from a range of sectors, including farm inputs, agronomy, crop production, accounting, banking, insurance and business advice. One of the core benefits of the FBM Adviser Updates is the opportunity for advisers from different sectors to work together in tackling common farm business issues.

FBM Grower Updates and FBM Adviser Updates will be conducted in all key cropping regions of southern Australia over the next three years. Each update event puts relevant, timely and real farm business problems under the microscope. Well-regarded consultants provide information and analysis to inform and develop awareness of management decisions that grain-growing businesses must make.

The design and subject matter for the updates were tested through pilot events held for advisers in Adelaide, South Australia,

and Bendigo, Victoria; and for growers in Cummins, South Australia, and Skipton, Victoria. The program commenced in March 2012 with three FBM Grower Updates, held in Forbes and Temora, New South Wales, and Donald, Victoria.

The GRDC used its customer relationship management database to distribute two FBM Update newsletters, providing stories and links to topics and speakers from the events, to growers, agronomists, accountants and other interested readers.

Grain marketing technical workshops

In 2011–12, the GRDC funded a program of specialised workshops designed to improve grain growers' confidence and skill in grain marketing. The first of the two workshops was conducted at Glenelg, South Australia, in April 2012; the second will be held in Swan Hill, Victoria, in September 2012.

The workshops assist participants to:

- develop an understanding of
 - the grain-marketing environment, including major grain-trading exchanges and how they impact on prices in Australia
 - the benefits of position reporting and cost of production for grain marketing
 - the strengths and weaknesses of commonly used grain-marketing products
 - terminology and concepts unique to grain marketing
- competently interpret the risks involved when using grain-marketing products and tools, and apply such products and tools to maximise potential business income
- learn tips and tricks to make harvest administration and contract management easier
- develop a grain-marketing plan that considers key farm management principles.

The workshop program includes a thorough evaluation process, including mechanisms to collect information from participants before, during and after the workshops. Of the participants who responded to a post-workshop survey, 56 percent had applied the skills, processes or new tools gained from the workshop to their business (and 43 percent had not); almost 45 percent had developed marketing plans for their businesses.

National Variety Trials workshops

To help agronomists, consultants and other advisers understand the science behind variety selection and performance, and the role of National Variety Trials (NVT), the GRDC conducted technical workshops in 2011–12.

The workshops were held in August 2011 in Wagga Wagga, New South Wales; Adelaide, South Australia; and Birchip, Victoria. Participants heard presentations from industry experts and decision-makers on a range of topics, including:

- plant breeding—varieties that are currently available, and how they perform; technologies used in new variety development; and varieties of the future
- plant physiology—the relationships between developmental genes, frost, drought, heat stress, flowering and seeding time; and the impacts of those relationships on variety performance
- agronomy and variety decision making—steps to selecting a variety; ways to improve decision making and know whether you are getting it right; and the regional relevance of variety selections
- NVT information—sorting NVT data to get the information clients need; tailoring variety recommendations to suit changing seasonal situations; and accessing and interpreting information from the NVT Online website (and providing feedback for its improvement).

The workshop featured interactive sessions, enabling advisers to further develop their skills in putting variety selection theory into practice. Each participant received a workshop manual that highlights the latest in variety selection, research, trends, and science and industry information.

Regional Cropping Solutions

In 2011–12, through the Regional Cropping Solutions initiative, the GRDC established networks of more than 100 grain growers, consultants and researchers across nine separate areas in southern and western Australia to provide on-the-ground insights into priority issues requiring R&D attention.

Increasing the GRDC's ability to capture information at the front line of grain production places the corporation in a better position to invest in RD&E where and when it is most needed. The Regional Cropping Solutions Networks (RCSN) and the Northern Region Grower Solutions Groups ensure that the GRDC is actively listening to and engaging with growers to identify and articulate local cropping issues and help determine how best to tackle those issues.

The networks also play an influential role in the GRDC's thrust to fast-track investments for RD&E projects aimed at improving grain growers' productivity, profitability and sustainability. Typically, this sees field trial work tackling some of the most pressing issues faced by growers in the region, backed up by practical communication and extension activities.

In the Western Region there are five Western Australian networks under the RCSN initiative, which comprise in total 70 growers and industry members plus a Western Regional Panel member. The Southern Region has four RCSN areas, based on rainfall zone or irrigation use, and networks collectively comprising 42 growers and agronomists plus two to three Southern Regional Panel members. The networks play a key role in capturing research ideas and prioritising short-term issues.

The Northern Region model for identifying and responding to regional issues is different. The main difference is that the four Northern Region GRDC Grower Solutions Groups have a substantial budget with which to plan, design and deliver local activities. Within each group there are multiple nodes which each have a local consultative committee consisting of growers, key local advisers and agency extension officers. The committees identify and prioritise specific agronomic production issues and provide a key link to the area represented by each node. They meet twice a year to review results and identify and prioritise new or continuing projects.

This initiative is part of a renewed effort to shorten the length of the adoption cycle for technologies and practices. This effort will also involve adjusting some of the GRDC's business procedures to speed up the investment process.

Case study

Pathways to registration improve pesticide access

Grain growers' access to effective pesticides is constrained by many factors, from pesticide resistance to the commercial failure of commercial producers to fund the costs of meeting regulatory requirements necessary to deliver their products to the Australian market. With the support of consultants and Plant Health Australia, and the guidance of the regulator, the Australian Pesticides and Veterinary Medicines Authority (APVMA), the GRDC has established the Pathways to Registration program to facilitate the grains industry's access to appropriate pest management options.

The program is designed to improve grain growers' access to effective pesticides by:

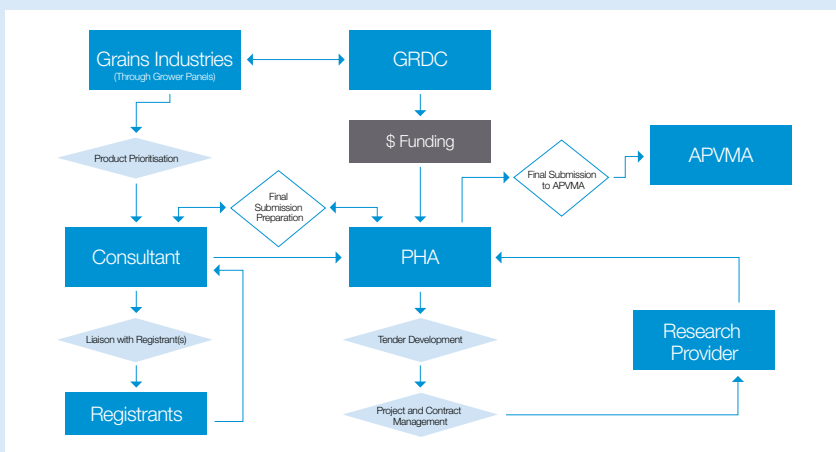
- facilitating access to necessary pesticide options and label improvements that were not previously made available to growers via pesticide manufacturers and formulators because of commercial market failure
- providing an improved, rapid pathway to registration for the outcomes of GRDC investments in pesticide R&D.

While APVMA minor use permits are potentially available as a means of gaining access to improved pest management options for a number of developing grain crops, they are not generally an option for major broadacre agricultural crops such as wheat, barley, canola, peas and lupins. The option of gaining label extensions (which authorise the use of a pesticide for an additional purpose) via Category 25 applications has been established as a means for major crop industries to gain approved access to those options. Figure 11 outlines the model that the program uses to expedite Category 25 submissions.

Plant Health Australia facilitates this program by providing essential management of the registration process through the distribution of research funds to consultants, contractors, and research providers; contract management; liaison and provision of information between parties; and submission of Category 25 applications to the APVMA. This is supported by consultants who facilitate the prioritisation of the pesticides program and manage the technical aspects of the submission process.

As well as creating a more rapid pathway to registration for GRDC pesticide R&D, this program will improve the grains industry's engagement with the key pesticide industry stakeholders, such as the APVMA and pesticide registrants. Overall, this project will result in improved pesticide use by growers, reducing production costs and improving quality assurance compliance.

Figure 11: Pathways to Registration approach to facilitating Category 25 submissions



APVMA = Australian Pesticides and Veterinary Medicines Authority, PHA = Plant Health Australia,
Source: GRDC and Plant Health Australia.

Case study

Phone app takes weed identification into the paddock

Reflecting the GRDC's commitment to delivering resources to growers in the formats that they prefer, in 2011–12 the GRDC's popular weed identification guide was made available for use via smartphone.

Australians have enthusiastically embraced smartphone technology, and many grain growers are part of that trend. A phone is a tool that growers tend to carry with them at all times, so it makes sense to use it as a platform for delivering immediate information to support on-farm decision-making processes.

The GRDC's first phone app, the Weeds: the Ute Guide app, was launched at a committee meeting of the National Integrated Weed Management Initiative in Adelaide in November 2011. It is available for download free of charge by users in Australia and New Zealand, for the Apple iPhone®, iPad® and Android™, from the GRDC website.

The Weeds: the Ute Guide app was created in a user-friendly format to streamline the weed identification process. Once installed, it can be accessed anywhere, at any time—even where there is no mobile phone coverage. It means that a grower walking in a paddock to inspect crops can quickly and easily identify any weed that they are not sure about.

A calendar for each weed shows which time of the year the weed is likely to be present in the paddock. Where possible, photographs of the weed at various growth stages are provided to assist with identification. Users can search, identify and compare photographs of weeds, and email them to their networks via their phone's inbuilt contacts list.

The app includes the most common annual, biennial and perennial weeds of the southern and western grain-growing regions. A similar weeds identification product for northern grain growers is under development.

The GRDC is planning to convert a number of other items in the popular The Ute Guide series into phone apps. Apps for other topics will soon follow.

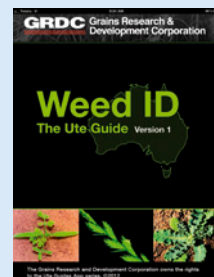


GRDC Webmaster Nikki Bricknell and Manager Delivery Platforms Tom McCue demonstrate the Weeds: the Ute Guide phone app.

Photo: Emma Leonard



Site Manager Scott Boyd and Don McCaffery from the New South Wales Department of Primary Industries use the app to identify weeds at the National Variety Trials wheat trials site near Parkes, New South Wales. *Photo: Paul Jones*



Grower survey snapshot

Table 14: Adoption levels of specific farm management practices and technologies, as assessed by GRDC grower surveys, 2004 to 2012, by proportion of growers surveyed (percent)

Key performance indicator	2004	2005	2006	2008	2010	2012
Specific practice change						
Growers improving soil condition, as indicated by the increased use of:						
• lime	40	41	39	42	48	50
• gypsum	51	48	49	53	44	51
• controlled traffic	15	24	20	30	22	29
Growers managing nutrients and minimising nutrient loss increases, as indicated by the increased use of:						
• nutrient budgeting	66	63	54	59	50	56
• variable rate technology	16	16	20	20	20	17
Growers taking up precision agriculture and related practices	36	44	48	63	77	87
Growers adopting new or different management practices to actively manage climate variability ^a	n/a	n/a	53	64	60	52
Growers monitoring 'plant available' water in the soil	33	33	32	35	28	34
Growers monitoring depth to the water table	27	28	24	26	22	22
Growers with improved confidence in managing:						
• weeds	84	81	86	86	84	84
• pests	73	71	79	70	70	82
• diseases	78	78	82	78	82	82
On-farm change and GRDC influence						
Growers adopting new or improved farming practices in the past five years	82	78	79	78	79	72
Growers adopting actions to ensure longer term sustainability of farm	92	88	89	86	89	92
Growers adopting actions to ensure longer term sustainability of farm as a result of GRDC-specific activities or initiatives	40	40	45	40	42	48
Growers influenced in a major way by GRDC information in motivating change on-farm	21	21	18	30	31	25

^a This measure was introduced in 2006.

Note: The Grower Survey was suspended in 2007 as part of the GRDC's drought response and is now conducted every second year.

Table 15: Practices overview

Output Group 1—Practices

Objective

Better practices developed and adopted faster

Strategies

- Identify and develop profitable, innovative and integrated practices and technologies
- Ensure active grain grower involvement and commitment
- Undertake targeted extension and adoption through appropriate delivery channels
- Enhance sustainable management of natural resources

Investment budget for 2011–12

\$66.53 million

Performance for 2011–12

Performance indicators	Targets	Achievements
<i>Identify and develop profitable, innovative and integrated practices and technologies</i>		
AOP: Improved land use choices and timing of activities to increase profit	<ul style="list-style-type: none"> • Development of a framework (including economic, biophysical and social components) for diagnosing suboptimal crop performance. • Application of the diagnostic framework in each of the three grain-growing regions. 	<p>Availability of the MyCrop website, including a yield constraint calculator and a wheat diagnostic tool, for growers in the Western Region.</p> <p>Ongoing development of frameworks for wheat, barley, canola and chickpea for all grain-growing regions.</p>
AOP: Insecticide and fungicide resistance surveillance management	<ul style="list-style-type: none"> • Resistance development surveyed and confirmed where necessary. • Appropriate management strategies deployed by growers to manage and delay the occurrence of insecticide and fungicide resistance. 	<p>Delivery of a resistance surveillance program which has identified fungicide-resistant powdery mildew in Western Australian barley and miticide-resistant redlegged earth mite biotypes.</p> <p>Delivery of strategies, information packages and training to assist growers to manage resistance in pests, weeds and diseases.</p>
PBS: Effective management of weed, disease and insect biosecurity risks	<ul style="list-style-type: none"> • 90% grower confidence in managing pests, weeds and diseases. 	<p>Results of the 2012 Grower Survey showing improved confidence in the management of pests and diseases (82%) and weeds (84%).</p>
AOP: Farm businesses provided with the skills to strategically identify priorities to maximise profit gains in individual businesses	<ul style="list-style-type: none"> • Grain growers better able to access, interpret, question and learn from the RD&E information available. • Grower and adviser training programs developed. • Development of a series of fact sheets on business management for growers. 	<p>Piloting of farm business management training for advisers and growers in the Southern Region.</p> <p>Delivery of Farm Business Management Updates.</p> <p>Publication of the 'Dollar\$ and \$en\$e' column in <i>Ground Cover</i>.</p>
AOP: Coordinated pesticide research results in a rapid pathway to registration of pesticide applications	<ul style="list-style-type: none"> • Generic pesticide labels improved to allow grower access to new use patterns of five registered products increasing to 10 per annum in the second year. 	<p>Through the Pathways to Registration program, submission of six industry-initiated label changes, focusing on summer weed control, stem rust and insect control, to the Australian Pesticides and Veterinary Medicines Authority.</p>
<i>Ensure active grain grower involvement and commitment</i>		
AOP: Growers have greater input to issue identification and priority setting of GRDC portfolio	<ul style="list-style-type: none"> • GRDC adoption of the Regional Cropping Solutions initiative for issue identification, investment decision and resolution. 	<p>Establishment of five Regional Cropping Solutions Networks in the Western Region and four in the Southern Region to complement the existing Northern Region Grower Solutions Groups.</p> <p>Appointment of members representing farming, agronomy, agribusiness and research sectors for each network. Commencement of projects in each zone.</p> <p>Collection of feedback on industry issues and priorities within each zone to inform GRDC regional advisory panels.</p>

Table 15: Practices overview (continued)

Performance for 2011–12		
Performance indicators	Targets	Achievements
AOP: Growers have greater input to issue identification and priority setting of GRDC portfolio (continued)	<ul style="list-style-type: none"> Appointment of facilitators/ coordinators to assist groups in identifying relevant RD&E activities and undertaking appropriate RD&E actions. 	Appointment of facilitators to provide coordination services and on-the-ground links for each zone and network.
PBS: Expanded participatory action research program to involve growers, agribusiness networks and researchers in jointly developing comprehensive sustainable management solutions to farming challenges	<ul style="list-style-type: none"> 40% of growers adopting new or improved farming practices due to GRDC activity. 	Results of the 2012 Grower Survey showing 38% of growers adopting new or improved farming practices due to GRDC activities.
<i>Undertake targeted extension and adoption through appropriate delivery channels</i>		
PBS: Improved profiling of the GRDC customer relationship management database	<ul style="list-style-type: none"> Maintain and update. 	Continual updates and improvements to the customer relationship management database.
AOP: Improved web interface	<ul style="list-style-type: none"> GRDC website that is more relevant and friendly to growers and researchers, to assist the extension of R&D information. Implementation of a website interface that is complementary to face-to-face learning and is not seen as an alternative to hands-on programs. 	<p>Analysis of website user needs based on:</p> <ul style="list-style-type: none"> feedback from national focus groups of growers and advisers a study of grower priorities in social media. <p>Major enhancements to the GRDC website, including a new look and feel, improved search ability and 'hot topics' to provide quick references for users.</p>
AOP: Continuation of technical workshops	<ul style="list-style-type: none"> Continued delivery of issue-specific workshops for growers, advisers and researchers. In-depth analysis and discussion of key issues by participants in grains RD&E. 	<p>Delivery of technical workshops on topics including:</p> <ul style="list-style-type: none"> grain marketing technology in agriculture crop nutrition GM canola management integrated weed management National Variety Trials foliar disease management precision agriculture grain storage pesticide application and spray drift management.
PBS: Improved access for growers to technical workshops and training materials	<ul style="list-style-type: none"> 17,600 growers and industry representatives participating in GRDC-funded activities. 	17,600 growers and industry representatives participating in GRDC-funded activities.
<i>Enhance sustainable management of natural resources</i>		
AOP: Grain growers actively demonstrating best management practices to minimise off-site impacts of pesticides and fertilisers	<ul style="list-style-type: none"> Quantification of pesticide and nutrient loss from grain farms. 	Identification and review of 24 existing studies of pesticide and nutrient loss from grain farms, including validation of the HowLeaky? model.
	<ul style="list-style-type: none"> Development of a grains industry best management manual, in consultation with growers. 	Review of existing programs and manuals, and development of a plan for a chemical and fertiliser stewardship program (in consultation with growers) including the place for a best management manual.
	<ul style="list-style-type: none"> Grain grower adoption of best management practices. 	Results of the second Farm Practice Survey, conducted in 2011 among 1,312 grain farming businesses (covering 2.36 million hectares of crop area, approximately 8% of the area of crop planted in Australia), which showed that growers are adopting best management practices.

Table 15: Practices overview *(continued)*

Performance for 2011–12		
Performance indicators	Targets	Achievements
PBS: Grain growers adapting to climate change and mitigating on-farm greenhouse gas emissions	<ul style="list-style-type: none"> 40% of growers using climate risk management tools to manage climate variability. 	Results of the 2012 Grower Survey showing 52% of growers adopting new or different management practices to actively manage climate variability.
PBS: Coordinated national investment in nutrient management research, data management and communication	<ul style="list-style-type: none"> 60% of growers using nutrient budgeting. 	Results of the 2012 Grower Survey showing 56% of growers managing nutrients and minimising nutrient loss through the increased use of nutrient budgeting.

AOP = annual operational plan, PBS = portfolio budget statements

What's in the RD&E pipeline for 2012–13?

- Investment to reduce the future threat of fungicide shortages and broaden the range of fungicide actives to manage resistance and potential regulatory changes, by delivering new pulse and cereal fungicide registration packages of new modes of action.
- New investments to scope potential technologies and approaches to more cost-effectively manage snails and slugs, based on increased understanding of their distribution and more effective biological, cultural and chemical control options.
- New investment in the Plant Biosecurity Cooperative Research Centre, to assist the grains industry to enhance its biosecurity preparedness and meet its obligations to increase risk mitigation activities.
- A collaborative program on post-harvest grain storage that will develop an industry-wide systems approach, integrating a range of tools and treatments, for managing stored-grain insect pests at all critical points in the Australian grains supply chain.
- The development of online learning tools for growers.
- A scoping study of potential agronomy apprenticeship programs.
- A range of projects to:
 - increase the GRDC's presence in social media
 - provide greater online access to the final reports of GRDC-supported research projects, and greater electronic access to traditional hardcopy publications
 - expand the farm business management training program
 - renew the GRDC's contribution to the Collaborative Partnership for Farming and Fishing Health and Safety
 - extend persuasion skills training to advisers
 - expand the map-based interactive web interface for PestFax
 - conduct technical workshops that are targeted to issues of significance to grain growers and their influencers
 - deliver Research Updates in the Northern Region and Southern Region, and Grains Research Updates in the Western Region.

Output Group 2—Varieties

The Varieties output group invested in gene discovery, functional genomics, grain quality research, plant pathology (where directly related to breeding), breeding technologies, genetic resources, germplasm enhancement, plant breeding, and crop variety testing across many of the 25 crops in the GRDC's R&D portfolio.

The output group supported crop improvement for growing domestic as well as export markets, with the aim of raising the overall value of the Australian grains industry. This involved developing new varieties with enhanced yields as well as quality attributes that add value and meet market demands, and included collaborating with the grains industry to clarify consumer requirements.

Varieties also supported the search for new sources of disease resistance to incorporate into crops, as well as research to improve the understanding of the processes involved in resistance breakdown. It also invested to facilitate an industry-wide approach to improving data collection, for industry-good purposes and to increase the efficiency of end point royalty collection.

Table 17 summarises the achievements of the Varieties output group against its performance indicators for 2011–12 and its objectives and strategies for 2007–12. The following sections describe some of the results of the output group's investments during the year.

Wheat breeding

Over the past decade, the production of durum wheat in Australia has been significantly adversely affected by the poor yield stability of available varieties under dry seasonal conditions; heat stress; cold temperatures around flowering; and fungal diseases.

These challenges are being addressed by the Australian Durum Wheat Improvement Program (ADWIP), a national collaborative breeding program established between the New South Wales Department of Primary Industries, the University of Adelaide and the GRDC. This coordinated approach has achieved synergies between breeding programs in the different grain-growing regions, including through

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germplasm exchange. Priority breeding objectives are informed by industry consultation through industry advisory committees.

In 2011–12, the exchange of material between the program's southern and northern nodes continued. Samples from both nodes were tested for quality attributes in Tamworth, New South Wales, and were assayed with DNA markers in Adelaide. ADWIP incorporated quality testing earlier in the breeding cycle and accelerated the development of breeding material through single-seed descent. The use of halogen lamps in the glasshouses has enabled the breeders to artificially extend the day length, allowing up to three generations to be bred in a 12-month period. All advanced lines were sent to the Australian Cereal Rust Control Program for testing of resistance to known rust pathotypes.

The breeding program has significantly increased its focus on international networks, in particular with Canada, Italy and the United States. In 2011–12 this included the importation of 200 lines from the International Maize and Wheat Improvement Center (CIMMYT) and the



Soil moisture is monitored during trials at an Australian Durum Wheat Improvement Program site in South Australia. Photo: University of Adelaide

International Center for Agricultural Research in the Dry Areas (ICARDA) and new material from Italian companies.

A new durum variety, Tjilkuri⁽¹⁾, was released to growers in 2011. Compared to other varieties, Tjilkuri⁽¹⁾ has a higher semolina extraction rate (80 percent) and reduced susceptibility to the most agronomically significant durum pathogen, crown rot. Plant breeder's rights and Wheat Quality Australia Limited approvals were granted for a further two new varieties.

Wheat classification

Wheat Quality Australia Limited is a not-for-profit company owned jointly by the GRDC and Grain Trade Australia. Since its inception in 2010, the company has been responsible for the variety classification process which assigns wheat varieties to functional groups or classes with particular end-product quality attributes.

The company's governing board presides over:

- the Wheat Classification Council, which is made up of representatives of all industry sectors and sets the national classification framework

- the Variety Classification Panel, which is made up of technical expert consultants and conducts the actual variety classification process
- a proficiency program that calibrates the testing methodologies of participating wheat quality laboratories to ensure that test results are technically robust and comparable.

Through its Wheat Classification Council, Wheat Quality Australia Limited calls for and considers submissions from the public and industry in relation to the wheat classification system and reports annually to growers.

During 2011–12, Wheat Quality Australia Limited:

- established a new website, www.wheatquality.com.au
- conducted two meetings of the Wheat Classification Council
- appointed new members to the Variety Classification Panel, and conducted five meetings of the panel
- received and considered public submissions and published them on the website
- received and considered 71 applications from Australian wheat-breeding programs for variety classification
- published an updated list showing the current classification of Australian wheat varieties
- presided over a national proficiency program with 13 participating quality laboratories
- held consultation meetings with growers in each agroecological zone
- made presentations at 12 GRDC Grower and Adviser Updates.

Oat breeding

Demand for domestic and export milling oats continues to increase, driven in part by a growing appreciation of the health benefits of oats. The national oat-breeding program aims to develop improved milling and feed varieties of oats for southern Australia. With support from the GRDC, the program is based in Adelaide and led by the South Australian Research and Development Institute, and has a node in Perth managed by the Department of Agriculture and Food, Western Australia.

The first milling variety adapted for Western Australia was launched in March 2012.

The variety, Bannister⁽¹⁾, has good leaf rust resistance and slightly improved septoria resistance compared to the resistance of current Western Australian varieties. Trials show that Bannister⁽¹⁾ averages 3.1 tonnes per hectare compared to averages for other milling oats such as Carolup⁽¹⁾ (2.6 tonnes per hectare) and Wandering⁽¹⁾ (2.9 tonnes per hectare). This demonstrates the potential for growers to increase production by as much as 20 percent.

In 2011–12, the Australian breeding program was accepted into the Collaborative Oat Research Enterprise program, a global collaboration for developing molecular markers. About 550 lines passed quarantine and were sown in single rows for observation.

Pulse breeding

The National Mungbean Improvement Program (NMIP) was established in 2003 by the GRDC and the Department of Employment, Economic Development and Innovation, Queensland, to deliver higher yielding, disease-resistant varieties of mungbean with the quality attributes required by high-value vegetable markets.

In 2011–12, the GRDC commissioned an analysis of the NMIP's economic performance from 2003 to 2011. The total investment of \$6.1 million (present value terms) was estimated to have produced total gross benefits of \$115 million (present value terms), providing a net present value of \$109 million—and a benefit-to-cost ratio of more than 18:1. Despite assumptions being conservatively estimated, this is a relatively high rate of return compared to those of other crop-breeding programs.

Also in 2011–12, the NMIP's commercial partner, the Australian Mungbean Association, completed a winter seed increase of the elite large-seeded line M07213 in Western Australia's Ord River Irrigation Area. This line will be a direct replacement for Crystal⁽¹⁾, which has accounted for 90 per cent of the Australian market since its release in 2008. M07213 has comparable agronomy and phenology to Crystal⁽¹⁾ but is 9 percent higher yielding and has superior grain quality for the large-seeded, shiny green seed market. It also has superior resistance to tan spot and powdery mildew.

The association's involvement makes the commercialisation process faster, meaning that growers are able to take advantage of improved varieties earlier. In addition, the association undertakes a range of quality

testing for the breeding program and is important in providing timely and accurate market signals to the breeders.

Development of enhanced winter cereals germplasm

The Australian Winter Cereals Pre-breeding Alliance is an industry forum established to promote collaboration and cooperation among cereal pre-breeders and improve their engagement with cereal breeders. Its members include CSIRO, agencies of the Council of Australian Governments' Primary Industries Steering Committee, and universities. The GRDC supports the alliance as a means to facilitate national coordination of winter cereals pre-breeding research in Australia, strengthen links between pre-breeders and breeders, and implement the pre-breeding component of the Grains Industry National RD&E Strategy.

In 2011–12, the alliance strengthened the transfer of winter cereals pre-breeding research outcomes to breeders by reconvening the Wheat Breeding Assembly conference. The conference, held in Perth in August 2011, was attended by representatives of all Australian wheat-breeding programs. In addition, the alliance convened technical workshops to identify pre-breeding research opportunities to improve the tolerance of winter cereals to heat stress and drought stress at the reproductive stage of plant development. Options papers developed through the workshops were provided to the GRDC to inform future investment strategies.

A new national frost program was launched in 2011–12. The program, a collaboration between the Department of Agriculture and Food, Western Australia, and the University of Adelaide, will develop robust frost phenotyping protocols and establish frost-trialling sites in New South Wales, South Australia and Western Australia. The primary objectives of the project are to:

- develop annual frost tolerance ratings for wheat and barley varieties
- develop a statistically repeatable and reliable field-based methodology for screening for frost tolerance in each grain-growing region
- provide a field-based wheat and barley germplasm phenotyping service to support other GRDC-funded frost research projects and Australian frost tolerance breeding activities for wheat and barley

- provide a framework for national coordination, training and extension of GRDC-supported frost research.

Gene discovery and new technologies

The Australian Centre for Plant Functional Genomics (ACPGF) is a national research centre devoted to the identification, development and deployment of genetic solutions to cereal abiotic production constraints such as drought, salinity, temperature extremes and nutrient deficiencies and toxicities. It is co-funded by the Australian Research Council and the GRDC, with further financial support from the South Australian Government.

During 2011–12, the centre entered into two large strategic partnerships designed to strengthen access to international research technologies and trait delivery expertise:

- The ACPFG and international seed company DuPont Pioneer announced a significant expansion of their existing research collaboration. The new collaborative agreement expands the research focus to include wheat molecular marker development and hybrid seed production research, while maintaining activity on the development of agronomic traits for increased drought tolerance and nutrient use efficiency in cereals, soybean and canola. The expansion confirms the ACPFG as a leading cereal research centre and provides Australian researchers with increased access to DuPont Pioneer's research and plant production technologies.
- The ACPFG and CSIRO entered into a licence agreement with Vilmorin and Cie, the largest seed company in Europe, to commercialise their joint nitrogen use efficiency technology. The licence agreement secures a pathway for the further development and deregulation of the nitrogen use efficiency technology, and its delivery to the Australian grains industry.

National Variety Trials

Established in 2005 by the GRDC, the NVT initiative aims to facilitate adoption of superior new varieties through the supply of accurate and independent performance information for winter cereal, pulse and canola varieties. In addition to collecting yield, quality and agronomic data for each nominated cultivar, trial managers record site characteristics, including soil fertility, rainfall, dates of sowing and harvest, and crop input and rotation information, to help growers and advisers to interpret the results.

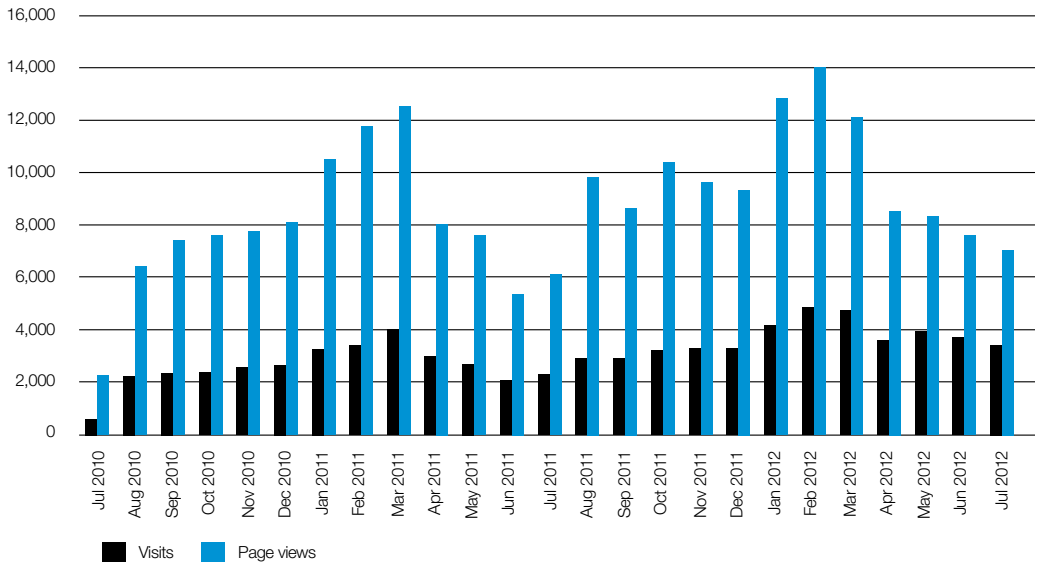
In 2011, the program conducted 651 trials at 443 locations across Australia. Of these, a total of 19 trials were abandoned, largely as a result of seasonal conditions, and a further 34 did not meet the program's stringent data quality requirements and thus were not published. The results of the remaining 598 trials were published on the NVT website (nvtonline.com.au) and in crop variety guides.

Ongoing development of the NVT Online website has resulted in significant increases in site visits and usage, as Figure 12 shows.



Peter Keys (front) from the Department of Employment, Economic Development and Innovation, Queensland, shows growers and GRDC Northern Regional Panel members through a National Variety Trials site near Biloela. Photo: GRDC

Figure 12: Use of the NVT Online website, July 2010 to July 2012



The management of the NVT trial network continued to be reviewed and improved through extensive consultation with the NVT regional advisory committees that were established in 2010–11. As well as advising on regionally relevant issues such as the retention or deletion of individual crop cultivars from the local trials, the committees provide feedback on national matters. In 2011–12, the committees expressed overwhelming support for change in the disease management protocols of the trial system. Consequently, a technical review has been undertaken with a view to developing better protocols for management practices for the 2012 season.

Statistical resources

Statistical input helps to deliver definitive answers to R&D questions and to secure industry acceptance and uptake of research outputs. In 2011–12, the GRDC established the national Statistics for the Australian Grains Industry program to deliver best practice statistical support and training, and innovative statistical technologies and software, to the Australian grains industry.

The program is funded for five years and involves the University of Wollongong (the lead agency), the University of Western Australia, Charles Sturt University, the University of Adelaide, Agri-Science Queensland (part of the Department of Employment, Economic

Development and Innovation, Queensland), and CSIRO Mathematics, Informatics and Statistics. It involves 17 statisticians, and interfaces with the Australian grains industry through an industry liaison and training division, a research and collaborative projects division, and a software development and implementation division.

The program will provide high-level support and training to national grains-breeding programs, the NVT system, and GRDC-supported pre-breeding, climate change, agronomy and farming systems projects.

Genetic resources

A vital asset for plant breeding and pre-breeding activities, plant genetic resource centres:

- safeguard seed collections
- maintain open access for users
- seek out, introduce and evaluate the most promising international germplasm for further R&D.

In addition to supporting the operations of grains-related genetic resource centres, the GRDC and partner organisations are working to establish a national genetic resource centre for grain crops, in order to safeguard Australia's access to the broad genetic diversity required to address production constraints faced by Australian grain growers.

In 2011–12, all GRDC-supported Australian genetic resources databases were merged with the internationally coordinated database GRIN Global, in order to fulfil Australia's obligations under the International Treaty on Plant Genetic Resources for Food and Agriculture.

In addition, the GRDC reached an in-principle agreement with the Department of Primary Industries, Victoria, regarding the establishment of the Australian Grains Genebank. Under the agreement, the GRDC and the department will invest in a significant expansion of genetic resource centre infrastructure at Horsham, Victoria, and commit to the long-term operational resourcing of the centre.

The Australian Grains Genebank will consolidate genetic resources from the existing Australian Winter Cereals Collection (Tamworth, New South Wales), the Australian Tropical Crops and Forages Collection (Biloela, Queensland) and the Australian Temperate Field Crops Collection (Horsham, Victoria). Locating the resources in one centre will increase operational efficiency and provide a single point of access for Australian and international researchers seeking grains genetic resources.

Case study

Ancestral gene increases durum yields on highly saline soils

In Australia, wheat is grown in many areas that are affected by transient or water-table dependent dryland salinity. Even at low levels salinity leads to yield reduction, particularly in durum wheat, and the impact of salinity on crop production is expected to become more prevalent in the future.

One mechanism that confers tolerance to highly saline soils is the ability of a plant to maintain low concentrations of salt in the leaves. This trait, known as sodium exclusion, is responsible for the greater salt tolerance of bread wheat relative to durum wheat.

In 2011–12, a group of GRDC-supported researchers from CSIRO, the University of Adelaide, the Australian Centre for Plant Functional Genomics, the University of Western Australia and the New South Wales Department of Primary Industries identified a sodium exclusion gene from the ancient relative of wheat *Triticum monococcum*, and introduced it into the commercial durum variety Tamaroi. The gene, known as *Nax2*, encodes a sodium-selective transporter expressed in root cells and is capable of pumping out sodium and preventing it from reaching the leaves.

The researchers showed that in low-salinity soils durum lines without the gene produced the same yields as a line carrying the *Nax2*, while in locations with a mean salt concentration of around one-third the concentration in sea water, the lines carrying *Nax2* provided a yield advantage of up to 25 percent. Salt levels in the flag leaf of *Nax2*-carrying lines were found to be four times lower than those in lines without the gene. These research results were published in the prestigious journal *Nature Biotechnology* in April 2012 and widely publicised in the media. The research group has received requests for access to the trait from all over the world.

The *Nax2* gene provides a very useful mechanism to assist wheat breeders to improve yields in highly saline soils. Even though the *Nax2* gene is present in a wheat ancestor, it is not present in commercial wheat cultivars. This highlights the importance of plant genetic resources as a source of many still to be discovered useful traits and genes for modern cultivars.

Ongoing GRDC-supported research is focusing on other mechanisms that have the potential to improve yield on soils with lower salt concentrations, which are more prevalent in farmers' fields. Ultimately, the researchers aim to combine both mechanisms so that breeders can generate varieties with broad salinity tolerance.

Case study

National Mungbean Improvement Program delivers varieties and value

Mungbean is a high-value export crop and an increasingly significant spring and summer rotation crop in the Northern Region. Mungbeans are mainly marketed as a vegetable, rather than as bulk grain, so their appearance is very important. A small proportion of the mungbean seed produced is used in Australia for sprouting.

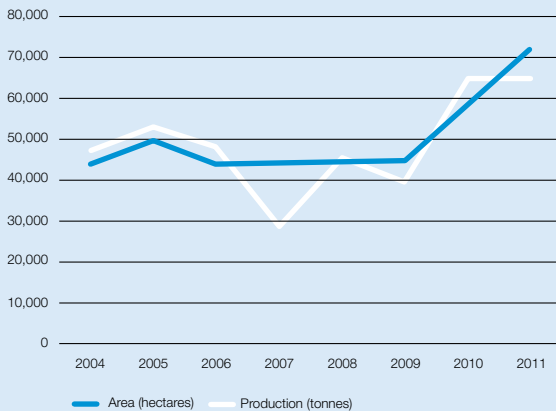
Until recently, the growth of the mungbean industry was constrained by grain growers' lack of confidence in the current mungbean varieties, which were up to 30 years old and susceptible to disease. To address this problem, the GRDC and the Department of Employment, Economic Development and Innovation, Queensland, established the National Mungbean Improvement Program (NMIP) in 2003.

Breeding programs for small industries such as mungbean may need to produce high rates of gain in terms of yield or quality in order to justify the investment. In the case of mungbean, both types of gain have been achieved. In addition, grower confidence has increased markedly, since the release of Crystal⁽¹⁾ and Satin II⁽¹⁾ in 2008, as Figure 13 shows. This was reflected in a 60 percent increase in planting area and a 44 percent increase in production between 2008 and 2011.

Such increases in confidence and productivity are likely to continue as new varieties become available through the program. In 2011, new lines of elite large-seeded germplasm showed yield gains of 10 percent to 20 percent, as well as improved resistance to powdery mildew and tan spot. New sources of resistance to halo blight have been found and introgressed into adapted backgrounds; they will be evaluated and brought to market by 2016.

In 2011–12, the NMIP's breeding activities and logistics were centralised at Hermitage Research Station in southern Queensland. In order to deliver better service to mungbean growers in New South Wales, the program is working with industry and agronomists to identify and develop on-farm co-operator sites in key growing districts of the Liverpool Plains and Moree. The program will conduct trials in the Burdekin region of north Queensland in 2012–13.

Figure 13: Australian mungbean production, 2004 to 2011



Source: Australian Bureau of Agricultural and Resource Economics and Sciences, *Agricultural Commodity Statistics* (2010), for years 2004 to 2009; Dale Reeves, Australian Mungbean Association, for years 2010 and 2011.

Also in 2011–12, the NMIP renewed its relationship with the World Vegetable Center (AVRDC). The NMIP has introduced 200 germplasm and breeding lines from the AVRDC, which contain potential new sources of disease resistance.

The program has developed a new, reliable glasshouse-based screening test for halo blight which will supplement testing in the existing field nursery. In combination, the identification of elite parents, higher crossing efficiency and disease screening will lay the groundwork for this program to expedite development of elite, large-seeded varieties with halo blight resistance.

A new managed environment has been implemented in the cross-pollination program; in 2011 it successfully increased the efficiency of winter crossing from 21 percent to 84 percent. In addition, the program has adopted new biometric techniques developed under the GRDC's Statistics for the Australian Grains Industry program.

Through the NMIP, new mungbean variety releases will lead to even greater yields and improved disease resistances. Given the positive adoption of Crystal^(b) and Satin II^(b), it is likely that the new varieties will be adopted rapidly by industry and that production will continue to increase, with benefits to the mungbean industry and to consumers.



Mung beans. Photo: GRDC

Grower survey snapshot

Table 16: Uptake of new varieties, as assessed by GRDC grower surveys, 2004 to 2012, by proportion of growers surveyed (percent)

Key performance indicator	2004	2005	2006	2008	2010	2012
Growers who had grown new varieties over the past five years:						
• wheat	76	72	71	67	75	79
• barley	42	41	41	40	47	54
• oats	24	22	18	23	24	14
• triticale	6	7	9	5	8	6
• pulses ^a	n/a	27	35	33	23	44
• oilseeds ^a	n/a	34	34	26	29	44
• sorghum (Northern Region only)	26	27	30	32	28	31
Growers who felt that new grain varieties met expectations ^a	n/a	58	59	58	57	60
Grower awareness of NVT ^b	n/a	n/a	54	73	79	86
NVT field days helped growers decide which varieties to adopt ^c	n/a	n/a	n/a	84	82	81
Information provided by the NVT program helped growers decide which varieties to adopt ^d	n/a	n/a	n/a	n/a	90	93

a These measures were introduced in 2005.

b This measure was introduced in 2006.

c This measure was introduced in 2008.

d This measure was introduced in 2010.

Note: The Grower Survey was suspended in 2007 as part of the GRDC's drought response and is now conducted every second year. NVT = National Variety Trials.

Table 17: Varieties overview

Output Group 2—Varieties		
Objective		
Growers have access to superior varieties that enable them to effectively compete in global grain markets		
Strategies		
Build and sustain world-leading breeding programs Focus pre-breeding research on key traits Develop a path to market for genetically modified crops Facilitate faster adoption of superior varieties		
Investment budget for 2011–12		
\$55.12 million		
Performance for 2011–12		
Performance indicators	Targets	Achievements
<i>Build and sustain world-leading breeding programs</i>		
AOP & PBS: Average annual increase in yield (as measured in National Variety Trials (NVT) trials) for wheat, barley, canola, sorghum and pulses	<ul style="list-style-type: none"> Average annual increase in yield (as measured in NVT trials) of: <ul style="list-style-type: none"> – 1.0% for wheat – 1.0% for barley – 1.5% for canola – 2.0% for pulses – 1.5% for sorghum. 	<p>Several clear examples of 2011-released varieties reflecting the targeted yield improvement trends:</p> <ul style="list-style-type: none"> Australian Premium Wheat (APW) variety Corack⁽¹⁾ has shown yield advantages of 9% over 2010 APW variety Estoc⁽¹⁾. Barley varieties Fathom⁽¹⁾, Skipper⁽¹⁾ and Henley⁽¹⁾ all consistently out yielded 2005 release Buloke by 4% to 10% in general. Triazine-tolerant canola variety CB Henty HT has shown yield advantages of up to 17% over CB June HT. Chickpea variety PBA Bounty⁽¹⁾ consistently achieves a 1.5% to 4% improvement over PBA HatTrick⁽¹⁾ in yield across all regions tested.
	<ul style="list-style-type: none"> The release of improved varieties of wheat, barley, canola, pulses and summer coarse grains that benefit the Australian grains industry. 	<p>Release of new varieties of:</p> <ul style="list-style-type: none"> barley—five canola—three chickpea—one faba bean—one field pea—two lentil—one lupin—one oat—three wheat—seven.
AOP: Commercial breeding programs meeting minimum disease standards	<ul style="list-style-type: none"> 90% of wheat second-year entries in NVT trials continue to meet minimum disease standards for rust resistance. 	Confirmation that up to 95% of wheat second-year entries met the minimum disease standards for rust resistance in 2011.
PBS: New varieties meet minimum disease standards for target environments	<ul style="list-style-type: none"> 90% of canola entries in NVT trials continue to have blackleg resistance scores of 7 or above. 	Confirmation that, despite breakdowns in blackleg resistance, 85% of 2011–12 released varieties that were in NVT trials had ratings better than MR (moderately resistant) in the NVT's new ratings system (equivalent to 7 in the previous system).
AOP: Research partners continue to invest in breeding programs where market failure exists	<ul style="list-style-type: none"> Where market failure exists, the GRDC's research partners contribute at least 50% of the costs of running the breeding program. 	Contributions by research partners to more than 50% of the costs associated with running the chickpea, lentil, lupin, field pea, vetch, peanut, mungbean, soybean, oat and durum breeding programs.
PBS: End point royalty (EPR) and seed royalty compliance greater than 80%	<ul style="list-style-type: none"> Maintain EPR and seed royalty compliance. 	Compliance estimated at around 70%. Commencement of the development of a method to more accurately measure compliance.

Table 17: Varieties overview (continued)

Performance for 2011–12		
Performance indicators	Targets	Achievements
<i>Focus pre-breeding research on key traits</i>		
<p>AOP: Nationally coordinated pre-breeding research with a focus on agreed key traits and effective international linkages</p> <p>PBS: Nationally coordinated pre-breeding research to focus percentage of resources on agreed key traits</p>	<ul style="list-style-type: none"> Development of new traits and selection methods for use by Australian breeding programs and continued access to international germplasm. 	<p>Coordination of pre-breeding activities through co-investment with:</p> <ul style="list-style-type: none"> the Department of Agriculture and Food, Western Australia, to establish the Australian Export Grains Innovation Centre, Perth the University of Sydney to expand northern regional capacity at the IA Watson Grains Research Centre, Narrabri. <p>Development of a memorandum of understanding with the International Crops Research Institute for the Semi-Arid Tropics as a precursor to a formal agreement on collaborative chickpea pre-breeding research.</p>
<p>AOP & PBS: Evidence that genes, germplasm and enabling technologies developed in GRDC-supported pre-breeding research are being used in breeding programs</p>	<ul style="list-style-type: none"> Effective extension and delivery mechanisms in place for pre-breeding outputs. 	<p>Licensing of 130 grain and 575 forage sorghum lines to commercial sorghum breeding programs through the GRDC-supported Sorghum Pre-breeding Program.</p>
<i>Develop a path to market for genetically modified crops</i>		
<p>AOP & PBS: Delivery platforms developed for genetically modified crops in Australia</p>	<ul style="list-style-type: none"> Technical milestones achieved towards developing genetically modified herbicide-resistant lupins. 	<p>Achievement of technical milestones and review of the commercial path to market.</p>
<i>Facilitate faster adoption of superior varieties</i>		
<p>AOP & PBS: Increased use of NVT results by growers and paid grower advisers</p>	<ul style="list-style-type: none"> Increase in use of NVT data by growers and paid advisers as determined by industry surveys and NVT website traffic. Maintain 80% or greater of paid advisers using NVT results to assist growers with variety selections. 	<p>Increase in NVT website visits of 28.6%, with an additional page view increase of over 15.7%.</p> <p>Results of the 2012 Grower Survey showing 86% of paid advisers using NVT results to assist growers with variety selections.</p>
<p>AOP & PBS: Breeder participation in NVT</p>	<ul style="list-style-type: none"> At least 90% of relevant breeding programs participate in NVT. 	<p>Participation in the 2011 trial series by 100% of relevant breeding programs.</p>

AOP = annual operational plan, PBS = portfolio budget statements

What's in the RD&E pipeline for 2012–13?

- Release of the first oat variety combining milling quality with cereal cyst nematode resistance/tolerance.
- Release of a new mungbean variety with an average yield 14 percent higher than that of the industry benchmark (Crystal[®]) and improved resistance to powdery mildew and tan spot.
- A range of projects related to barley quality, including work to:
 - analyse the relationship between alpha amylase alleles in barley and the processing performance of commercial malts
 - identify novel sources of resistance to kernel discolouration and pre-harvest sprouting
 - support the brewing component of the malting barley accreditation process in an industry co-funded project led by Barley Australia.

Output Group 3—New Products

The New Products output group comprised two investment areas: New Grain Products, and New Farm Products and Services. The two investment areas targeted opportunities both pre-farm gate and post-farm gate, by investing in research, development and commercialisation to provide growers with additional options in farm management and marketing.

The New Grain Products portfolio identified and developed opportunities for the use of grain for a range of markets, including human food products, animal feed products and industrial markets. Maintaining product integrity through improved grain hygiene was also a key theme for this portfolio.

The New Farm Products and Services portfolio focused on inputs for the grains industry that improve productivity and profitability. Those with the greatest potential to deliver benefits to the grains industry were subjected to careful market evaluation, and a business case was developed to justify each potential investment.

To achieve its objective, the output group actively identified national and international technology relevant to the Australian grains industry; built partnerships to develop products and services and deliver them to growers; undertook product development to meet market requirements; and developed robust business cases to demonstrate the market demand for and value of any product or service that the GRDC and its partners proposed to invest in.

Table 18 summarises the achievements of the New Products output group against its performance measures for 2011–12 and its objectives and strategies for 2007–12. The following sections describe some of the results of the output group's investments during the year.

Wheat yield gene technology

A GRDC investment with CSIRO Plant Industry demonstrated that changing the expression of a particular gene in the developing wheat seed increased both biomass and grain yield by up to 30 percent in glasshouse trials. In 2011–12, the

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project focused on testing field performance of the wheat lines and developing a path to market for the technology in wheat. In 2011–12:

- wheat lines with the yield gene technology were grown at three different locations in Australia to test the field performance of the technology
- Bayer CropScience joined with CSIRO and GRDC as the commercialisation partner for the technology in wheat. Bayer is expected to take up a commercial licence to exploit the technology in wheat and assist in delivering varieties with the trait to the Australian and overseas markets.

The GRDC and CSIRO also explored whether this yield gene technology has application in other crops. For example, increasing the biomass and yields of sorghum could increase the value of sorghum as a feed grain crop. In 2011–12, the GRDC and CSIRO engaged an international commercial partner in a research collaboration to determine whether the yield gene technology can boost the biomass and yields of sorghum. This collaboration is also supported by the livestock R&D corporations that are members of the Australian Feedgrain R&D Partnership.

High-amylose wheat

High-amylose wheat produces a high level of resistant starch, which is important in bowel health. It also has a lower glycaemic index than other starches, with benefits for managing body weight and stabilising blood glucose levels. Arista Cereal Technologies Pty Ltd, a joint venture between the GRDC, CSIRO and French company Limagrain Céréals Ingrédients, is generating high-amylose wheat lines. In 2011–12, the Australian shareholders initiated a process to identify and engage a logistics manager to deliver high-amylose wheat lines to market in Australia.

Ultra-low gluten barley

Since 2003, the GRDC has supported work by CSIRO Plant Industry to develop ‘ultra-low gluten’ barley, a cereal grain that could be safely consumed by people with coeliac disease. Through conventional breeding approaches, the project has developed barley lines with very low gluten content. In 2011–12, the project implemented an intensive cross-breeding program to improve the grain quality and agronomic backgrounds of the lines; and conducted field trials to generate sufficient quantities of grain to enable commercial-scale evaluation of the material by the commercial partner.

Crop Biofactories Initiative

The Crop Biofactories Initiative is a joint investment between the GRDC and CSIRO that is developing safflower seeds with fatty acid compositions that match specific industrial applications, to replace products that are currently manufactured from petrochemical feedstocks.

In 2011–12, the Crop Biofactories Initiative reached a significant milestone with the development of a safflower line with seed oil containing more than 90 percent oleic acid, the world’s highest level of acid in a seed oil. The Crop Biofactories Initiative secured patent positions in early 2012, which enabled the initiative to publicly announce its success and commercialisation directions, and to begin to engage with potential commercial partners who could assist in bringing the new safflower lines to market in Australia.

To assist with the commercialisation of a new industrial safflower variety, the GRDC also

invested in a project with the New South Wales Department of Primary Industries to evaluate a collection of international safflower germplasm for performance in the Australian environment. The collection of lines carries important traits such as no spines, disease resistance and increased seed oil content, as well as short-season and long-season growing traits which may be useful to develop industrial safflower varieties that have good field performance. In 2011–12, the lines were multiplied and preliminary data on field performance and oil properties was collected.

Processing technology for low-protein flour

A GRDC investment with the Centre for Grain Food Innovation in Western Australia developed a prototype dough-sheeting line to process high-moisture, low-protein wheat flour. This new processing method looks highly promising for making bread products from low-protein Australian wheats and is aimed at the growing Asian bakery market, which currently uses mostly high-protein wheats from North America.

Results from the project in 2011–12 showed that when doughs from Australia and the United States were mixed with higher moisture than normally considered optimal for the flour, an Australian flour with 10.4 percent protein, derived from the Wyalkatchem wheat variety, had the best sheetability and baking qualities.

Further development and validation of this processing technology will be undertaken within the newly formed Australian Export Grain Innovation Centre, a partnership between the GRDC and the Department of Agriculture and Food, Western Australia.

Collaborative research for post-harvest integrity

The GRDC is a participant in the Cooperative Research Centre for National Plant Biosecurity. The centre’s post-harvest integrity research program, which delivers research outputs to address issues in post-harvest storage of grain, is a collaborative investment involving the GRDC, the Australian Government, bulk grain handling companies and research agencies. The GRDC participated in the advisory panel that developed project proposals for the program.

In 2011–12, the program delivered outputs in areas of diagnostics, surveillance systems,

alternatives to phosphine and storage structure integrity. Highlights included the development of new diagnostics to determine the phosphine resistance status of grain storage insects, and a low-oxygen atmosphere protocol to control insects as an alternative to chemical control methods.

The program also completed and reported on work related to:

- strategic monitoring, in which insect samples are collected from key points through the supply chain based on a standardised survey. This work annually involves about 150 farms in the Northern Region, 250 farms in the Southern Region and 600 farms in the Western Region. In total about 2,500 insect samples have been established for insect testing across grain-growing regions.
- tactical monitoring, in which insect samples are received from bulk handlers seeking an immediate diagnosis to inform timely decisions on treatment. This work annually involves about 100 insect samples from the Northern Region, 250 samples from the Southern Region and 100 samples from the Western Region.

New farm products and services

The GRDC supports the development and commercialisation of technologies that are identified as having the greatest potential to deliver benefits to the grains industry. Potential technologies are subjected to careful market evaluation, and a business case is developed to justify each potential investment.

In 2011–12, the work supported by the GRDC to develop new farm products and services included:

- developing a virus-based insecticide for the control of diamondback moth in canola. Based on a granulovirus, the product will fit well into integrated pest management programs as well as allowing late-season applications. A commercial partner has been brought in to do parallel research into the manufacturing and formulation of the product.
- researching biopesticide options for the alleviation of nematodes in cereals. Root lesion nematode is a major pest of cereals in Australia, costing an estimated \$100 million

in production per year in wheat and barley. This project will investigate the opportunity to use a biological agent to reduce the impact of the pest through the protection of fine root hairs.

- designing and building a pilot plant for the conversion of liquid waste streams into economically viable fertiliser. Following a successful survey and economic analysis of waste streams, contracts were made for the establishment of pilot plants. The first will be a plant producing the fertiliser ingredient struvite from the liquid waste from an abattoir and feedlot complex. Discussions with Meat & Livestock Australia regarding potential joint investment have been positive.

The GRDC also funded activities to develop information resources that will help Australian wheat to compete in export markets in 2011–12. One project is developing a choice analysis approach to define the end user's needs for wheat functionality. 'Choice analysis' is a method used in applied economics to ascertain the relative or weighted value that a consumer places on attributes of a product. Through a complex questioning methodology the consumer is guided to provide quantitative values for particular attributes (in this case, traits such as milling yield, colour or protein content). Japanese millers, who collectively represent almost 75 percent of Japan's total market for wheat, will be surveyed using this technique, providing valuable feedback for use by exporters, growers and breeders of Australian wheat.

A GRDC-supported barley variety identification project has led to the establishment of a commercial service that enables growers to have samples of their barley seed tested for variety and purity. The barley variety identification technology will be commercialised through Diversity Arrays Technology Pty Ltd and GrainGrowers Limited. Through its analytical laboratory, GrainGrowers will offer growers the opportunity to test the variety and genetic purity of barley seed samples later in 2012 through a cost-effective service.

In 2011–12, work commenced to extend the technology platform that underlies the barley-testing service to the testing of wheat. The research involves building baseline profiles of more than 200 pedigree samples held at the Australian Winter Cereals Collection, then comparing those profiles to more than 2,000

samples collected from across the major wheat-growing regions of Australia. The final testing platform is expected to be able to accurately identify both variety and genetic purity from a small sample of grain.

The GRDC's other commercialisation activities in 2011–12 included signing:

- a commercial licence agreement to take the Harrington Weed Seed Destructor technology to market. Following an extensive evaluation process, deBruin Engineering Pty Ltd, based in South Australia, was chosen to commercialise the technology. Growers around Australia have shown significant interest, and the company is planning to have a limited number of machines ready for the 2012 harvest season.
- a development and commercialisation agreement to manage the DGT (diffusive gradients in thin films) soil-testing product and

its introduction into laboratories. The Back Paddock Company, based in Queensland, was chosen to manage the product. The company is committed to training and educating staff in soil-testing laboratories, consultants, agronomists and farmers on the benefits of using the DGT technology for the testing of phosphorus in soil.

Progress was also made towards the commercialisation of two other novel technologies arising from GRDC-supported research. An expression of interest process was run to find a commercial partner to take the GLO2 grain fumigant product to market; a company has been approached and negotiations are underway. A new project has commenced to use the MEMS IR (micro-electrical mechanical systems—infrared) technology to develop an instrument for measuring important soil attributes such as moisture profile and nitrogen content.

Case study

Safflower is set to become a sustainable source of industrial oils

The Crop Biofactories Initiative reached a significant milestone in 2011–12, with the development of a new type of safflower that produces seed oil uniquely suited to industrial applications.

The Crop Biofactories Initiative is a strategic research and product development partnership between CSIRO and the GRDC. It aims to develop safflower varieties with oil compositions suitable for industrial uses, to be used as the basis for a new crop industry for Australian growers.

The research team has developed safflower plants that produce seed oil that has the potential to replace petroleum-based feedstock in the manufacture of a number of industrial products, such as plastics, hydraulic fluids and lubricants. The safflower seed oil contains more than 90 percent oleic acid, which is the highest level of purity of an individual fatty acid currently available in any plant.

Plant oils contain a range of fatty acids including both monounsaturates and polyunsaturates. For food use it is important to have a healthy balance of the two. However, the polyunsaturates cause problems for industrial use because they are unstable and difficult to remove during oil processing. To circumvent such problems, CSIRO silenced select safflower genes in order to switch off the conversion of oleic acid to the unwanted polyunsaturates.

The plants are classified as genetically modified (GM), and before new varieties are released they will need to undergo a regulatory approval that involves up to five years of field trials and other tests in Australian and other markets.

Once approved for commercial release, the varieties will initially be promoted for use in northern New South Wales and southern Queensland paddocks. These regions will be targeted to tap local expertise in modern agricultural methods acquired from growing GM cotton and to take advantage of pre-existing oil-extracting facilities.

The Crop Biofactories Initiative is engaging in discussions with local and international companies with a view to forming a commercial partnership to help develop this crop variety.

Table 18: New Products overview

Output Group 3—New Products

Objective

Deliver new products and services (both on farm and off farm) that will assist growers to effectively compete in global grain markets

Strategies

- Identify national and international technology relevant to the grains industry
- Develop partnerships to deliver new technology
- Undertake product development to meet market requirements
- Build robust business cases that demonstrate stakeholder return on investment

Investment budget for 2011–12

\$15.04 million

Performance for 2011–12

Performance indicators	Targets	Achievements
<i>Identify national and international technology relevant to the grains industry</i>		
AOP & PBS: Identify six new technologies and at least one new international supplier, including unsolicited offers	<ul style="list-style-type: none"> • Scoping of opportunities for the use of triticale and sorghum to make bio-based industrial products. 	Opportunities for industrial uses of triticale and sorghum were not scoped.
	<ul style="list-style-type: none"> • Scoping of further export development opportunities where targeted R&D investments open up precompetitive positions for Australian grains. 	Extension of the Chinese noodle project into steamed breads and other products through COFCO, China's largest importer and trader of grain. Consideration of GRDC investment in a program to improve canola meal quality.
	<ul style="list-style-type: none"> • Completion of a market study to identify product development technologies for small and medium-sized bakeries. 	Completion of a market study of product opportunities for small and medium-sized bakeries in Asia.
<i>Develop partnerships to deliver new technology</i>		
AOP & PBS: Existing and new partnerships to deliver technology to growers	<ul style="list-style-type: none"> • Engagement of a partner to identify safflower lines with improved agronomic performance and end-use quality. 	Contracting of the New South Wales Department of Primary Industries to evaluate safflower germplasm.
	<ul style="list-style-type: none"> • Joint development with a major enzyme company of an optimised process for brewing beer from Australian barley. 	Successful testing of all major malting varieties and commencement of trial shipments to Asia.
	<ul style="list-style-type: none"> • Engagement of a commercial partner for the delivery of the yield gene technology in wheat. 	Engagement of a commercial partner to evaluate field performance of the yield gene technology in wheat.
	<ul style="list-style-type: none"> • Engagement of a partner to develop and market the DGT (diffusive gradients in thin films) soil-testing technology to Australian growers. 	Commercial partnership with Brisbane-based Back Paddock Company.
	<ul style="list-style-type: none"> • Progress in establishing a path to market for high-amylose wheat. 	Ongoing negotiations with potential commercial partners for North America. Initiation of a process to identify a commercial partner for Australia and New Zealand.
	<ul style="list-style-type: none"> • Establishment of a path to market for, and licensing of, the barley variety identification test, following industry engagement. 	Commencement of a commercial partnership and plans to launch the product in August 2012.
	<ul style="list-style-type: none"> • Development of a strategic relationship with an international biopesticide company to evaluate products in professional formulations. 	Relationships with two manufacturers being developed, with field testing underway.

Table 18: New Products overview *(continued)*

Performance for 2011–12		
Performance indicators	Targets	Achievements
<i>Undertake product development to meet market requirements</i>		
AOP & PBS: New products identified and market assessments undertaken and new products tested under market conditions	<ul style="list-style-type: none"> Evaluation of the ultra-low gluten barley product with a commercial partner. 	Semi-commercial scale evaluation of ultra-low gluten barley with commercial partner.
	<ul style="list-style-type: none"> Production of urea and other fertiliser-based products from waste streams and biological processes. 	A pilot production plant, attached to a sewage plant, producing product for field trials.
	<ul style="list-style-type: none"> Evaluation of international safflower germplasm for suitability as parent germplasm for outputs from the Crop Biofactories Initiative. 	Safflower germplasm evaluation contracted with the New South Wales Department of Primary Industries. Additional safflower material sourced from international collaborators.
	<ul style="list-style-type: none"> Progress towards the proof-of-concept for yield gene technology in corn and sorghum. 	Engagement of a commercial partner to determine proof-of-concept for yield gene technology in sorghum.
	<ul style="list-style-type: none"> Formulation of studies to identify the necessary parameters for the inclusion of lupin flour into breads made from Western Australia's 'low-protein' flours. 	Determination of variation in protein cross-linking and textural properties of different lupin-wheat flour mixes.
	<ul style="list-style-type: none"> Testing of a new enzyme additive that improves the digestibility of sorghum in ruminants. 	Commencement of enzyme combination testing in live animals.
<i>Build robust business cases that demonstrate stakeholder return on investment</i>		
AOP & PBS: Development of robust business cases to justify GRDC investment and to attract co-investment	<ul style="list-style-type: none"> Completion of business cases for all investments greater than \$250,000 per annum. 	Presentation of four business cases at investment planning week for major projects.

AOP = annual operational plan, PBS = portfolio budget statements

What's in the RD&E pipeline for 2012–13?

- Development and commercialisation of a new product for the control of diamondback moth.
- A biopesticide product for control of stored-grain insects in and around storage complexes and between seasons.
- Further development of an infrared soil probe for rapid measurement of soil moisture and soil nutrients.
- Development of a biopolymer for counteracting non-wetting soils.
- Evaluation of the potential of transferring the sorghum stay-green drought adaptation technology into wheat and other crops.
- Evaluation of commercial opportunities for GM herbicide-resistant lupins in Australia.
- Evaluation of commercial opportunities for the outputs of the GRDC's triple-rust project with CSIRO.
- Focus on generating a transgenic event suitable for deregulation to produce super-high oleic acid safflower through the Crop Biofactories Initiative.

Output Group 4—Communication & Capacity Building

Effective communication is vital to:

- increase understanding and awareness of the GRDC, and how the organisation is a leader in rural RD&E and provides value for money to the grains industry, the Australian Government and the wider community
- promote awareness and adoption of the outcomes of the GRDC's RD&E investments, to help achieve the GRDC's primary objective of supporting the grains industry's competitiveness through enhanced profitability and sustainability.

The Communication & Capacity Building output group produced high-quality, innovative communication products to meet grains industry needs, and invested in a range of programs to enhance awareness and adoption of the outcomes of GRDC investments.

Australian grain growers are a diverse audience, and their information needs and preferred delivery mechanisms vary. Recognising this, the output group used a combination of print, electronic, audio, video and multimedia channels to reach growers, and began developing a strategy to use social media as a way to further interact and communicate with stakeholders.

Communication & Capacity Building participated in joint activities with research partners, government agencies and industry bodies, recognising the important role they play in influencing on-farm decision making. Such collaboration helps to optimise the dissemination of new information.

The output group also supported initiatives to encourage and develop capacity in education, training and technology transfer for researchers and the wider industry. By supporting activities that encourage new entrants, as well as supporting continuing professional development, the GRDC aims to build a dynamic and resilient team to ensure the ongoing prosperity of Australia's grains industry.

Table 21 summarises the achievements of the Communication & Capacity Building output group against its performance measures for 2011–12 and its objectives and strategies

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Media training

Information packaging

Publications

Awards and scholarships

Industry conferences

Extension and adoption training and support

Capacity-building collaborations

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Communication & Capacity Building overview

What's in the RD&E pipeline for 2012–13?

for 2007–12. The following sections describe some of the results of the output group's work during the year.

Communication campaigns

During 2011–12, the GRDC effectively implemented a range of communication campaigns that focused on priority issues identified by the GRDC's regional advisory panels and delivered tangible outcomes for grains growers and the Australian Government.

Australian Year of the Farmer partnership

The GRDC entered into a partnership with Australian Year of the Farmer Limited, a non-profit organisation established to raise awareness of farm production, reinforce the relationship between rural and urban communities and educate Australians about the role of farmers during 2012. GRDC-supported

initiatives as part of the partnership included the development of three SkillsOne™ television segments that will be aired nationally on pay television in July 2012; promotion of the GRDC's Grain Inventors program, which will be launched in September 2012; and joint cross-promotion of GRDC and Australian Year of the Farmer activities.

Climate communication

The Climate Champions program developed strong strategic links with individuals and national and local organisations. National workshops, including a National Press Club event in March 2012, continued to link participants with researchers and climate experts. The program received strong media coverage, with an average of three media items a week, and was one of three finalists in the prestigious 2011 Australian Museum Eureka Prizes, in the category of 'Advancement of Climate Change Knowledge'.

A GRDC climate webpage was created, providing downloadable copies of plain English summaries of climate-related research, *Top Paddock* fact sheets, a news and events feed showing climate-related articles and events, and links to the Agri Climate Culture website. The website (www.agriclimature.com.au) is Australia's first agriculture and climate blog and discussion site for advisers, growers and researchers. Its forum is open to anyone to post or answer questions and share thoughts, tips and tools.

A research knowledge audit was completed; 42 plain English summaries of research were produced and re-purposed for the new GRDC website. This information also underpinned the development of *Top Paddock* climate-related fact sheets. Fourteen *Top Paddock* fact sheets and a folder showcasing GRDC-supported climate-related research were written, printed and distributed.

Over the Fence multimedia campaign

The GRDC's successful Over the Fence multimedia campaign entered its third year in 2011–12. The campaign highlights outcomes from more than 20 GRDC-funded research areas and effectively uses video to facilitate grower-to-grower communication.

In 2011–12, the campaign released 36 media packages, including videos, articles and photographs. The packages were distributed:

- via selected rural weekly newspapers, with a combined circulation figure exceeding 117,000 across Queensland, New South Wales, Victoria, South Australia and Western Australia
- online through portals such as Farmonline, which receives more than 90,000 visits from unique Australian users per month.

The campaign achieved 100 percent uptake by media, including a regular monthly publication on the grains page of the Queensland Country Life website (with GRDC branding).

Grain storage strategy

In September 2011, the GRDC commenced a communications strategy to encourage best practice in on-farm grain storage among growers in the Northern and Southern regions. The strategy builds on the large amount of available knowledge about grain storage, by updating and localising content, filling information gaps, and pointing growers towards the GRDC-supported stored-grain information hub (www.storedgrain.com.au) and new GRDC fact sheets.

Communication consultants worked closely with the experts involved in the GRDC-funded Grain Storage Extension Project, to generate timely information articles for the different regions of Australia on topics such as hygiene and structural treatments for grain storages, pre-harvest planning, and temperature and pressure management. In 2011–12, nine feature editorials were distributed nationally; collectively, they generated around 120 media articles via print, radio or social media.

The first of three videos that will be developed under the strategy, Getting the Best out of your Aeration Cooling, was released in 2011–12 and made available on the GRDC website and the stored grain information hub.

Interactive displays at field days

The GRDC has developed an interactive national display for use at field days and events to help to communicate the diversity of the GRDC's RD&E portfolio to growers and other stakeholders. The display includes interactive demonstrations with microscopes to view damaged grain, spray nozzle demonstrations,



The GRDC provides interactive displays on current research at field days. Photo: GRDC

Petri dishes filled with weather-damaged grains and other displays. Regional interactive displays have also been developed for each of the grain-growing regions.

Wheat breeding strategy

The wheat breeding communications strategy was developed in 2010 and implemented during 2010, 2011 and 2012. It was designed to raise awareness of the structure of wheat breeding in Australia, and the GRDC's role in that, among growers and other grains industry participants.

Key messages included:

- The GRDC's involvement in wheat breeding has changed because the environment for wheat breeding in Australia has changed.
- The industry is now better positioned to make significant progress in wheat breeding than it ever was before.
- The GRDC now invests heavily in pre-breeding to discover novel genes and deliver germplasm to help crack the 'hard nuts'. This pre-breeding will result in new varieties with improved drought, frost and salinity tolerance and improved disease and sprouting resistance.
- Genetic gain is the one real opportunity for further significant leaps in grain productivity.
- National and international collaboration will ensure that Australian breeders can access the most sophisticated technology, the time taken to breed new varieties can be halved, and potential gains in productivity can be realised.

Activities in 2011–12 included arranging presentations to GRDC Grower and Adviser Updates and other key regional grower meetings; publishing editorial features, media releases and information sheets; and conducting a webcast. Key results included:

- face-to-face presentations made to 1,060 growers and advisers
- print and online features read by 637,053 readers in more than 50 print, radio and online articles
- two information sheets distributed to growers—40,400 copies via *Ground Cover* and 2,500 copies via *Grower Updates*
- a media release about the webcast read by 361,273 readers in more than 30 print and online articles (not including ABC broadcasts), with the webcast viewed live by 300 growers and industry stakeholders.

High-rainfall zone campaign

The GRDC conducted a multifaceted campaign, HRZ—the New Grains Horizon, to raise grower awareness of opportunities to increase the productivity of cropping in the high-rainfall zone of the Southern Region. The campaign focused on issues such as perennial pastures, dual-purpose cereals, raised beds, and management of pests and diseases.

The campaign included 10 media releases and four feature articles distributed to an extensive media list in 2011–12, and achieved high levels of media uptake and interest.

A feature of the campaign was *HoRiZon*, a 12-page, full-colour biannual newsletter that was produced in hard copy and electronically for distribution to 15 grower groups across southern Australia. It featured research results and grower case studies and was well received.

Another feature was short vodcasts (online videos) on timely cereal rust management in the high-rainfall zone, developed and recorded by researchers working in the area and delivered via the GRDC's YouTube channel and by email to grower groups.

Media training

Tailored media and presentation skills training was delivered to all newly appointed GRDC panel members to increase their confidence in dealing with the media and presenting in public. This training supports the delivery of the GRDC's media program and ensures that panel members are prepared to provide appropriate information about GRDC investments to journalists, to interact with the media, and to effectively represent the GRDC at various events.

Information packaging

In 2011–12 the GRDC provided pre-packaged content on the most recent research results relevant to grower needs, in readily accessible and user-friendly formats that met the needs of a diverse range of audiences.

Audio and video

During 2011–12, the GRDC:

- developed and produced three episodes of Ground Cover TV and distributed them on DVDs to all recipients of the *Ground Cover* newspaper
- distributed 50 Driving Agronomy radio programs to commercial radio stations
- packaged 24 interviews for distribution through the RadioWest Network
- produced 36 Over the Fence videos and written articles for the Farmonline website and print media
- conducted two webcasts
- released the first edition of In The Field, a video bulletin by GRDC Managing Director John Harvey, for screening via the GRDC's YouTube channel.

Where appropriate, the packages were cross-promoted, and materials were made widely available through the GRDC's website and YouTube channel.

Website

The GRDC's website provides online access to information about the GRDC, including information on the GRDC's events and publications and outcomes of the projects in the GRDC's investment portfolio.

On average, the GRDC's website homepage received 9,856 unique visitors per month in 2011–12. Of the 196,803 visitors received in 2011–12, 56.2 percent were new visitors. The bookshop page received 9,653 unique page views during the year, making it the most popular single module on the site.

Since the current version of the website was launched, in July 2007, the GRDC has added more than 20,000 pages of content and numerous functions and features. In 2011–12, the GRDC commenced a major overhaul of the site, to address feedback received from stakeholders and GRDC staff.

The redeveloped site includes an entirely new look and feel, improved navigation and search functionality, improved linkages to the GRDC's multimedia and social media content, and an improved capability to see regionalised and timely information via personal computer or smartphone/tablet devices.

The site has undergone rigorous testing and grower focus group evaluation and will be launched in July 2012.

Fax and SMS

In 2011–12, the GRDC introduced fax campaigns as part of the expanded suite of delivery options available via its customer relationship management database. A total of 124 email, fax and SMS alerts were sent out to grain growers and industry. These alerts included the promotion of GRDC-supported activities such as GRDC updates and specific workshops, as well as timely and regionally targeted information on climate, disease and pest management.

The use of SMS was also trialled at the Innovation Generation Conference held in Western Australia in July 2011. Conference participants were provided with the latest information on GRDC investments via SMS and an SMS-based social media survey was conducted.

Publications

The GRDC produces a range of publications, most of which are distributed free to grain growers and made available via the GRDC's website. Details of the new publications released in 2011–12 are in Appendix D.

Ground Cover newspaper and supplements

In 2011–12, to accompany the release of each bi-monthly regional edition of the GRDC's newspaper *Ground Cover*, the GRDC generated either an email alert with visuals or a text message promoting selected key articles in the *Ground Cover* newspaper, Ground Cover supplements or issue-specific GRDC fact sheets. The notifications also pointed to important information on the GRDC's website which was relevant to the particular region.

Recipients of the emails were able to forward the content to their peers; this contributed to a substantial increase in *Ground Cover*

subscribers from 39,000 in 2010–11 to just over 42,000 in 2011–12. The Grower Survey conducted in the first half of 2012 revealed that 65 percent of respondents valued *Ground Cover* ‘a lot’—an increase of nine points from the previous survey in 2010.

To ensure that the newspaper continues to be relevant and timely, the GRDC has added regular dedicated pages on issues such as spray application, grain marketing, risk management and farm business management.

Grower fact sheets

During 2011–12, a total of 34 fact sheets, covering both national and regional issues, were published and distributed to grain growers and industry through the *Ground Cover* newspaper. Several fact sheets related to on-farm grain storage or effective spray application; other topics included aspects of weed, pest and disease management.

Technical reports

The final reports of GRDC-supported research projects sometimes contain information of immediate interest to grain growers, particularly where the research relates to an industry-wide issue. In some cases, the GRDC has the information repackaged for a wider readership in a technical report. One such report, *Weather Essentials for Pesticide Application*, was published by the GRDC in early 2012.

This research report was presented in plain English as a booklet which aimed to help both

growers and spray rig operators to understand, observe and interpret local weather conditions so that they can plan and effectively execute spray applications to avoid spray drift.

In response to a high level of interest in the technical report, the GRDC presented a summary of the content in a fact sheet on surface temperature inversions and spraying, which was distributed nationally to grain growers through the *Ground Cover* newspaper. Requests for bulk copies of both the research report and the fact sheet were also received from participants in the horticultural and wine industries.

Awards and scholarships

The GRDC helps to build capacity in the Australian grains industry and related research disciplines by providing targeted awards and scholarships. The GRDC places a high priority on the dissemination and communication of knowledge and learning outcomes gained from the experiences offered by these awards.

Education and training scholarships

The GRDC offers six categories of education and training scholarships for financial assistance to Australian students, permanent residency students, Australian R&D personnel and overseas R&D personnel, to support study which may ultimately benefit the Australian grains industry.

The scholarships awarded in 2011–12 are summarised in Table 19; more details are provided in Appendix B.

Table 19 : Education and training scholarships granted in 2011–12

Title	Eligible candidates	Period	No.
Agricultural Training Awards	Students undertaking full-time study at a recognised vocational education and training provider institution.	1 year	12
Grains Industry Undergraduate Honours Scholarships	Students of excellence proceeding to undergraduate honours study in a field relevant to the future of the Australian grains industry.	1 year	17
Grains Industry Research Scholarships	Students of excellence proceeding to postgraduate study in a field relevant to the future of the Australian grains industry.	3 years	11
Grains Industry Indigenous Training Awards	Indigenous Australians undertaking work placements, tertiary study and other forms of training approved by the GRDC.	Up to 3 years	0
Grains Industry In-Service Training Awards	Younger scientists, advisers, technical staff and others engaged in work relevant to GRDC objectives that may not be eligible for other forms of support—funding will be considered for travel, secondment or interchange between institutions.	6 months	0
Grains Industry Visiting Fellowships	Overseas R&D personnel who are able to enhance programs supported by the GRDC with their specific skills.	2–12 months	0

Note: In three categories, awards were not granted because no applications were received.

Travel awards

The GRDC granted 13 travel awards in 2011–12. The awards are granted to researchers or students within the Australian grains industry who wish to attend a conference or undertake travel that aligns with the GRDC's corporate objectives and demonstrates benefit to the Australian grains industry.

Travel award recipients are selected against the selection criteria and the GRDC's priority research areas. The main criteria used in evaluating applications are:

- the likely benefit to the Australian grains industry
- the scope of the proposed plan for communicating the learning gained from the travel
- the level of financial support from the applicant's employer
- previous travel grants received by the applicant from the GRDC or other organisations
- previous travel undertaken by the applicant
- whether the applicant will be making a presentation at a conference.

Industry Development Awards

These awards allow groups of Australian grain growers to take part in study tours and other forms of training that will help them develop new skills, build relationships and contribute to the sustainability and profitability of the Australian grains industry.

Industry conferences

The GRDC sponsors organisations that wish to conduct a conference, workshop, seminar or field day that will directly benefit the Australian grains industry; 40 were sponsored in 2011–12.

The GRDC also participates in industry conferences, through displays, presentations and face-to-face interactions. Such participation provides an opportunity for the GRDC to raise awareness of its role and activities, deliver key messages about R&D outcomes in a relevant context, and learn about the interests and concerns of grain growers and other industry participants.

Examples in 2011–12 included:

- the inaugural Innovation Generation Conference, held in Fremantle, Western Australia, in July 2011. The conference encouraged delegates to think beyond the farm gate and develop their knowledge of the supply chain and market impacts on their businesses. The GRDC had a display and made a presentation that focused on social media platforms in agriculture and challenged the audience to determine priority methods to extend RD&E information using new media and novel technologies. Attendees were interviewed using mobile smartphone/tablet devices and web-based surveys, providing feedback that will inform the GRDC's social media strategy.
- the Sustaining Rural Communities conference, held in Narrabri, New South Wales, in April 2012. Addressing the theme 'Local Solutions to National Issues', the conference involved presentations from a range of sectors: government, agricultural industries, small business, mining, manufacturing, finance, tourism, transport, science, education and health professions. The GRDC had a display promoting its capacity-building investments, which helped to connect people from many networks with GRDC-supported projects such as the Primary Industry Centre for Science Education.

Extension and adoption training and support

Agronomists and extension specialists are recognised as important sources of information and motivation for growers, especially when growers are adopting new practices. Yet many of these specialists work in small businesses and have little opportunity to access training in the use of the latest methods and tools for information delivery.

The GRDC Extension and Adoption Training and Support program, which commenced in 2010, was designed to help experienced agronomists and extension specialists to achieve greater uptake of best practice, and improve their understanding of how to effectively communicate technical information to individuals and groups with different motivations and styles of learning. Participants are involved in the program for one year.

In 2011–12, the program included three-day workshops, held in Canberra, at which participants were updated on the GRDC's operations, senior personnel and investments, and learned about the use of current and developing technology for extension. The course covered topics such as how to use webinars, RSS feeds and YouTube for extension, as well as applications that are available or being developed for mobile phones.

Each participant makes a commitment to:

- create a plan for action throughout the year to help further develop their skills and their application of what they learned
- mentor a young person in the grains industry to help ensure that their new skills are shared widely.

The program includes a field tour to visit agronomists and implement skills, which the participants will undertake in August 2012.

Capacity-building collaborations

The GRDC collaborates with other organisations to leverage their individual contributions to more effectively build capacity across Australian primary industries, with particular benefits for the grains industry. In 2011–12 the GRDC contribution included support for programs for high school students; research grants for university students, researchers and growers; and professional development opportunities for future leaders.

Primary Industry Centre for Science Education

The Primary Industry Centre for Science Education (PICSE) is a partnership funded by the Australian Government, universities, rural RDCs and primary industry bodies to attract students into tertiary science and increase the number of professionals in agribusiness and research institutions. It delivers class activities, teachers' professional development, teaching resources, student camps and student industry placement programs.

The GRDC supports the centre as a means to increase participation in science education, particularly in tertiary agricultural science, to address current and predicted skills shortages in the grains industry.

In 2011–12, science education officers spoke to 6,520 year 11 and year 12 students in science classes in 141 schools across Australia, presenting GRDC research with local relevance.

Eight five-day industry–science residential camps were run for 168 year 11 and year 12 students as a prerequisite for five-day industry placements with scientists during January 2012. At least five PICSE activity centres arranged grains-focused placements for students. Two students from each Activity Centre were awarded travel scholarships to a camp in another state, funded by national industry partners such as the GRDC. One student travelled from Queensland to Western Australia while another travelled from Queensland to Tasmania. Each student wrote a report describing their experience and a thank you letter to the GRDC.

Eight two-day professional development sessions for teachers were delivered Australia-wide to 157 year 11 and year 12 science teachers, with each program linked to local industries and a host university. The common topic for the year was 'The science relating to food and water security', and each activity centre customised the topic with local relevant examples of industry extension and research pertaining to the state curriculum. One teacher from each activity centre was awarded a travel scholarship to a professional development session in another state, funded by national industry partners. GRDC funding allowed one teacher from South Australia to attend a professional development session at the University of Western Australia in Perth.

National Youth Science Forum

The GRDC supports the National Youth Science Forum, which aims to encourage students from across Australia to enter science- or engineering-based university courses and to explore associated careers.

The forum includes intensive residential programs, follow-up seminars and visits to various university campuses and industry sites around Australia. The experience involves presentations, debates, personal development sessions and visits to science, research and engineering facilities. Around 40 of the top students are selected for leadership development and take on the role of team leaders at the following year's forum.

The 2011–12 forum included three 12-day intensive residential programs involving a total of 450 year 12 science students. Two programs were held at the Australian National University, Australian Capital Territory, and one was held at Curtin University, Western Australia.

Four GRDC staff members gave presentations at the programs, including information about their own journeys through agricultural science. Staff also held informal discussions with each of the student groups during the program.

CSIRO Plant Industry Summer Student Program

The GRDC is a sponsor of the CSIRO Plant Industry Summer Student Program. The program runs for 10 weeks and is tailored for second- and third-year university students.

Each student works on a project alongside a CSIRO research scientist at one of CSIRO Plant Industry's sites, in Adelaide, Brisbane, Canberra, Narrabri (New South Wales) or Perth. Projects are designed to ensure that students have the opportunity to learn new techniques and approaches, and to understand the importance of scientific research in the context of the delivery of practical outcomes. At the completion of the program, the students prepare final reports on their findings and present their results in a public forum.

Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

The GRDC is a sponsor of the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.

The awards, which are coordinated by ABARES, aim to encourage science, innovation and technology in rural industries and to advance the careers of young scientists through national recognition of their research ideas. The awards are open to applicants aged between 18 and 35 who have proposals for innovative research that will benefit rural industries.

In 2011–12, the GRDC-sponsored award was granted to Jeff Powell for his project 'A trait-based approach for understanding the processes limiting effective nodulation of pulse crops'.



The GRDC-sponsored Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry is presented at the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) Outlook Conference 2012. From left: Kim Ritman, ABARES Chief Scientist; Jeff Powell, award recipient; Senator the Hon. Joe Ludwig, Minister for Agriculture, Fisheries and Forestry. *Photo: ABARES*

Nuffield Australia Farming Scholarships

The GRDC supports the skill and leadership development of people working in the grains industry through its sponsorship of Nuffield Australia Farming Scholars.

This scholarship program gives Australian primary producers the opportunity to travel overseas to study a research topic related to farming practices in New Zealand, Europe, Asia or the Americas. The scholars are expected to actively share the benefits of their experiences with their industries and communities. In this way, the scholarships provide a better understanding of the forces shaping international trade policy in key markets, the issues behind consumer sentiment, and the technological advances being made by producers overseas, for individuals and their farming sectors.

The 2011–12 GRDC scholars are:

- Michael Chilvers, from Nile, Tasmania— Michael will research strategies to efficiently transition from a traditional family farming structure to a diversified agricultural business. He anticipates drawing from a range of systems from China, France, New Zealand, North America, South America and the United Kingdom.
- Ashley Fraser, from Lilliput, Victoria— Ashley will study how seed coating both protects and enhances crop growth. He plans to travel to Canada, Europe and the United States to visit research facilities,

manufacturers of coating equipment and materials, powder manufacturers, and chemistry experts.

- Jemma Sadler, from Wongan Hills, Western Australia—Jemma will study profitable cropping with sustainable weed management. She plans to visit Europe, North America and South America.
- Robin Schaefer from Loxton, South Australia—Robin will study farm business management systems as well as medium- to long-term weather forecasting, with a particular focus on management tools to aid decision making. He plans to visit Argentina, Europe and the United States.
- Ryan Smart from Keith, South Australia—Ryan will study ways of managing farm energy use to maximise efficiency, including by reviewing farm operation systems to work out ways to minimise greenhouse gas emissions and maximise carbon sequestrations at the farm level. He plans to visit Canada, Germany and the United States.

Australian Rural Leadership Program

The GRDC supports the development of grains industry leaders through the Australian Rural Leadership Program. The program's objective is to produce a network of informed, capable and ethical leaders who are able to work collaboratively to advance the interests of their industries and communities and rural Australia in general.

The program is delivered in seven sessions over 17 months, and accepts up to 35 people each year. Recognising the benefits of diversity, the program selects men and women, including Indigenous people, of various ages, from different employment backgrounds and from places with different climate and geographical conditions.

The GRDC-sponsored participants on the course commencing in 2011–12 were Luke Fitzgerald from Vale Park, South Australia, and Julia Hausler from Warracknabeal, Victoria.

Vavilov–Frankel fellowships

The aim of the Vavilov–Frankel Fellowship Fund is to encourage the conservation and use of plant genetic resources by enabling outstanding young scientists from developing countries to carry out relevant, innovative research outside their own countries. Applicants must demonstrate the importance and benefit of their proposed research and indicate how it will be applied in the framework of a national or regional program in their home country or another developing country. In this way, the Vavilov–Frankel Fellowship Fund helps countries to build the scientific capacity they need to address urgent issues relating to the management of plant genetic resources and to promote the contribution of those plant genetic resources to development.

Proposals that might be supported by the GRDC must be carried out at an Australian research institute, address one of the research topics specified for the funding round, and meet at least one of the following criteria:

- target a species that is a priority for both Australia and the home country
- target an alternative, neglected or underutilised species with either environmental or economic potential for Australia
- work on wheat, barley, oats, sorghum, cereal rye, triticale, maize, canary seed, millets/panicum, canola, linseed, safflower, soybeans, sunflowers, chickpeas, cowpeas, faba beans, field peas, lentils, lupins, mungbeans, navy beans, peanuts, pigeon peas and/or vetch



Peter Schwarz, Deputy Chair of the GRDC's Southern Regional Panel, congratulates the GRDC's latest Nuffield Scholars. From left: Robin Schaefer, Michael Chilvers, Jemma Sadler, Ashley Fraser and Ryan Smart. *Photo: Emma Leonard*

- use biotechnology in support of efficient use of plant genetic resources.

In 2011–12, the GRDC supported Vietnamese researcher Bui Thi Thu Huyen, a plant breeder specialising in the study of legumes. During her fellowship, Bui Huyen focused on identifying the causal agents and resistance of mungbeans to mungbean yellow mosaic disease.

Mungbean is a traditional food crop in Vietnam, but its cultivation is often threatened by mungbean yellow mosaic disease, which is transmitted by whitefly and causes yield losses of up to 70 percent. Bui Huyen's research

focused on identifying prevalent strains of the disease in Vietnam, and mapping sources of resistance in mungbean populations, in order to develop more resilient varieties. Improved varieties would offer a more sustainable and effective alternative to the current management technique of using chemical pesticides.

Bui Huyen's research and training was done in collaboration with several institutes, including the World Vegetable Centre (AVRDC) in Taiwan and India, and the Department of Employment, Economic Development and Innovation in Queensland.

Case study

Extension program spreads the word on grain storage

Grain storage is at the interface between the grower and the end user, and it is essential that growers implement best grain storage practice to meet the needs of the market and achieve the best return for their harvest. In recent years, this has become increasingly challenging as more grain has been stored on farm, insect pests have developed pesticide resistance, and markets have shown 'zero tolerance' to live insects in export grain shipments.

To help growers to understand and apply best management practice when storing grain, the GRDC conducted a comprehensive Grain Storage Extension Program, reinforced by a communications campaign, in 2011–12.

The extension program delivered practical, hands-on workshops for growers, and a number of publications were produced and distributed in both print and electronic format to grain growers and industry.

Within the GRDC's grower fact sheet series, relevant topics included:

- on-farm storage of high-moisture grain
- the importance of vigilant monitoring of grain in storage to ensure delivery of high-quality grain to buyers
- the implementation of safe workplace practices around the farm
- ways to manage bulk grain bags (silo bags) for short-term storage
- requirements for successful storage of pulses and oilseeds.

Other complementary information resources included: the Stored Grain Pests Identification Poster; *Stored Grain Pests Identification: The Back Pocket Guide*; and the *Aerating Stored Grain—Cooling or Drying for Quality Control* booklet.

A Ground Cover TV segment was also produced, to visually enhance the key messages contained in the fact sheets and other grain storage information resources.



Case study

GRDC PhD student identifies nematode resistance mechanism in wheat

Pratylenchus thornei is one of the two species of root lesion nematode that occur in all wheat-growing zones of Australia and cause significant economic losses to grain growers. *Pratylenchus* resistance is a priority trait in Australian wheat breeding. The GRDC supports research to identify *Pratylenchus* resistance genes and develop tools such as molecular markers to assist breeders to incorporate resistance into elite breeding lines.

Katherine Linsell is undertaking PhD research at the South Australian Research and Development Institute (SARDI), with support from a GRDC Grains Industry Research Scholarship. Katherine has made a significant breakthrough in root lesion nematode research, by identifying the biological and genetic mechanisms of resistance to *P. thornei*, providing the first strong evidence linking form to function.

Katherine's studies identified the inhibition of nematode hatching and motility as mechanisms associated with resistance to *P. thornei*, and resulted in the development of corresponding nematode assays that are simple and reproducible and can be used by breeders to screen wheat lines for *P. thornei* resistance. Figure 14 illustrates the contrast in the extent of infection in resistant and susceptible lines.

In addition to identifying the basis of resistance, the research group at SARDI has identified the genomic regions of wheat that are associated with *P. thornei* resistance. The group identified regions associated with suppression of hatching and motility on six wheat chromosomes. Plant defence by suppression of hatching was attributable to genomic regions on chromosomes 2B, 5B, 6B and 6D, while the defence mechanism related to suppression of motility was identified on chromosome 2B only.

Figure 14: *P. thornei* nematode infection on roots of resistant and susceptible wheat lines



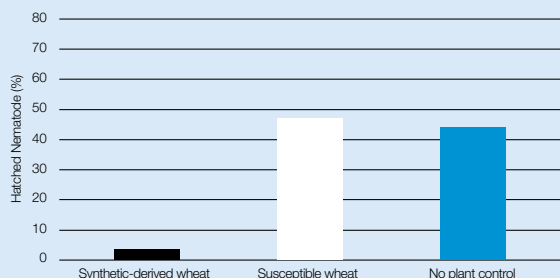
Resistant

Susceptible

Note: Red 'threads' are stained nematodes. Source: Klaus Oldach, SARDI.

Most of the resistance was contributed by regions on chromosomes 2B and 6D, regions that were contributed by a synthetic-derived wheat line with a pedigree involving a cross between durum and a wild relative of wheat. Figure 15 illustrates the contrast in the rate of nematode hatching in the synthetic-derived and susceptible lines.

Figure 15: Inhibition of *P. thornei* hatching in resistant and susceptible wheat lines



Note: 'No plant control' indicates percentage of nematodes that hatched in the absence of a wheat plant.

Source: Klaus Oldach, SARDI.

This knowledge will enable wheat breeders to move *P. thornei*-susceptible lines towards more resistance in their breeding programs. It also provides the basis for the identification of the genes involved in the suppression of hatching and motility of *P. thornei* and the development of efficient selection tools to assist breeders to accelerate the development of wheat germplasm with resistance to *P. thornei*.

Case study

Webcast opens a new window on mouse control

On 28 September 2011, the GRDC delivered a highly successful live webcast (internet broadcast) on mouse control.

The webcast was recorded at a meeting of the Crop Science Society of South Australia and brought together a panel of experts from the National Mouse Management Working Group and the Australian Pesticides and Veterinary Medicines Authority. The panel discussion was streamed live, and a 'chat window' was provided to enable viewers to ask questions of the panel and participate in the discussion.

In total, 250 registrations to view the webcast were received, from growers, agronomists, ABC journalists and members of parliament located in metropolitan, regional and remote locations. The issues raised by growers included what to look for in their crops, and whether emergency permits for regional bait mixing would be extended.

The event received a lot of media coverage, including 156 media articles, effectively raising awareness of the GRDC through state, metropolitan and local media channels.



At the mouse control broadcast, John Both (Crop Science Society of South Australia) introduces panel members Andrew Polkinghorne (Grain Producers Australia), Alan Norden (Australian Pesticides and Veterinary Medicines Authority), Jon Lamb (Moderator), Simon Humphrys (Invasive Animals Cooperative Research Centre) and Rohan Rainbow (GRDC). *Photo: Cox Inall*

Grower survey snapshot

Table 20: Proportion of growers who value particular sources of GRDC information 'a lot', as assessed by GRDC grower surveys, 2006 to 2012, by proportion of respondents who were aware of the GRDC (percent)

Source of GRDC information valued 'a lot'	2006	2008	2010	2012
Ground Cover newspaper	54	59	56	65
National Variety Trials (NVT) ^a	n/a	n/a	52	55
Ground Cover supplement inserts	25	37	40	48
GRDC Fact Sheets ^a	n/a	n/a	37	45
Crop Updates	37	40	43	39
Ute Guides	25	30	34	39
GRDC articles in <i>Rural Weekly</i> newspapers ^b	n/a	49	47	32
GRDC articles in local or national newspapers ^a	n/a	n/a	25	32
GRDC items on the ABC Country Hour	56	54	54	31
GRDC Growers Report ^b	n/a	31	37	30
Paddock Diaries	24	28	35	27
Ground Cover TV DVD ^c	n/a	n/a	n/a	14
GRDC website	5	4	8	12
GRDC Annual Report	13	21	15	11
Driving Agronomy CD ^c	n/a	n/a	n/a	10

These measures were introduced in: a 2010; b 2008; c 2012.

Except as otherwise noted, the measures used in this table were introduced in 2006.

Note: The survey was suspended in 2007 as part of the GRDC's drought response and is now conducted every second year.

Table 21: Communication & Capacity Building overview

Output Group 4—Communication & Capacity Building

Objective

Increase the awareness and capacity to optimise adoption of grains research outputs

Strategies

- Ensure planned, targeted, measured communication
- Leverage delivery through partnerships
- Develop demand-driven publications and products
- Coordinate a national approach to building industry and research capacity

Investment budget for 2011–12

\$11.85 million

Performance for 2011–12

Performance indicators	Targets	Achievements
<i>Ensure planned, targeted, measured communication</i>		
AOP & PBS: Implementation of a revised GRDC communications strategy	<ul style="list-style-type: none"> • Development and implementation of an updated GRDC communication strategy that identifies the needs of stakeholders, key messages and processes for evaluation. 	Implementation of a new corporate brand, through: <ul style="list-style-type: none"> • a revised logo • a tagline, 'Your GRDC working with you' • corporate stationery • publications • presentations • a corporate brochure. Commencement of a research partner engagement strategy.
	<ul style="list-style-type: none"> • Facilitation of the delivery of research outputs to a wide audience, building on existing regional delivery channels. 	Successful delivery of three national and seven regional issues communication campaigns communicating key research outcomes to targeted grower segments. A highly effective communication program, including three Ground Cover TV DVDs, over 50 Driving Agronomy radio segments, and 36 Over the Fence packages.
AOP & PBS: Increased awareness of the GRDC and its research outcomes	<ul style="list-style-type: none"> • Implementation of national issues-based campaigns to increase awareness of priority issues including: <ul style="list-style-type: none"> – GRDC profitability and productivity objectives – wheat breeding – climate change. 	Successful conclusion of: <ul style="list-style-type: none"> • the 'The Way We Were' campaign, with three grain growers undertaking an international study tour • the wheat breeding campaign, with presentations to GRDC Grower and Adviser Updates and other key regional grower meetings; editorial features; media releases; fact sheets; and a webcast.
	<ul style="list-style-type: none"> • Development and implementation of regional issues-based communication campaigns to increase awareness of priority issues. 	Successful conclusion of regional issues-based communication campaigns for: <ul style="list-style-type: none"> • root lesion nematodes • crown rot • non-wetting soils • frost.
	<ul style="list-style-type: none"> • Increase in unaided awareness of the GRDC, through targeted communication activities (from 54% in 2010 to 75% in 2011). 	Significant increase in unaided awareness of the GRDC, to 74% in 2012 from 67% in 2010.
	<ul style="list-style-type: none"> • Increased understanding of the GRDC and its role, as measured through independent research surveys. 	Significant increase in the proportion of growers surveyed who claimed to know a fair to considerable amount about what the GRDC does, to 62% in 2012 from 54% in 2010.

Table 21: Communication & Capacity Building overview (continued)

Performance for 2011–12		
Performance indicators	Targets	Achievements
Increased awareness of the GRDC and its research outcomes (continued)	<ul style="list-style-type: none"> Publications, products and services that increase awareness of the GRDC's research outcomes in the Australian grains industry and wider community and reflect the needs of different target audiences. 	<p>Increase in the proportion of Grower Survey respondents who valued 'a lot':</p> <ul style="list-style-type: none"> Ground Cover—65% in 2012 (an increase of 9 percentage points since 2010) Ground Cover supplements—48% (an increase of 8 points) fact sheets—45% (an increase of 8 points).
	<ul style="list-style-type: none"> Production of: <ul style="list-style-type: none"> three episodes of Ground Cover TV 36 Over the Fence media packages at least 42 Driving Agronomy segments for commercial radio. 	<p>Production of:</p> <ul style="list-style-type: none"> three episodes of Ground Cover TV, containing 26 segments and three supplements, that were sent to over 42,000 recipients and played at GRDC displays at field days, updates and conferences around Australia 36 Over the Fence packages that were 100% taken up by the Rural Press website Faronline 50 Driving Agronomy segments that were broadcast on commercial radio stations throughout Australia.
	<ul style="list-style-type: none"> Implementation of communication activities and a media program to increase awareness of new panel members. 	<p>Implementation of a national campaign to increase panel member profiles: media releases were distributed nationally and regionally, and videos profiling all panel members were made available on the GRDC website and YouTube channel.</p>
AOP & PBS: Delivery of a strategic media program focused on grower activity on-farm to ensure information is delivered when it can be of most benefit	<ul style="list-style-type: none"> Management of a national media program to deliver high-quality, timely media products to inform stakeholders of research, development and extension (RD&E) outcomes and activities. 	<p>National and regional distribution of over 500 targeted and timely media products, such as media releases, 'grains flash' media alerts, newspaper columns, magazine articles and comprehensive media packages including text, video and photographs.</p>
	<ul style="list-style-type: none"> Increase (over established benchmarks) in national media coverage of research activities and outputs for the GRDC and its research partners. 	<p>A rise in the volume of media coverage that mentioned or discussed the GRDC, to 3,546 press articles and broadcast reports, an increase of 9.0% from 3,252 in 2010–11 and 36.8% from 2,592 in 2009–10.</p>
	<ul style="list-style-type: none"> Increase (over established benchmarks) in favourable GRDC mentions in the media. 	<p>A rise in the volume of favourable press coverage, to 2,351 articles, an increase of 3.0% from 2,283 in 2010–11 and 15.1% from 2,042 in 2009–10.</p> <p>A very high favourability rating of all press coverage of the GRDC, at 60.7, the same as in 2010–11 and 12% higher than 60.2 in 2009–10.</p> <p>A rise in the volume of reports that were identified as containing some GRDC media release content to 2,278, an increase of 4.5% from 2,179 in 2010–11 and 53.4% from 1,485 in 2009–10.</p> <p>A total of 13 press articles that were unfavourable for the GRDC, representing 0.5% of total press coverage—most of this reporting occurred during the months of July 2011 and February 2012, and included criticism of GRDC-funded GM lupin research and the GRDC's funding for GM research.</p> <p>For proactive content in each region:</p> <ul style="list-style-type: none"> a drop in the Northern Region to 488 reports, a decline of 7.4% from 527 in 2010–11 a rise in the Southern Region to 1,328 reports, an increase of 12.9% from 1,176 in 2010–11 a drop in the Western Region to 462 reports, a decrease of 2.9% from 476 in 2010–11.

Table 21: Communication & Capacity Building overview (continued)

Performance for 2011–12		
Performance indicators	Targets	Achievements
AOP: Increased awareness and understanding of the role and function of the GRDC's regional panels	<ul style="list-style-type: none"> Implementation of campaigns focused on the regional panel profile and activities in each region. 	<p>Successful conclusion of a panel profile communication campaign, with:</p> <ul style="list-style-type: none"> panel member profiles made available on the GRDC website video interviews included on YouTube media and presentation skills training delivered in the regions media releases announcing panel member appointments distributed nationally.
	<ul style="list-style-type: none"> Increase in the proportion of growers who are aware of the GRDC's regional panels (to 70% by 2011–12). 	<p>Significant increase in the proportion of growers who are aware of the GRDC's regional panels, to 68% in 2012 from 60% in 2010.</p>
AOP: Regular monitoring of current and emerging issues	<ul style="list-style-type: none"> Monitoring of grains industry and corporate issues, and development of targeted communication tools to assist in the exchange of information and delivery of consistent messages. 	<p>Implementation of an effective issues management strategy.</p> <p>Development of talking points and question-and-answer packages for a range of issues, including genetic modification, mouse control, commercial investments, and GRDC initiatives such as Board and panel appointments.</p>
<i>Leverage delivery through partnerships</i>		
AOP: Recognition of strong cooperative research partnerships	<ul style="list-style-type: none"> Increased favourable mentions of the GRDC's research activities and outputs and those of its research partners. 	<p>Development of 100% of GRDC RD&E media products in partnership with, and subject to approval by, research partners, and acknowledgement of the partner organisation in all cases.</p>
	<ul style="list-style-type: none"> Increase (over established benchmarks) in positive GRDC coverage in the print and electronic media. 	<p>Continued positive media environment, reflected in the 60.7% average favourability rating of coverage in 2011–12.</p> <p>Successful media strategy in which media release activity, in partnership with research organisation, drove favourable reporting and uptake of key messages.</p>
	<ul style="list-style-type: none"> Establishment of a national grains communication network. 	<p>This activity was not funded for delivery in 2011–12.</p>
AOP & PBS: Increased collaboration in R&D communication and extension activities between the GRDC and research partners	<ul style="list-style-type: none"> Delivery of a pilot national GRDC research partner communication workshop and forum to build relationships and leverage existing activities. 	<p>Effective leveraging of research partnerships through a successful media program—relationship management activities were the most commonly mentioned topic in media coverage of the GRDC, and were discussed in 1,221 reports (34.4% of total coverage).</p> <p>The pilot workshop was not delivered in 2011–12, but may be considered as part of the broader research partner engagement strategy in 2012–13.</p>
	<ul style="list-style-type: none"> Identification of opportunities for the GRDC to work collaboratively with other rural R&D corporations (RDCs), research partners, industry partners and governments to deliver information in ways that reduce duplication, better target stakeholders and are more cost effective. 	<p>Engagement with:</p> <ul style="list-style-type: none"> research partners, through a theme consultation booklet that was emailed to research partners and distributed at information sessions to encourage feedback on GRDC investment priorities and themes. researchers, government agencies, industry and growers, during consultations on the development of the Strategic R&D Plan 2012–17.

Table 21: Communication & Capacity Building overview (continued)

Performance for 2011–12		
Performance indicators	Targets	Achievements
AOP & PBS: Increased collaboration in R&D communication and extension activities between the GRDC and research partners (continued)	<ul style="list-style-type: none"> Publication of materials in collaboration with RDCs, research partners, industry partners and government to meet grower and industry needs. 	<p>Publication of <i>Irrigated Wheat—Best Practice Guidelines in Cotton Farming Systems</i> as a joint collaboration between the Cotton CRC and the GRDC.</p> <p>Distribution of bulk quantities of fact sheets in the GRDC's spray application/spray drift series to the RDCs for the cotton, sugar and grape and wine industries.</p>
	<ul style="list-style-type: none"> Joint communication efforts with other RDCs. 	<p>Efforts including:</p> <ul style="list-style-type: none"> hosting and regularly attending joint meetings of RDC communication managers participating in joint RDC activities.
<i>Develop demand-driven publications and products</i>		
AOP & PBS: Enhanced information tools to account for industry issues and emerging technologies to enhance adoption by the grains industry and the wider community	<ul style="list-style-type: none"> Production of electronic media publications, including audio, video and other electronically based content. 	<p>Regular distribution of notifications to stakeholders, via emails through the customer relationship management system, of diary dates, surveys and newsletters.</p> <p>Release of the Southern Region edition of <i>Weeds: the Ute Guide</i> via phone app.</p>
	<ul style="list-style-type: none"> Distribution of national Over the Fence case studies, including media articles and video content, to rural press and online publishers. 	<p>Delivery of 36 Over the Fence packages that were 100% taken up by the Rural Press website Farmonline.</p>
	<ul style="list-style-type: none"> Development of the Ground Cover TV program, and delivery to growers, including through Web 2.0 platforms. 	<p>Production of three episodes of Ground Cover TV and three supplements, that were:</p> <ul style="list-style-type: none"> sent to over 42,000 recipients on DVDs played at GRDC displays at field days, updates and conferences around Australia. made available on YouTube and included in the electronic version of <i>Ground Cover</i>.
	<ul style="list-style-type: none"> Delivery of pre-recorded content of the national radio program Driving Agronomy to radio stations. 	<p>Production of 50 Driving Agronomy segments that were broadcast on commercial radio stations around Australia.</p>
<i>Coordinate a national approach to building industry and research capacity</i>		
AOP & PBS: A nationally coordinated agricultural research capacity-building strategy	<ul style="list-style-type: none"> Evidence that key stakeholders understand the GRDC's capacity-building strategy. 	<p>Efforts to communicate the strategy to stakeholders, including:</p> <ul style="list-style-type: none"> promotion of all training, travel and industry support awards to growers via the GRDC customer relationship management system promotion of the strategy at all GRDC-supported events for capacity building <p>Feedback received following discussions of the strategy during stakeholder consultations about the GRDC's investment themes.</p>
	<ul style="list-style-type: none"> Continued support of activities that provide growers and others in the grains industry with opportunities to develop leadership skills, including investment in industry-based awards such as the Nuffield Foundation and the Australian Rural Leadership Foundation scholarships. Continued support for training awards, conferences and workshops to maximise targeted awareness of GRDC investment outcomes. 	<p>Support for:</p> <ul style="list-style-type: none"> 13 Travel Awards 14 Industry Development Awards 40 new training scholarships, including 11 Grains Industry Research Scholarships and 17 Undergraduate Honours Scholarships 40 conferences five Nuffield Australia Farming Scholarships two Australian Rural Leadership Program participants.

What's in the RD&E pipeline for 2012–13?

- A boost in regional communication capacity, through:
 - delivery of a wider range of media products through a greater range of media outlets
 - use of multimedia to cater for different delivery needs and learning preferences
 - expanded availability of detailed technical information to equip growers with the tools, knowledge and confidence they need to implement beneficial practice changes.
- Enhancements to the GRDC website to improve access to relevant content, regional tailoring of searches and the way information is displayed.
- A social media strategy to facilitate conversations and information exchange between the GRDC and its stakeholders.
- New mobile phone apps to provide up-to-the-minute information and decision-making support in the field and on the road.
- Support for activities that provide growers and others in the grains industry with opportunities to develop leadership skills, including investments in industry-based awards.
- Support for travel awards, conferences and workshops to maximise targeted awareness of the research outcomes of GRDC-supported projects.
- Regionally focused priority practice change campaigns.
- An expanded range of farm business management training options.
- Enhanced capacity to target information to address particular needs and interests.
- Availability of *Ground Cover* newspaper and supplements as fully searchable content on the GRDC's website.



GRDC Corporate Services. From Left (back row) Ross Thompson, Cathy Stewart, Bob Watson, Carmen Jiang, Brendan Lawler, Johan Pienaar, Nino Divito, Mary Dalton, Sara Gordon, Klaudia Skazlic, Michelle Priest; (front row) Vincent Fernandez, Jeff Derix, James Macintyre, Zoltan Lukacs. *Photo: Geoff Comfort*

The GRDC's enabling business group, Corporate Services, is responsible for key operational activities in relation to:

- corporate governance and legal services
- corporate strategy
- preparation of statutory documents and submissions to government reviews and inquiries
- human resource management
- finance and administration
- quality management
- risk management
- information management systems
- impact assessment.

These activities provide essential support for the corporation's responsibilities under the PIERD Act and the CAC Act, and equip the operational business groups to perform their functions.

Portfolio management

The GRDC's RD&E investment portfolio in 2011–12 included more than 1,000 projects, at various stages of development. The management of the investment portfolio aims to achieve a balanced spread of projects in terms of:

- GRDC investment themes
- the National Research Priorities and Rural R&D Priorities
- crop type
- project type (strategic basic, applied, experimental development, extension, commercialisation or capacity building)
- delivery time to growers of R&D outcomes (long-term projects versus short-term projects)
- probability of overall success (high-risk long shots versus lower risk sure bets)
- level of expected on-farm benefits relative to investment required
- induced spillover benefits to industry
- expected benefits to be achieved for the broader community.

The GRDC's portfolio is grouped under 30 clusters. This enables groupings of projects around a common theme (for example, summer crops, crop protection, supply chain and markets) to be assessed generally, rather than have all individual projects examined separately.

Each year, the GRDC assesses the clusters in terms of their expected relative benefit flow on-farm, to industry and to the broader community. Some clusters are also assessed for their economic, social and environmental impact, as described in Table 10 of this report.

Different approaches are used to monitor, evaluate and manage projects, depending on project characteristics. For example, evaluation and management approaches for projects with standard GRDC research agreements are different from the approaches used to manage the GRDC's involvement in incorporated and unincorporated joint ventures.

The GRDC undertakes a range of activities to ensure that individual projects achieve their objectives and scheduled milestones, and that the R&D portfolio as a whole continues to address industry and government stakeholder priorities.

The portfolio monitoring system includes internal guidelines and/or procedures for:

- identifying and managing risks associated with individual projects during planning and implementation stages
- evaluating progress reports for project performance against objectives and milestones—each year, a satisfactory progress report must be submitted to the GRDC before further payments will be made to the research provider
- developing business cases, terms of reference and timeframes for a limited number of formal reviews of targeted investment areas—five formal reviews were conducted in 2011–12, in the areas of herbicide tolerance; dual-purpose crops; lupin breeding; national molecular marker programs for wheat, barley, canola and pulses; and the CIMMYT–Australia–ICARDA Germplasm Evaluation program.

Business process review

In 2011–12 the GRDC enhanced aspects of its business processes as part of an ongoing process of review and improvement. The areas of focus in 2011–12 were the GRDC investment cycle and continuing to improve capacity-building processes.

The high-level business process for determining how the GRDC reviews investment opportunities was a significant area of focus in 2011–12. The process was revised to allow program logic on investment strategies under a series of six themes to drive the GRDC’s investment decisions. The process changes encourage greater interaction across the lines of business in the GRDC, increasing the level of direct discussion between regional panel members and GRDC managers about proposed investments. In addition, the amount of time available to managers to contract an investment has been increased to facilitate earlier contracting and to even out the task of contracting over time.

The capacity-building processes were improved through the creation of electronic forms and workflows in the GRDC’s project management system, Clarity, to support procuring and managing capacity-building investments.

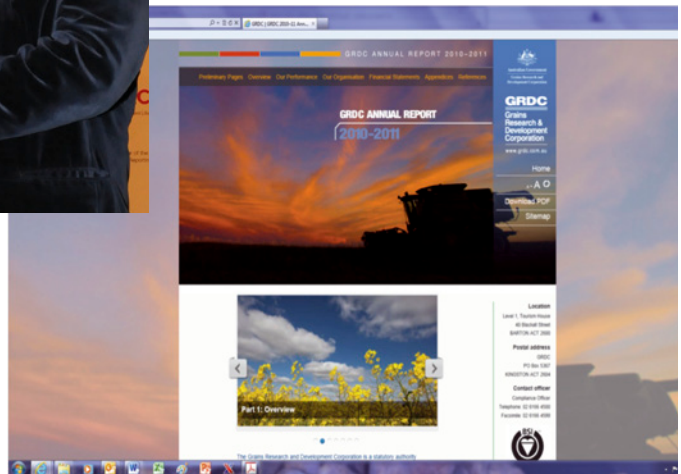
Information technology

The GRDC’s information technology environment maintains the integrity and functionality of the GRDC’s records and project management software.

In 2011–12, upgrades to the environment focused on improving the end user experience and introducing mobility-focused tools and equipment (such as mobile digital devices). Infrastructure changes were also introduced during the year to better utilise existing hardware and to provide capacity to cope with increased demand on records and project management systems.



The GRDC’s 2010–11 annual report receives the winners award in the Online Reporting Award (Public Sector) category at the 2012 Australasian Reporting Awards. Zoltan Lukacs, Strategic Planning and Reporting (left), accepts the award from Carlton Boyse, Group Director New Business and Marketing, Pacific+ Corporate Publishing. *Photo: Brightlights Photography*



The GRDC's primary aim is to make new technology available to grain growers as quickly and as cost-effectively as possible. In some cases, the benefits of GRDC research investments can be most efficiently delivered to growers through the commercial production of the research outputs. Commercialisation is a means of delivering technology to Australian grain growers so that they can effectively compete in global grain markets, and securing technology adoption.

Commercialisation strategy

In 2011–12, the GRDC achieved its objective in commercialising research outputs through:

- ensuring commercialisation activities were aligned with the GRDC's four core strategies and relevant to the strategies of the four output groups (Practices, Varieties, New Products and Communication & Capacity Building)
- leveraging capital and expertise from co-investors, to maximise opportunities to bring technology to the marketplace and give grain growers access to technology
- developing comprehensive business plans for delivering satisfactory returns to grain growers and investors.

As part of the overall commercialisation strategy, the GRDC recognises that the following are necessary for commercialisation: a sustainable market size, expertise, funds and distribution channels. Usually the GRDC is only one of a number of organisations investing in the development of new technologies by public and/or private organisations. Investment partnerships are desirable and necessary because they reduce the risk to the GRDC in the funding of new technologies, and because partner organisations can bring benefits, apart from financial resources and research capacity, such as market knowledge and access to complementary technologies.

Where the GRDC is a member of a research consortium using public and private sector funds, it has influence over the terms of commercialisation, and determines these in collaboration with the other investors to ensure

that a proper balance is struck among the needs of all members of the consortium.

While the most usual path to market for commercial research products from GRDC research investment will be through licensing to suitable partners, investments in joint ventures and companies to deliver the products will be considered based on the merits of business cases that demonstrate that this will deliver the best outcome for the industry.

In selecting investment structures, the GRDC follows its internal guidelines and identifies and implements the most appropriate structure for holding its equity in each business arrangement. The GRDC position is that all commercial entities with which it is involved should have appropriate boards that possess the broad range of skills required to provide oversight for the business.

The GRDC continues to seek new business opportunities that arise from its research portfolio, with the aim of providing benefit firstly to growers and secondly to the GRDC and its research partners. For each commercial business opportunity, the GRDC seeks investment of resources from the partners that will profit from the development and widespread uptake of the new technology. This is an important part of using GRDC investment funds to leverage funds from other sources — including, in this area, commercial investment funds — for the benefit of growers.

Commercialisation outcomes

Every commercialisation task is unique, and the process of bringing products and technology to market must be undertaken on a project-by-project basis. A cross-section of commercialisation work undertaken in 2011–12 is described below.

New crop varieties

In 2011–12, the GRDC was actively involved in the release and commercialisation of several new crop varieties that were released by public breeding programs with financial support from the GRDC. The GRDC's primary objective was to encourage rapid adoption of the new,

superior varieties by growers, while protecting the interests of the intellectual property owners.

In selecting commercial partners, the GRDC and its research partners take into consideration capabilities such as the ability to produce quality seed, the ability to market seed successfully, and the targets for seed production and variety uptake. The management and collection of end point royalties, including the terms and conditions imposed on growers, are also taken into consideration.

In the case of commercially bred crops such as wheat the GRDC has no ownership in new varieties and the responsibility for commercialisation lies with the breeding companies alone. However, the GRDC is an investor in some of the breeding companies and reports on the variety releases from all of its breeding-related investments, regardless of whether they are publicly funded or commercial enterprises.

In 2011–12, the new crop varieties commercialised (that is, new varieties for which there is a significant amount of seed available commercially to growers) comprised:

- five barley varieties—Bass ^(b), Fathom ^(b), Navigator ^(b), Skipper ^(b) and Wimmera ^(b)
- three canola varieties—CB Frontier RR ^(b), CB Henty HT ^(b) and CB Tango C ^(b)
- one chickpea variety—PBA Boundary ^(b)
- one faba bean variety—PBA Rana ^(b)
- two field pea varieties—PBA Oura ^(b) and PBA Percy ^(b)
- one lentil variety—PBA Herald XT ^(b)
- one lupin variety—PBA Gunyidi ^(b)
- three oat varieties—Bannister ^(b), Dunnart ^(b) and Wombat ^(b)
- seven wheat varieties—Corack ^(b), Elmore CL Plus ^(b), Emu Rock ^(b), Impose CL Plus ^(b), Sunguard ^(b), Tjilkuri ^(b) and Wallup ^(b).

New products

As described in more detail in the report on performance for Output Group 3—New Products, in 2011–12 the GRDC progressed the development and commercialisation of new products related to:

- the use of an identified gene to increase yield in wheat, and its possible application to other crops—this work is being done through CSIRO Plant Industry, with GRDC support,

and Bayer CropScience has been engaged to exploit the technology in wheat (subject to proof-of-concept testing)

- high-amylose wheat lines to meet market demand for certain health benefits—this work is being done through Arista Cereal Technologies Pty Ltd, a joint venture between the GRDC, CSIRO and French company Limagrain Céréals Ingrédients
- safflower seeds with high concentrations of oleic acid, for use in industrial applications—this work is being done through the Crop Biofactories Initiative (a joint investment of the GRDC and CSIRO). The GRDC is working with the New South Wales Department of Primary Industries to identify better varieties that can be grown in the Northern Region.

Commercial agreements

In May 2012 the GRDC formed a commercial agreement with South Australian firm deBruin Engineering Pty Ltd to take the Harrington Weed Seed Destructor technology to market. DeBruin is widely recognised for its high standard of craftsmanship; in addition to skilled staff, it has state-of-the-art design and building facilities that meet ISO 9001 quality standards. DeBruin plans to build and sell at least two machines in the first year, ramping up production in successive years to more than 10 per year, subject to demand. In response to strong interest from growers, the group's representatives have been travelling extensively to engage with potential customers in New South Wales, South Australia and Western Australia.

A test for barley variety identification based on the outcomes of GRDC-supported research on diversity arrays technology forms the basis for a new service to be offered by GrainGrowers Limited's analytical laboratories. Correct varietal identification and purity levels are a crucial part of the quality specifications required for growers to achieve malting grade for their barley. The new service will allow growers to send a small sample of seed to the lab for testing, prior to sowing, to ensure that the end product will meet the required specifications. Seed companies and merchants will also be able to offer an identification and purity certificate to customers, as a guarantee of quality. A cost-effective, reliable methodology for barley quality testing is a world first and has the potential to ensure that Australia's barley industry maintains its position as preferred supplier to many of the best maltsters and brewers.

In the past, the ability to accurately estimate the amount of plant-available phosphorus in the soil was lacking for many growers across Australia, because existing soil tests offered limited accuracy in soils with high calcium or aluminium levels. The DGT soil test was developed to overcome this problem by simulating the way in which the plant root takes phosphorus from the soil. In May 2012, the DGT testing technology was licensed to Back Paddock Company, based in Queensland. The test has since been made available through a number of commercial soil-testing laboratories and is being promoted strongly to growers with calcareous soils as a means of accurately informing their decisions on fertiliser use.

The ACPFG and CSIRO entered into a licence agreement with Vilmorin and Cie, the largest seed company in Europe, to commercialise their joint nitrogen use efficiency technology. The licence agreement secures a pathway for the further development and deregulation of the nitrogen use efficiency technology, and its delivery to the Australian grains industry.

Business relationships

Most of the GRDC's business relationships are governed by contracts, such as research agreements and the licensing of the resulting intellectual property. However, in several cases the most effective way to encourage innovation in the grains industry is to establish a company or unincorporated joint venture. Key reasons for deciding to set up a company or joint venture include more effective management of intellectual property; more focused governance; ease of interaction with the private sector; and, in the case of cooperative research centres, government policy.

Table 22 describes the companies in which the GRDC had shares or membership at 30 June 2012. In most cases the GRDC also nominated one or more directors to the company's board.

Intellectual property management

The GRDC usually owns a share of all intellectual property generated by research projects it funds. This consists of registrable intellectual property (plant breeder's rights, patents and trademarks) and non-registrable intellectual property (copyright and trade secrets).

The corporation actively manages its intellectual property, to:

- ensure that research outcomes are adopted as quickly and effectively as possible, by either dissemination or commercialisation
- provide access to GRDC intellectual property and gain access to third-party intellectual property where it will facilitate the delivery of research outcomes.

The GRDC (together with research partners) registers intellectual property where to do so will achieve the above objectives, and maintains a register of its registered intellectual property.

Patents

During 2011–12, the GRDC continued to file and prosecute a number of patent applications and to maintain a number of patents. All except one patent family of applications is held in conjunction with research partners.

The GRDC holds interests in 33 patent families; this includes six new patent families, four abandoned patent families, and two assigned patent families.

Plant breeder's rights

In 2011–12, the GRDC and its research partners:

- lodged nine new plant breeder's rights (PBR) applications
- withdrew no new PBR applications
- surrendered six certificates of PBR.

At 30 June 2012, the GRDC co-owned 148 plant varieties covered by PBR and 26 PBR applications.

Trademarks

At 30 June 2012, the GRDC held:

- six registered trademarks
- three trademark families, granted in a combination of classes
- two word marks, granted in classes 16 and 42
- one composite mark, granted in classes 16 and 42.

Table 22: Companies in which the GRDC had shares or membership as at 30 June 2012

Name	Activity	GRDC role
Companies limited by guarantee		
Agricultural Biotechnology Council of Australia Ltd (formerly Agrifood Awareness Ltd)	Provides information about gene technology to enable informed debate.	Is a member of the company and provides research funding. Nominates a director.
Australian Crop Accreditation System Limited	Provides cereal variety details online for farmers and advisers, manages the National Variety Trials.	Is a member of the company and provides a research contract. Nominates a director.
Australian Seed Federation Limited	Promotes interests of seed industry members.	Is a member of the company.
Barley Australia Ltd	Provides leadership for the development of the barley industry in Australia.	Is a member of the company. Nominates a director.
Grains & Legumes Nutrition Council Ltd (formerly Go Grains Health & Nutrition Limited)	Identifies and communicates the health benefits of grain food products.	Is a member of the company and provides research funding. Nominates a director.
Pulse Australia Ltd	Provides leadership for the development of the pulse industry in Australia.	Is a member of the company. Nominates a director.
Value Added Wheat CRC Ltd	Serves as the management company for the Value Added Wheat CRC.	Is a member of the company. Nominates a director.
Wheat Quality Australia Limited	Manages and delivers the wheat variety classification process.	Is a member of the company. Nominates a director.
Companies limited by shares		
Arista Cereal Technologies Pty Ltd	Undertakes development of high-amylose wheat.	Is a 21 percent shareholder. Nominates one director.
Australian Centre for Plant Functional Genomics Pty Ltd	Conducts functional genomics research into abiotic stress.	Is a 19 percent shareholder. Nominates two directors.
Australian Grain Technologies Pty Ltd	Undertakes commercial wheat breeding.	Is a 39 percent shareholder and provides research contracts. Nominates three of the seven directors.
Canola Breeders Western Australia Pty Ltd	Develops high-performing commercial canola varieties focused on Western Australian low-rainfall areas with some adaptation to other regions of Australia.	Is a 39 percent shareholder. Nominates one director.
HRZ Wheats Pty Ltd	Develops high-yielding milling wheat varieties for Australia's high-rainfall zone.	Is a 18 percent shareholder. Nominates one director.
InterGrain Pty Ltd	Undertakes commercial wheat breeding.	Is a 27 percent shareholder. Nominates one director.
Novozymes Biologicals Australia Pty Ltd (formerly Philom Bios (Australia) Pty Ltd)	Develops and markets inoculant products to benefit growers.	Is a 50 percent shareholder and provides research contracts. Nominates two of the four directors.

Part 3—Our Organisation

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The GRDC Board is responsible for the stewardship of the corporation, and oversees corporate governance within the GRDC. Its other functions include setting strategic direction and monitoring the ongoing performance of the business and of the Managing Director.

Board members

As illustrated in Figure 16, the Board has combined expertise in business management; corporate governance; commodity production, processing and marketing; finance; risk management; management and conservation of natural resources and the environment; R&D administration; science, technology and technology transfer; intellectual property management; and public administration.

Figure 16: Members of the GRDC Board in 2011–12

Directors as at 30 June 2012		
	<p>Keith Perrett Chair (Non-executive) Appointed: 1 October 2007, reappointed until 30 September 2013 Chair: Remuneration Committee</p>	<p>Keith farms his 2,100 hectare Gunnedah property in northern New South Wales. He produces wheat, barley, cotton, sunflower, sorghum, sheep and cattle.</p> <p>He is a former Chairman of the National Rural Advisory Council, which advises the Minister for Agriculture, Fisheries and Forestry on rural issues, including Exceptional Circumstances declarations.</p> <p>Keith was President of the Grains Council of Australia between April 2001 and April 2005. He is a past Chairman of the New South Wales Farmers' Association Grains Section, and has represented the grains industry at state and federal levels.</p> <p>Keith was the Chairman of the Wheat Research Foundation of New South Wales between 2000 and 2007. He was also a member of the Governing Council of the Plant Breeding Institute of the University of Sydney between 1997 and 2003 and Chairman from 2000 to 2007.</p>
	<p>John Harvey BRurSc, GDRE, GCBS, MAICD Managing Director Appointed: 1 March 2011</p>	<p>John is a graduate member of the Australian Institute of Company Directors. He is a director of Australian Crop Accreditation System Limited and was a director of the Value Added Wheat Cooperative Research Centre.</p> <p>Before becoming Managing Director of the GRDC, John was on the management boards of Pulse Breeding Australia, Barley Breeding Australia and the National Soybean Breeding Program.</p> <p>John joined the GRDC in November 1997 as Program Manager Farming Systems. He became Manager R&D Programs in 2001, Executive Manager Varieties in 2005 and Managing Director in March 2011. His background is in agricultural extension and research, development and extension (RD&E) management. He previously worked with the Queensland Department of Primary Industries.</p>
	<p>Richard Brimblecombe MBA, MAICD Director (Non-executive) Appointed: 4 November 2011, until 30 September 2014</p>	<p>Richard has held senior executive positions across a range of industries spanning financial services, commodity processing and marketing, rural services and renewable energy, with prominent companies including Suncorp Bank, Namoi Cotton Co-operative Ltd, Landmark, CBA and Quantum Power Limited. His executive positions in the financial services industry have developed his finance skills, while his engagement with the agricultural production, processing and marketing sectors has enhanced his understanding of the economics of the grains industry.</p> <p>As the former non-executive chairman and now Chief Executive Officer and Managing Director of Quantum Power Limited, a company in the renewable energy sector, Richard has significant experience in the development, evaluation and execution of R&D strategy.</p>

Directors as at 30 June 2012 *(continued)*



Jeremy Burdon

BSc (Hons), PhD, Hon DSc, FAA, FTSE, MAICD
Director (Non-executive)

Appointed:
4 November 2011, until
30 September 2014

Jeremy has an international reputation in evolutionary biology, particularly the application of molecular technologies to crop production. Since late 2003, Jeremy has led CSIRO Plant Industry, taking responsibility for the development of its scientific capability; the strategic direction of its work; and its financial health and staff training. The division has a strong reputation for the execution of high-quality research and the delivery of research outcomes to industries, including the grains industry.



Jenny Goddard

BComm (Hons)
Director (Non-executive)

Appointed:
11 November 2008,
reappointed until
30 September 2014

Chair:
Finance, Risk and
Audit Committee

Jenny works as a director and an economic and public policy consultant. She has 24 years of experience as an economic policy adviser to the Australian Government, initially in the Department of the Treasury and later in the Department of the Prime Minister and Cabinet, where she worked until May 2008.

Her 11 years as a senior executive officer in the Department of the Prime Minister and Cabinet include four years as a deputy secretary with policy responsibility for the economic, industry, infrastructure and environment, and Cabinet divisions; and the Council of Australian Governments Secretariat.

Jenny is the inaugural Chair of the Australian Solar Institute Board. She is also a Commissioner with the Australian Fisheries Management Authority. Jenny has extensive experience in and understanding of government policies, processes and administration, including detailed knowledge of Australian Government Cabinet and Budget processes.



Kim Halbert

BComm
Deputy Chair
(Non-executive)

Appointed:
4 November 2011, until
30 September 2014

**Appointed as Deputy
Chair:** 10 April 2012, until
30 September 2013

Member:
Remuneration Committee

Since 1980, Kim has been a grain producer in the mid-west region of Western Australia, where he undertakes numerous production trials and engages in innovative farming practices. He has experience in the management and conservation of natural resources, which he demonstrated in his role as a member of the management committee overseeing Natural Heritage Trust project funding for the Arrowsmith Catchment Group.

Kim has a strong interest in the marketing of grain, which is reflected in his participation on a number of boards, including Wheat Exports Australia. As a director of the Geraldton Port Authority, the second largest grain-exporting port in Australia, he consulted with grain marketers, bulk handlers and grower organisations.



Robert Lewis

BSc (Hons), Hon DSc,
PSM, FTSE
Director (Non-executive)

Appointed:
4 November 2011, until
30 September 2014

Member:
Remuneration Committee

Rob was Chief Executive Officer/Executive Director of the South Australian Research and Development Institute (SARDI) for 18 years, a position from which he retired in June 2010.

Rob's leadership of SARDI, the principal institution for public sector research in life sciences for the South Australian Government, demonstrates his depth of experience in research, research management, public and private sector policy and governance, intellectual property management, and commercialisation.



Sharon Starick

BAGSc (Hons)
Director (Non-executive)

Appointed:
4 November 2011, until
30 September 2014

Member:
Finance, Risk and Audit
Committee

Since 1993, Sharon has been producing grain and pigs in the Mallee region of South Australia. Her extensive knowledge of sustainable primary production was developed through her own on-farm practices and participation in Mallee Sustainable Farming Inc. and the South Australian No-Till Farmers Association.

Sharon's strong interest in natural resource management and conservation is reflected in her membership of South Australia's Natural Resources Management Council, the Australian Landcare Council, the South Australian Murray–Darling Basin Natural Resources Management Board, and the Community Advisory Committee for the Murray–Darling Basin Ministerial Council. As a director of Land & Water Australia, Sharon has experience in strategic planning for research and extension.

Directors as at 30 June 2012 *(continued)*



John Woods

BAppSc (RT)
Director (Non-executive)

Appointed: 8 March 2012,
until 30 September 2014

John owns and operates a cropping enterprise in northern New South Wales and southern Queensland, where he also participates in summer crop R&D trials and innovative new techniques. He has a strong interest in economic policy that affects agriculture, reflected in the positions he has held in industry and community advisory bodies such as the National Rural Advisory Council, the National Agricultural Monitoring System and the Agriculture Finance Forum.

John also has experience in technology transfer and extension of R&D, which he demonstrated in his role as Chairman ChemCerti Training Queensland and as a ChemCerti trainer to the grains and cotton industries. The extension and adoption of best management practice was integral to his role as Queensland Manager Cotton Australia.

Departing members



Nicole Birrell

MSc (LSE), FAICD
Director (Non-executive)

Appointed:
1 October 2005,
reappointed until
30 September 2011

Chair:
Finance, Risk and Audit
Committee

Nicole is an operational risk management consultant and runs a mixed farming enterprise at Corowa, New South Wales. She has more than 25 years experience in corporate and investment banking.

Nicole is currently a director of Queensland Sugar Ltd, Superpartners Pty Ltd and SMS Management and Technology Ltd, and a member of Wheat Exports Australia.

Nicole also serves on the Programs Advisory Committee for the School of Applied Economics at Victoria University, Melbourne. She is a past director of AusBulk Ltd and Australian Practice Nurses Association Inc.



Colin Butcher

MBA, GAICD
Director
(Non-executive)

Appointed:
11 November 2008 until
30 September 2011

Member:
Finance, Risk and Audit
Committee

Colin is a grain producer from Brookton in Western Australia. His farming business produces wheat, canola, barley and hay for export, and sheep for meat and wool.

Colin is also a board member of ChemCerti Western Australia and a former director of CBH Ltd and Grain Pool Pty Ltd.

Colin has a strong interest in the management and conservation of natural resources.



Steve Marshall

BSc (Hons1), MAppSc,
FAIFST
Deputy Chair
(Non-executive)

Appointed:
1 October 2005,
reappointed until
30 September 2011

**Appointed as Deputy
Chair:** 24 February 2009
until 30 September 2011

Member:
Remuneration Committee

Steve has a background in food science and technology management. Steve became a director of Go Grains Health & Nutrition Limited in 2008.

Steve's career has included the positions of Managing Director of Goodman Fielder Ingredients Ltd and Technology Director of Goodman Fielder Ltd.

He was a director of the Rural Industries Research and Development Corporation from June 2002 and Deputy Chair until May 2008. He has also been a director of the Australian Rural Leadership Foundation.



Professor Timothy Reeves

BSc (Hons), MAgrSc, FTSE
Director
(Non-executive)

Appointed:
1 October 2005,
reappointed until
30 September 2011

Member:
Remuneration Committee

Timothy is a consultant specialising in national and international agricultural R&D, mostly focused on sustainable agriculture. His career in Australia has included positions in the Department of Agriculture, Victoria, Adelaide University, Deakin University, Melbourne University and Queensland University of Technology.

He has also held positions in the International Maize and Wheat Improvement Center (CIMMYT), United Nations Millennium Project Task Force on Hunger, Food and Agriculture Organization of the United Nations, European Commission Expert Group for Evaluation of Framework Projects, and Academic Advisory Board on International Community and Development Studies.

Timothy is a former President of the Australian Society of Agronomy. He has received several international and national honours, including the Centenary Medal for service to Australian society.



Professor Graeme Robertson

BScAg (Hons), PhD, FAIM,
FAIAST, FTSE

Director
(Non-executive)

Appointed:

11 November 2008 until
30 September 2011

Member:

Finance, Risk and Audit
Committee

Graeme is a consultant and a part-time academic, and serves as a Commissioner of the Agricultural Produce Commission in Western Australia. He was the Director of Curtin University's School of Agriculture and Environment (the Muresk Institute) from 2004 to 2009.

Graeme's career has included 10 years as Director General of the Western Australian Department of Agriculture, and he was the inaugural Chair of the Land and Water Resources Research and Development Corporation.

Graeme was awarded the Sir William McKell Medal for outstanding contribution to soil and land conservation in 1993; the Australian Medal of Agricultural Science in 2001; and a Centenary Medal for service to Australian society in 2002.

Board selection

The Minister for Agriculture, Fisheries and Forestry selects and appoints the Chair of the Board. The Managing Director is selected by the Board, and holds office at the corporation's pleasure.

The GRDC Selection Committee is chosen by the Minister, on advice from the grains industry representative organisation (currently Grain Producers Australia) and in consultation with other grower organisations. The Selection Committee nominates five to seven GRDC directors. Appointment of directors nominated through this mechanism is subject to ministerial approval.

Change of Board membership

The terms of Nicole Birrell, Colin Butcher, Steve Marshall, Timothy Reeves and Graeme Robertson finished on 30 September 2011.

On 4 November 2011, a new GRDC Board was appointed, until 30 September 2014.

On 4 November 2011 the Board included five new members: Richard Brimblecombe, Jeremy Burdon, Kim Halbert, Robert Lewis and Sharon Starick. They joined the continuing Chair, Keith Perrett, and re-appointed member Jenny Goddard. A sixth new member, John Woods, was appointed to the Board on 8 March 2012.

On 6 August 2012, the Selection Committee's Presiding Member, Joanne Grainger, delivered a copy of her annual report to the Minister. A copy of this report is at Appendix E.

Board Secretary

Geoff Budd, General Counsel, was the Board Secretary until 13 April 2012, when he resigned from the GRDC. At 30 June 2012, the role was held by Edwina Menzies, Acting General Counsel and Corporate Secretary.

The role of the Board Secretary is to:

- ensure that Board minutes, resolutions and action plans are correctly recorded
- help ensure that action plans are closed out within agreed timeframes
- prepare Board agendas
- collate and distribute Board papers and other related documents.

Finance, Risk and Audit Committee

At 30 June 2012, the Board had one committee, the Finance, Risk and Audit Committee. The committee assists the Board in fulfilling its corporate governance responsibilities and reviews the GRDC's:

- financial reporting process
- internal control system
- risk management strategy and processes
- internal and external audits
- process for monitoring compliance with laws and regulations and the Board's code of conduct
- financial statements.

The Board receives formal reports from the committee, and any decisions the Board makes in relation to the reports are recorded in the minutes of the subsequent Board meeting.

The membership of the committee comprises at least three of the non-executive members of the Board.

Roles, responsibilities and code of conduct

The roles and responsibilities of members of the Board, and their code of conduct, are documented in the GRDC Operating Manual. The Board reviews its roles and responsibilities in July each year.

Induction and training

New Board members participate in a formal induction process, and all Board members undergo a process of continuous education.

Disclosure of interests

Directors must comply with the CAC Act requirements regarding material personal interests and with the GRDC's policy and procedures for conflict of interest.

The Board reviews declarations of conflicts of interest at the start of each Board meeting and directors regularly update their conflict of interest declarations.

Independent professional advice

With the Chair's approval, directors may obtain independent professional advice, at the GRDC's expense, on matters arising in the course of their Board and committee duties.

Meetings

The GRDC Board holds six to seven meetings every 12 months, teleconferences as required, and tours to GRDC regions. During 2011–12 the Board held five meetings in Canberra and one meeting in Melbourne. Directors joined the regional panels on their spring tours in September 2011.

Each director's attendance at meetings during the year is set out in Table 23.

Table 23: Attendance at Board and Board committee meetings, 2011–12

Members	Board		Finance, Risk and Audit Committee	
	Meetings attended	Meetings held and eligible to attend	Meetings attended	Meetings held and eligible to attend
Current at 30 June 2012				
Richard Brimblecombe	4	4	3	3
Jeremy Burdon	3	4		
Jenny Goddard	5	6	3	4
Kim Halbert	4	4	3	3
John Harvey	6	6		
Robert Lewis	4	4		
Keith Perrett	6	6		
Sharon Starick	4	4	3	3
John Woods	2	2		
Departed at 30 September 2011				
Nicole Birrell	2	2	1	1
Colin Butcher	2	2	1	1
Steve Marshall	1	2		
Timothy Reeves	2	2		
Graeme Robertson	2	2	1	1

Relationship with the Senior Leadership Group

The Senior Leadership Group has an advice and implementation role in relation to the Board. The group investigates and recommends matters for the Board to consider. It also implements Board decisions in accordance with approved policies and procedures, including an approval authority schedule that sets out the necessary delegations.

Performance monitoring and review

At the start of each year the Board sets a detailed work plan for the corporation. The Board reviews the corporation's performance against the work plan at least twice each year. This is a key factor in determining the level of any performance bonuses paid to GRDC staff.

At the start of each year the Board also sets its own annual key performance objectives. The Board reviews its performance against these objectives at least twice each year. At each meeting the Board uses a checklist to review its performance against agreed effectiveness indicators.

The Board periodically commissions an external review of its performance. The most recent review was completed in April 2010 and discussed in the Annual Report 2009–10.



GRDC Southern Regional Panel. From left: (back row) David Shannon (Chair), John Minogue, Chris Jones, Neil Fettell, Peter Schwarz; (front row) Bill Long, Chris Blanchard, Richard Konzag, Susan Findlay Tickner, Keith Pengilley, Stuart Kearns.
Photo: Geoff Comfort

Advisory panels

The panel system is a key strength of the GRDC. The Board makes decisions with the support of a national advisory panel, informed by the knowledge and experience of three regional panels. This network helps to ensure that GRDC investments are directed towards the interests of all its stakeholders and deliver benefits as relevant products and services in each grain-growing region. The efforts and expertise of this network of growers, advisers and researchers are crucial to the GRDC's success.

Table 24: Regional panel membership as at 30 June 2012

Northern Regional Panel		
Chair	Members	
James Clark	Aaron Sanderson	Mark Sutherland
	Jodi McLean	Vicki Green
Deputy Chair	Keith Harris	William Martel
John Sheppard	Loretta Serafin	Stephen Thomas
	Rob Taylor	
Southern Regional Panel		
Chair	Members	
David Shannon	Chris Blanchard	Bill Long
	Susan Findlay	Neil Fettell
Deputy Chair	Tickner	John Minogue
Peter Schwarz	Chris Jones	Keith Pengilley
	Richard Konzag	Stuart Kearns
Western Regional Panel		
Chair	Members	
Peter Roberts	Ralph Burnett	Shauna Stone
	John Even	Susan Hall
Deputy Chair	Paul Kelly	Kit Leake
Mike Ewing	Narrelle Moore	Vince Logan
	William Ryan	

The GRDC Operating Manual covers the roles, responsibilities, code of conduct, remuneration and selection guidelines for panel members.

Panel members as at 30 June 2012 are listed in Table 24. Biographical information on panel members is available from the GRDC's website and YouTube channel.

Senior Leadership Group

The SLG has five members: the Managing Director and the executive managers from each of the four business groups. The management structure as at 30 June 2012 is shown in Figure 9 in Part 1.

The SLG leads the GRDC's business activities, advises the GRDC Board and implements the

Board's decisions. To ensure that the GRDC's operations are monitored and managed efficiently and effectively, the SLG meets regularly, and maintains and updates an annual business schedule.

Information on the roles and backgrounds of the SLG members is shown in Figure 17.

Figure 17: Members of the GRDC Senior Leadership Group in 2011–12



John Harvey

Managing Director

John joined the GRDC in November 1997 as Program Manager Farming Systems. He became Manager R&D Programs in 2001, Executive Manager Varieties in 2005 and Managing Director in March 2011.

John is a graduate member of the Australian Institute of Company Directors. He is a director of Australian Crop Accreditation System Limited and was a director of the Value Added Wheat Cooperative Research Centre (VAWCRC). He was on the management boards of Pulse Breeding Australia, Barley Breeding Australia and the National Soybean Breeding Program until becoming GRDC Managing Director.

John's background is in agricultural extension and research, development and extension (RD&E) management. He previously worked with the Queensland Department of Primary Industries.



Stephen Thomas

Executive Manager Research Programs

Stephen joined the GRDC in March 2009. He manages all aspects, including performance, of the GRDC's R&D investments.

Stephen is a graduate member of the Australian Institute of Company Directors. He was a director of the VAWCRC and has held board positions with Enterprise Grains Australia and the Australian Sheep Industry CRC.

Stephen was Director of Rural Innovation at the New South Wales Department of Primary Industries and a member of the New South Wales Expert Committee on Gene Technology. Stephen has an honours degree in agricultural science and a PhD in molecular biology from Adelaide University. He has undertaken postdoctoral research in Australia and overseas.



Vince Logan

Executive Manager Commercial

Vince joined the GRDC in 1996 as Business Manager. He was appointed Executive Manager Business Development in 2001 and Executive Manager New Products in 2004. Vince manages all aspects, including performance, of the GRDC's commercial R&D investments.

Vince is a CPA and a graduate member of the Australian Institute of Company Directors. He is a director of Novozymes Biologicals Australia Pty Ltd and Arista Cereal Technologies Pty Ltd. He has been a board member of Pulse Australia Limited, GrainGene, the VAWCRC and Australian Grain Technologies Pty Ltd.

Vince comes from a background of 17 years in finance and marketing roles in the petroleum industry.



Leecia Angus

Executive Manager Corporate Services

Leecia joined the GRDC in 2005 as Manager Wheat and Barley Breeding. She was appointed Executive Manager Corporate Strategy & Impact Assessment, in May 2009. In July 2011, Leecia became the Executive Manager Corporate Services, in which role she manages the enabling functions of the GRDC.

Leecia holds an honours degree in science and a Graduate Diploma in Applied Finance and Investment. She is a graduate of the Australian Institute of Company Directors and the Australian Rural Leadership Program.



Stuart Kearns

Executive Manager Regional Grower Services

Stuart joined the GRDC in 1998 as the Northern Panel Officer and later took on the additional role of Policy Adviser. He became Program Facilitator within the Product and Service Delivery group in 2002, Manager Validation and Adoption in 2005, and Executive Manager Regional Grower Services in 2012. Stuart has primary accountability for building, leading and managing the GRDC's Regional Grower Services business group to deliver research outputs in innovative products and services that create awareness and practice change and meet the needs of growers and their advisers.

Stuart is President of the Australian Capital Territory and Southern New South Wales Division of the Australian Institute of Agricultural Science and Technology and was Chairman of the local organising committee for the fifth World Congress on Conservation Agriculture. He has held management positions in the Grain and Graze program for mixed farming enterprises.

The GRDC's three operational business groups—Research Programs, Commercial, and Regional Grower Services—oversee and manage investments to achieve the outcomes determined under the GRDC's Strategic R&D Plan 2012–17. The operational business groups are supported by the enabling business group, Corporate Services.

In August 2011, the business groups replaced the four lines of business—Varieties, Practices, New Products and Communication & Capacity Building—that were established to deliver the objectives of the Strategic R&D Plan 2007–12.

Table 25 provides details of the role of each group.

Table 25: GRDC business groups

Mandate	Priorities
Operational business groups	
<i>Research Programs</i>	
<p>Create value for Australian grain growers by investing in R&D programs that address key grains industry priorities, enhance competitiveness and sustainability and generate the greatest potential return for growers and the wider community.</p> <p>Ensure that R&D programs are nationally coordinated and integrated with extension so that the Australian grains industry has access to a highly capable and effective research, development and extension (RD&E) sector with the infrastructure and capability to meet future industry needs.</p>	<ul style="list-style-type: none"> • Design R&D programs focused on addressing issues identified by stakeholders. • Deliver R&D outcomes that are adoptable and therefore have an impact at the farm level. • Provide scientific advice to stakeholders to assist in the identification of issues. • Provide national coordination and regional linkages that ensure that R&D is focused and adoptable. • Ensure that R&D capability is maintained in core areas.
<i>Commercial</i>	
<p>Access and develop innovation from Australia and overseas to ensure that it is commercialised in such a way that the overall benefit to Australian grain growers is optimised.</p>	<ul style="list-style-type: none"> • Expand the GRDC's global reach in order to increase the availability of technology to the Australian industry. • Invest in R&D and commercialisation in commercial grain technologies and commercial farm technologies that meet industry priorities and provide the greatest benefit to the GRDC's stakeholders. • Take the lead in identification, scoping, undertaking market assessment and assessing the value of GRDC commercially orientated investments. • Ensure that the GRDC's investment in intellectual property and commercial enterprises continues to be focused on providing a return on investment. • Identify the opportunities provided within the GRDC R&D portfolio to form more commercial partnerships to deliver benefits to the Australian industry.
<i>Regional Grower Services</i>	
<p>Deliver the outputs of research in innovative products and services that meet the needs of growers and their advisers in each region.</p>	<ul style="list-style-type: none"> • Understand growers' needs (listen to what is important). • Develop new and improved grower-orientated products and services. • Deliver high-value regionally relevant products and services to growers and advisers. • Evaluate the performance and impact of GRDC products and services on growers' performance.
Enabling business group	
<i>Corporate Services</i>	
<p>In the context of the GRDC delivering benefits to its stakeholders, provide:</p> <ul style="list-style-type: none"> • the supporting services required for the GRDC to plan, conduct, report on and assess the effectiveness of its operations • processes to assist the operational business groups to achieve their objectives • support for effective governance of the GRDC by the Board. 	<ul style="list-style-type: none"> • Plan to satisfy corporation objectives. • Establish business processes to optimally support all business groups in the GRDC. • Provide services to the operational business groups (human resources, information technology, records management and evaluation). • Report for risk and compliance purposes. • Perform financial forecasting, reporting and budgeting. • Provide legal advice to the corporation. • Conduct performance evaluation, including impact assessment. • Perform portfolio and business analysis.

The GRDC is accountable to Australian grain growers and the Australian Government for its performance in addressing their identified priorities. The GRDC also meets its responsibilities under its governing legislation and the broader legal framework for Commonwealth statutory authorities.

Accountability to the Australian Government

Responsible minister

Under the PIERD Act, the GRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry, who is responsible for all RDCs. During 2011–12, Senator the Hon. Joe Ludwig was the Minister for Agriculture, Fisheries and Forestry.



Senator the Hon. Joe Ludwig, Minister for Agriculture, Fisheries and Forestry (right), measures nitrous oxide emissions with Peter Grace, Professor of Global Change at the Queensland University of Technology.
Photo: Queensland University of Technology

Australian Government priorities

The GRDC's strategies and investments actively address the Australian Government's National Research Priorities and ministerial research priorities for rural R&D. These priorities are discussed in detail in Part 1 and the GRDC's achievements in meeting them during 2011–12 are discussed in detail in Part 2.

Ministerial directions

The PIERD Act and the CAC Act provide that the responsible minister or the Finance Minister may direct the GRDC with respect to the performance of its functions and the exercise of its powers, or require it to provide information.

In July 1998, the responsible minister, the Minister for Primary Industries and Energy, issued a direction requiring the GRDC to comply with the reporting requirements of the *Guidelines on Funding of Consultation Costs by Primary Industries and Energy Portfolio Statutory Authorities*.

On 1 December 2004, the Finance Minister issued the Finance Minister's (CAC Act Procurement) Directions 2004, requiring the GRDC to comply with the *Commonwealth Procurement Guidelines*.

On 18 December 2006, the Finance Minister required the GRDC to provide an annual report on compliance and financial sustainability, under section 16(1)(c) of the CAC Act. The requirements are detailed in Finance Circular 2008/05 Compliance Reporting—CAC Act bodies.

On 23 September 2008, the responsible minister, the Minister for Agriculture, Fisheries and Forestry, directed the GRDC to adopt the Australian Government Bargaining Framework.

The GRDC is complying with the directions.

General policies of the government

Until 1 July 2008, under section 28 of the CAC Act, the responsible minister could notify the GRDC Board of any general Australian Government policies that apply to the GRDC.

The GRDC had been notified of the following policies as at 30 June 2008:

- *Commonwealth Fraud Control Guidelines 2011* (replacing *Commonwealth Fraud Control Guidelines 2002*)
- Finance Circular No. 2006/06 Australian Government Foreign Exchange Risk Management Guidelines (replacing Finance Circular 2002/01 and Finance Circular 2004/11)

- Finance Circular No. 2005/09 Australian Government Cost Recovery Guidelines (replacing Finance Circular 2002/02)
- *National Code of Practice for the Construction Industry* and the associated Implementation Guidelines
- Australian Government Property Ownership Framework 2005
- Australian Government Protective Security Policy Framework (replacing *Protective Security Manual 2005*).

Section 28 of the CAC Act has been amended, and now provides that from 1 July 2008 the GRDC must comply with any General Policy Order made by the Finance Minister, to the extent that it applies to the GRDC. At 30 June 2012, the Finance Minister had not made any General Policy Orders that apply to the GRDC.

Accountability to the grains industry

Industry representative

Under the PIERD Act, the GRDC is made accountable to Australian grain growers through the industry's representative organisation, Grain Producers Australia (GPA). The GRDC also consults widely with a range of other grower organisations.

Grains industry priorities

In setting directions for 2011–12 (the final year of the Strategic R&D Plan 2007–12), the GRDC identified industry priorities through direct consultations with GPA, as well as local research advisory committees, grower groups, grower organisations and individual grain growers. The key industry priorities were incorporated into the GRDC Annual Operational Plan 2011–12. The priorities are discussed in detail in Part 1 and the GRDC's achievements in meeting them during 2011–12 are discussed in detail in Part 2.

Stakeholder report

Each year the GRDC prepares a stakeholder report to assist the representative organisation to formulate advice to the Minister on setting the research levy rates which provide the basis for the corporation's income. The draft stakeholder report for 2012–13 was provided

to GPA in October 2011 for comment. The final Stakeholder Report 2012–13 was provided to GPA in June 2012.

The GRDC also prepares a growers' report each year. This 20-page report is a shortened form of the GRDC annual report, providing a reader-friendly summary of how the GRDC operates, the corporation's financial situation, and highlights of research investments. The 2010–11 report was circulated to growers and other *Ground Cover* subscribers in December 2011.

Industry levy rates

In 2011–12, a levy rate of 0.99 percent applied to all leviable crops covered by the GRDC, with the exception of maize, which was levied at 0.693 percent.

The levies were imposed and collected as stipulated by the:

- *Primary Industries (Excise) Levies Act 1999*, supported by the *Primary Industries (Excise) Levies Regulations 1999*, Schedules 4, 12, 20 and 25
- *Primary Industries Levies and Charges Collection Act 1991*, supported by the *Primary Industries Levies and Charges Collection Regulations 1991*, Schedules 8, 19, 29 and 34.

Proceeds from levies in 2011–12 are recorded in Note 4B of the notes to the financial statements.

The GRDC paid the Australian Government Department of Agriculture, Fisheries and Forestry \$644,673 for the collection and management of levies in 2011–12.

Consultation arrangements

The GRDC paid GPA \$38,345 plus GST for its participation in consultations with the corporation during 2011–12. GPA used these funds to meet its costs of preparing for and attending consultative meetings with the GRDC, to consider grains industry strategic directions and concerns and to assess the corporation's performance against industry expectations.

The payments for consultation were made under the *Guidelines on Funding of Consultation Costs by Primary Industries and*

Energy Portfolio Statutory Authorities, issued by the Minister for Primary Industries and Energy in July 1998. The guidelines also require that when a representative organisation conducts a project or consultancy on behalf of a statutory authority details are to be included in the authority's annual report.

The GRDC also paid the travel and accommodation costs of representatives of other grower groups, to attend formal consultation meetings with the GRDC.

Obligations under the Commonwealth Authorities and Companies Act

Accountability

A system of accountability and reporting obligations for the GRDC, reflecting its obligations under the PIERD Act, is set out under the CAC Act. Under the CAC Act, the GRDC is obliged to:

- prepare an annual report (in the prescribed form, including a report of operations), and give it to the responsible minister by 15 October each year (section 9)
- ensure that any subsidiary's financial statements are audited by the Auditor-General (section 12(1))
- prepare and provide to the responsible minister interim reports during a financial year, if required by the Finance Minister by notice in the Gazette (section 13)
- prepare and provide budget estimates (section 14)
- provide the responsible minister (in writing) with particulars of any proposal of the GRDC to undertake any one of a number of significant events (section 15)
- keep the responsible minister informed of the operations of the GRDC and its subsidiaries and provide such reports, documents and information as that minister or the Finance Minister requires (section 16)
- invest any reserves in accordance with the manners listed in section 18 or approved by the Finance Minister (approved under *Commonwealth Authorities and Companies Act 1997—Investment Approval 2008/01—Grains Research and Development*

Corporation and Commonwealth Authorities and Companies Act 1997—Investment Approval 2008/01—Dematerialised equivalents)

- comply with any General Policy Orders of the Australian Government to the extent that the General Policy Order applies to it (sections 28 and 48A)
- ensure that the general policies of the Australian Government as notified to the corporation before 1 July 2008 are carried out (Table A Item 71).

Conduct of officers

The CAC Act imposes specific standards of general conduct for directors and other officers. Sections 22–27P ensure that officers of Commonwealth authorities are subject to standards of conduct comparable to those required of officers of companies under the *Corporations Act 2001*.

In particular, a director must disclose to a meeting of the Board the nature of any material personal interest in a matter to be considered by the Board and, unless otherwise determined by the Board or the Minister, ensure that he or she is not present at deliberations and does not take part in any decision on the relevant subject matter (section 27F to section 27K). These requirements are reinforced by the GRDC's policy and procedures regarding conflict of interest.

Sanctions

A civil penalty regime is contained in the CAC Act (Schedule 2), to deal with any breach by directors of:

- annual reporting rules (section 11)
- accounting records (section 20)
- their general duty to exercise care and diligence (section 22)
- their general duty to act in good faith (section 23)
- their duty to not make improper use of the position of director to gain an advantage or cause detriment (sections 24 and 25).

Independent audits

The Auditor-General, under the CAC Act, is required to audit each Commonwealth authority's financial statements. In addition, the *Auditor-General Act 1997* confirms the power of the Auditor-General's staff to carry out performance audits of Commonwealth authorities and, in this role, to obtain documents and information.

The Auditor-General's Independent Audit Report on the GRDC for 2011–12 is presented on pages 108–109.

Significant events

One of the GRDC's reporting requirements under section 15 of the CAC Act is to notify the responsible minister of significant events. Table 26 lists significant events of which the GRDC notified the Minister for Agriculture, Fisheries and Forestry during 2011–12, as well as the dates on which the Minister made announcements or decisions of particular significance to the GRDC.

Judicial decisions and reviews by outside bodies

In 2011–12, the GRDC was not affected by judicial decisions or reviews by administrative tribunals, the Auditor-General, parliamentary committees, the Commonwealth Ombudsman or the Office of the Australian Information Commissioner.

Table 26: Significant events, 2011–12

Date	Event
8 July 2011	The GRDC Managing Director wrote to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig, to seek approval of the draft enterprise agreement.
11 July 2011	The Minister advised that the selection process for directors was underway.
6 October 2011	The GRDC submitted the GRDC's Annual Report 2010–11 to the Minister.
4 November 2011	The Minister advised the appointment of directors to the GRDC Board.
8 November 2011	The Minister approved the GRDC's 2010–11 Annual Report for tabling. The report was tabled in parliament on 22 November 2011.
8 November 2011	The Minister approved the GRDC's draft enterprise agreement.
8 March 2012	The Minister advised the appointment of John Woods as a member of the GRDC Board.
19 March 2012	The GRDC Chair wrote to the Minister to recommend the appointment of Kim Halbert as GRDC Deputy Chair.
10 April 2012	The Minister confirmed the appointment of Kim Halbert as GRDC Deputy Chair.
26 April 2012	The GRDC submitted the GRDC's Annual Operational Plan 2012–13 to the Minister.
26 April 2012	The GRDC submitted the GRDC's Strategic R&D Plan 2012–17 to the Minister.
1 May 2012	The Minister advised the GRDC of priorities to be reflected in the Strategic R&D Plan 2012–17 and Annual Operational Plan 2012–13.
19 June 2012	The Minister approved the GRDC's Annual Operational Plan 2012–13.
19 June 2012	The Minister approved the GRDC's Strategic R&D Plan 2012–17.

The GRDC Board has overall responsibility for corporate governance within the organisation and places high value on continuously improving the GRDC's performance in this area.

Key activities during 2011–12 included:

- development of the new five-year strategic R&D plan
- liaison with the grain grower representative organisation, GPA, and the Department of Agriculture, Fisheries and Forestry
- assessment of major investment opportunities
- ongoing review of policies
- ongoing risk assessment and management
- ongoing monitoring to ensure that compliance obligations were met.

Policies and procedures

In continuously improving the GRDC's corporate governance, the corporation is guided by the Australian National Audit Office *Better Practice Guide: Public Sector Governance*.

The GRDC Operating Manual, which is available to the Board and all staff members, describes the corporation's:

- policies and procedures
- roles and responsibilities (including those of the Board and its committees)
- Code of Conduct
- approval authority schedule, which sets out delegations from the Board to management under the PIERD Act.

Code of Conduct

The GRDC Code of Conduct is published as part of the GRDC Operating Manual. New directors and staff members are introduced to the code during induction, and presentations on the code are made to staff at regular intervals. All staff have access to the code via the policies section on the GRDC intranet.

Risk management and fraud control

Risk management has been embraced throughout the GRDC as a tool to assess risks at the strategic, operational and project levels.

The GRDC prepares a regular business environment report to the Board. This report is used to update the GRDC's situation analysis and identify developing risks.

The SLG and Board conduct a detailed review of the GRDC's strategic risks at least every six months.

The GRDC conducts external business risk assessments. External provider Oakton completed an external business risk assessment in December 2011, and subsequent staff training took place in May 2012.

The GRDC also conducts a fraud risk assessment every two years. During 2011–12 the GRDC engaged Oakton to conduct a fraud risk assessment, in conjunction with GRDC management, and to provide an updated GRDC Fraud Control Plan for 2011 to 2013. Oakton provided the final Fraud Risk Assessment and Fraud Control Plan in December 2011.

To ensure that the business and fraud risks identified in the Business Risk Assessment and Fraud Control Plan are fully monitored and regularly updated, the Executive Manager Corporate Services and the Compliance Office prepare a business risk assessment report and a fraud control action plan. The SLG, in consultation with managers, updates the report and action plan each month. The Board reviews these documents at each meeting, as does the Finance, Risk and Audit Committee.

The SLG also conducts a full review of the business risk assessment report and the fraud control action plan every six months. The business risk report template was prepared in accordance with risk management standard AS/NZS ISO 3100:2009 Risk Management—Principles and Guidelines.

The GRDC's Managing Director is satisfied that:

- a fraud risk assessment and fraud control plan have been prepared that comply with the *Commonwealth Fraud Control Guidelines*

- appropriate fraud prevention, detection, investigation and reporting procedures and processes are in place
- annual fraud data that complies with the *Commonwealth Fraud Control Guidelines* has been collected and reported to the Australian Institute of Criminology.

The GRDC is insured by Comcover, the Australian Government's self-managed fund for insurance risks. Each year the GRDC participates in Comcover's Risk Management Benchmarking Program. The March 2012 benchmarking survey rated the GRDC at 7.6 out of 10—the 'peer group' of 25 small agencies' average was 6.4 out of 10.

Quality assurance

The GRDC's Quality Management System has ISO9001:2008 quality assurance accreditation from BSI Management Systems.

In 2011–12, regular internal audits were conducted by a contracted certified auditor over two days every two months. In February 2012, a successful external surveillance audit was conducted by BSI Management Systems and the GRDC's certification to the ISO9001:2008 standard was continued.

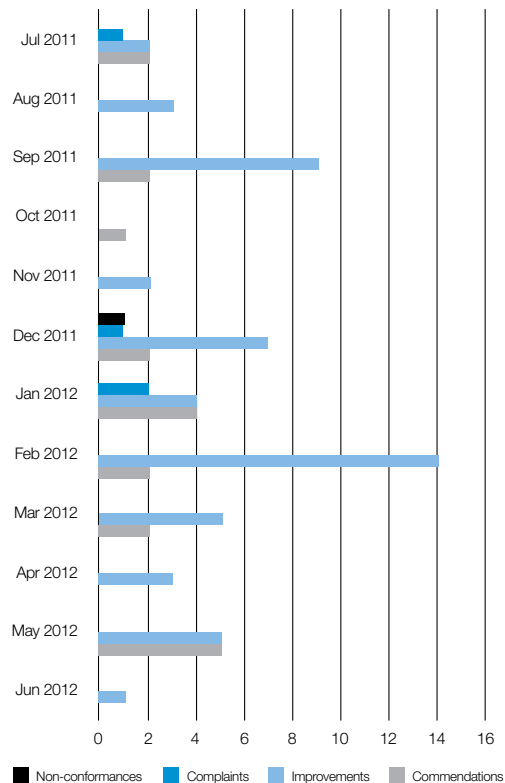
In addition, the SLG formally reviewed the quality system every six months. All aspects of the quality system were considered at the quality management review meetings, including required improvements, complaints, non-conformances and commendations.

Figure 18 shows the results of the quality audits and other feedback in 2011–12. The audits demonstrate that the quality management system is robust, is being used correctly and continues to be a useful tool for business improvement.

Indemnities and insurance premiums for officers

GRDC officers, including members of the Board, are insured by the GRDC against various liabilities that they may incur in their capacity as officers of the corporation, through Comcover. The Comcover insurance contract prohibits the GRDC from disclosing the nature or limit of the liabilities covered or the amount of premiums payable.

Figure 18: Results of quality audits, 2011–12



Environmental objectives

The GRDC is required to report annually on its performance in relation to ecologically sustainable development and other environmental issues discussed in section 516A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The principles of ecologically sustainable development have been incorporated into the decision-making systems and processes of the GRDC, as required under the EPBC Act.

The GRDC's environmental policy states:

The GRDC is committed to investing in RD&E that addresses the environmental priorities of its stakeholders and underpins the sustainable development of an internationally competitive Australian grains industry.

The GRDC seeks investments that address the environmental concerns represented in the Australian Government's National Research Priorities and Rural R&D Priorities (as shown in Table 5 in Part 1).

Privacy Commissioner

The corporation's privacy policy and procedures form part of the GRDC Operating Manual. The GRDC's annual Personal Information Digest entry as at 30 June 2012 has been lodged with the Privacy Commissioner. The online digest may be viewed at the commissioner's website (www.privacy.gov.au).

Freedom of information

Agencies subject to the *Freedom of Information Act 1982* (FOI Act) are required to publish information to the public as part of the Information Publication Scheme (IPS). This requirement is in Part II of the FOI Act and has replaced the former requirement to publish a section 8 statement in an annual report. Each agency must display on its website a plan showing what information it publishes in accordance with the IPS requirements.

Relevant information on the GRDC's information, including its IPS plan, is available from the GRDC's website, at www.grdc.com.au/About-Us/Freedom-of-Information/Information-publication-scheme.

People management

The GRDC values its people highly and recognises that attracting, developing and retaining the right staff are fundamental to the ongoing success of the corporation. Individual performance is monitored and rewarded, excellence is encouraged, and training and development needs are identified as part of performance management, in order to meet the requirements of the GRDC now and in the future.

Staff

Table 27 summarises the GRDC's personnel structure at 30 June 2012, while Table 28 lists individual staff members by position.

Table 27: Personnel structure as at 30 June 2012

Type of employment	Male	Female	Total
Full-time permanent	25	21	46
Part-time permanent	0	4	4
Temporary	3	1	4
Parental leave	0	3	3
Total	28	29	57



A team-building exercise for GRDC staff in November 2011. Photo: GRDC

Table 28: Staff as at 30 June 2012

	Position	Occupant
Managing Director's area	Managing Director	John Harvey
	Executive Assistant	Wynette Neil (P) Mary Dalton (T)
	Communication Manager	Kylie Dunstan
	Communication Coordinator	Sarah Smith
Commercial	Executive Manager	Vince Logan
	Administrative Coordinator	Bettina Garrett
	Senior Manager Commercial Grain Technologies	Jody Higgins
	Manager Commercial Farm Technologies	Paul Meibusch
	Senior Manager Commercial Enterprises	Andreas Betzner
Corporate Services	Executive Manager	Leecia Angus
	General Counsel and Corporate Secretary	Vacant
	Corporate Lawyer	James Macintyre
	Section Head Finance and Audit	Danielle Jakubowski (P)
	Manager Finance	Nino Divito
	Contracts Coordinator	Klaudia Skazlic
	Accountant—Reporting	Johan Pienaar (A)
	Human Resources Coordinator	Cerasela Muller
	Contract Payments Officer	Carmen Jiang
	Accounts Payable Officer	Diana Barry
	Section Head Planning Processes and Reporting	Vincent Fernandes (A)
	Strategic Planning and Reporting	Zoltan Lukacs
	Compliance Officer	Catherine Wells
	Manager IT Facilities	Bob Watson (A)
	Network Administrator	Vacant
	Network Support Officer	Brendan Lawler
	Manager Business Processes and Procurement	Cathy Stewart
	Impact, Business and Portfolio Analysis	Vacant
	Manager Records and Building	Ross Thompson Kevin Wren (T)
	Receptionist	Michelle Priest (P) Sara Gordon (P)
Regional Grower Services	Executive Manager	Stuart Kearns
	Administrative Coordinator	Tom Riethmuller (T)
	Senior Manager Products and Services	Kyle Thoms
	Publishing Manager	Maureen Cribb
	Manager Delivery Platforms	Tom McCue
	Webmaster	Nikki Bricknell
	Manager Grower Services West	Darren Hughes
	Manager Grower Services North	Sharon O'Keeffe
Manager Grower Services South	Andrew Rice	

Table 28: Staff as at 30 June 2012 *(continued)*

	Position	Occupant
Research Programs	Executive Manager	Stephen Thomas
	Administrative Coordinator Capacity	Merrilyn Baulman
	Senior Manger Natural Resources	Martin Blumenthal
	Project Manager Resource Management	Tanya Robinson
	Administrative Coordinator	Tom Langley (T)
	Senior Manager Plant Health	Rohan Rainbow
	Project Manager Plant Health	Lucinda Staley (A)
	Administrative Coordinator	Wendy Bosci
	Senior Manager Breeding Programs	Brondwen MacLean
	Project Manager Breeding Programs	Kate Light
	Administrative Coordinator	Vacant
	Senior Manager Operations and Farm Practices	Vacant
	Manager Trial Operations	Tom Giles
	Project Manager Farm Practices	Jan Edwards
	Senior Manager Discovery	Juan Juttner
	Manager Yield and Quality Traits	Jorge Mayer
	Manager Protection Traits	Francis Ogonnaya
Project Manager Traits	Omid Ansari	

A = acting, P = part-time permanent, T = temporary

Note: Three staff members were on maternity leave on 30 June 2012: Zoe Morosini (Project Manager Plant Health), Noelia Grech (Section Head Planning Processes and Reporting) and Carolyn Pearson (Administrative Coordinator).

Recruitment, retention and succession management

During 2011–12, 15 people were recruited to fill vacancies. Six of the vacancies arose from the establishment of new positions: Human Resources Coordinator, Senior Manager Products and Services, Manager Grower Services North, Manager Grower Services South, Manager Grower Services West, and Manager Protection Traits.

The GRDC continued to attract sound people from the agricultural and research sectors, indicating that the organisation continues to have a strong reputation as an employer. The GRDC has also been successful in retaining experienced staff; its low turnover rate allows the organisation to focus on staff development rather than recruitment. Nine staff members left the GRDC in 2011–12.

The GRDC conducts a formal succession planning and talent management process

each year, taking into consideration internal and external factors that might affect the organisation and its people. Staff are rated according to their potential to take up certain roles, based on past results and performance ratings. People identified as having good potential to take on new roles are encouraged and assisted to develop their skills in case an opportunity should arise. The succession plan is reviewed by the Board and is a successful retention tool, as staff are recognised for their skills and performance.

Learning and development

The GRDC encourages staff to undertake external education to enhance their skill set and professional development and continue their career growth, which eventually benefits GRDC business outcomes.

In 2011–12, several staff members continued formal study and other members of staff attended short courses and conferences.

The GRDC is proud to have supported:

- three employees who undertook academic studies in such subjects as creativity and strategy for innovation, chartered accounting, and conflict of interest
- 10 employees who attended managerial and leadership training programs
- 24 employees who attended training and development courses in the areas of finance and taxation, government contracts, governance, risk and compliance, workplace health and safety, business continuity management, occupational first aid, policy design and delivery, negotiation skills, and project management.

Monthly staff briefings and regular face-to-face communications such as social club activities and team-building excursions keep staff informed, involved, valued and cohesive in their commitment to and ownership of grains RD&E and GRDC initiatives.

Performance management

The GRDC's performance management process encourages staff to excel. Each staff member's progress towards agreed personal and corporate management objectives and competencies is reviewed by their manager twice each year. The discussion leads to a mutual agreement on progress and performance. At the end of the year, an annual performance increment rewards excellent individual performance while taking into account the overall performance of the organisation.

Enterprise agreement

The Minister for Agriculture, Fisheries and Forestry directed the GRDC to adopt the Australian Government Bargaining Framework. The corporation has complied with this direction.

The GRDC Enterprise Agreement 2011–13 became effective on 9 December 2011 and will expire on 31 December 2013. It has been posted on the GRDC's intranet and all employees are familiar with its provisions.

As part of the implementation of the agreement, a new consultation mechanism, the Workplace Consultative Committee, was established. Its members were selected by staff and its role is mainly to discuss work-related matters with management.

Equal employment opportunity

Staff are employed under terms and conditions consistent with the *Equal Employment Opportunity (Commonwealth Authorities) Act 1987*. Equal opportunity employment is prescribed in the employment policy set out in the GRDC Operating Manual, and in the provisions of the GRDC Enterprise Agreement 2011–13.

Consistent with a wish to support staff members who have family responsibilities, the GRDC has been accommodating reasonable requests from staff members who require flexible working arrangements in order to meet family commitments while remaining in the workforce. Three female members of staff were on maternity leave at 30 June 2012. The GRDC participates in the Australian Government's Paid Parental Leave scheme and staff benefit from financial support from the scheme as well as the GRDC's paid maternity leave.

The GRDC welcomes new members of staff from within Australia and from around the world, and is proud that its workforce enjoys cultural diversity while remaining harmonious and cohesive.

The GRDC ensures that its employment policies and procedures comply with the requirements of the *Disability Discrimination Act 1992* in the broader context of the *National Disability Strategy 2010–20*, and seeks to remove obstacles that may discourage people with disabilities from contributing to the work of the GRDC.

Analysis of the GRDC workforce for 2011–12 shows that, compared to last year, both the gender profile and the age profile remained steady. Table 29 shows the age and gender profile of GRDC staff for the past two reporting periods.

Table 29: Breakdown of staff by age and gender, 2010–11 and 2011–12

	2010–11		2011–12	
	Number	%	Number	%
20–30 years	8	17	10	17
31–40 years	14	29	17	30
41–50 years	12	25	15	25
51–60 years	13	27	14	25
>60 years	1	2	1	3
Female	24	50	29	53
Male	24	50	28	47
Total	50	100	57	100

Work health and safety

During 2011–12, the GRDC designed and partially implemented a work health and safety (WHS) framework complying with the *Work Health and Safety Act 2011* and Work Health and Safety Regulations 2011.

From a health and safety perspective, the GRDC's goal is to provide a safe environment for its workers. The GRDC's strategy to achieve this goal materialised in:

- appropriate policy and procedures
- a participatory approach
- the identification of risks and risk mitigators
- processes for dealing with incidents
- education and training for workers
- regular reporting
- resources
- periodic review.

The GRDC's framework for workplace health and safety expresses commitment in the area of managerial responsibilities and details how relevant legislation will be implemented. Processes for consultation between employees and their representatives and management have been established, through a WHS Committee and WHS representatives.

The GRDC has clearly defined health and safety responsibilities, including in job descriptions. The following WHS roles and responsibilities have been defined:

- **individual workers**—ensure that their conduct does not endanger themselves, others or the environment; ensure their own health and safety; and take reasonable care for the health and safety of others
- **working groups**—take steps to ensure that the identified hazards are eliminated as far as reasonably practicable or controlled using the hierarchy of risk
- **the WHS Committee**—be responsible for ensuring that effective consultation takes place within their area, and provide WHS advice
- **WHS representatives**—represent working group members in relation to health and safety matters at work

- **first aid officers**—ensure that the health of workers and conditions at the workplace are monitored for the purpose of preventing work-related illness or injury
- **fire wardens**—provide any information, training, instruction or supervision needed to protect all persons from risks to their health and safety associated with fire danger
- **executive managers**—ensure that the WHS policy and programs are effectively implemented in their area of control; and be accountable for taking all practical measures to ensure that the workplace under their control is safe and without risks to health
- **regional panel chairs**—ensure that the WHS policy and programs are effectively implemented in their area of control; and be held accountable for taking all practical measures to ensure that the workplace under their control is safe and without risks to health
- **the Executive Manager Corporate Services and the Managing Director**—ensure engagement and leadership in WHS management; establish WHS strategic objectives and targets in line with the requirements of the WHS policy and ensure targets are met; and ensure managers have been responsible and accountable for their areas of responsibility and that they have the necessary resources for the identification, evaluation and control of hazards
- **the Board**—exercise due diligence to ensure that the GRDC complies with any duty or obligation in the area of WHS; and maintain a work environment that is without risks to health and safety.

The framework also includes procedures for identifying hazards, identifying and managing risk, and dealing with incidents.

WHS training requirements have been developed for the induction of new staff and for periodic WHS training for staff in various categories of jobs (for example, office work or field work), including training on WHS requirements for travel.

Table 30 outlines measures that the GRDC implemented to promote a safe workplace for healthy staff.

Table 30: GRDC work health and safety performance in 2011–12

Indicators	Performance
Health and wellbeing initiatives	<p>The GRDC offered to staff, free of charge:</p> <ul style="list-style-type: none"> • flu vaccinations (annually) • fresh fruit (daily) • opportunities to participate in health promotion and fitness programs (such as the Global Corporate Challenge) • counselling, for staff members and members of their families, through its Employee Assistance Program.
Training and awareness of work health and safety (WHS) requirements	<p>Important activities included:</p> <ul style="list-style-type: none"> • induction information for new staff members on WHS and the importance given to health and wellbeing by the GRDC • training on emergency procedures, for new staff • building evacuation and fire drill training, for all staff • senior first aid training, for four staff members • defensive driver training for all new staff who will be frequently required to drive as part of their role • a presentation about the Employee Assistance Program • wellness seminars. <p>The WHS Committee was implemented, and the GRDC's WHS policies were reviewed and extended.</p>
Improved internal security arrangements	<p>Compliance with the Protective Security Manual continued to be implemented in stages.</p> <p>The internal alarm system was tested and found to be working well.</p>
Workplace facilities maintained to a high standard	<p>Activities to ensure that facilities were well maintained included:</p> <ul style="list-style-type: none"> • twice-yearly inspection of fire extinguishers • annual checking and restocking of the first aid kit • annual checking and tagging of electrical leads and power cords • an annual radiation check of microwave ovens • regular inspection of smoke detectors • regular cleaning of carpets.
Statistics of any accidents or dangerous incidents	<p>There were four incidents and one near miss during 2011–12. Three incidents were of a psychological nature and one was a trip; the near miss was in the fall category.</p> <p>The GRDC took action by implementing engineering control measures (for the trip) as well as elimination (for the near miss) and use of the Employee Assistance Program.</p>
Investigations conducted, including notices given	<p>One investigation was conducted, related to a psychological incident.</p> <p>No directions or notices were given to the GRDC.</p>

Photo by Arthur Mostead



Financial Statements

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INDEPENDENT AUDITOR'S REPORT

To the Minister for Agriculture, Fisheries and Forestry

I have audited the accompanying financial statements of the Grains Research and Development Corporation (the Corporation) for the year ended 30 June 2012, which comprise: a Statement by the Directors, Chief Executive and Chief Financial Officer; the Statement of Comprehensive Income; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments; and Notes comprising a Summary of Significant Accounting Policies and other explanatory information.

Directors' Responsibility for the Financial Statements

The directors of the Grains Research and Development Corporation are responsible for the preparation of the financial statements that give a true and fair view in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards, and for such internal control as is necessary to enable the preparation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Corporation's preparation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Corporation's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Opinion

In my opinion, the financial statements of the Grains Research and Development Corporation:

- (a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards; and
- (b) give a true and fair view of the matters required by the Finance Minister's Orders including the Grains Research and Development Corporation's financial position as at 30 June 2012 and of its financial performance and cash flows for the year then ended.

Australian National Audit Office



Carla Jago
Executive Director
Delegate of the Auditor-General

Canberra

9 August 2012

Statement by directors and chief financial officer


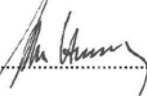

GRAINS RESEARCH AND DEVELOPMENT CORPORATION

STATEMENT BY THE DIRECTORS, CHIEF EXECUTIVE AND CHIEF FINANCIAL OFFICER

In our opinion, the attached financial statements for the year ended 30 June 2012 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the Commonwealth Authorities and Companies Act 1997, as amended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Corporation will be able to pay its debts as and when they become due and payable.

The statement is made in accordance with a resolution of the directors.

Signed..... 	Signed..... 	Signed..... 
Mr K G Perrett 9 August 2012	Mr J E Harvey 9 August 2012	Ms D K Jakubowski 9 August 2012

Statement of comprehensive income

for the period ended 30 June 2012

	Notes	2012 \$'000	2011 \$'000
EXPENSES			
Employee benefits	3A	7,219	6,867
Research and Development	3B	150,231	140,660
Supplier expense	3C	6,697	5,753
Depreciation and amortisation	3D	381	402
Write-down and impairment of assets	3E	535	369
Total expenses		165,063	154,051
LESS:			
OWN-SOURCE INCOME			
Own-source revenue			
Interest	4A	13,197	7,219
Industry contributions	4B	97,714	104,496
Project refunds	4C	1,380	899
Royalties	4D	4,900	2,961
Grants income	4E	3,104	5,987
Other	4F	402	573
Total own-source revenue		120,697	122,135
Gains			
Gain-investments	4G	904	-
Total gains		904	-
Total own-source income		121,601	122,135
Net cost of services			
Revenue from Government	4H	55,935	53,397
Share of (deficit) of associates and joint ventures accounted for using the equity method	5C	(156)	(659)
Surplus attributable to the Australian Government		12,317	20,822
OTHER COMPREHENSIVE INCOME			
Changes in asset revaluation surplus	6B	597	(45)
Total other comprehensive income		597	(45)
Total comprehensive income		12,914	20,777
Total comprehensive income attributable to the Australian Government		12,914	20,777

The above statement should be read in conjunction with the accompanying notes.

Balance sheet

As at 30 June 2012

	Notes	2012 \$'000	2011 \$'000
ASSETS			
Financial assets			
Cash and cash equivalents	5A	77,860	50,249
Trade and other receivables	5B	24,072	23,834
Investments accounted for using the equity method	5C	114	126
Investments in managed funds	5D	113,767	117,866
Investments—other	5E	8,107	7,533
Total financial assets		223,920	199,608
Non-financial assets			
Land and buildings	6A,C	5,900	5,498
Infrastructure, plant and equipment	6B,C	256	242
Intangibles	6D,E	245	267
Other	6F	355	392
Total non-financial assets		6,756	6,399
Total assets		230,676	206,007
LIABILITIES			
Payables			
Suppliers	7A	602	1,038
Research and development	7B	66,187	54,395
Total payables		66,789	55,433
Provisions			
Employee provisions	8A	1,658	1,259
Total payables		1,658	1,259
Total liabilities		68,447	56,692
Net assets		162,229	149,315
EQUITY			
Retained surplus		69,936	64,069
Asset revaluation surplus		3,913	3,316
Capital commitment reserve		-	200
Contracted research reserve		88,380	81,730
Total equity		162,229	149,315

The above statement should be read in conjunction with the accompanying notes.

Statement of changes in equity

for the period ended 30 June 2012

	Retained surplus		Asset revaluation surplus		Contracted research reserve		Capital commitment reserve		Total equity	
	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000
Opening balance										
Balance carried forward from previous period	64,069	55,683	3,316	3,361	81,730	69,312	200	182	149,315	128,538
Adjusted opening balance	64,069	55,683	3,316	3,361	81,730	69,312	200	182	149,315	128,538
Comprehensive income										
Other comprehensive income	-	-	597	(45)	-	-	-	-	597	(45)
Surplus for the period	12,317	20,822	-	-	-	-	-	-	12,317	20,822
Total comprehensive income	12,317	20,822	597	(45)	-	-	-	-	12,914	20,777
Transfers between equity components	(6,450)	(12,436)	-	-	6,650	12,418	(200)	18	-	-
Closing balance as at 30 June	69,936	64,069	3,913	3,316	88,380	81,730	-	200	162,229	149,315

The above statement should be read in conjunction with the accompanying notes.

Cash flow statement

for the period ended 30 June 2012

	Notes	2012 \$'000	2011 \$'000
OPERATING ACTIVITIES			
Cash received			
Industry contributions		97,725	104,426
Commonwealth contributions		55,892	43,728
Interest		10,532	6,950
Grants income		4,502	5,115
Other		8,079	5,456
Total cash received		176,730	165,675
Cash used			
Research and development		138,961	130,690
Employees		7,187	6,839
Suppliers		6,777	6,730
Net GST paid		2,418	2,352
Total cash used		155,343	146,611
Net cash from operating activities	9	21,387	19,064
INVESTING ACTIVITIES			
Cash received			
Investments		14,000	3,000
Total cash received		14,000	3,000
Cash used			
Purchase of property, plant and equipment		178	189
Investments		7,247	5,290
Shares		351	241
Total cash used		7,776	5,720
Net cash from (used by) investing activities		6,224	(2,720)
Net increase in cash held		27,611	16,344
Cash and cash equivalents at the beginning of the reporting period		50,249	33,905
Cash and cash equivalents at the end of the reporting period	5A	77,860	50,249

The above statement should be read in conjunction with the accompanying notes.

Schedule of commitments

as at 30 June 2012

	2012 \$'000	2011 \$'000
BY TYPE		
Commitments receivable		
GST recoverable on commitments	(18,601)	(19,421)
Total commitments receivable	(18,601)	(19,421)
Commitments payable		
Capital commitments		
Investments ¹	-	200
Total capital commitments	-	200
Other commitments		
Operating leases ²	268	266
Research projects forward program ³	204,340	213,360
Total other commitments	204,608	213,626
Net commitments by type	186,007	194,405
BY MATURITY		
Commitments receivable		
One year or less	(8,006)	(9,139)
From one year to five years	(10,595)	(10,282)
Over five years	-	-
Total commitments receivable	(18,601)	(19,421)
Commitments payable		
Capital commitments		
One year or less	-	200
From one year to five years	-	-
Total capital commitments	-	200
Research project commitments		
One year or less	87,896	100,360
From one year to five years	116,444	113,000
Over five years	-	-
Research projects commitments	204,340	213,360
Operating lease commitments		
One year or less	171	171
From one year to five years	97	95
Over five years	-	-
Total operating lease commitments	268	266
Total commitments payable	204,608	213,826
Net commitments by maturity	186,007	194,405

Note: Commitments are GST inclusive where relevant.

1 The nature of capital commitments relates to share purchases.

2 Operating leases comprise:

<i>Nature of the lease</i>	<i>General description of leasing arrangement</i>
Motor vehicles—staff	Leased as part of salary packages No contingent rentals exist
Franking machine	A rental agreement for a period of 5 years exists for the franking machine, after this time it is usually replaced with new rental equipment

3 Research project forward program commitments are amounts payable in respect of contracted Research Agreements held between the GRDC and research providers as at 30 June 2012.

The above statement should be read in conjunction with the accompanying notes.

Notes to and forming part of the financial statements

for the year ended 30 June 2012

Note 1: Summary of Significant Accounting Policies

1.1 Objective of the GRDC

The Grains Research and Development Corporation (the Corporation) is an Australian Government controlled entity, established in 1990 as a statutory corporation under the *Primary Industries and Energy Research and Development Act 1989*. It is a not-for-profit entity. The primary objective of the Corporation is to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and sustainability. By strategically investing in research and development (R&D) and the delivery of R&D outputs, the Corporation works to achieve one outcome:

Outcome 1—New information and products that enhance the productivity, competitiveness and environmental sustainability of Australian grain growers and benefit the industry and wider community, through planning, managing and implementing investments in grains research and development.

The continued existence of the Corporation in its present form and with its present programs is dependent on Government policy.

1.2 Basis of Preparation of the Financial Statements

The financial statements are general purpose financial statements and are required by clause 1(b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997*.

The financial statements have been prepared in accordance with:

- (a) Finance Minister's Orders (FMOs) for reporting periods ending on or after 1 July 2011; and
- (b) Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Unless an alternative treatment is specifically required by an accounting standard or the FMOs, assets and liabilities are recognised in the balance sheet when and only when it is probable that future economic benefits will flow to the Corporation or a future sacrifice of economic benefits will be required and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under executor contracts are not recognised unless required by an accounting standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments.

Unless alternative treatment is specifically required by an accounting standard, income and expenses are recognised in the Statement of Comprehensive Income when, and only when, the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.3 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies listed in this note, the Corporation has made the following estimates that have the most significant impact on the amounts recorded in the financial statements:

- (a) The valuation of unlisted shares held by the Corporation (as detailed in note 1.10) at each balance date is equivalent to the Corporation's share of net assets of each company.

No other accounting assumptions or estimates have been identified that have a significant risk of causing material adjustment to carrying amounts of assets and liabilities within the next reporting period.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.4 New Australian Accounting Standards

Adoption of new Australian Accounting Standard Requirements

No accounting standard has been adopted earlier than the application date as stated in the standard.

The following new standards, revised standards, interpretations and amendments to standards were issued prior to the sign-off date, were applicable to the current reporting period and had a financial impact on the Corporation:

Standard/Interpretation		Impact on the Corporation
AASB 124	Related Party Disclosures—December 2009 (Principal)	Reduced disclosure requirements for government-related entities
AASB 1054	Australian Additional Disclosures—December 2009 (Principal)	Minimal impact on financial statements

Other new standards, revised standards, interpretations and amendments to standards that were issued prior to the sign-off date and are applicable to the current reporting period did not have a financial impact, and are not expected to have a future financial impact on the Corporation.

Future Australian Accounting Standard Requirements

The following new standards, revised standards, interpretations and amendments to standards were issued by the Australian Accounting Standards Board prior to the sign-off date, which are expected to have a financial impact on the Corporation for future reporting periods:

Standard/Interpretation		Impact on the Corporation
AASB 9	Financial Instruments—December 2010 (Principal)	Changes to presentation, however, no significant impact on financial statements
AASB119	Employee Entitlements—September 2011 (Principal)	Changes may impact accounting treatment and disclosure requirements

Other new standards, revised standards, interpretations and amendments to standards that were issued prior to the sign-off date and are applicable to future reporting periods are not expected to have a future financial impact on the Corporation.

1.5 Revenue

The revenues described in this note are revenues relating to the core activities of the Corporation.

Revenue from Government

Revenue paid to the Corporation under Section 32 of the *Primary Industries and Energy Research and Development Act 1989*, representing 0.5% of the three-year moving average of gross value of production of grains, is for the purpose of funding research and development activities. Revenues from Government are recognised when they are entitled to be received by the Corporation.

Funding received or receivable from agencies (appropriated to the agency as a CAC Act body payment item for payment to the Corporation) is recognised as Revenue from Government by the Corporation unless the funding is in the nature of an equity injection or loan.

Industry contributions

Revenue paid to the Corporation under Section 30 of the *Primary Industries and Energy Research and Development Act 1989*, where a research levy is attached to grain producers' output, is for the purpose of providing funds for research and development. Industry contributions are recognised when they are entitled to be received by the Corporation.

Interest revenue

Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.5 Revenue *(continued)*

Project refunds

Project refunds are recognised upon receipt of the refund when it relates to prior years expenditure and when the funds accrued are not required for the completion of the project.

Royalties

Royalties are recognised when the royalty is entitled to be received by the Corporation.

Grants income

Grants income is revenue paid to the Corporation for the purpose of funding specific research and development projects. Grants and other non-reciprocal contributions are recognised as revenue when the Corporation obtains control over the assets comprising the contributions. Control is normally obtained upon receipt.

1.6 Gains

Sale of assets

Gains from the disposal of assets are recognised when control of the asset has passed to the buyer.

Gain – Investments

Gains from a change in the accounting treatment of share investments are recognised at the time the change is required to be made (for example, at the time significant influence is lost).

1.7 Employee Benefits

Liabilities for 'short-term employee benefits' (as defined in AASB 119 *Employee Benefits*) and termination benefits due within twelve months of the end of the reporting period are measured at their nominal amounts.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

Other long-term benefits are measured as net total of the present value of the defined benefit obligation at the end of the reporting period minus the fair value at the end of the reporting period of plan assets (if any) out of which the obligations are to be settled directly.

Leave

The liability for employee benefits includes provision for annual leave and long service leave. No provision has been made for sick leave as all sick leave is non-vesting and the average sick leave taken in future years by employees of the Corporation is estimated to be less than the annual entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that apply at the time the leave is taken, including the Corporation's employer superannuation contribution rates, to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability for long service leave has been determined by using the Australian Government shorthand method. In applying this method, the accrued long service leave for each employee as at reporting date is probability weighted, based on the Australian Government probability profile. The amount obtained for each employee is then discounted using the ten year Treasury Bond rate. The total estimated liability for the Corporation is the sum of the liabilities for each employee. The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Separation and redundancy

The Corporation recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

Superannuation

Staff of the Corporation are members of the Commonwealth Superannuation Scheme (CSS), the Public Sector Superannuation Scheme (PSS), the PSS Accumulation Plan (PSSap), the Australian Government Employees Superannuation Trust (AGEST) or an approved superannuation scheme of their choice.

The CSS and PSS are defined benefit schemes for the Australian Government. The PSSap is a defined contribution scheme.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.7 Employee Benefits *(continued)*

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported by the Department of Finance and Deregulation's administered schedules and notes.

For CSS and PSS members, the Corporation makes contributions based on the rates determined by an actuary to be sufficient to meet the current costs to the Government. The Corporation accounts for the contributions as if they were contributions to defined contribution plans.

For AGEST and other approved superannuation schemes, the Corporation contributes a minimum of 9% of superannuable salaries.

As at 30 June, all superannuation contributions were fully paid, therefore no superannuation liability has been recognised (2011: \$NIL).

1.8 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessor to the lessee substantially all the risks and rewards incidental to ownership of leased assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains substantially all such risks and benefits.

The Corporation has no finance leases. Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

1.9 Cash

Cash is recognised at its nominal amount. Cash and cash equivalents includes:

- cash on hand; and
- demand deposits in bank accounts with an original maturity of 3 months or less that are readily convertible to known amounts of cash and subject to insignificant risk of changes in value.

1.10 Financial Assets

The Corporation classifies its financial assets in the following categories:

- (a) financial assets at fair value through profit or loss;
- (b) held-to-maturity investments;
- (c) available-for-sale financial assets; and
- (d) loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition. Financial assets are recognised and derecognised upon trade date.

Effective interest method

The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset, or, where appropriate, a shorter period.

Income is recognised on an effective interest rate basis except for financial assets at fair value through profit or loss.

Financial assets at fair value through profit or loss

Financial assets are classified as financial assets at fair value through profit or loss where the financial assets:

- (a) have been acquired principally for the purpose of selling in the near future;
- (b) are derivatives that are not designated and effective as a hedging instrument; or
- (c) are parts of an identified portfolio of financial instruments that the Corporation manages together and has a recent actual pattern of short-term profit-taking.

Assets in this category are classified as current assets.

Financial assets at fair value through profit or loss are stated at fair value, with any resultant gain or loss recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest earned on the financial asset. Interest earned on financial assets at FVPL is included in note 4A.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.10 Financial Assets *(continued)*

Available-for-sale financial assets

Available-for-sale financial assets are non-derivatives that are either designated in this category or not classified in any of the other categories.

Available-for-sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised directly in reserves (equity) with the exception of impairment losses. Interest is calculated using the effective interest method and foreign exchange gains and losses on monetary assets are recognised directly in profit or loss. Where the asset is disposed of or is determined to be impaired, part (or all) of the cumulative gain or loss previously recognised in the reserve is included in surplus or deficit for the period.

Where a reliable fair value cannot be established for unlisted investments in equity instruments, cost is used.

The Corporation has acquired shares in the following unlisted companies:

- Australian Grain Technologies Pty Ltd (holding: 39.11%);
- Australian Centre for Plant Functional Genomics Pty Ltd (holding: 18.54%);
- Arista Cereal Technologies Pty Ltd (holding: 21.43%);
- InterGrain Pty Ltd (holding: 27.42%);
- Canola Breeders Western Australia Pty Ltd (holding: 39.25%); and
- HRZ Wheats Pty Ltd (holding: 18.16%)

The above companies conduct research and development activities relating to seed technology, new wheat varieties, high amylose wheat and the development of canola varieties. The success and ability to generate future economic benefits are subject to uncertainty and the Corporation believes that this will impair the carrying values of the investments.

The Corporation has established a *provision for diminution in share value* to record a reduction in the value of each of these investments based on the Corporation's estimate of the trading performance of each company. A review of the trading performances will be done annually and the provisions adjusted accordingly. The provision for each investment is disclosed at note 5E. The provision will remain effective until such time as the Corporation believes that the investment would generate sufficient future economic benefits from a successfully marketed product or service and an active market for the investment exists. The investment would then be measured at fair value.

Held-to-maturity investments

Non-derivative financial assets with fixed or determinable payments and fixed maturity dates that the Corporation has the positive intent and ability to hold to maturity are classified as held-to-maturity investments. Held-to-maturity investments are recorded at amortised cost using the effective interest method less impairment, with revenue recognised on an effective yield basis.

Loans and receivables

Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Impairment of financial assets

Financial assets are assessed for impairment at the end of each reporting period.

Financial assets held at amortised cost—if there is objective evidence that an impairment loss has been incurred for loans and receivables or held-to-maturity investments held at amortised cost, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the Statement of Comprehensive Income.

Available-for-sale financial assets—if there is objective evidence that an impairment loss on an available-for-sale financial asset has been incurred, the amount of the difference between its cost, less principal repayments and amortisation, and its current fair value, less any impairment loss previously recognised in expenses, is transferred from equity to the Statement of Comprehensive Income.

Financial assets held at cost—if there is objective evidence that an impairment loss has been incurred, the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.11 Investments in Associates

The Corporation's investments in its associates are accounted for using the equity method.

Under the equity method, investments in associates are carried in the Corporation's balance sheet at cost as adjusted for post-acquisition changes in the Corporation's share of net assets of the associates. Goodwill relating to an associate is included in the carrying amount of the investment. After the application of the equity method, the Corporation determines whether it is necessary to recognise any impairment loss with respect to the net investment in associates.

1.12 Financial Liabilities

Financial liabilities are classified as either financial liabilities at 'fair value through profit or loss' or other financial liabilities. Financial liabilities are recognised and derecognised upon 'trade date'.

Financial liabilities at fair value through profit or loss

Financial liabilities at fair value through profit or loss are initially measured at fair value. Subsequent fair value adjustments are recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest paid on the financial liability.

Other financial liabilities

Other financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs. These liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective yield basis.

The effective interest method is a method of calculating the amortised cost of a financial liability and of allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments through the expected life of the financial liability, or, where appropriate, a shorter period.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

1.13 Contingent Liabilities and Contingent Assets

Contingent liabilities and contingent assets are not recognised in the Balance Sheet but are reported in the relevant schedules and notes. They may arise from uncertainty as to the existence of a liability or asset, or represent an asset or liability in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

As at 30 June 2012 the Corporation held no contingent liabilities or contingent assets.

1.14 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets (with the exception of investments in equity instruments that do not have a quoted market price in an active market and whose fair value cannot be reliably measured) are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost, or for nominal consideration, are initially recognised as assets and income at their fair value at the date of acquisition.

1.15 Property, Plant and Equipment

Asset recognition threshold

Purchases of property, plant and equipment are recognised initially at cost in the Balance Sheet, except for purchases costing less than \$2,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.15 Property, Plant and Equipment *(continued)*

Revaluations

Fair values for each class of asset are determined as shown below:

Asset Class	Fair Value Measured at:
Land	Market selling price
Building	Market selling price
Infrastructure, plant and equipment	Market selling price

Following initial recognition at cost, property, plant and equipment were carried at fair value less subsequent accumulated depreciation and accumulated impairment losses. Valuations were conducted with sufficient frequency to ensure that the carrying amounts of assets do not differ materially from the assets' fair values as at the reporting date. The regularity of independent valuations depended upon the volatility of movements in market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment was credited to equity under the heading of asset revaluation reserve except to the extent that it reverses a previous revaluation decrement of the same asset class that was previously recognised in the surplus/deficit. Revaluation decrements for a class of assets were recognised directly in the surplus/deficit except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset restated to the revalued amount.

Depreciation

Depreciable property, plant and equipment assets are written-off to their estimated residual values over their estimated useful lives to the Corporation using, in all cases, the straight-line method of depreciation.

Depreciation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

	2012	2011
Buildings on leasehold land	25 years	25 years
Other infrastructure, plant & equipment	3 to 12 years	3 to 12 years

Assets purchased with research payments

Assets purchased with research payments may revert to the Corporation at the end of the research project period and will be accounted for appropriately at that date. During the financial year no research assets reverted to the Corporation (2011: \$NIL).

Impairment

All assets were assessed for impairment at 30 June 2012. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the Corporation were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

Derecognition

An item of property, plant and equipment is derecognised upon disposal or when no further economic benefits are expected from its use or disposal.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.16 Intangibles

The Corporation's intangibles comprise software for internal use and development costs.

Software

Software is carried at cost less accumulated amortisation and accumulated impairment losses.

Software is amortised on a straight-line basis over its anticipated useful life as follows:

	2012	2011
Information management system	2.5 years	2.5 years
Other software	4 years	4 years

Development costs

Research costs are expensed when incurred. An intangible asset arising from development expenditure is only recognised when technical feasibility studies identify that the expenditure will deliver future economic benefits and these benefits can be measured reliably. Other development expenditure is recognised in the Statement of Comprehensive Income as an expense when incurred.

Following initial recognition of development expenditure, the cost model is applied requiring the asset to be carried at cost less any accumulated amortisation and accumulated impairment losses.

All intangible assets were assessed for indications of impairment as at 30 June 2012.

1.17 Taxation

The Corporation is exempt from all forms of taxation except Fringe Benefits Tax (FBT) and the Goods and Services Tax (GST).

Revenues, expenses and assets are recognised net of GST except:

- (a) where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- (b) for receivables and payables.

Note 2: Events After the Reporting Period

There was no subsequent event that had the potential to significantly affect the ongoing structure and financial activities of the Corporation.

Note 3: Expenses

	2012 \$'000	2011 \$'000
3A—Employee Benefits		
Salaries and wages	5,871	5,900
Superannuation		
Defined contribution plans	660	709
Defined benefits plans	124	76
Leave and other entitlements	399	27
Separation and redundancies	165	155
Total employee benefits	7,219	6,867

Note 3: Expenses (continued)

3B—Research and Development

2012	Cross-commodity \$'000	Coarse grains \$'000	Grain legumes \$'000	Oilseeds \$'000	Wheat \$'000	Total \$'000
National	91,259	290	956	545	2,681	95,731
Northern Region	12,672	-	507	-	844	14,023
Southern Region	24,162	1,800	10	450	314	26,736
Western Region	12,366	-	500	425	450	13,741
TOTAL	140,459	2,090	1,973	1,420	4,289	150,231
2011	116,185	4,987	10,447	2,182	6,859	140,660

The aforementioned classification of national and regional payments is usually based on investment recommendations by the three Regional Panels and the National Panel. The project outcomes may, however, have impacts across one or more regions.

	2012 \$'000	2011 \$'000
3C—Suppliers		
Goods and services		
Staff travel and accommodation	1,097	1,108
Consultants	30	55
Panel expenses	1,959	1,089
Program team expenses	17	418
Communications	65	97
Corporate governance	210	299
Corporate services	1,927	1,387
Legal and procurement	222	227
Levy collection costs	645	599
Other	522	443
Total goods and services	6,694	5,722
Goods and services are made up of:		
Provision of goods—external parties	117	111
Rendering of services—external parties	6,577	5,611
Total goods and services	6,694	5,722
Other supplier expenses		
Operating lease rentals—external parties		
Minimum lease payments	3	31
Total other supplier expenses	3	31
Total supplier expenses	6,697	5,753

Note 3: Expenses *(continued)*

	2012 \$'000	2011 \$'000
3D—Depreciation and Amortisation		
Depreciation:		
Property, plant and equipment	82	107
Buildings	195	196
Total depreciation	277	303
Amortisation:		
Intangibles:		
Information Management System	13	14
Software	91	85
Total amortisation	104	99
Total depreciation and amortisation	381	402
3E—Write-down and Impairment of Assets		
Asset write-downs and impairments from:		
Investments (shares)—revaluation decrement	535	369
Total write-down and impairment of assets	535	369

Note 4: Income

	2012 \$'000	2011 \$'000
OWN-SOURCE REVENUE		
Note 4A—Interest		
Deposits	10,848	7,364
Management fee	(305)	(309)
Revaluation of investments	2,654	164
Total interest	13,197	7,219
Note 4B—Industry Contributions		
Coarse grains	19,550	18,509
Grain legumes	7,376	8,277
Oilseeds	16,841	13,794
Wheat	53,947	63,916
Total industry contributions	97,714	104,496
Note 4C—Project Refunds		
Cross commodity	1,038	687
Coarse grains	3	119
Grain legumes	-	7
Oilseeds	5	77
Wheat	334	9
Total project refunds	1,380	899

Note 4: Income *(continued)*

	2012 \$'000	2011 \$'000
Note 4D—Royalties		
Coarse grains	1,428	542
Grain legumes	497	481
Oilseeds	396	381
Wheat	1,974	1,545
Other	605	12
Total royalties	4,900	2,961
Note 4E—Grants Income		
Commonwealth	2,664	5,483
Industry	440	504
Total grants income	3,104	5,987
Note 4F—Other Revenue		
Levy penalties	95	97
Groundcover advertising income	230	218
Publications revenue	-	46
Other income	77	212
Total other revenue	402	573
GAINS		
Note 4G—Gain-Investments		
Gain on change in accounting treatment of share investment	904	-
	904	-
REVENUE FROM GOVERNMENT		
Note 4H—Revenue from Government		
Commonwealth contributions	55,935	53,397
Total revenue from Government	55,935	53,397

Note 5: Financial Assets

	2012 \$'000	2011 \$'000
5A—Cash and Cash Equivalents		
Interest bearing cheque account	575	460
Money market call account	65,949	38,949
Business online saver account	11,336	10,840
Total cash and cash equivalents	77,860	50,249

Note 5: Financial Assets (continued)

	2012 \$'000	2011 \$'000
5B—Trade and Other Receivables		
Goods and services		
Goods and services—related entities	16,028	15,996
Goods and services—external parties	1,097	2,117
Total receivables for goods and services	17,125	18,113
Other receivables		
GST receivable from the Australian Taxation Office	6,947	5,721
Total other receivables	6,947	5,721
Total trade and other receivables	24,072	23,834
Receivables are aged as follows:		
Not overdue	23,656	22,762
Overdue by:		
0 to 30 days	115	1,040
31 to 60 days	-	5
61 to 90 days	-	-
more than 90 days	301	27
	416	1,072
Total receivables	24,072	23,834
All receivables are expected to be recovered in no more than 12 months. No indicators of impairment were found for trade and other receivables.		
5C—Investments Accounted for Using the Equity Method		
Investments in associates:		
Novozymes Biologicals Australia Pty Ltd	114	71
HRZ Wheats Pty Ltd ¹	-	55
Total equity accounted investments	114	126
All such investments are expected to be recovered in more than 12 months.		
1. During the reporting period, the Corporation ceased to have significant influence over HRZ Wheats Pty Ltd. Accordingly, the Corporation has changed the accounting treatment for this investment and it is now accounted for in accordance with AASB 139 <i>Financial Instruments: Recognition and Measurement</i> . The resultant gain from the change in accounting treatment has been disclosed at Note 4G.		

Details of investments accounted for using the equity method

Name of entity	Principal activity	Reporting date	Ownership	
			2012 %	2011 %
Novozymes Biologicals Australia Pty Ltd*	Soil inoculant research and development	30 September	50.0	50.0
HRZ Wheats Pty Ltd*	Wheat breeding and commercialisation	30 June	-	36.3

* Incorporated in Australia

Note 5: Financial Assets (continued)

Summarised financial information of associates:

	2012 \$'000	2011 \$'000
Balance sheet		
Assets	907	1,070
Liabilities	(678)	(777)
Net assets	229	293
Statement of comprehensive income		
Income	385	643
Expenses	(707)	(2,610)
Net (deficit)	(322)	(1,967)
Share of associates' net (deficit)		
Share of net (deficit) before tax	(156)	(659)
Income tax expense	-	-
Share of associates' net (deficit) after tax	(156)	(659)
5D—Investments in Managed Funds		
BT Individually Managed Fund	57,174	59,051
At market value		
UBS Individually Managed Fund	56,593	58,815
At market value		
Total investments	113,767	117,866

Individually managed funds

The funds are available at call. Interest rates will vary to reflect varying market interest rates.

Ministerial approval

The Corporation has received approval under paragraph 18(3)(d) of the CAC Act to hold the investments listed above.

	2012 \$'000	2011 \$'000
5E—Investments—Other		
<i>Shares in unlisted companies</i>		
Australian Grain Technologies Pty Ltd	11,386	11,386
Provision for diminution in share value	(7,171)	(7,171)
	4,215	4,215
Australian Centre for Plant Functional Genomics Pty Ltd	21	21
Provision for diminution in share value	(8)	-
	13	21
Arista Cereal Technologies Pty Ltd	3,200	3,200
Provision for diminution in share value	(1,990)	(1,752)
	1,210	1,448
InterGrain Pty Ltd	7,200	7,200
Provision for diminution in share value	(5,392)	(5,392)
	1,808	1,808

Note 5: Financial Assets *(continued)*

	2012 \$'000	2011 \$'000
5E—Investments—Other <i>(continued)</i>		
Canola Breeders Western Australia Pty Ltd	950	800
Provision for diminution in share value	(950)	(759)
	-	41
HRZ Wheats Pty Ltd	1,499	-
Provision for diminution in share value	(638)	-
	861	-
Total Investments—Other	8,107	7,533

The shares held are ordinary shares.

All such investments are expected to be recovered in more than 12 months.

Note 6: Non-Financial Assets

	2012 \$'000	2011 \$'000
6A—Land and Buildings		
Leasehold land—fair value	1,000	1,000
Total land	1,000	1,000
Buildings on leasehold land—fair value	4,900	4,890
Accumulated depreciation	-	(392)
Total buildings	4,900	4,498
Total land and buildings	5,900	5,498
No indicators of impairment were found for land and buildings.		
No land and buildings were expected to be sold or disposed of within the next 12 months.		
6B—Property, Plant and Equipment		
Property, plant and equipment—fair value	338	242
Accumulated depreciation	(82)	-
Total property, plant and equipment	256	242
Movement in asset revaluation reserve		
Increment for buildings	597	-
Decrement for property, plant and equipment	-	(45)
Total movement in asset revaluation reserve	597	(45)

No indicators of impairment were found for property, plant and equipment.

No property, plant or equipment is expected to be sold or disposed of within the next 12 months.

Revaluation of non-financial assets

All revaluations were conducted in accordance with the revaluation policy stated at Note 1.

No revaluation decrements were expensed during the year (2011: \$NIL).

An independent valuer, the Australian Valuation Office, conducted a formal revaluation of land and buildings as at 30 June 2012.

A formal revaluation of property, plant and equipment was conducted by the Australian Valuation Office as at 30 June 2011.

It has been assessed that the carrying amount of property, plant and equipment does not materially differ from fair value at 30 June 2012.

Note 6: Non-Financial Assets (continued)

6C—Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment 2012

	Leasehold Land \$'000	Buildings on Leasehold Land \$'000	Other Property, Plant & Equipment \$'000	Total \$'000
As at 1 July 2011				
Gross book value	1,000	4,890	242	6,132
Accumulated depreciation and impairment	-	(392)	-	(392)
Net book value 1 July 2010	1,000	4,498	242	5,740
Additions:				
By purchase	-	-	96	96
Revaluations and impairment recognised in other comprehensive income	-	597	-	597
Depreciation expense	-	(195)	(82)	(277)
Disposals:				
Other disposals	-	-	-	-
Net book value 30 June 2012	1,000	4,900	256	6,156
Net book value as at 30 June 2012 represented by:				
Gross book value	1,000	4,900	338	6,238
Accumulated depreciation and impairment losses	-	-	(82)	(82)
Net book value 30 June 2012	1,000	4,900	256	6,156
6C—Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment 2011				
As at 1 July 2010				
Gross book value	1,000	4,890	467	6,357
Accumulated depreciation and impairment	-	(196)	(155)	(351)
Net book value 1 July 2010	1,000	4,694	312	6,006
Additions:				
By purchase	-	-	82	82
Revaluations and impairment recognised in other comprehensive income	-	-	(45)	(45)
Depreciation expense	-	(196)	(107)	(303)
Disposals:				
Other disposals	-	-	-	-
Net book value 30 June 2011	1,000	4,498	242	5,740
Net book value as at 30 June 2011 represented by:				
Gross book value	1,000	4,890	242	6,132
Accumulated depreciation and impairment losses	-	(392)	-	(392)
Net book value 30 June 2011	1,000	4,498	242	5,740

Note 6: Non-Financial Assets (continued)

	2012 \$'000	2011 \$'000
6D—Intangibles		
Information management system—at cost	725	725
Accumulated amortisation	(715)	(702)
Total information management system	10	23
Software—at cost	516	448
Accumulated amortisation	(394)	(303)
Total software	122	145
Intellectual property—at cost	113	99
Accumulated amortisation	-	-
Total intellectual property	113	99
Total intangibles	245	267

No indicators of impairment were found for intangible assets.

No intangibles are expected to be sold or disposed of within the next 12 months.

6E—Reconciliation of the Opening and Closing Balances of Intangibles 2012

	Information Management System \$'000	Software \$'000	Intellectual Property \$'000	Total \$'000
As at 1 July 2011				
Gross book value	725	448	99	1,272
Accumulated amortisation and impairment	(702)	(303)	-	(1,005)
Net book value 1 July 2011	23	145	99	267
Additions				
By purchase	-	68	14	82
Amortisation expense	(13)	(91)	-	(104)
Net book value 30 June 2012	10	122	113	245
Net book value as at 30 June 2012 represented by:				
Gross book value	725	516	113	1,354
Accumulated amortisation and impairment	(715)	(394)	-	(1,109)
Net book value 30 June 2012	10	122	113	245

Note 6: Non-Financial Assets (continued)

6E—Reconciliation of the Opening and Closing Balances of Intangibles 2011 (continued)

	Information Management System \$'000	Software \$'000	Intellectual Property \$'000	Total \$'000
As at 1 July 2010				
Gross book value	696	399	70	1,165
Accumulated amortisation and impairment	(688)	(218)	-	(906)
Net book value 1 July 2010	8	181	70	259
Additions				
By purchase	29	49	29	107
Amortisation expense	(14)	(85)	-	(99)
Net book value 30 June 2011	23	145	99	267
Net book value as at 30 June 2011 represented by:				
Gross book value	725	448	99	1,272
Accumulated amortisation and impairment	(702)	(303)	-	(1,005)
Net book value 30 June 2011	23	145	99	267

	2012 \$'000	2011 \$'000
6F—Other Non-Financial Assets		
Accrued interest	242	230
Accrued income	83	144
Prepayments	30	18
Total other non-financial assets	355	392

All non-financial assets are expected to be recovered in no more than 12 months.

No indicators of impairment were found for other non-financial assets.

Accrued interest

The interest rates range from 2.95% to 5.07% (2011: 3.47% to 5.21%) and the frequency of payments is monthly.

Note 7: Payables

	2012 \$'000	2011 \$'000
7A—Suppliers		
Trade creditors—external parties	295	454
Accrued expenses—external parties	307	584
Total supplier payables	602	1,038

All supplier payables are expected to be settled within 12 months.

Settlement is usually made within 30 days.

Note 7: Payables (continued)

	2012 \$'000	2011 \$'000
7B—Research and Development		
Research and development	66,187	54,395
Research and development payables are expected to be settled in:		
No more than 12 months	62,103	54,104
More than 12 months	4,084	291
Total research and development payables	66,187	54,395

Note 8: Provisions

	2012 \$'000	2011 \$'000
8A—Employee Provisions		
Leave	1,658	1,259
Total employee provisions	1,658	1,259
Employee provisions are expected to be settled in:		
No more than 12 months	1,220	1,091
More than 12 months	438	168
Total employee provisions	1,658	1,259

Note 9: Cash Flow Reconciliation

Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement

	Notes	2012 \$'000	2011 \$'000
Cash and cash equivalents as per:			
Cash Flow Statement		77,860	50,249
Balance Sheet	5A	77,860	50,249
Difference		-	-

Note 9: Cash Flow Reconciliation *(continued)*

Reconciliation of net cost of services to net cash from operating activities:

	2012 \$'000	2011 \$'000
Net cost of services	(43,462)	(31,916)
Add revenue from Government	55,935	53,397
Add share of (deficit) of associates	(156)	(659)
Adjustments for non-cash items		
Depreciation/amortisation	381	402
Net write down of financial assets	535	369
Share of net loss of associates	156	659
Revaluation of investments	(2,654)	(164)
Gain-investments	(904)	-
Changes in assets/liabilities		
(Increase)/decrease in trade and other receivables	(27)	(11,428)
(Increase)/decrease in other non-financial assets	(11)	(1)
(Increase)/decrease in employee provisions	399	26
(Increase)/decrease in trade and other payables	11,195	8,379
Net cash from operating activities	21,387	19,064

Note 10: Directors' Remuneration

	2012	2011
The number of non-executive directors of the Corporation included in these figures are shown below in the relevant remuneration bands:		
\$0 – \$29,999	11	-
\$30,000 – \$59,999	1	6
\$60,000 – \$89,999	1	1
Total	13	7
	\$	\$
Total remuneration received or due and receivable by directors of the Corporation	269,816	301,090

Remuneration of executive directors is included in Note 12: Executive Remuneration.

The directors of the Corporation are appointed by the Minister—Agriculture, Fisheries and Forestry, Australia.

Note 11: Related Party Disclosures

The following persons were Directors of the Grains Research and Development Corporation during the year:

Mr Keith Perrett (Chair)
 Ms Nicole Birrell (term finished 30 September 2011)
 Mr Steve Marshall (Deputy Chair, term finished 30 September 2011)
 Prof. Timothy Reeves (term finished 30 September 2011)
 Ms Jennifer Goddard (reappointed 4 November 2011)
 Mr Colin Butcher (term finished 30 September 2011)
 Prof. Graeme Robertson (term finished 30 September 2011)
 Mr Richard Brimblecombe (appointed 4 November 2011)
 Dr Jeremy Burdon (appointed 4 November 2011)
 Mr Kim Halbert (appointed 4 November 2011, Deputy Chair—appointed 10 April 2012)
 Prof. Robert Lewis (appointed 4 November 2011)
 Ms Sharon Starick (appointed 4 November 2011)
 Mr John Woods (appointed 8 March 2012)
 Mr John Harvey (Executive Director)

Several directors of the Corporation hold directorships with other companies. All transactions between the Corporation and companies with a Director common to the Corporation are conducted using commercial and arms-length principles.

Note 12: Executive Remuneration

12A—Senior Executive Remuneration Expenses for the Reporting Period

	2012 \$	2011 \$
Short-term employee benefits:		
Salary	1,101,547	1,296,606
Annual leave accrued	98,811	118,853
Performance bonuses	151,514	128,297
Total short-term employee benefits	1,351,872	1,543,756
Post-employment benefits:		
Superannuation	149,442	185,148
Total post-employment benefits	149,442	185,148
Other long-term benefits:		
Long service leave	32,691	32,071
Total other long-term benefits	32,691	32,071
Termination benefits	99,694	155,250
Total employment benefits	1,633,699	1,916,225

Notes

- Note 12A is prepared on an accrual basis (therefore the performance bonus expenses disclosed above may differ from the cash 'Bonus Paid' in Note 12B).
- Note 12A excludes acting arrangements and part-year service where total remuneration expensed for a senior executive was less than \$150,000.

Note 12: Executive Remuneration (continued)

12B—Average Annual Reportable Remuneration Paid to Substantive Senior Executives During the Reporting Period

		2012					2011						
Average annual reportable remuneration ¹		Senior Executives No.	Reportable salary ² \$	Contributed Superannuation ³ \$	Reportable Allowances ⁴ \$	Bonus Paid ⁵ \$	Total \$	Senior Executives No.	Reportable salary ² \$	Contributed Superannuation ³ \$	Reportable Allowances ⁴ \$	Bonus Paid ⁵ \$	Total \$
Total remuneration (including part-time arrangements):													
	\$180,000 to \$209,999	2	145,517	31,710	44	19,758	197,029	3	151,740	17,588	29	21,745	191,102
	\$210,000 to \$239,999	2	171,049	26,293	176	23,253	220,771	2	161,401	34,361	110	24,357	220,229
	\$240,000 to \$269,999	1	224,539	5,926	-	15,836	246,301	1	194,674	19,896	308	26,393	241,271
	\$300,000 to \$329,999	2	268,738	16,718	110	26,747	312,313	1	358,621	41,019	-	43,988	443,628
	Total	7						7					
Average annual reportable remuneration¹													
Total remuneration (including part-time arrangements):													
	\$180,000 to \$209,999	3	151,740	17,588	29	21,745	191,102	3	151,740	17,588	29	21,745	191,102
	\$210,000 to \$239,999	2	161,401	34,361	110	24,357	220,229	2	161,401	34,361	110	24,357	220,229
	\$240,000 to \$269,999	1	194,674	19,896	308	26,393	241,271	1	194,674	19,896	308	26,393	241,271
	\$420,000 to \$449,999	1	358,621	41,019	-	43,988	443,628	1	358,621	41,019	-	43,988	443,628
	Total	7						7					

Notes

- This table reports substantive Senior Executives who received remuneration during the reporting period. Each row is an averaged figure based on headcount for individuals in the band.
- 'Reportable salary' includes the following:
 - gross payments (less any bonuses paid, which are separated out and disclosed in the 'Bonus Paid' column);
 - reportable fringe benefits (at the net amount prior to 'grossingup' to account for tax benefits); and
 - exempt foreign employment income.
- The 'contributed superannuation' amount is the average actual superannuation contributions paid to senior executives in that reportable remuneration band during the reporting period, including any salary sacrificed amounts, as per individuals' payslips.
- 'Reportable allowances' are the average actual allowances paid as per the 'total allowances' line on individuals' payment summaries.
- 'Bonus Paid' represents average actual bonuses paid during the reporting period in that reportable remuneration band. The 'bonus paid' within a particular band may vary between financial years due to various factors such as individuals commencing with or leaving the entity during the financial year.
- Various salary sacrifice arrangements were available to senior executives including superannuation, car parking, motor vehicle and expense payment fringe benefits. Salary sacrifice benefits are reported in the 'reportable salary' column, excluding salary sacrificed superannuation, which is reported in the 'Contributed Superannuation' column.

Note 12: Executive Remuneration (continued)

12C—Other Highly Paid Staff

		2012				
Average annual reportable remuneration ¹	Staff No.	Reportable salary ² \$	Contributed Superannuation ³ \$	Reportable Allowances ⁴ \$	Bonus Paid ⁵ \$	Total \$
Total remuneration (including part-time arrangements)	6	130,053	24,278	315	6,717	161,363
\$150,000 to \$179,999						
Total	6					
		2011				
Average annual reportable remuneration ¹	Staff No.	Reportable salary ² \$	Contributed Superannuation ³ \$	Reportable Allowances ⁴ \$	Bonus Paid ⁵ \$	Total \$
Total remuneration (including part-time arrangements)	3	123,003	30,455	293	13,547	167,298
\$150,000 to \$179,999						
Total	3					

Notes

- This table reports staff:
 - who were employed by the Corporation during the reporting period;
 - whose reportable remuneration was \$150,000 or more for the financial period; and
 - were not required to be disclosed in Tables A, B or director disclosures.
 Each row is an averaged figure based on headcount for individuals in the band.
- 'Reportable salary' includes the following:
 - gross payments (less any bonuses paid, which are separated out and disclosed in the 'Bonus Paid' column);
 - reportable fringe benefits (at the net amount prior to 'grossing up' to account for tax benefits); and
 - exempt foreign employment income.
- The 'Contributed Superannuation' amount is the average actual superannuation contributions paid to staff in that reportable remuneration band during the reporting period, including any salary sacrificed amounts, as per individuals' payslips.
- 'Reportable Allowances' are the average actual allowances paid as per the 'total allowances' line on individuals' payment summaries.
- 'Bonus Paid' represents average actual bonuses paid during the reporting period in that reportable remuneration band. The 'bonus paid' within a particular band may vary between financial years due to various factors such as individuals commencing with or leaving the entity during the financial year.
- Various salary sacrifice arrangements were available to other highly paid staff including superannuation, car parking, motor vehicle and expense payment fringe benefits. Salary sacrifice benefits are reported in the 'reportable salary' column, excluding salary sacrificed superannuation, which is reported in the 'Contributed Superannuation' column.

Note 13: Remuneration of Auditors

The cost of financial statement audit services provided to the Corporation was:

	2012 \$	2011 \$
Australian National Audit Office	26,000	25,300

No other services were provided by the auditors of the financial statements.

Note 14: Financial Instruments

14A—Categories of Financial Instruments

	2012 \$'000	2011 \$'000
Financial Assets		
Loans and receivables:		
Cash and cash equivalents	77,860	50,249
Trade and other receivables	17,125	18,113
Total	94,985	68,362
Available-for-sale:		
Shares in unlisted companies	8,107	7,533
Total	8,107	7,533
Fair value through profit or loss (designated):		
Managed funds	113,767	117,866
Total	113,767	117,866
Carrying amount of financial assets	216,859	193,761
Financial Liabilities		
At amortised cost:		
Payables	66,482	54,849
Total	66,482	54,849
Carrying amount of financial liabilities	66,482	54,849

Note 14: Financial Instruments *(continued)*

Note 14B—Net Income and Expense from Financial Assets

	2012 \$'000	2011 \$'000
Loans and receivables		
Interest revenue (note 4A)	3,296	1,764
Net gain from loans and receivables	3,296	1,764
Available-for-sale		
Impairment (note 3E)	(535)	(369)
Net (loss) from available-for-sale	(535)	(369)
Fair value through profit or loss (designated)		
Interest revenue (note 4A)	9,901	5,455
Net gain from fair value through profit and loss	9,901	5,455
Net gain from financial assets	12,662	6,850

Note 14C—Fair Value of Financial Instruments

The carrying amount of all financial assets and financial liabilities approximate their fair value.

Fair value measurements categorised by fair value hierarchy

The following table provides an analysis of financial instruments that are measured at fair value, by valuation method. The different levels are defined below:

Level 1: fair value obtained from unadjusted quoted prices in active markets for identical instruments.

Level 2: fair value derived from inputs other than quoted prices included in Level 1 that are observable for the instrument, either directly or indirectly.

Level 3: fair value derived from inputs that are not based on observable market data.

Fair value hierarchy for financial assets

	Level 1 2012 \$'000	Level 1 2011 \$'000	Level 2 2012 \$'000	Level 2 2011 \$'000	Level 3 2012 \$'000	Level 3 2011 \$'000
Financial assets at fair value						
Fair value through profit or loss	113,767	117,866	-	-	-	-
Total	113,767	117,866	-	-	-	-

There were no transfers between levels (2011: \$NIL).

Note 14: Financial Instruments *(continued)*

Note 14D—Credit Risk

The Corporation's maximum exposure to credit risk at reporting date in relation to each class of recognised financial assets is the carrying amount of those assets as indicated in the balance sheet.

Fair value through profit or loss investments are restricted to securities that are in accordance with paragraphs 18(a)–(d) of the CAC Act, including, as a minimum, a Standard and Poor's long-term rating of A-. Further restrictions are imposed under the policies and procedures of the Corporation. The majority of loans and receivables are cash and levies from industry.

The Corporation manages its credit risk through:

- A monthly review by management of the Corporation's investments:
 - to ensure that they are in accordance with section 18 of the CAC Act and the Corporation's policies and procedures; and
 - to assess how the investments are performing against various benchmarks (including the Cash Rate, the 90 Day Bank Bill Index and the UBS Government Bond Index 0-5 years);
- A biannual review by the Finance, Risk and Audit Committee of the performance of the Corporation's individually managed funds in comparison with other managed funds investing in the Australian Bond and Australian Cash sectors; and
- Policies and procedures that guide employees in managing debtors.

The Corporation holds no collateral to mitigate against credit risk.

Credit quality of financial instruments not past due or individually determined as impaired

	Not past due nor impaired 2012 \$'000	Not past due nor impaired 2011 \$'000	Past due or impaired 2012 \$'000	Past due or impaired 2011 \$'000
Cash and cash equivalents	77,860	50,249	-	-
Trade and other receivables	16,709	17,041	416	1,072
Managed funds	113,767	117,866	-	-
Shares in unlisted companies	-	21	8,107	7,512
Total	208,336	185,177	8,523	8,584

Ageing of financial assets that are past due but not impaired for 2012

	0 to 30 days \$'000	31 to 60 days \$'000	61 to 90 days \$'000	90+ days \$'000	Total \$'000
Receivables	115	-	-	301	416
Total	115	-	-	301	416

Ageing of financial assets that are past due but not impaired for 2011

	0 to 30 days \$'000	31 to 60 days \$'000	61 to 90 days \$'000	90+ days \$'000	Total \$'000
Receivables	1,040	5	-	27	1,072
Total	1,040	5	-	27	1,072

The following assets have been individually assessed as impaired:

	2012 \$'000	2011 \$'000
Shares in unlisted companies	8,107	7,512

Factors that have been considered in assessing the shares as impaired include:

- the continued uncertainty in the success and ability of the companies to generate future economic benefits; and
- the decrease in the net assets of the companies.

Note 14: Financial Instruments *(continued)*

Note 14E—Liquidity Risk

The exposure to liquidity risk is based on the notion that the Corporation will encounter difficulty in meeting its obligations associated with financial liabilities.

The Corporation has minimal exposure to liquidity risk. The Corporation receives funding from industry through levies and contributions from the Australian Government. In addition, the Corporation has controls in place to ensure that it has adequate resources to meet its financial obligations and has no experience of default.

Maturities for non-derivative financial liabilities 2012

	On demand \$'000	Within 1 year \$'000	1 to 2 years \$'000	2 to 5 years \$'000	> 5 years \$'000	Total \$'000
Payables	-	62,398	3,755	329	-	66,482
Total	-	62,398	3,755	329	-	66,482

Maturities for non-derivative financial liabilities 2011

	On demand \$'000	Within 1 year \$'000	1 to 2 years \$'000	2 to 5 years \$'000	> 5 years \$'000	Total \$'000
Payables	-	54,558	292	-	-	54,850
Total	-	54,558	292	-	-	54,850

The Corporation has no derivative financial liabilities in both the current and prior year.

Note 14F—Market risk

Sensitivity analysis of the risk that the Corporation is exposed to for 2012

	Risk variable	Change in risk variable	Effect on	
			Profit or loss 2012 \$'000	Equity 2012 \$'000
Interest rate risk	Interest	+1.40%	(3,902)	(3,902)
		- 1.40%	3,904	3,904
Currency risk	USD	+15%	21	21
		-15%	(28)	(28)

Sensitivity analysis of the risk that the Corporation is exposed to for 2011

	Risk variable	Change in risk variable	Effect on	
			Profit or loss 2011 \$'000	Equity 2011 \$'000
Interest rate risk	Interest	+1.75%	(4,573)	(4,573)
		- 1.75%	4,574	4,574
Currency risk	USD	+15%	17	17
		-15%	(23)	(23)

Note 14: Financial Instruments (continued)

Note 14F—Market risk (continued)

Interest rate risk

Interest rate risk refers to the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. The Corporation is exposed to interest rate risk primarily from managed funds.

The table above details the interest rate sensitivity analysis of the Corporation at the reporting date, holding all other variables constant. A 140 basis point (2011: 175 basis point) change is deemed to be reasonably possible and is used when reporting interest rate risk.

The method used to arrive at the possible risk of 140 basis points was based on both statistical and non-statistical analysis. The statistical analysis has been based on the cash rate for the past five years issued by the Reserve Bank of Australia (RBA) as the underlying dataset. This information is then revised and adjusted for reasonableness under the current economic circumstances.

Currency risk

Foreign currency risk refers to the risk that the fair value or future cash flows of a financial instrument will fluctuate due to changes in foreign exchange rates. The Corporation is exposed to foreign exchange currency risk primarily through undertaking certain transactions denominated in foreign currency.

The Corporation is exposed to foreign currency denominated in US dollars.

The table above details the effect on the profit and equity as at the reporting date from a 15 percent (2011: 15 percent) favourable/unfavourable change in AUS dollars against US dollars with all other variables held constant.

The method used to arrive at the possible risk of 15 per cent was based on both statistical and non-statistical analyses. The statistical analysis has been based on main currencies movement for the last five years. The five main currencies that the Commonwealth is exposed to are USD, EUR, GBP, JPY and NZD. This information is then revised and adjusted for reasonableness under the current economic circumstances.

Other price risk

The Corporation is not exposed to other price risk.

Note 15: Financial Assets Reconciliation

	Notes	2012 \$'000	2011 \$'000
Financial assets			
Total financial assets as per balance sheet		223,920	199,608
Less: non-financial instrument components:			
Other receivables	5B	6,947	5,721
Investments accounted for using the equity method	5C	114	126
Total non-financial instrument components		7,061	5,847
Total financial assets per financial instruments note		216,859	193,761

Note 16: Compensation and Debt Relief

No compensation or debt relief payments were made during the reporting period (2011: \$NIL).

Note 17: Reporting of Outcomes

Corporation activity involves the identification, co-ordination, funding and evaluation of research and development for the Australian grains industry. The financial statements provide a detailed overview of the Corporation's total financial operations for the year ended 30 June 2012. The Corporation operates predominantly in one industry, the grains industry and in one geographical area, being Australia.

Note 17A: Net Cost of Outcome Delivery

	Outcome 1		Total	
	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000
Expenses				
Departmental	165,063	154,051	165,063	154,051
Total	165,063	154,051	165,063	154,051
Other own-sourced income				
Departmental				
Interest	13,197	7,219	13,197	7,219
Industry contributions	97,714	104,496	97,714	104,496
Project refunds	1,380	899	1,380	899
Royalties	4,900	2,961	4,900	2,961
Grants income	3,104	5,987	3,104	5,987
Other revenue	402	573	402	573
Gain- investments	904	-	904	-
Total other own-sourced income	121,601	122,135	121,601	122,135
Net cost of outcome delivery	43,462	31,916	43,462	31,916

Outcome 1 is described at Note 1.1.

Note 17: Reporting of Outcomes *(continued)*

Note 17B—Major Classes of Departmental Expense, Income, Assets and Liabilities by Outcomes

	Outcome 1		Total	
	2012 \$'000	2011 \$'000	2012 \$'000	2011 \$'000
Expenses				
Research and development	150,231	140,660	150,231	140,660
Employees	7,219	6,867	7,219	6,867
Suppliers	6,697	5,753	6,697	5,753
Depreciation and amortisation	381	402	381	402
Write-down of assets	535	369	535	369
Total expenses	165,063	154,051	165,063	154,051
Income				
Revenues from Government	55,935	53,397	55,935	53,397
Interest	13,197	7,219	13,197	7,219
Industry contributions	97,714	104,496	97,714	104,496
Project refunds	1,380	899	1,380	899
Royalties	4,900	2,961	4,900	2,961
Grants	3,104	5,987	3,104	5,987
Other revenue	402	573	402	573
Gain—investments	904	-	904	-
Total income	177,536	175,532	177,536	175,532
Assets				
Cash and cash equivalents	77,860	50,249	77,860	50,249
Trade and other receivables	24,072	24,208	24,072	24,208
Investments in managed funds	113,767	117,866	113,767	117,866
Investments accounted for using the equity method	114	126	114	126
Investments—other	8,107	7,533	8,107	7,533
Land and buildings	5,900	5,498	5,900	5,498
Infrastructure, plant and equipment	256	242	256	242
Intangibles	245	267	245	267
Other non-financial assets	355	18	355	18
Total assets	230,676	206,007	230,676	206,007
Liabilities				
Employee provisions	1,658	1,259	1,658	1,259
Suppliers payables	602	1,038	602	1,038
Research and development payables	66,187	54,395	66,187	54,395
Total liabilities	68,447	56,692	68,447	56,692

Outcome 1 is described at Note 1.1.



Appendices

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The following tables summarise the total expenditure allocated against the Australian Government's National Research Priorities and priorities for rural R&D within the 2011–12 financial year (see Table 5 in Part 1 for a summary of how GRDC investments addressed these priorities). The allocation of funds is shown in both dollar and percentage terms for each output group.

Table 31a: Australian Government National Research Priorities, dollar values (\$m)

	An environmentally sustainable Australia							Promoting and maintaining good health				Frontier technologies for building and transforming Australian industries				Safeguarding Australia				Total		
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3		D4	Other
Practices	3.41	0.11	1.39		0.02		5.13			0.06			25.20	0.04	2.14	12.01			16.57		0.45	66.53
Varieties	1.65	0.86	0.98				1.12						39.29	0.37	0.23	2.08			8.31		0.23	55.12
New Products	0.35	0.93	0.06		0.11		0.06		0.38				7.40	1.68	0.29	0.04			3.60		0.14	15.04
CCB	0.05		0.03				0.17						0.06			11.51			0.03			11.85
CS							0.01						0.15		0.02	1.30			-		0.21	1.69
Total	5.46	1.90	2.46		0.13		6.49			0.44			72.10	2.09	2.68	26.94			28.51		1.03	150.23

CCB = Communication & Capacity Building, CS = Corporate Services

Appendix A – Expenditure on government research priorities

Table 31b: Australian Government National Research Priorities, percentage values (%)																						
	An environmentally sustainable Australia							Promoting and maintaining good health				Frontier technologies for building and transforming Australian industries					Total					
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5		D1	D2	D3	D4	Other
Practices	2.27	0.08	0.92	0.02	0.02	3.41			0.04			16.80	0.02	1.42	7.99			11.03			0.30	44.30
Varieties	1.10	0.57	0.65			0.75						26.13	0.26	0.15	1.38			5.53			0.15	36.67
New Products	0.23	0.62	0.04	0.07		0.04		0.25				4.92	1.12	0.19	0.03			2.40			0.10	10.01
CCB	0.03		0.02			0.11						0.05			7.66			0.02			0.14	7.89
CS						0.01						0.09		0.02	0.87			-			0.14	1.13
Total	3.63	1.27	1.63	0.09	0.09	4.32		0.29				47.99	1.40	1.78	17.93			18.98			0.69	100.00

CCB = Communication & Capacity Building, CS = Corporate Services

Table 32: Australian Government Rural R&D Priorities, dollar and percentage values																	
	Productivity and adding value		Supply chain and markets		Natural resource management		Climate variability and climate change		Biosecurity		Innovation skills		Technology		Other		Total
	\$m	%	\$m	%	\$m	%	\$m	%	\$m	%	\$m	%	\$m	%	\$m	%	
Practices	37.21	24.77	0.81	0.54	6.07	4.04	4.76	3.17	13.40	8.92	4.27	2.84	0.01		66.53	44.28	
Varieties	39.42	26.24	3.00	2.00	3.03	2.02	1.70	1.13	7.86	5.23	0.07	0.05	0.04	0.02	55.12	36.69	
New Products	7.25	4.83	3.61	2.40	0.73	0.48	0.06	0.04	2.99	2.00	-0.03	-0.02	0.39	0.26	15.04	10.02	
CCB	0.62	0.41			0.15	0.10	0.17	0.11	0.04	0.02	10.87	7.23			11.85	7.87	
CS	0.13	0.09	0.08	0.05			0.01	0.01	0.01	0.01	1.28	0.85	0.02	0.02	1.69	1.14	
Total	84.63	56.34	7.50	4.99	9.98	6.64	6.70	4.46	24.30	16.18	16.46	10.95	0.45	0.30	150.23	100.00	

CCB = Communication & Capacity Building, CS = Corporate Services

Appendix B—GRDC project list

Number	Title	Expenditure \$
PRACTICES		
Cross Practices		
MCC00008	Defining the Metrics required for each GRDC Investment Strategy	30,500
MCC00009	Evaluate Progress Reports within Natural Resources Portfolio	9,000
PR149-1	Commercialisation	1,316
URS00004	Assist the GRDC in monitoring and evaluating progress of projects within the Regional Grower Services portfolio	64,000
URS00005	Monitoring and Evaluation of Research Programs 2011 Progress Reports	13,600
Cross Practices Total		118,416
Agronomy, Soils and Environment		
CCC00004	High Yielding Irrigated Grains in Cotton Farming Systems	220,909
CSA00019	Soil Carbon Research Program	172,000
CSA00020	Economic assessment of nutrient use efficiency of the Australian grains industry	106,847
CSA00021	Enhancing the capability of the Australian grains industry to improve nutrient use efficiency	150,238
CSA00024	More Good, less Bad and Ugly—Extracting additional value from grain production through selective harvesting	224,910
CSA00032	More Profit from Crop Nutrition II—Improving nutrient use efficiency in wheat—CSIRO engagement of Postdoctoral Fellow, GRDC Western Region	165,000
CSE00051	Pest suppressive landscapes—linking integrated pest management and natural resource management	128,218
CSO00041	A fundamental understanding of biochar—implications and opportunities for the grains industry	62,085
CSP00115	Improving productivity by rotating wheat varieties in wheat-on-wheat systems	84,569
CSP00127	Water balance of conservation farming systems in WA 2	78,078
CSP00132	Optimising the integration of dual-purpose crops in the high-rainfall zone	295,150
CSP00134	Biodiversity management in the high-rainfall zone for conservation and provision of ecosystem services	296,596
CSP00135	A molecular approach to unravel the dynamics of disease-suppressive microbial communities	119,500
CSP00138	Manipulating biological processes that improve nitrogen supply to cereal crops	103,437
CSP00139	Novel solutions for managing non-wetting soils	224,951
CSP00160	Refining variety and management recommendations to improve productivity and resource use efficiency of dual-purpose crops in Australia	400,000
DAN00129	Development of agronomy packages for new varieties in NSW	178,944
DAN00131	Developing agronomic solutions to improve barley yield and grain quality in the Northern Region	172,705
DAN00132	Making better fertiliser decisions for cropping systems in Australia	502,300
DAN00144	How much ammonia is lost from surface-applied nitrogen fertiliser in northwest NSW?	75,000
DAN00165	More Profit from Crop Nutrition II—Program Coordination and Communication	300,000
DAN00166	More Profit from Crop Nutrition II—Making Better Fertiliser Decisions for Cropping Systems in Australia phase 2	256,200

Number	Title	Expenditure \$
DAN00167	Variety Specific Agronomy Packages for southern, central and northern New South Wales	518,349
DAQ00163	Participatory adaptation and mitigation strategies for climate change on the mixed farms of north-eastern Australia	418,999
DAQ00164	Biological suppression of root lesion nematodes in grain-growing soils	151,255
DAS00111	DNA tests for nematode community analysis	176,894
DAV00095	Improving nitrogen and phosphorus management in south-east Australian cropping systems	244,284
DAV00097	The potential of inhibitors for the mitigation of nitrous oxide emissions from animal production systems, in south-eastern Australia	255,000
DAV00099	Harnessing the biological potential of Australian cropping soils	122,056
DAV00102	Monitoring soil biology with high-resolution genomic technologies	110,932
DAV00105	Suppressive soils—Can we find a microbial fingerprint using 'omics' technology?	79,960
DAV00106	Managing soil biology to improve nitrogen supply in grain production systems	87,000
DAV00108	Demonstrating climate change mitigation and adaptation options through linked and integrated cropping farms in Victoria	654,516
DAV00113	Expanding the use of pulses in the Southern Region	430,000
DAV00116	Stepping up grain production in the high-rainfall zone of southern Australia	482,616
DAV00121	Sustaining wheat yield and quality under increasing atmospheric carbon dioxide	993,025
DAV00122	Diagnostic Agronomy South: development, validation and delivery of a diagnostic framework	400,000
DAW00190	Barley agronomy for the Western Region—2009 to 2012	425,000
DAW00201	Identification and characterisation of disease-suppressive soils in the Western Region	125,000
DAW00202	Demonstrating adaptation to climate change in the wheatbelt of WA through innovative on-farm and virtual farm approaches	626,036
DAW00204	Delivering agronomic strategies for water-repellent soils in WA	349,854
DAW00217	Diagnostic Agronomy West	512,453
DAW00218	Wheat agronomy—building system profitability in the Western Region	746,921
DEF00001	Regional scenario analyses for cropping in future climates	150,000
DGA00001	Durum expansion in SA through improved agronomy	35,000
DGQ00004	Review of Seeder Technology developed in GRDC Project UNS00002 'Active Implements for Precision Seed and Fertiliser Placement'	5,757
ERM00001	Reducing nitrous oxide emissions from sugarcane lands	32,000
ERM00003	Does strategic tillage undo long term improvement in soils under no-till?	300,000
FFI00004	Development of a salt- and waterlogging-tolerant wheat	66,000
FFI00006	EverCrop—delivering profitable perennial options to crop-livestock systems	684,000
MCC00006	Review of progress in meeting the goal and strategies of the Australian Grains Industry Environmental Plan	20,000
MCV00006	Assessing and managing heat stress in cereals	40,000
MCV00007	Teleconnections between climate drivers and regional climate, and model representation of links	233,338
MCV00008	Improving forecast accuracy, especially with improved Indian Ocean initialisation	297,500
MCV00009	Improving multiweek predictions	255,200
MCV00010	Understanding frost risk in a variable and changing climate	144,379
MCV00013	Temperature extremes and cropping in WA	115,928
MCV00014	Managing Climate Variability—communication support	204,332
MCV00015	Managing Climate Variability—program coordinator	77,599

Number	Title	Expenditure \$
MCV00017	Managing Climate Variability—communication support and administration	19,909
MCV00022	Managing Climate Variability—program officer	8,427
MCV00023	Managing Climate Variability—program management committee	548
MCV00024	Managing Climate Variability— independent chair	5,570
MCV00028	Managing Climate Variability—climate analyser decision support system tools	107,520
MCV00029	Specifying Australia's climate variability in the context of a changing climate	50,000
MCV00030	Adding value to climate risk management decision support systems	159,443
MCV00032	Northern Australia—monsoon prediction	194,902
PR204-1	Australia's Farming Future Climate Change Research Program	10,000
QUT00002	Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils	382,309
QUT00003	Reducing nitrous oxide emissions in irrigated grains–cotton farming systems	66,387
RPS00002	Quantifying impacts of management on sediment, nutrient and pesticide loss from grain farms	140,000
RRR00001	Development of a grains industry stewardship plan	47,674
UA00111	Developing chemical methods to mobilise fixed nutrients in cropping soils	300,000
UA00119	Assessing management options for enhanced soil phosphorus availability using rotations	87,500
ULA00008	Validating subsoil manuring in the high-rainfall zone	141,143
UM00037	Enhanced efficiency fertilisers as mitigation tools for reducing greenhouse gas emissions from intensive agricultural systems in Australia	56,233
UM00044	Climate change research strategy for primary industries participants' agreement	45,000
UMU00035	Improving profit from fertiliser through knowledge-based tools that account for temporal and spatial soil nutrient supply	418,212
UNE00012	Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management	75,000
UQ00050-DAQ	Agronomic packages for improved yield and quality in the Australian peanut industry	196,602
UQ00058-DAQ	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern NSW and Queensland	370,396
UWA00114	Capacity building in production agronomy and farming systems (teaching, research and postgraduate training) at UWA	50,048
UWA00130	A fundamental understanding of biochar—implications and opportunities for the grains industry	147,182
UWA00131	Fertiliser management strategies for decreasing on-farm greenhouse gas emissions	143,992
UWA00136	Long term no-till farming systems	250,076
UWA00138	A national soil quality monitoring framework	342,750
UWA00139	Harnessing the nitrogen cycle through novel solutions	192,370
UWA00142	Molecular indicators for soil quality	51,297
UWS00008	Carbon storage: Identifying microbial drivers and key modulators in grain cropping systems	121,437
Agronomy, Soils and Environment Total		19,070,747
Crop Protection		
AEP00001	Current and potential costs of invertebrate pests in grain crops	35,822
AKC00004	Registration for minor use chemicals for the grains industry	187,700
AKC00005	Pathways to registration— Tactical pesticide registration program	4,500
AMC00004	Viticulture Spray Drift Impacts	10,507
AMC00005	Support for Zinc Phosphide Occupational Health and Safety Study	21,200

Number	Title	Expenditure \$
AMC00006	Scoping of the use of caffeine as a potential molluscicide	6,675
AMC00008	Program Review 2012—National Plant Pathology Program	17,700
AMC00009	Program Review 2012—National Herbicide Tolerance Evaluation Program	7,445
ANU00019	Understanding the production risks from necrotrophic fungi	99,730
BHO00001	Program Review 2012—National Plant Pathology Program	3,250
CSE00054	Pest management in grains—research, coordination and industry engagement	630,090
CSP00150	Management of soilborne <i>Rhizoctonia</i> disease risk in cereal crops	185,000
CSP00151	New knowledge and tools to manage food and feed harvest quality	180,000
CUR00016	Australian Centre for Necrotrophic Fungal Pathogens Phase 2—Fungicide benchmarks	35,000
CUR00019	Fungicide evaluation of new generation actives in cereals and pulse crops	450,000
DAN00142	Differential herbicide tolerance of winter crops in south-east Australia—Stage 3	357,000
DAN00143	Northern NSW integrated disease management	600,008
DAN00147	Integrated disease management for cereal and broadleaf crops in southern NSW and northern Victoria	205,000
DAN00164	Helicoverpa insecticide resistance: monitoring, management and novel methods of helicoverpa control on Bollgard II cotton	75,000
DAQ00153	Northern Region pulse and grains integrated pest management	525,000
DAQ00154	Northern Region integrated disease management	1,463,944
DAQ00166	Project review—Australian Cereal Rust Control Program	(1,546)
DAS00094	Diamondback moth (<i>Plutella xylostella</i>) control and insecticide resistance management	272,962
DAS00099	Disease management in a changing farming environment	1,245,000
DAS00100	Herbicide tolerance screening in the Southern Region with national coordination	320,000
DAS00115	Molecular diagnostics centre for delivery of training and diagnostics for soilborne disease management	300,000
DAS00122	Fungicide control of <i>Rhizoctonia</i> Part C	45,000
DAS00123	Fungicide control of <i>Rhizoctonia</i> Part B	155,000
DAS00125	Fungicide control of <i>Rhizoctonia</i> Part A	120,000
DAS00127	Snail and slug control scoping study	130,000
DAW00111	Victorian integrated disease management	480,000
DAW00191	Evaluating herbicide tolerance of new crop varieties in the Western Region with national coordination	367,000
DAW00196	Communication and development to deliver innovative weed management practices to WA grain growers	460,000
DAW00207	National modelling, risk forecasting and epidemiology of crop diseases	264,999
DAW00210	Western Region fungal and viral integrated disease management research and development	850,000
DAW00212	Western Region nematology integrated disease management research and development	185,000
DGS00001	Program Review 2012—National Plant Pathology Program	17,700
FFC00008	Program Review 2012—National Herbicide Tolerance Evaluation Program	6,741
FOR00003	Program Review 2012—National Plant Pathology Program	19,000
FOR00004	Program Review 2012—National Plant Pathology Program	27,400
FRA00001	Program Review 2012—National Plant Pathology Program	17,100
GPA00001	National working party on pesticide application	8,500
GRD4-10-1	Program Review—National Herbicide Tolerance Evaluation Program	10,136
IAC00001	Extending approved use patterns of zinc phosphide products for in-crop mouse control	75,000

Number	Title	Expenditure \$
ICN00009	National promotion of integrated weed management in Australian cropping systems	147,873
MRM00001	Pesticide research advisory support	25,520
NPB00008	Russian wheat aphid hypervirulence and Australia's preparedness strategy	119,203
PCP00002	Support for zinc phosphide occupational health and safety study	11,278
PHA00002	Australian Pesticides and Veterinary Medicines Authority spray drift modelling investment consultancy	1,744
PHA00004	Provision of independent technical and secretarial services to the national working party for pesticide application	65,000
PHA00005	A detailed evaluation of current international responses (regulation and research) to the management of pesticide spray drift—Project 3	70,000
PHA00006	To facilitate a stakeholder discussion and solutions regarding the management of plant industry 'minor use' permit applications	19,100
PHA00007	A strategic assessment of current and potential revised national training framework(s) for pesticide application that would support the implementation of Drift Reducing Technology (as a mechanism to lower buffer distances), best management practice and improved product efficacy (Project 8)	10,000
PHA00008	Review of draft Agvet bill on research delivery	8,000
PJS00001	Program Review 2012—National Plant Pathology Program	35,500
RDP00008	Provision of independent National Integrated Weed Management Initiative Chair Services	35,943
ROE00002	GRDC Grower Survey Regarding Strategies to Deal with Mouse Plague	25,000
SGA00005	Review of the potential use and role of propyzamide for registration in pulse and oilseed production	10,412
SGA00006	Program Review 2012—National Herbicide Tolerance Evaluation Program	21,743
TAP00003	The Australian Cereal Rust Control Program Strategic Plan	40,987
TAS00001	Building Industry capacity to adopt integrated weed management in the cotton-grains farming system through research-client linkages	75,000
TEP00002	Scoping of application of surface inversions and Sigma Theta relationships and development of grower tools in the Clare Valley	7,270
UA00104	Understanding and management of weed resistance to glyphosate	50,000
UA00113	Improving integrated weed management in conservation farming systems in the Southern Region	842,454
UA00121	Managing the risks of trifluralin resistance in no-till cropping systems	149,953
UA00124	Understanding and management of resistance to group M, group L and group I herbicides	599,994
UA00134	Improving integrated weed management practice in the Southern Region—Emerging weed issues	499,940
UM00033	Developing and demonstrating the role of alternative chemistries and integrated management for crop establishment pests	77,420
UM00035	Impact assessment for GM canola in cropping systems	126,692
UM00038	Novel approaches to control fungal diseases of oilseed brassicas in Australia	680,000
UM00039	Understanding pathogenicity risk within the current <i>Ascochyta rabiei</i> fungal population and development of a revised disease management plan	185,750
UM00041	Wheat curl mite, wheat streak mosaic and high plains virus: detection, transmission, epidemiology and management	284,850
UM00042	Staying ahead of blackleg: monitoring and managing host and pathogen	376,949
UM00043	Insecticide resistance and alternative chemistries for mite control	197,917
UM00046	Scoping study for further research and development on managing aphids and virus transmission and economic impact of integrated pest management in grain production zones	98,313
UNE00013	Introduction and Extension of Integrated Pest Management in Northern New South Wales	100,000

Number	Title	Expenditure \$
UQ00047	An interim model for buffer zone reduction in pesticide application from ground sprayers	10,000
UQ00059-DAQ	Herbicide tolerance screening of winter crops in the Northern Region—Phase 4	210,000
UQ00060	Core drift reduction technologies database to support the ground application of pesticides (boom sprayer), accommodating nozzles, formulations and adjuvants	213,353
UQ00062	Improving Integrated Weed Management practice in the Northern Region	450,000
US00053	Adult plant resistance and strategic fungicide use for integrated management of cereal rust	413,790
US00055	Formative study of human exposure to zinc phosphide during the on-farm preparation of mouse baits—Phase 1	310,599
US00062	Human exposure to zinc phosphide during the on-farm preparation of mouse baits—Phase 2	356,694
UWA00124	Efficacy of the Harrington Weed Seed Destructor in targeting weed seeds during the harvest of Australian grain crops	182,102
UWA00125	Weed Seed Wizard: validation and improvement of a weed management decision support tool	200,000
UWA00134	Developing and promoting integrated pest management in Australian grains	460,133
UWA00144	Building national capacity in education and research in applied entomology	172,484
UWA00146	Australian Herbicide Resistance Initiative—Phase 4	1,100,000
UWA00152	Managing soil-borne diseases with a focus on <i>Rhizoctonia</i>	40,001
Crop Protection Total		19,594,524
Validation and Integration		
AEA00004	South-eastern Australia Grain and Graze 2 Program	459,650
AFL00002	Optimising future Australian grains industry extension systems	198,400
ARO00001	Agribusiness Trial Extension Network	12,500
BWD00012	Yielding benefits through partnerships	303,782
BWD00018	Northern Victorian Grain and Graze 2 Program	487,327
BWR00001	Northern Region Agribusiness Trial Extension Network	7,000
CCC00005	The role of Bt (<i>Bacillus thuringiensis</i>) cotton in pest-suppressive landscapes	29,091
CRA00001	Northern Region Agribusiness Trial Extension Network	12,500
CRA00002	Cultivar Crown Rot Tolerance trials	44,000
CRC00002	Western Region Agribusiness Trial Extension Network	100,000
CSA00023	Doing it better, doing it smarter—managing soil water in Australian agriculture	322,320
CSA00025	Water use efficient farming systems for the Mallee	399,885
CSA00027	Adding value to the GRDC's National Variety Trials network	495,000
CSA00029	National integration of crop sequence strategies and tactics	234,916
CSA00030	Benchmarking data	50,000
CSA00033	Realising yield potential through farming systems research, development and extension—Western region—Extension	174,949
CSE00055	Crop sequences to manage soil pathogens and reduce the yield gap of Northern Region grain production	250,000
CSP00111	Identifying farm-scale opportunities to improve water use efficiency—a nationally coordinated systems approach	253,385
CSP00128	Maximising crop yield in the high-rainfall zone of WA through efficient use of water and nutrients	481,176
CSP00146	Facilitating increased on-farm adoption of broadleaf species in crop sequences to improve grain production and profitability	594,310

Number	Title	Expenditure \$
CSP00159	Increasing Water Use Efficiency in the northern sandplain region of Western Australia—extension	315,637
CWF00013	Increasing farm water use efficiency in central-west NSW	364,100
CWF00015	Low-rainfall collaboration project	200,000
DAN00102	CropMate—climate information for crop production	60,000
DAN00148	Southern Region Agribusiness Trial Extension Network	12,500
DAN00150	Improving the reliability of sorghum in the western zone	324,940
DAN00156	Establishing a Northern Pulse Agronomy Initiative	60,000
DAQ00162	Grain and Graze 2—Northern Region	514,500
DAQ00170	Grower solutions for central Queensland	392,968
DAQ00173	Evaluating the role of brassica crops in south-west Queensland and northern NSW grain cropping systems	90,809
DAQ00174	Cropping solutions for the sugarcane farming systems of the Burdekin	375,000
DAS00089	Improving crop and farm water use efficiency in Australia	125,000
DAS00119	Profitable crop sequencing in the low-rainfall areas of south-eastern Australia	435,000
DAS00126	Regional Cropping Solutions	198,479
DAW00193	The agronomy jigsaw—finding the pieces that maximise water use efficiency	240,000
DAW00213	Putting the focus on profitable break crop and pasture sequences in WA	1,750,000
FBP00003	Agribusiness Trial Extension Network	12,500
FFC00005	Validate and integrate canopy management principles into WA cropping systems	148,600
FFC00006	Western Region Agribusiness Trial Extension Network	12,500
FFC00007	Western Region Agribusiness Trial Extension Network	12,500
FGI00007	Grain and Graze 2—WA region	504,500
FGI00008	Western Region Agribusiness Trial Extension Network	10,250
FLR00005	Catch More, Store More, Grow More: integrating soil and crop management to improve whole-farm water use efficiency in the mixed farming zone of southern NSW	210,000
FLR00006	Grain and Graze 2—Building resilient mixed farming systems in southern NSW	333,000
FPR00001	Practical financial figures for farm business management	497,898
GCM00001	Southern Region Agribusiness Trial Extension Network	12,500
GOA00001	Grower solutions for central NSW	650,000
GRA00002	Southern Region Agribusiness Trial Extension Network	12,275
GRD4-9	Project Review 2012—Partners in Grain	8,000
HFG00006	Managing moisture for improved water use efficiency in the Southern Region	104,791
HGS00001	Agribusiness Trial Extension Network	12,500
IAR00001	Field trial database and grower engagement support	100,000
KAR00002	2011 tracking survey	54,860
LEA00001	Improving water use efficiency in lower Eyre Peninsula farming systems	100,000
LIE00006	Improved stubble and soil management practices for sustainable farming systems in the Liebe area	247,889
MAF00001	Southern Region Agribusiness Trial Extension Network	12,428
MCP00003	Northern Region Cropping Solutions Coordinator	100,000
MFM00003	Improving farm water use efficiency on Kangaroo Island and in the south-east of South Australia	100,000
MFM00004	Regional Cropping Solutions	207,046
MIG00012	Grower Group Alliance	328,430

Number	Title	Expenditure \$
NAG00002	Western Region Agribusiness Trial Extension Network	12,500
NGA00003	Grower solutions for northern NSW and southern Queensland	1,000,000
NPN00001	Agribusiness Trial Extension Network	8,575
NRS00005	National leadership and mentoring	66,596
PAL00017	Better Break Crops—advancing broad leaf cropping	650,000
PLN00004	Regional Cropping Solutions	114,000
PLN00005	Understanding <i>Sclerotinia</i> in Canola in the Northern Agricultural Region of Western Australia	15,000
PLN00006	Herbicide Sequencing for Better and More Sustainable Wild Radish Control	35,000
PR185-1	Cropping in catchments	3,009
PR205-1	Water use efficiency workshop	22,818
PR333-1	Industry Development Award Extension Network—Advertising	11,535
PR93-1	5th World Congress of Conservation Agriculture 2011	208,418
PRI00002	Southern Region Agribusiness Trial Extension Network	12,436
PRI00003	Regional Cropping Solutions	205,899
RDP00007	Southern Region Agribusiness Trial Extension Network	12,500
ROE00001	Evaluation activities for Grain and Graze 2	137,000
RPI00007	Improved water use efficiency in no-till cropping and stubble retention systems in spatially and temporally variable conditions in the riverine plains	198,543
RWB00001	Rural Focus interviews with the GRDC	6,000
SCF00001	Western Region Agribusiness Trial Extension Network	12,500
SDI00002	Regional Cropping Solutions	453,000
SDI00003	Regional Cropping Solutions, Albany—Soil and water relationships during variable seasons	16,000
SDI00004	Regional Cropping Solutions, Esperance—Hybrid canola management in low rainfall mallee areas	10,000
SDI00005	Regional Cropping Solutions, Kwinana East—Soil and water relationships during variable seasons	50,000
SDI00006	Regional Cropping Solutions, Kwinana West—Management of Non-wetting Soils	49,080
SDI00007	Regional Cropping Solutions, Albany—Grazing crops for frost mitigation	13,600
SDI00008	Regional Cropping Solutions, Esperance—Management options of non-wetting soils in the southern coastal region	29,000
SDI00009	Regional Cropping Solutions, Esperance—Variable Rate Technology and its application in the Esperance Port Zone	1,000
SDI00010	Regional Cropping Solutions, Esperance—Learning events to actively manage business risk and uncertainty	5,000
SDI00011	Regional Cropping Solutions, Albany—Wheat variety research and extension focusing on wheat sprouting tolerance for wheat grown in the Albany zone	9,300
SDI00012	Regional Cropping Solutions, Albany—Weed seed destruction	11,000
SDI00013	Regional Cropping Solutions—Non-wetting soil management farmer visit	5,000
SFS00019	Optimising the profitability of high-rainfall zone cropping in south-west Victoria through improved water use efficient farming systems	209,870
SFS00020	Southern Victorian Grain and Graze 2 Program	351,946
SFS00022	Pastures in crop sequencing for the high-rainfall zone of Southern Australia	245,000
SOD00001	Custom website for the Grain and Graze 2 Program	10,715
SYN00003	Western Region Agribusiness Trial Extension Network	12,500
SYN00004	Western Region Agribusiness Trial Extension Network	12,500

Number	Title	Expenditure \$
UA00107	Eyre Peninsula Farming Systems 3—responsive farming systems	353,988
UA00117	Eyre Peninsula Grain and Graze 2	202,029
UNF00001	Increasing farm water use efficiency in the upper north of SA	125,000
UQ00053-DAQ	Improving the integration of legumes in grain and sugarcane farming systems in southern Queensland	310,221
UT00016	Improved water use efficiency of rain-fed and irrigated farming systems in Tasmania	130,035
UT00020	Increasing water use efficiency in mixed crop–livestock systems in Tasmania	160,800
VIC00009	Regional Cropping Solutions	191,962
WAG00001	Strategic nitrogen management for western New South Wales no-till farming systems on vertosols	24,584
Validation and Integration Total		19,887,050
Extension and Grower Programs		
ACC00006	Extension and adoption training and support	105,000
ADW00001	GRDC extension portal	6,500
AES00006	GRDC Farm Business Management face-to-face and online training and Farm Business Management factsheets	302,630
AMP00004	Integrated disease management—Study Tour	25,000
ANV00011	Research and production of Integrated Weeds Management (IWM) video tutorials for online version of the GRDC IWM manual	24,387
ANV00012	Ground Cover TV EDM and Web Based Content	224,889
APR00001	Practical Financial Figures for Farm Business Management	753,500
BGC00001	Improving practice of spray drift management techniques	304,467
BWD00016	GM canola agronomy	70,025
CEC00001	Integration of final reports onto the GRDC website	70,000
CQA00001	Extension provider upskilling—technology adoption	88,450
CSA00028	Empirical studies of farming systems technology adoption	67,500
DAQ00158	Grain storage extension	531,807
DAW00200	Agribusiness Training Program GRDC-subsidised training project	33,000
DAW00211	Grains Research Updates—Western Region	32,000
EXH00001	GRDC Website Hitwise Accessibility	22,500
FPL00002	GRDC Search Engine Enhancements	11,385
GGA00003	Grain Gain—leadership for grains industry innovation	142,000
GHD00002	Continuation of GRDC–Agribusiness relationship	105,925
GIA00001	GRDC–DAFWA Grains Research Updates—Western Region	100,000
GRF00001	Queensland Regional Advisory Committee coordination	48,000
ICN00010	Delivery of technical workshops to enhance industry knowledge—foliar disease	15,000
ICN00011	GRDC Research Updates—Northern Region	205,000
ICN00013	Weeds instructional videos, online version of the Integrated Weed Management manual, on-line web content updates and e-learning content and 3 weeds webinars	153,725
IDA10202	IDA—Study Tour of Western Australian No-Till Farming Association Spring Field Day	(1,115)
IDA10301	IDA—Study tour of Argentinean zero-till machinery and systems	13,800
IDA10306	IDA—Study tour of non-chemical weed control options	12,000
IDA10311	IDA—Support for grower group attendance at Agribusiness Crop Updates	6,050
IDA10317	IDA—Practices Study Tour	15,000

Number	Title	Expenditure \$
IDA10323	IDA—precision agriculture and machinery tour to Western New South Wales Grain Growers	3,500
IDA10351	IDA—Bringing northern knowledge south	12,950
IDA10352	IDA—Australia-wide grower group involvement at the GGA Annual Forum—A decade of working together: preparing for the future	14,500
IDA10355	IDA—Farming systems and the continued problem of herbicide resistance	14,947
IDA10357	IDA—Farming group exchange	15,000
IDA10358	IDA—team participating in Invigorating Agriculture Conference	7,910
IDA10363	IDA—'China' the elephant in our economy	14,950
IDA10364	IDA—Study tour 2012	15,000
IDA10388	IDA—To attend the Australian Grains Industry Conference	15,000
JLC00013	Final report editing for GRDC website for advisers and growers	95,000
LDP00001	Digitisation of Ground Cover for the website and technical training programs	185,603
LSP00001	GRDC Customer Relationship Management Database	2,285
MCC00003	Precision agriculture coordination support	8,000
MDE00001	Database-cleansing services for the GRDC CRM	60,000
MDE00002	Enhancing GRDC website regional eNewsletters, Ground Cover, SMS and other customer relationship management campaign data enhancements	160,290
MDE00003	Customer Relationship Management Consultancy and Campaign Development—Mobile devices—the next step in Precision Agriculture adoption	165,190
NCA00008	Improving market signals for the GRDC and the grains industry to enhance delivery to customers	72,000
NCA00009	Intra-maps for the CRM	48,000
NFA00008	Research Advisory Committees—northern and southern NSW	72,720
ORM00001	GRDC Research Updates—Southern Region	514,592
ORM00004	Delivery of Farm Business Management Updates in the GRDC Southern Region	630,000
PAC00003	New GRDC website grower focus groups	36,800
PCT00001	Precision agriculture—Building knowledge, linking agronomy, growers profiting	130,900
PNS00011	Social media and the GRDC	79,960
PR236-1	Continuation of agribusiness relationship	6,050
PR298-1	Purchase of customer relationship management datasets and mail-house campaigns—National Grower Register	2,310
PR321-1	Adding economic value to the update programs	5,918
PR324-1	Delivery of GRDC technical workshops	22,017
PR325-1	Capacity maintenance—managing grower and adviser human capacity for long term sustainability of the grains industry	15,340
PR331-1	Development of an online field trials website	9,648
PR332-1	E-learning and electronic application training packages	9,840
RBC00002	Delivery of technical workshops to enhance industry knowledge—understanding National Variety Trials, crop nutrition and water use efficiency	72,590
RDC00004	GRDC Contribution to Collaborative Partnership for Farming and Fishing Health and Safety	60,000
RDC00006	Investing in Youth initiative	10,000
RDP00009	GRDC Southern Region Technical Workshop—Grain Marketing	46,000
RMP00007	2011–2014 GRDC Crop Update DVD and YouTube Videos	76,188
RMP00008	Range Media Crop Notes	75,000
RRA00015	Ute Guides online and smart-phone application	6,990

Number	Title	Expenditure \$
RRA00029	Redevelopment of the GRDC website (www.grdc.com.au) and Customer Relationship Management development	118,640
RRA00032	Weeds—Ute Guide and iPad Android Application	69,300
RRA00033	Insects Western—Ute Guides and iPad Android Application	55,800
RRA00034	Insects Southern—Ute Guides and iPad Android Application	31,400
RRA00035	Insects Northern—Ute Guides and iPad Android Application	31,400
RRA00036	Plain English Summaries for the GRDC website	19,000
RRA00037	App Sitecore Integration	76,500
RRA00038	Bookshop Payment Gateway	59,000
RRA00039	Updating GRDC Main Website	11,500
RRA00040	Winter Cereal Nutrition Ute guide iPhone/iPad/Android	58,200
RRA00041	Canola Ute Guide iPhone/iPad/Android	58,200
RRA00042	Field Peas Ute Guide iPhone/iPad/Android	58,200
SAF00004	Research Advisory Committees—South Australia	37,080
SEP00009	South East Premium Wheat Growers Association Tech Heads Technology Day in Agriculture	5,000
SEP00011	Mobile devices—the next step in Precision Agriculture adoption	11,567
SIT00001	Redevelopment of the GRDC website (www.grdc.com.au) and content management system development—Sitecore Software	11,900
SPA00010	Training and demonstration of precision agriculture in practice	281,250
TFG00001	Tasmanian Research Advisory Committee	12,360
UB00002	Online libraries for the GRDC website—digitisation of GRDC documents for online publication	39,000
UNE00015	Graduate Certificate and Diploma in Sustainable Grains Production for industry advisors and growers	329,564
UWA00135	Map-based interactive web interface for PestFax	163,300
VFF00006	Research Advisory Committee—Victoria	37,080
WZ00001	GRDC Website Weatherzone	1,132
Extension and Grower Programs Total		7,857,786
PRACTICES TOTAL		66,528,523

VARIETIES

Cross Varieties

AMC00007	Progress Report Evaluation	10,848
BRE00005	Evaluating Progress Reports	1,050
EPP00001	Coordination of GRDC Theme Consultation Meetings	10,000
JOL00001	Progress Report Evaluation	12,220
VR83-1	Varieties commercialisation	40,682
Cross Varieties Total		74,800

Gene Discovery

ACP00002-Q	Australian Centre for Plant Functional Genomics, Phase 2	2,000,000
ANU00011	The generation of wheat cultivars with improved drought tolerance and agronomic traits	53,000
ANU00014	The plasticity and genetic control of root development under mechanical impedance	319,932
ANU00016	Characterisation of effector proteins from necrotrophic fungal wheat pathogens	99,990

Number	Title	Expenditure \$
ANU00017	Wheat ERECTA/ERECTA-like genes: Isolation and functional evaluation of candidate transpiration efficiency genes	180,000
ANU00018	Identifying wheat germplasm with superior rubiscos for breeding for increased productivity	349,990
BWD00014	Benchmarking study of the economic, agronomic and environmental impacts of GM herbicide-tolerant canola	84,915
CSP00099	Triple Rust Initiative	1,200,000
CSP00114	Analysis of plant defence responses to the broad host range fungal pathogen, <i>Rhizoctonia solani</i> , using wheat and <i>Arabidopsis</i>	71,000
CSP00126	'Overgrowth' mutants of wheat and barley: new sources of genetic variation for growth, yield and grain quality	130,000
CSP00129	Fast-tracking gene discovery in wheat root systems with <i>Brachypodium distachyon</i>	242,248
CSP00143	New strategies for phenotyping reproductive stage frost and chilling tolerance in wheat	304,918
CSP00154	Functional analysis of the genome of the major crown rot pathogen	180,000
CSP00155	Reverse genetics for the development of wheat cultivars with improved resistance to necrotrophic pathogens	300,000
CSP00161	Triple Rust Resistance Project—Australian Centre for Rust Control Program	1,400,000
CUR00012	Australian Centre for Necrotrophic Fungal Pathogens, Phase 3—Pleosporales functional genomics	600,437
CUR00018	Australian Centre for Necrotrophic Fungal Pathogens; Phase 3—Pleosporales Effector Delivery	199,940
DAN00117	Development of molecular markers for application in Australian canola breeding	377,309
DAN00117UQ	Development of molecular markers for application in Australian canola breeding	110,410
DAN00123	Quarantine CIMMYT bread wheat germplasm	96,355
DAN00125	Australian winter cereals collection	462,270
DAN00161	Direct negotiation of succession planning	100,000
DAQ00177	Identifying Candidate Genes for Stay-Green in Sorghum	199,368
DAQ00178	Barley Foliar Pathogens—genetic control	288,810
DAS00087	Map-based cloning of the scald resistance gene Rrs1 'Turk'	95,400
DAV00098	Molecular markers for pulse-breeding programs	600,000
DAV00103	Establishing a SNP genomic resource for the Australian wheat industry	229,171
GRD4-11-1	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	29,964
HEA00001	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	9,000
HOW00001	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	7,000
ICA00007	Focused identification of germplasm for specific traits	237,020
JWS00001	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	5,000
MUE00001	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	5,000
DIB00001	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	3,020
GAR00001	Program Review 2012—CIMMYT—Australia—ICARDA Germplasm Evaluation Program	12,200
GRD4-7	Program Review 2012—CIMMYT—Australia—ICARDA Germplasm Evaluation Program	16,038
GRD4-7-1	Program Review 2012—CIMMYT—Australia—ICARDA Germplasm Evaluation Program	3,593
TAP00005	Program Review 2012—National Molecular Marker Programs—wheat and barley, canola and pulses	7,000

Number	Title	Expenditure \$
SHE00003	Program Review 2012—CIMMYT—Australia—ICARDA Germplasm Evaluation Program	11,013
PBH00001	Program Review 2012—CIMMYT—Australia—ICARDA Germplasm Evaluation Program	20,305
UA00102	Australian Wheat and Barley Molecular Marker Program—genetic analysis module	1,000,000
UA00123	Identification of genetic variation for heat tolerance in durum and bread wheat	249,614
UA00136	Australian National Frost Program—coordination and phenotyping	500,000
UMU00037	International wheat genome sequencing consortium assembly of chromosome 7A	220,000
UQ00057-DAQ	Optimised wheat root architecture for increased yield and yield stability in the face of a changing climate	189,080
US00039	Australian Cereal Rust Control Program	1,678,145
US00045	CIMMYT–ICARDA suite of projects: communication	123,382
UW00004	Capacity building for statistics	200,000
UW00005	Statistics for the Australian Grains Industry—II	1,019,196
UWA00145	Innovative approaches to resistance to necrotrophic pathogens and sap-sucking insect pests	597,449
UWA00147	Genome sequencing in narrow-leaved lupins	499,960
UWA00151	Unleashing the power of genomics for lupin marker development and crop improvement	119,954
UWA00154	Strategies to provide resistance to the economically important fungal pathogen, <i>Rhizoctonia solani</i>	300,000
VR174-1	National Variety Trials program, Round 2	6,475,683
Gene Discovery Total		23,814,079
Germplasm Enhancement		
ACP00007	Development of a pre-breeding strategy on nutrient use efficiency—a scientific review	1,000
AGP00010	Validation of late sowing to identify heat stress tolerance in wheat and investigation of quantitative trait loci for heat stress tolerance	51,700
ANU00012	Disease resistance and epidemiology of scald and net form of net blotch	150,960
ATR00011	Development of a pre-breeding strategy on nutrient use efficiency—an economic impact assessment	485
BRE00002	Crown Rot and Nematode Consultancy	35,000
CFF00003	Elimination of pre-harvest sprouting in wheat	371,557
CIM00013	Australian Cereal Rust Control Program—adult plant resistance to wheat rusts	500,000
CIM00015	Enhanced delivery of CIMMYT germplasm to Australia	240,096
CIM00016	Enhancement of CIMMYT wheat breeding strategy for drought tolerance and genotypes of relevance to rain-fed areas of Australia	410,152
CSP00133	New sources of salt tolerance for wheat and barley	155,724
CSP00137	Increasing the capacity of wheat to extract phosphorus from soils	96,000
CSP00142	Protecting the Australian wheat industry from the wheat streak mosaic virus	58,500
CSP00144	Genetic analysis of wheat quality using MAGIC (multiparent advanced generation intercross) populations	600,000
CSP00149	Develop new crown rot resistant barley germplasm	166,782
CSP00156	Engagement of the national managed environment facility in validation and delivery of key physiological traits for improved wheat performance under drought	334,000
DAN00137	Managed environment facility: Yanco	245,805
DAN00162	Evaluation of durum material in managed environment facilities	34,023
DAQ00142	Wheat pathology in the Northern Region—development of rapid screening methodologies for wheat diseases of importance	(558)
DAQ00167	Germplasm enhancement for crown rot resistance in winter cereals	206,611

Number	Title	Expenditure \$
DAQ00171	Genetic options for nematode control	433,978
DAR00008	Data capture and management of Managed Environmental projects	147,000
DAS00096	Control of cereal fungal diseases	146,850
DAS00101	Development of molecular markers for cereal cyst nematode resistance and tolerance	35,426
DAS00114	Provision of test reagents for antibody-based late maturity α -amylase detection to researchers and breeders	40,000
DAS00116	Genetic options for nematode control in the Southern Region	300,000
DAS00118	Scoping study for GRDC strategic pre-breeding alliance with ICRISAT	6,000
DAV00093	Plant genetic resources: Australian Temperate Field Crops Collection	332,730
DAV00123	Victorian Field Crop Nematology Project	203,041
DAW00162	Nationally coordinated frost trials—Western Region	30,000
DAW00198	Managed environment facility: Merredin	334,672
DAW00205	Genetic and phenological basis of head loss in malting barley	150,000
DAW00206	Germplasm enhancement for yellow spot resistance in wheat	299,969
DAW00209	Genetic options for the management of root lesion nematode species in WA	100,000
DAW00215	Characterising water deficit and benchmarking genetic diversity in wheat for key adaptive traits at Merredin, Yanco and Narrabri managed environment facilities	236,126
DAW00219	Characterising and exploiting genetic diversity in wheat and barley for tolerance to water deficit during germination and crop establishment	117,064
DAW00220	Barley Grain Defects—Research and Screening Services	240,000
ICA00008	Breeding chickpea for drought tolerance and disease resistance	220,250
ICA00009	Enhancement of yield and yield stability of spring bread wheat targeted to semi-arid Mediterranean areas	249,175
NYC00001	GM Lupin Steering Committee consultancy	4,220
PBB00001	Executive support for the Australian Winter Cereals Pre-breeding Alliance	83,363
RJC00001	Business case for the development and running of the Australian Grains Genebank at Horsham	1,720
UA00100	Nationally coordinated frost trials—Southern Region	30,000
UA00112	Development and evaluation of weed competitive wheat cultivars	140,314
UA00114	Frost tolerance in wheat	224,454
UA00115	Improving phosphorus use efficiency in wheat and barley	312,504
UA00116	Investigation of root traits and nutrient efficiency for durum wheat improvement	319,080
UA00118	Development of high salinity tolerant winter cereals germplasm	633,564
UA00120	Breeding tools to predict gene effects influencing adaptation and grain quality in dry environments	255,571
UA00122	Understanding the genetic control of hectolitre weight and screenings under normal growing conditions	150,000
UA00130	Preharvest sprouting resistance in wheat	170,000
UA00131	Black point in wheat	46,400
UA00132	Yellow pigments in wheat and wheat-based end products	252,000
UA00133	Late maturity α -amylase in wheat	395,000
UMU00029	Pre-emptive breeding for Russian wheat aphid resistance	280,000
UMU00036	Integration of an extra glutenin subunit into Australia wheat cultivars	187,232
UMU00038	Improved Adaptation of Barley to Acid Soils	200,000
UMU00039	Validating the role of the wheat 1-FEH (fructan exohydrolase) gene in stem water-soluble carbohydrate remobilisation to the grain	173,660

Number	Title	Expenditure \$
UQ00043	CIMMYT–ICARDA suite of projects: Database Project	56,583
UQ00049	Rapid introgression of crown rot resistance into hexaploid wheat	245,166
UQ00052-DAQ	Nationally coordinated frost trials and physiological studies of frost resistance in wheat and barley	80,000
UQ00064	StressMaster: A decision support tool to manage irrigation in real time in managed environments	118,724
US00051	National managed environment facility: Narrabri	123,765
US00054	Crown rot germplasm enhancement for wheat: University of Sydney and SARDI components	361,676
USQ00012	Enhanced germplasm for crown rot in winter cereals through application of molecular markers	130,000
UT00022	Quantifying the relative contribution of physiological traits contributing to salinity tolerance in wheat and barley	160,948
UT00024	The role of canopy architecture in improving the water-limited yield of wheat lines contrasting in the 'tin' gene	69,874
UWA00129	Generation of GM herbicide-tolerant narrow-leaf lupin	682,820
UWA00133	Improved nitrogen use efficiency in wheat and barley	317,956
Germplasm Enhancement Total		13,486,712
Wheat and Barley Breeding		
AGL00009	Report the terms and conditions for access to ticket-by-variety date at point of delivery	20,000
AGP00011	The National Triticale Improvement Program	415,000
AVI00002	Project Review 2011 – Dual Purpose Crop	11,774
BA00003	Pilot brewing evaluation for malting barley lines destined for export	66,666
BA00007	Pilot Brewing for Malting Barley Lines	69,300
CFF00004	APH Zone Evaluation	323,000
CPL00001	Hybridisation Systems	19,851
CPL00002	Hybridisation Systems Part 2	5,134
CSP00101	Breeding dual purpose feed wheats for the high-rainfall zones	325,000
HDE00001	Project Review 2011 – Dual Purpose Crop	4,900
DAN00118	Australian Durum Wheat Improvement Program	519,051
DAN00118UA	Australian Durum Wheat Improvement Program	388,019
DAN00149	Project Review 2011 – Dual Purpose Crop	4,525
DAN00155	Barley Scald Nursery – New South Wales Department of Primary Industry	57,794
DAN00163	Australian Durum Wheat Improvement Program	1,200,000
DAQ00175	Barley Breeding Continuation – Northern Region	973,692
DAS00091	National oat-breeding program for milling and feed end uses	823,300
DAS00102	Breeding stem rust resistant oat using wild avena species	100,000
DAS00124	Cost effective doubled haploids for accelerated wheat and oat breeding	60,000
DAW00186	Barley quality – barley grain defects (blackpoint, pre-harvest sprouting, kernel staining)	210,000
DAW00187	Department of Agriculture and Food Western Australia–Tasmanian Institute of Agricultural Research – China Barley Collaboration	360,000
JCR00002	Project Review 2011 – Dual Purpose Crop	21,462
KEN00002	Future of the South East Australian Barley Advisory Committees	5,000
MPC00004	Wheat Breeding Liaison	15,000
PRO00002	Barley Australia – Directors	10,000

Number	Title	Expenditure \$
SCH00001	Future of the South Australian Barley Advisory Committee	2,161
TW00003	Project Review 2011—Dual Purpose Crop	8,000
UA00032	Barley Breeding Australia—southern node	1,800,000
UA00108	Barley quality: Characterisation of genetic variation for alpha amylase alleles	113,492
US00049	National Triticale Improvement Program	764,952
UT00017	Biochemistry and genetics of protein modification and fermentability of malting barley	290,202
UWA00118	Barley improvement through germplasm—coordination, introduction and evaluation	184,686
WCA00002	Pilot Malting Australia (Australian Export Grains Innovation Centre Program 5)—Interim funding	67,687
WQA00002	Wheat variety classification services	400,000
Wheat and Barley Breeding Total		9,639,648
Pulse, Oilseed and Summer Coarse Grains		
BAR00001	Program Review 2011—Pulse Breeding Australia Lupin Breeding Program	5,889
BRE00003	Program Review 2011—Pulse Breeding Australia Lupin Breeding Program	10,000
CSP00104	Australian Soybean Breeding Program	450,000
CSP00157	Australian Soybean Breeding Program	500,000
DAN00108	National Brassica Germplasm Improvement Program	300,000
DAN00139	Improving food quality and end use market acceptance of Australian pulses—cooking and sensory	129,330
DAN00140	New tools and germplasm for Australian pulse breeding programs to respond to changing virus threats	100,000
DAN00157	Evaluating remaining albus lupin breeding material at Wagga Wagga	50,000
DAN00158	Increasing market value of canola through improved quality traits	199,862
DAQ00155	Maize germplasm enhancement and productivity improvement	154,896
DAS00086	New vetch varieties for grain and hay production for Australian farmers	10,000
DAS00107	Development of herbicide-tolerant pulses	199,813
DAS00108	Improving yield and reliability of field peas under water deficit	150,000
DAS00112	Lupin evaluation for eastern Australia	100,000
DAS00113	Pulse Breeding Australia: PhD—Improving metribuzin tolerance in lentil	30,000
DAS00117	New common and woolly pod vetch varieties for grain and hay/silage production for Australian farmers	21,550
DAS00120	Pulse germplasm enhancement—National coordination	25,000
DAS00121	Pulse germplasm enhancement—Abiotic stresses	250,000
DAV00085	Australian Canola Germplasm Enhancement Program	330,000
DAV00110	Pulse Breeding Australia: PhD—Improving salinity tolerance of field pea	30,000
DAV00114	Improving food quality and end-use acceptance of Australian pulses	120,500
DAW00181	National lupin breeding for southern Australia	1,205,600
FWC00002	Coordinator for Pulse Breeding Australia	66,000
FWC00003	Assist the GRDC in monitoring and evaluating Progress Reports	16,000
GRD4-8-1	Program Review 2011—Pulse Breeding Australia Lupin Breeding Program	1,142
GUI00001	Program Review 2011—Pulse Breeding Australia Lupin Breeding Program	6,000
MGP00003	Australian National Blackleg Resistance Rating System	125,000
PCA00001	Australian Peanut Genetic Improvement Program	680,000
PCA00002	Investigations into off-flavour contamination in peanuts	102,000

Number	Title	Expenditure \$
PRO00003	Program Review 2011—Pulse Breeding Australia Lupin Breeding Program	5,843
RWF00020	Program Review 2012—Lupin Industry	9,600
UM00034	Identification of resistance genes in Australian canola cultivars through development of a differential set of blackleg isolates	120,000
UM00045	Expanding the Brassica Germplasm Base through collaboration with China and India	600,000
UQ00051-DAQ	Sorghum core breeding	1,275,000
UQ00065	Crop modelling support for the Australian grains industry	80,000
UWA00132	Interspecific hybrids in lupins—stabilisation and trait transfer to fixed lines for lupin crop improvement	150,009
UWA00140	Biotechnology tools to accelerate lupin and lentil improvement	180,000
UWA00153	Lupin Economic Analysis	14,000
VIT00001	Juncea canola development for Australia	300,000
Pulse, Oilseed and Summer Coarse Grains Total		8,103,034
VARIETIES TOTAL		55,118,273

NEW PRODUCTS

Cross New Products

GRD27-1	The assessment of International Commercial Wheat Yield Technology	196,250
NP45-1	Commercialisation	46,543
NP99-1	Conceptual scoping and market intelligence	41,175
Cross New Products Total		283,968

New Farm Products and Services

AGL00016	Diffusive Gradients in Thin films (DGT) business case—extension into sulphur and potassium (K&S)	6,250
AGL00017	Benchmarking for the Nitrogen Fixation Program	100,000
AME00001	Evaluation of the Harrington Weed Seed Destructor	1,900
BBE00015	Wheat Variety Identification	15,625
BBE00016	Barley Variety Identification DNA Quality Testing—continuation	21,173
BBE00017	Novozymes Biologicals Australia—Independent Director and Chairman	23,374
BBE00018	Scoping of ryegrass herbicide testing technology	6,250
BPC00001	Joint Market Development Diffusive Gradients in Thin films—Phosphorus Pilot Project	130,000
BRI00040	A new baking process for Asia	240,100
BRI00045	Australian wheat for China	285,700
CAD00001	Registration and commercialisation of new chemicals	(72,616)
CAD00002	Registration and commercialisation of new chemicals—continuation	8,472
CCP00003	Developing a strategy for commercialising the MEMS IR technology	16,000
CSE00056	Bio-routes to urea fertilisers	415,887
CSA00031	Next Generation Beneficial Microbes—quantifying disease control efficacy, environmental persistence and microbial community impacts	111,969
DAN00145	National independent quality assurance and germplasm maintenance for <i>Rhizobium</i> inoculants	155,548
DAN00154	Wheat Collection for Variety Identification	20,000
DAR00006	Wheat Variety Identification DNA Quality Testing	182,200
DAR00007	Wheat Variety Identification DNA Quality Testing—Phases 2 and 3	180,300

Number	Title	Expenditure \$
DAS00110	Novel products to control plant pathogens in broadacre crops	227,452
ECE00002	Supply of formulated nematode products	11,855
GGL00001	The economic value of functional characteristics of Australian wheat in selected Asian markets	289,100
GTL00001	Endophyte technologies for modern cereals	420,000
IMB00001	Insecticidal peptides from natural predators	399,950
LUN00001	Reducing the impact of the parasitic root lesion nematode on cereal crops	449,918
MLC00001	Report on key issues in objective pulse measurement	7,000
NP72-1	Barley variety identification	449
NP81-1	Variety Identification for Wheat	44,880
QUT00004	A new biopesticide for Diamondback Moth management in canola	149,618
QUT00005	New technology for stored grain pest management	210,177
RMI00005	Polymer functional architectures at the bio-interface to control soil–water–nutrient behaviour during plant growth	298,680
SAC00001	Use of polymers as biopesticides	97,162
SEP00010	Enzyme brewing—The catalyst for a new export barley market	140,501
UA00135	Improved functionality of grain storage products	99,911
UA00137	Evaluation of the field efficacy of beneficial microbial products	80,545
UCS00013	Biological control of pest snails in Australia using native nematodes	353,427
UCS00016	Biopesticides for the Australian grains industry	240,152
UF00007	Beneficial Microbes Program—progressing new microbial products for Australian grain production to commercialisation	235,395
UM00040	Increasing feed grain digestibility: probiotics and enzyme additives	225,630
UMU00032	National Rhizobium Program—Managing rhizobia to maximise nitrogen fixation by legumes in agriculture	510,000
UNE00016	Attract-and-kill technology for diamondback moth	150,308
UNE00017	Coordination—Nitrogen Fixation in Farming Systems	30,000
UQ00061	Fertiliser from Wastes Phase II	250,286
US00050	Formulation and application of beneficial microbial inoculants for agriculturally important crops	133,810
USA00008	Weed seed termination method of harvest	21,875
USA00010	Mechanical weed seed termination at harvest	293,766
USA00012	A scoping study of engineering solutions for soil and plant sensing using infrared technology	229,853
UT00018	Microbial T-RFLP (terminal restriction fragment length polymorphism) screening as a solution for premature yeast flocculation (PYF) assurance for malt and malting barley exports	73,244
UT00023	The suitability for barley brewing of Australian barley varieties	134,828
UWA00113	Demonstration of UWA microspectrometer technology for assessment of soil and grain parameters in broadacre agriculture	199,500
New Farm Products and Services Total		7,857,404
New Grain Products		
BAR00002	Independent Evaluation of Ultra Low Gluten Research and Development Program	5,374
BTC00001	The approval of Australian sweet lupins for food use in overseas markets	17,625
CFF00002	Novel mechanisms for enhancing wheat yield and quality	517,411
CFF00005	Novel mechanisms for enhancing wheat yield and quality	478,110

Number	Title	Expenditure \$
CFF00006	Novel mechanisms for enhancing yield in wheat and maize	32,193
CSE00049	Crop Biofactories Initiative 2—Joint Innovation Agreement	1,703,564
CSP00145	Omega-3 Canola Collaborative research project	900,000
CSP00152	Use of dough improvers in grain quality testing	85,165
CSP00153	Coeliac Friendly Cereals—Phase 5	303,067
CUR00007	Superior quality lupin breads using low-protein wheat flour	35,000
CUR00009	Modeling processing of bread dough and bread texture—a structural mechanics approach	55,000
DAN00153	Northern NSW safflower evaluation and seed increase	139,996
GOG00001	Go Grains—Membership Subscription	250,000
GOG00006	Go Grains—Health & Nutrition	100,000
JCS00004	Review of the Australian feed grain industry looking at industry trends and R&D completed in the area of feed grains	15,000
JCS00006	Canola Meal Quality and Usage in Animal Feed	2,400
NP83-1	Safflower germplasm improvement program	10,074
NP89-1	Communicating the value of feed grain—National component	7,143
NPB00004	Grain Hygiene Program for CRC for National Plant Biosecurity	1,800,000
NPB00012	Core participation seed funding for the CRC for National Plant Biosecurity	2,500
NUM00001	Review of commercial opportunities for high lutein wheat	4,385
PCL00005	Enhancing near-infrared spectroscopy calibrations for predicting the nutritional value of grains for livestock	25,859
PCL00008	Pork CRC Projects related to grain handling and statistical analysis	120,000
PNP00001	Increasing the value and marketability of feed grains for the grains industry	95,000
RCL00001	Grain Foods CRC Ltd—Directors	12,980
SED00002	Development, planning and conducting two Feedgrain Workshops	17,472
SMC00001	Go Grains Health & Nutrition Limited—Director	25,442
UCS00015	Canola proteins for optimal food functionality	57,250
WJM00005	Coordination of Registration of Grain Storage Chemicals and Codex Attendance	76,689
New Grain Products Total		6,894,699
NEW PRODUCTS TOTAL		15,036,071

COMMUNICATION & CAPACITY BUILDING

Building Research Capacity

ARL00007	Australian Rural Leadership Foundation	100,000
ATA97	Agricultural Training Award (ATA)— to study at the WA College of Agriculture, Cunderdin	12,000
ATA98	ATA—to study at the Longerenong College, Victoria	12,000
ATA99	ATA—to study at the Tocal College, CB Alexander Campus, Paterson	12,000
CSP00147	CSIRO Summer Student Program	35,000
DAF00002	Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry	20,000
GRS10004	Grains Industry Research Scholarship (GIRS)—(ANU) Identifying novel epigenetic components that regulate seed size in a model plant, <i>Arabidopsis</i>	27,145
GRS10026	GIRS—(UA) Assessing management options for enhancing soil phosphorus availability using rotations	27,145
GRS10027	GIRS—(UWA) Phosphorus use efficiency of <i>Austrodanthonia</i>	27,145

Number	Title	Expenditure \$
GRS10028	GIRS—(UMU) Genetic factors and genes underpinning drought response in wheat	27,145
GRS10029	GIRS—(UCS) Manipulation of phosphorus sorption in agricultural soils	27,145
GRS10031	GIRS—(UA) Use of novel wheat (waxy durum) in baking applications	27,145
GRS10034	GIRS—(UA) Identification of the controller of nitrate transport in maize	27,145
GRS10035	GIRS—(CUR) Minimising fungicide resistance	27,145
GRS10036	GIRS—(USQ) Inter-relationships between <i>Bipolaris sorokiniana</i> isolates involved in spot blotch, common root rot and black point in winter cereals	27,145
GRS10037	GIRS—(UWA) Evolved glyphosate resistance in wild radish (<i>Raphanus raphanistrum</i> L) populations with the use of glyphosate-resistant GM canola	27,145
GRS10038	GIRS—(US) Enhancing plant nutrition with rhizosphere microorganisms	27,145
GRS10039	GIRS—(UWA) Unravelling the cause of black pod disease of narrow-leaved lupin and developing a control solution	27,145
GRS10040	GIRS—(UF) Examining the role of sucrose transporter SUT1 in increasing yield and iron/zinc content in barley	27,145
GRS10041	GIRS—(UQ) Understanding abiotic stress impacts on cereal starch structure and value-added quality through genetic and environmental screening	27,145
GRS10042	GIRS—(CUR) The integration and validation of precision management tools for mixed farming systems	27,145
GRS10044	GIRS—(UA) Evaluating the salt tolerance of transgenic wheat and barley	27,145
GRS10045	GIRS—(UQ) Genetic variability and physiological mechanisms controlling time to flowering in wheat under high temperatures	27,145
GRS10061	GIRS—(CUR) Comparative genomics of necrotrophic fungal pathogens	27,145
GRS10063	GIRS—(RMIT) Bread-making procedure, product digestibility and impact on sensibility to gluten proteins	27,145
GRS10248	GIRS—(US) Regulation and long-distance movement of nutrient starvation-responsive plant microRNAs	7,599
GRS10249	GIRS—(UQ) Functional pathogen genomics and characterisation of the infection mechanisms of the wheat and barley crown rot pathogen, <i>Fusarium pseudograminearum</i>	2,083
GRS10258	GIRS—(US) Characterising potential symbiosome membrane proteins essential to the legume-rhizobium symbiosis	10,424
GRS10259	GIRS—(UA) (1,3;1,4)- β -D-glucan biosynthesis in the Poaceae: Exploring transcriptional regulation, associated expression and specific activities of biosynthetic enzymes	13,898
GRS10263	GIRS—(UA) Effect of small amounts of ammonium on the total nitrogen nutrition and on overall nutrition of maize	13,898
GRS10268	GIRS—(UMU) Wheat potassium nutrition in saline and/or sodic soils and in drought-prone environments	13,898
GRS10275	GIRS—(UWA) The use of potassium to improve water usage, growth and yield of canola in European high-yielding and Australian low-yielding farming systems	13,898
GRS10290	GIRS—(RMIT) Forms, analysis and stability of vitamin E and selenium in grains and grain products	9,265
GRS10329	GIRS—(ANU) Investigating the role of root architecture regulators as mediators of environmental information in root development	10,424
GRS10335	GIRS—(UA) Foliar Fertilisation Of Wheat Plants—Phosphorus in Combination with Other Nutrients	10,424
GRS10336	GIRS—(US) Genetics of Biofortified Wheat	13,799
GRS134	GIRS—(UF) Characterising the molecular basis of the beneficial plant: endophytic actinobacteria relationship	21,500
GRS135	GIRS—(US) The physiological mechanisms for desiccation tolerance in Rhizobia	15,000
GRS137	GIRS—(UF) Investigating the differences between R protein activation in monocotyledonous (Wheat) and dicotyledonous (Flax) plant species	9,945

Number	Title	Expenditure \$
GRS138	GIRS—(US) Genetic improvement of grain quality for bread making in triticale	30,000
GRS139	GIRS—(US) Rust resistance in cultivated barley (<i>Hordeum vulgare</i>)	5,000
GRS140	GIRS—(UCS) The relationship between earliness and vigour in cereals	15,000
GRS141	GIRS—(UQ) Investigation of techniques to rapidly introgress new genes into adapted cereal cultivars	16,170
GRS145	GIRS—(ULA) Regulation of the XERO2 gene in <i>Arabidopsis</i>	15,000
GRS147	GIRS—(UCS) Investigation of the use of biochar to enhance soil physical and chemical properties under dryland cropping	15,000
GRS150	GIRS—(US) Metallic nanoparticle phytosynthesis	17,500
GRS151	GIRS—(UMO) The effect of adsorption of the properties and structure of nanostructured emulsions	17,500
GRS152	GIRS—(UQ) Development and validation of molecular disease resistance markers for use in lucerne breeding	7,500
GRS153	GIRS—(UWA) The effect of biochar on soil nitrogen cycling and associated soil biological community	20,000
GRS154	GIRS—(UMO) Integrated and sustainable control of pest mite and aphid species in the context of climate change	32,500
GRS155	GIRS—(UT) The effect of crop rotation and irrigation on water use efficiency and soil health of grain crop production in Tasmania	28,750
GRS157	GIRS—(UCS) Improved drought avoidance for water-limited environments in Australian wheat	25,000
GRS159	GIRS—(UQ) Improved knowledge of crown rot pathogen biology and toxigenicity to safeguard market assess of wheat	22,500
GRS160	GIRS—(UA) <i>Phoma koolunga</i> : biology and role in ascochyta blight of field peas	32,500
GRS161	GIRS—(ULA) The role of intracellular localisation signals in NHX antiporter regulation in <i>Arabidopsis</i>	30,000
GRS163	GIRS—(UWA) Exploring the impact of salt stress on respiration and mitochondrial function in wheat varieties	30,000
GRS165	GIRS—(UWA) Generation of homozygosity and genome fixation in field pea (<i>Pisum sativum</i> L.)	30,000
GRS167	GIRS—(UA) Late maturity alpha-amylase in wheat	20,000
GRS171	GIRS—(ANU) A biochemical approach to understanding <i>Stagonospora nodorum</i> toxin proteins	21,875
GRS172	GIRS—(UNE) Root vigor of cereal genotypes in response to phosphorus nutrition	30,000
GRS174	GIRS—(CSP) Effects of carbon dioxide on the epidemiology of crown rot infection in resistant and susceptible wheat cultivars	35,000
GRS175	GIRS—(US) Identifying site-specific crop production risk	21,875
GRS176	GIRS—(UA) Physiological studies on the response of wheat to short-term heat stress during reproductive development	30,000
GRS177	GIRS—(UWA) Costs and benefits of different options for WA farmers to mitigate greenhouse gas emissions	21,875
GRS179	GIRS—(ULA) Homeostatic sensing and feedback regulations of sodium-proton antiporter expression in <i>Arabidopsis</i>	30,000
GRS180	GIRS—(US) The basis of chickpea heat tolerance under semi-arid environments in India and Australia	21,875
GRS181	GIRS—(UA) Confirmation and characterisation of a Na ⁺ (sodium) exclusion gene in barley	30,000
GRS183	GIRS—(UWA) Uncovering changes in the molecular networks of protein oxidation underpinning cereal crop responses to environmental stress	21,875
GRS184	GIRS—(ANU) Gene regulation in plant adaptation to stressful environments and drought conditions	21,875

Number	Title	Expenditure \$
GRS185	GIRS—(CUR) The effect of heat treatment and processing techniques on the quality of Australian sweet lupin flour	14,375
GRS186	GIRS—(UCS) Investigating the fungal endophyte <i>Neotyphodium occultaans</i>	26,875
GRS187	GIRS—(JMU) Investigating the method of action of plant growth promoting rhizosphere bacteria-enhancing nodulation in legumes	27,145
GTA10247	Travel Award (TA)—(UQ) to attend the Plant & Animal Genome XX Conference 2012	2,000
GTA10250	TA—(UQ) to attend and present at the Plant and Animal Genome XX Conference 2012	2,000
GTA10252	TA—(UM) IIIrd International Ascochyta workshop and scientific discussions with the Cordoba University <i>Ascochyta rabiei</i> team	2,000
GTA10253	TA—(ACPFPG) Gordon Research Conference—Plant Molecular Biology and lab visiting after conference	2,700
GTA10255	TA—(ACPFPG) Vienna International Plant Conference Association—Plant Growth, Nutrition and Environment Interactions	2,700
GTA10267	TA—(UA) to attend the Plant and Animal Genome XX Conference 2012	2,000
GTA10281	TA—(CUR) Research exchange	2,500
GTA10282	TA—(UQ) to attend and present at the Plant and Animal Genome XX Conference 2012	2,000
GTA10283	TA—(UA) Weed Science Society of America 2012 Annual Meeting	2,607
GTA10340	TA—(UQ) Keynote Speaker for the Ecological Society of Australia Conference in Hobart, 21–24 November 2011	1,575
GTA10348	TA—(CSP) International Plant Molecular Biology Congress	1,941
GTA10361	TA—(SANTFA) Bus Trip to New South Wales	15,000
GTA10368	TA—(UA) Conference Travel to America and visits to researchers to strike up collaboration	5,000
GTA10377	TA—(UWS) The Third Australian–China Wheat Genetics and Breeding Forum—Climate change ready wheat cultivars for Australia and China	3,200
GTA10385	TA—(CUR) To present a paper at the 16th Australian Agronomy Conference	2,112
IPR00003	Vavilov–Frankel Fellowship	21,588
ITA00001	Indigenous Training Award (ITA)—to study at University of Western Australia	10,000
ITA00002	ITA—to study at Longerenong College, Victoria	10,000
ITA00003	ITA—to study at South West TAFE, Victoria	10,000
NUF00009	Nuffield Australia Farming Scholarships	150,000
NYC00002	Advisory Council of the National Science Summer School Inc	15,935
NYS00002	National Youth Science Forum	50,000
UHS10224	Undergraduate Honours Scholarship (UHS)—(UNE) Application of mixed waste organic outputs to cropping soils—potential benefits and pitfalls: impacts on soil carbon storage, function and nutrition	10,000
UHS10225	UHS—(UM) <i>Leptosphaeria</i> effectors, key determinants of blackleg disease of canola	10,000
UHS10226	UHS—(UWA) Economic impact of soil borne diseases over the entire rotation sequence	10,000
UHS10228	UHS—(UT) Effect of irrigation and nitrogen supply on water use efficiency of barley	10,000
UHS10229	UHS—(ANU) Analysing the production risks in the white grain pathogen <i>Botryosphaeria zeae</i>	10,000
UHS10232	UHS—(UWA) Effect and economic benefit of rate of soil wetting agent in gravelly loam pasture and cropping systems	10,000
UHS10234	UHS—(UF) Interactions of actinobacteria with rhizobia	10,000
UHS10235	UHS—(US) In-crop assessment of soil microbial communities following compost application	10,000
UHS10236	UHS—(UWA) An economic assessment of on-farm storage in Western Australia	10,000
UHS10237	UHS—(UQ) A quantitative approach relating crown rot resistance to water use efficiency and grain yield in wheat (<i>Triticum aestivum</i>)	10,000

Number	Title	Expenditure \$
UHS10238	UHS—(UNE) Application of mixed waste organic outputs to cropping soils—potential benefits and pitfalls: impacts on soil biology and function	10,000
UHS10241	UHS—(USA) Image fusion for phenotypic analysis of plant images	10,000
UHS10242	UHS—(UA) Can rye genes be used to 'supercharge' aluminium tolerance in wheat and barley?—A transgenic approach to dissect biochemical and biological properties of organic anion transporters from rye and wheat	10,000
UHS10244	UHS—(ANU) An analysis of gamma-aminobutyric acid metabolism in the wheat pathogen <i>Stagonospora nodorum</i>	10,000
UHS10338	UHS—(QUT) Immigration levels of <i>C.ferrugineus</i>	10,000
UHS10356	UHS—(UCS) Pulse Breeding Australia Health Benefits of Australian Pulses	11,250
UHS10360	UHS—(UCS) Pulse Breeding Australia Health Benefits of Australian Pulses	11,250
US00056	Research Project 1: Superior water use efficiency through improved leaf mesophyll conductance	455,991
US00057	Identification of genetic variation for heat tolerance in wheat germplasm of relevance to the northern grains region	1,248,030
US00058	Capacity building to support research and plant breeding at the IA Watson Grains Research Centre	1,931,917
US00059	Research Capacity Building: GRDC Senior Lectureship in Agronomy/Plant–Soil–Microbe Interactions	147,168
US00060	Research Capacity Building: GRDC Senior Lectureship in Agronomy/Crop Physiology	147,168
US00061	Identification of wheat breeding targets to enhance soil function for efficient nutrient and water use	219,858
UT00019	Primary Industry Centre for Science Education—Phase 3	195,000
Building Research Capacity Total		6,471,865
Corporate Communications		
AAC00006	Conference Sponsorship (CS)—Australian Grains Industry Conference 2012	10,000
ADE00001	Salt-affected soils booklet	25,000
ANV00009	Ground Cover TV—National	300,000
ANV00010	Ground Cover TV—Electronic Direct Mail and Web Based Content	10,500
BAE00019	CS—Australian Bureau of Agricultural and Resource Economics and Sciences Outlook Conference 2012	7,273
BER00010	International Grains Research Review	60,000
BER00011	Australian Grains Focus	17,500
CAN00003	Warehousing and distribution of the GRDC's publications, periodicals and promotional material 2009–2012	60,000
CCS49-1	Advertisements for GRDC Regional Communication Services	9,350
CFM00009	CS—Crawford Fund Annual Development Conferences 2012	10,000
CIC00006	Western Region communicator services	155,980
CIC00007	Northern Region communicator services	155,979
CIC00014	Issues-based communication—High-rainfall zone	66,255
CIC00015	Issues-based communication—Over the Fence	78,000
CIC00016	Issues-based communication—Panel profiles 2012	30,733
CIC00017	Issues-based communication—Managing herbicide resistance	74,861
CIC00018	Issues-based communication—Grain storage	1,839
CIC00019	Issues-based communication—Mouse control	26,890
CIC00020	Issues-based communication—Interactive broadcast	30,804
COR00017	<i>Ground Cover</i> supplements	252,780

Number	Title	Expenditure \$
COR00018	Ground Cover newspaper	1,255,472
COR00020	Ground Cover Direct publication catalogues	40,000
COR00021	Repurposing of research report information for a grower audience	165,000
COR00022	Back Pocket Guides	111,000
COR00023	GRDC articles for <i>Farming Ahead</i> magazine	35,760
COR00031	Fact Sheets for publication and website	242,500
COR00032	Mouse control Fact Sheet	35,119
COR00033	Grain and Graze—Phase 2 editing, design, printing and mail out of 7 regional Fact Sheets	56,828
COR00034	Paddock Diary 2012—Mail out	41,001
ECO00005	Climate Champions initiative	170,000
ECO00006	Issues-based communication—Climate strategy implementation	80,000
GCS10151	CS—Farming Ahead 2012	25,000
GCS10291	CS—2nd Annual National Sustainable Food Summit	20,000
GCS10292	CS—56th Annual Conference of Australian Agricultural and Resource Economics Society	5,000
GCS10293	CS—Workshop on International Durum Collaboration	15,000
GCS10294	CS—Invigorating Agriculture; A fresh approach to a changing industry	5,000
GCS10297	CS—16th Biennial Conference of the Australian Society of Agronomy	25,000
GCS10298	CS— Australasian Milling Conference 2012	1,650
GCS10299	CS—Joint Australian Society of Soil Science Incorporated and New Zealand Society of Soil Science—Soil Science Conference	15,000
GCS10312	CS— International Congress of Dietetics	15,000
GCS10313	CS—22nd International Grassland Congress	10,000
GCS10319	CS— Mallee Sustainable Farming Forum	5,000
GCS10320	CS—South Australian Groundsprayers Association Annual Industry Day	5,000
GCS10321	CS—South Australian No-Till Farmers Association Annual Conference	10,000
GCS10324	CS—Tasmanian Farmers and Graziers Association 2012 Biennial Conference	5,000
GCS10325	CS—Plant Reproduction for Food 2012—22nd International Congress on Sexual Plant Reproduction	10,000
GCS10327	CS—Victorian Farmers Federation Annual Grains Conference	8,000
GCS10328	CS—Western Australian Farmers Centenary Conference—Annual Grains Conference	8,000
GCS10339	CS—Queensland Department of Agriculture, Fisheries and Forestry Hermitage Research Facility Schools Plant Science Competition	3,500
GCS10341	CS—South East Premium Wheat Growers Association Harvest Review and Season Preview	5,000
GCS10342	CS—Outlook 2013	7,273
GCS10343	CS—2012 AgForce State Conference	8,000
GCS10345	CS—1st International Crown Rot Workshop for Wheat Improvement	17,000
GCS10349	CS—Managing soil biology for better business outcomes	15,000
GCS10350	CS—The epidemiology and management of whitefly-transmitted viruses	5,000
GCS10354	CS—Your Irrigation Farm—Where to next?	4,500
GCS10359	CS—Sowing the Seeds of Farmer Health	5,000
GCS10362	CS—Pulse Breeding Australia National Pulse Conference	30,000
GCS10374	CS—16th Australian Nitrogen Fixation Conference	7,000
GCS10376	CS—International InterDrought—IV Conference	20,000

Number	Title	Expenditure \$
GCS10378	CS—10th Annual Victorian No-Till Farmers Association Conference in conjunction with the 1st National Conservation Agriculture Alliance of Australia and New Zealand—Farmers Conference	10,000
GCS10391	CS—Australasian Applied Statistics Conference 2012	7,500
GCS10392	CS—COMBIO 2012—the annual combined meeting of the major biological learned societies in Australia	10,000
GCS10393	CS—15th Precision Agriculture Symposium of Australasia	7,500
GCS10394	CS—VIth International Conference on Legume Genetics and Genomics	10,309
GCS10396	CS—South East Premium Wheat Growers Association Ladies Day Out—Enterprising Women 2012	5,000
GGA00002	Innovation Generation 2010—Building Supply Chain Solutions	100,000
KDI00022	GRDC editorial in <i>Farming Ahead</i> magazine	27,000
KIS00001	Kondinin Farmer of the Year Awards—Sponsorship of Grain Grower of the Year	20,000
MAA00006	The 'COB' magazine	15,000
MMO00004	Media monitoring services: Carma	49,000
MMO00005	Media monitoring services	98,166
OBR00003	GRDC's Driving Agronomy Radio Program	80,000
PIG00007	Building the human capacity of grain growers through Partners in Grain	300,000
PNS00004	Southern Regional communicator services	241,508
PNS00006	Issues-based communication—Productivity and profitability campaign implementation	10,000
PNS00009	Issues-based communication—Soil biology initiative	15,009
PNS00010	Issues-based communication—Getting GRDC closer to growers: Australian Year of the Farmer	58,545
PNS00012	Issues-based communication—In the field with John Harvey	45,111
PNS00013	Issues-based communication—National RESIST communication campaign	42,285
PNS00014	Issues-based communication—Sponsorship of National Australian Year of the Farmer	50,000
RBC00003	Field days support and interactive displays	18,369
RBC00004	Field days support and interactive displays	50,000
RHC00001	Corporate brand development	63,455
RHC00002	Barley purity and variety identification brand development	19,000
UCS00017	Monograph series row spacing booklet	10,000
WDM00008	Paddock Diary 2009–10, 2010–11 and 2011–12	87,600
Corporate Communications Total		5,381,704
COMMUNICATION & CAPACITY BUILDING TOTAL		11,853,569

CORPORATE SERVICES

AAA00006	AgriFood Awareness Australia Limited (2009–12)	100,000
AEG00001-4	Australian Export Grain Innovation Centre—Selection of Chair	68,700
AGL00015	Grains Stocks Project	19,876
AGP2	Australian Grain Technologies Pty Ltd—Independent directors	80,526
ATR00010	2011 impact assessments	31,400
ATR00012	Aggregate Analysis of 33 Cost-Benefit Analysis of Clusters of GRDC Research	37,100
ATR00013	Impact Assessment—Climate Champions	15,700
ATR00014	Ex Ante Analysis of 20 new investments commencing 2012–13	67,000
BA00006	Barley Australia—annual subscription	22,500

Number	Title	Expenditure \$
BAE00017	Australian Agricultural and Grazing Industries Survey and Grains Industry Reports: 2009–10, 2010–11 and 2011–12	400,000
BAE00021	Cost of Grain Production—Supplementary survey in Australian agricultural and grazing industries survey	59,600
BRE00004	Plain-English summary consultancy	9,600
CCS64-1	Regional panel specific workshops	1,818
CIN00001	Wheat Quality Australia—Director and Chair	50,285
DCC00002	High Rainfall Zone and Canola Breeders of Western Australia—Independent Director	10,024
DER00012	GRDC 2011 Research Partner Survey	57,325
DER00014	GRDC 2012 Grower Survey	100,000
GBU00001	Platform Technology	16,951
GGL00002	Grain Growers management of Australian Bureau of Statistics grain stocks projects	235,500
GRD16-1	Impact assessment	1,891
GRD172	Global Crop Diversity Trust—securing conservation and availability of GRDC mandated crop genetic diversity	7,010
GRD18-1	National Research, Development and Extension Strategy	1,178
GRD20-3	National Research, Development and Extension Strategy—Independent Director	5,646
GRD24-1-1	Council of Rural Research and Development Corporations—expenditure	120,000
MCC00007	Assistance with developing GRDC Strategic Research and Development Plan 2012–17	18,000
NRS00008	Supply and delivery of Strategy Development Workshops	32,000
PFR00002	Australian Export Grains Innovation Centre consultancy	25,732
PFR00003	Canola Breeders Western Australia—Directors	40,673
PRO00001	Barley Australia—Directors	25,000
TAP00004	Australian Crop Accreditation System—Directors	28,269
TJH00001	Agrifood Awareness Australia Limited—Directors	5,000
CORPORATE SERVICES TOTAL		1,694,304
GRAND TOTAL		150,230,740

ANU = Australian National University, ACPFG = Australian Centre for Plant Functional Genomics, APH = Australian Prime Hard Wheat, ATA = Agricultural Training Award, CIMMYT = International Maize and Wheat Improvement Center, CRC = cooperative research centre, CRM = customer relationship management system, CS = Conference Sponsorship, CSIRO = Commonwealth Scientific and Industrial Organisation, CSP = CSIRO Plant Industry, CUR = Curtin University of Technology, Western Australia, DAFWA = Department of Agriculture and Food, Western Australia, DGT films = diffusive gradients in thin films, EDM = electronic direct mail, GGA = Grower Group Alliance, GIRS = Grains Industry Research Scholarship, GM = genetically modified, ICARDA = International Center for Agricultural Research in the Dry Areas, ICRISAT = International Crops Research Institute for the Semi-Arid Tropics, IDA = Industry Development Award, ITA = Indigenous Training Award, IWM = Integrated Weeds Management, MEMS-IR = Micro-electrical mechanical systems infrared, NSW = New South Wales, QUT = Queensland University of Technology, R&D = research and development, RMIT = RMIT University, SA = South Australia, SANTFA = South Australian No-Till Farmers Association, SARDI = South Australian Research and Development Institute, SMS = Short Messaging Service, SNP = single-nucleotide polymorphism, TA = Travel Award, TAFE = technical and further education, UA = University of Adelaide, UCS = Charles Sturt University, UF = Flinders University, UHS = Undergraduate Honours Scholarship, ULA = La Trobe University, UM = University of Melbourne, UMO = Monash University, UMU = Murdoch University, UNE = University of New England, UQ = University of Queensland, US = University of Sydney, USA = University of South Australia, USQ = University of Southern Queensland, UT = University of Tasmania, UWA = University of Western Australia, UWS = University of Western Sydney, WA = Western Australia

Summary of GRDC project expenditure

Practices	Cross Practices	118,416
	Agronomy, Soils and Environment	19,070,747
	Crop Protection	19,594,524
	Validation and Integration	19,887,050
	Extension and Grower Programs	7,857,786
	Total Practices	66,528,523
Varieties	Cross Varieties	74,800
	Gene Discovery	23,814,079
	Germplasm Enhancement	13,486,712
	Wheat and Barley Breeding	9,639,648
	Pulse, Oilseed and Summer Coarse Grains	8,103,034
	Total Varieties	55,118,273
New Products	Cross New Products	283,968
	New Farm Products and Services	7,857,404
	New Grain Products	6,894,699
	Total New Products	15,036,071
Communication & Capacity Building	Building Research Capacity	6,471,865
	Corporate Communications	5,381,704
	Total Communication & Capacity Building	11,853,569
Corporate Services	Total Corporate Services	1,694,304
	GRAND TOTAL	150,230,740

Appendix C—Joint R&D project list

R&D Partners	Project ID	Project	Start	Finish
ARC, DPI VIC, GRDC, SARDI, UA, UM, UQ	ACP00002	Australian Centre for Plant Functional Genomics, Phase 2	1 Jan 2008	31 Dec 2012
AEA, DAFF, GRDC	AEA00004	South-eastern Australia Grain and Graze 2 Program	31 Jan 2010	31 Dec 2013
ABARES, GRDC, MLA	BAE00017	Australian Agricultural and Grazing Industries Survey and Grains Industry Reports: 2009–10, 2010–11 and 2011–12	30 Jun 2009	30 Jun 2012
ABARES, AEC, APL, ARLP, AWI, DAFF, DRALGAS, FRDC, FWPA, NUF, RIRDC	BAE00019	Conference Sponsorship—ABARE's Outlook 2010, Outlook 2011 and Outlook 2012 conferences	2 Mar 2010	29 Feb 2012
ABARES, MLA	BAE00021	Cost of Grain Production—Supplementary Survey in AAGIS	31 May 2011	30 Jun 2014
BCG, DAFF, GRDC	BWD00018	Northern Victorian Grain and Graze 2 Program	31 Jan 2010	31 Dec 2013
BCG, DAFF, GRDC	BWD00019	Australian farm groups demonstrating adaptive practices to minimise the impact of climate change on farm viability	31 May 2010	1 Jun 2012
CRDC, GRDC	CRD00003	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern NSW and Queensland	30 Jun 2009	30 Jun 2012
CSIRO, DAFF, DAFWA, DEEDI, GRDC, DERM QLD, DPI VIC, I&I NSW, SARDI, UNE, UWA	CSA00019	Soil Carbon Research Program	1 Jun 2009	30 Jun 2012
CSIRO, DAFF, GRDC, UM	CSA00022	Developing climate change resilient cropping and mixed cropping–grazing businesses in Australia	15 Jun 2009	30 Jun 2012
CSIRO, DAFWA, DEEDI, GRDC, UQ	CSE00051	Pest suppressive landscapes—linking integrated pest management and natural resource management	30 Jun 2009	30 Jun 2012
AEC, APL, CSIRO, DA, GRDC, MLA, PRC	CSP00118	Australian Feed Grain Partnership sorghum project	1 Oct 2008	30 Sep 2010
CSIRO, DAFWA, DEEDI, GRDC, UM, UQ	CSP00125	Adapting wheat to future warm and dry climates—improved simulation of flowering and tillering	30 Jun 2009	30 Jun 2012
CSIRO, Nuseed	CSP00145	Omega-3 Canola Collaboration	1 Jul 2010	30 Jun 2015
CSIRO, DAFF, DAFWA, DEEDI, DERM, DPI VIC, GRDC, I&I NSW, SARDI, UNE, UWA	DAF00001	Australia's Farming Future: Climate Change Research Program	1 Apr 2009	30 Sep 2012
DAFF, GRDC	DAF00002	Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry	1 Jul 2009	30 Jun 2013
BCG, DAFF, DAFWA, DEEDI, DPI VIC, GRDC	DAF00003	National Adaptation and Mitigation Initiative coordination project	31 May 2010	1 Jun 2012
CRDC, DPI NSW, GRDC	DAN00121	Helicoverpa insecticide resistance: monitoring, mechanisms and management 2	1 Jul 2008	30 Jun 2011

R&D Partners	Project ID	Project	Start	Finish
GRDC, SRDC	DAQ00129	Improving the integration of legumes in grain and sugarcane farming systems in southern Queensland	1 Jul 2008	30 Jun 2012
CRDC, DEEDI, GRDC	DAQ00148	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern NSW and Queensland	30 Jun 2009	30 Jun 2012
DAFF, DEEDI, GRDC	DAQ00162	Grain and Graze 2—Northern Region	1 Apr 2010	31 Dec 2013
DAFF, DEEDI, GRDC	DAQ00163	Participatory adaptation and mitigation strategies for climate change on the mixed farms of north-eastern Australia	31 May 2010	1 Jun 2012
DEEDI, GRDC, SRDC	DAQ00173	Evaluating the role of brassica crops in south-west Queensland and northern NSW grain cropping systems	1 May 2011	30 Apr 2014
DEEDI, GRDC, SRDC	DAQ00174	Cropping solutions for the sugarcane farming systems of the Burdekin	1 Jun 2011	31 May 2015
GRDC, RIRDC	DAS00091	National Oat Breeding Program for milling and feed end uses	1 Jul 2008	30 Jun 2012
CU, GRDC, HAL, SARDI, UA, UM	DAS00094	Diamondback moth (<i>Plutella xylostella</i>) control and insecticide resistance management	1 Mar 2009	30 Jun 2012
GRDC, RIRDC	DAS00117	New common and woolly pod vetch varieties for grain and hay/silage production for Australian farmers	30 Jun 2011	30 Jun 2014
DAFF, DPI VIC, GRDC	DAV00096	Decreasing nitrous oxide emissions in high-rainfall cropping systems	30 Jun 2009	30 Dec 2012
DA, DAFF, DPI VIC, GRDC	DAV00097	The potential of inhibitors for the mitigation of nitrous oxide emissions from animal production systems, in south-eastern Australia	1 May 2009	30 Jun 2012
DAFF, DPI VIC, GRDC	DAV00108	Demonstrating climate change mitigation and adaptation options through linked and integrated cropping farms in Victoria	31 May 2010	1 Jun 2012
DAFF, GRDC	DAV00121	Sustaining wheat yield and quality under increasing atmospheric carbon dioxide	1 Jul 2011	30 Jun 2014
DAFF, DAFWA, GRDC	DAW00202	Demonstrating adaptation to climate change in the wheatbelt of WA through innovative on-farm and virtual farm approaches	31 May 2010	1 Jun 2012
DAFF, GRDC	DEF00001	Regional scenario analyses for cropping in future climates	1 Dec 2011	30 Nov 2014
DA, GRDC	DRD00002	Improving the utilisation of red wheat by lactating dairy cows	1 Jan 2009	1 Jan 2012
DAFF, DEEDI, DERM, GRDC, QUT	ERM00001	Reducing nitrous oxide emissions from sugarcane lands	15 Mar 2009	30 Dec 2012
DAFF, FG, GRDC	FGI00007	Grain and Graze 2—WA region	1 Apr 2010	31 Dec 2013
DAFF, FR, GRDC	FLR00006	Grain and Graze 2—Building resilient mixed farming systems in southern NSW	1 Apr 2010	31 Dec 2013
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00006	Assessing and managing heat stress in cereals	1 Jul 2008	30 Jun 2013
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00007	Teleconnections between climate drivers and regional climate, and model representation of links	31 May 2010	31 May 2013
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00008	Improving forecast accuracy, especially with improved Indian Ocean initialisation	31 May 2010	31 May 2013

R&D Partners	Project ID	Project	Start	Finish
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00009	Improving multiweek predictions	1 Oct 2009	30 Sep 2012
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00010	Understanding frost risk in a variable and changing climate	30 Jun 2010	30 Dec 2012
DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00013	Temperature extremes and cropping in WA	1 Mar 2010	28 Feb 2013
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00014	Managing Climate Variability—communication support	1 Jul 2008	30 Jun 2013
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00017	Managing Climate Variability—communication support and administration	1 Jul 2008	30 Jun 2013
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00022	Managing Climate Variability—program officer	1 Jul 2008	30 Sep 2011
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00023	Managing Climate Variability—program management committee	1 Jul 2008	30 Jun 2013
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00024	Managing Climate Variability— independent chair	1 Jul 2009	30 Jun 2011
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00028	Managing Climate Variability—climate analyser decision support system tools	1 Dec 2010	30 Aug 2012
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00029	Specifying Australia's climate variability in the context of a changing climate	30 Jun 2011	30 Jun 2012
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00030	Adding value to climate risk management decision support systems	1 Jan 2011	30 Jun 2012
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00031	Predictions of heat extremes on the multiweek timescale	30 Jun 2011	31 Dec 2013
DA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00032	Northern Australia—monsoon prediction	1 May 2011	30 Apr 2013
DA, HAL, MLA, RIRDC, SRDC	MCV00033	Managing Climate Variability Program—Climate Champion	1 Jun 2012	30 Jun 2013
CBH, GC, CRCNPB, Viterra	NPB00004	Grain Hygiene Program for Cooperative Research Centre for National Plant Biosecurity	1 Jul 2007	30 Jun 2012
DAFF, GRDC, NRS	NRS00005	National leadership and mentoring	1 Jul 2009	30 Jun 2013
ANU, CSIRO, DEST, GRDC, UNSW, UQ, UWA	NYS00002	National Youth Science Forum	1 Jul 2011	30 Jun 2015
DEEDI, GRDC, PRC, UQ	PCL00006	Dedicated Feed Grain Production Systems: An assessment of wheat, barley and triticale systems in Australia	1 Jul 2011	30 Jun 2012
DEEDI, GRDC, PRC, UQ	PCL00008	Pork CRC Projects related to Grain handling and statistical analysis	1 Jul 2011	30 Jun 2014
GRDC, PNP, SAGIT	PNP00001	Increasing the value and marketability of feed grains for the grains industry	1 Jul 2010	30 Jun 2013
ACIAR, GRDC	PR93	5th World Congress of Conservation Agriculture 2011	1 Jul 2009	30 Jun 2012
DAFF, GRDC, QUT	QUT00002	Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils	1 Mar 2009	28 Feb 2012
DAFF, GRDC, QUT	QUT00003	Reducing nitrous oxide emissions in irrigated grains—cotton farming systems	1 Mar 2009	28 Feb 2012
CRDC, FRDC, GRDC, RIRDC, SRDC	RDC00004	Collaborative partnership for farming and fishing health and safety	1 Jun 2008	30 Jun 2012
GRDC, RIRDC	RDC00006	Investing in Youth initiative	1 Jan 2010	31 Dec 2013
GRDC, RIRDC	RDC00007	Sustainable food and fibre program	15 Apr 2011	30 Sep 2011

R&D Partners	Project ID	Project	Start	Finish
DAFF, GRDC, ROE	ROE00001	Evaluation activities for Grain and Graze 2	1 Jul 2009	30 Jun 2014
DAFF, GRDC, SFS	SFS00020	Southern Victorian Grain and Graze 2 Program	31 Jan 2010	31 Dec 2013
GRDC, SRDC	SRD00002	Contribution to DAQ00129 Improving the integration of legumes in grain and sugarcane farming systems in southern Queensland	1 Jul 2008	30 Jun 2012
DAFF, DERM, GRDC, SRDC	SRD00003	Reducing nitrous oxide emissions from sugarcane lands	15 Mar 2009	30 Jun 2012
GRDC, SRDC	SRD00004	Water use efficiency	1 Jul 2010	30 Jun 2014
DPI VIC, GRDC, UA	UA00111	Developing chemical methods to mobilise fixed nutrients in cropping soils	30 Jun 2009	31 Dec 2013
DAFF, GRDC, UA	UA00117	Eyre Peninsula Grain and Graze 2	31 Mar 2010	31 Dec 2013
DAFF, GRDC, UM	UM00037	Enhanced efficiency fertilisers as mitigation tools for reducing greenhouse gas emissions from intensive agricultural systems in Australia	15 Jun 2009	30 Jun 2012
DAFF, DPI NSW, GRDC, UNE	UNE00012	Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management	1 May 2009	30 Apr 2012
GRDC, UT, UWA, CUR, UF, UNE, USQ, USC, CRDC, UCS	UT00019	Primary Industry Centre for Science Education—Phase 3	30 Jun 2009	30 Jun 2012
DAFF, GRDC, UWA	UWA00131	Fertiliser management strategies for decreasing on-farm greenhouse gas emissions	1 Mar 2009	28 Dec 2012

AAGIS = Australian Agricultural and Grazing Industries Survey, ABARES = Australian Bureau of Agricultural and Resource Economics and Sciences, ACIAR = Australian Centre for International Agricultural Research, AEA = Ag Excellence Alliance, AEC = Australian Egg Corporation, ANU = Australian National University, APL = Australian Pork Ltd, ARC = Australian Research Council, ARLP = Australian Rural Leadership Program, AWI = Australian Wool Innovation Ltd, BCG = Birchip Cropping Group, CBH = Cooperative Bulk Handling Ltd, CRCNPB = Cooperative Research Centre for National Plant Biosecurity, CRDC = Cotton Research and Development Corporation, CSIRO = Commonwealth Scientific and Industrial Research Organisation, CU = Cornell University, CUR = Curtin University of Technology, DA = Dairy Australia, DAFF = Department of Agriculture, Fisheries and Forestry, DAFWA = Department of Agriculture and Food, Western Australia, DEEDI = Department of Employment, Economic Development and Innovation, Queensland, DERM = Department of Environment and Resource Management, Queensland, DEST = Department of Education, Science and Training (now Department of Education, Employment and Workplace Relations), DPI VIC = Department of Primary Industries, Victoria, DPI NSW = Department of Primary Industries, New South Wales, DRALGAS = Australian Government Department of Regional Australia, Local Government, Arts and Sport, FG = Facey Group, FR = FarmLink Research, FRDC = Fisheries Research and Development Corporation, FWPA = Forest and Wood Products Australia, GC = Graincorp Operations Ltd, HAL = Horticulture Australia Ltd, I&I NSW = Industry and Investment New South Wales, LWA = Land and Water Australia, MLA = Meat and Livestock Australia, NRS = Nicon Rural Services, NSW = New South Wales, NUF = Nuffield Australia, PNP = Productive Nutrition Pty Ltd, PRC = Pork CRC Ltd, QUT = Queensland University of Technology, RIRDC = Rural Industries Research and Development Corporation, ROE = Roberts Evaluation Pty Ltd, SAGIT = South Australian Grains Industry Trust, SARDI = South Australian Research and Development Institute, SFS = Southern Farming Systems, SRDC = Sugar Research and Development Corporation, UA = University of Adelaide, UCS = Charles Sturt University, UF = The Flinders University of SA, UM = University of Melbourne, UNE = University of New England, UNSW = University of New South Wales, UQ = University of Queensland, USC = Southern Cross University, USQ = University of Southern Queensland, UT = University of Tasmania, UWA = University of Western Australia, WA = Western Australia

Appendix D—Publications

The GRDC delivers a wide range of information products, in printed and electronic formats.

Most of the GRDC's electronic publications are available for download, free of charge, through the GRDC website. The website also provides a catalogue of GRDC publications and links to the GRDC's distribution service, Ground Cover Direct. Items in print or on CD or DVD can be ordered through Ground Cover Direct by phone, fax, email or post. Most are available for the cost of postage and handling only. Some books are sold at a price, to fully or partially recover the costs of publication.

Table 33 lists the new publications that were released in 2011–12.

Table 33: New GRDC publications in 2011–12

Booklets	
	<i>Adjuvants—Oils, Surfactants and Other Additives for Farm Chemicals (2012)^a</i>
	<i>Aerating Stored Grain—Cooling or Drying for Quality Control</i>
	<i>Managing Legume and Fertiliser N for Northern Grains Cropping</i>
	<i>Spread, Delve, Spade, Invert^a</i>
	<i>The Current and Potential Costs from Diseases of Oilseed Crops in Australia</i>
	<i>The Current and Potential Costs from Diseases of Pulse Crops in Australia</i>
	<i>Water Use Efficiency of Grain Crops in Australia: Principles, benchmarks and management</i>
	<i>Weather Essentials for Pesticide Application^a</i>
CDs and DVDs	
Driving Agronomy CDs	Northern Region (November 2011)
	Southern Region (November 2011)
	Western Region (November 2011)
Ground Cover DVDs	Episode 4 (July–August 2011)
	Episode 5 (September–October 2011)
	Episode 6 (January–February 2012)
	Episode 7 (May–June 2012)
Corporate publications	
Governance	<i>GRDC Annual Report 2010–11</i>
	<i>GRDC Growers' Report 2010–11</i>
	<i>GRDC Stakeholder Report 2012–13</i>
	<i>GRDC Annual Operational Plan 2012–13</i>
Products	Ground Cover Direct publications catalogue:
	<ul style="list-style-type: none"> • November–April 2011 • May–October 2012
Fact sheets	
National	End Point Royalties—End Point Royalties: Simplifying the System
	Foliar Applications of Spray—Foliar Applications of Fungicides and Insecticides
	Grain Storage—Dealing with High-moisture Grain
	Grain Storage—Stay Safe around Grain Storage
	Grain Storage—Storing Oilseeds
	Grain Storage—Storing Pulses
	Grain Storage—Successful Storage in Grain Bags
	Grain Storage—Vigilant Monitoring Protects Grain Assets
	In-Crop Herbicide Use—Application Considerations for In-crop Herbicide Use
	Mouse Control—Minimising Crop Damage by Mice
	Pre-season Sprayer Checks

Table 33: New GRDC publications in 2011–12 *(continued)*

Fact sheets <i>(continued)</i>	
National <i>(continued)</i>	<p>Spray Equipment—Weather Monitoring Equipment for Agricultural Spraying Operations</p> <p>Spray Mixing Requirements—Mixing Requirements for Spraying Operations</p> <p>Spray Water Quality—Water Quality for Spraying Operations</p> <p>Stem Rust of Wheat—Seasonal Conditions Drive Outbreaks</p> <p>Surface Temperature Inversions and Spraying—The Influence of Surface Temperature Inversions on Spray Operations</p> <p>Variable-Rate Application—Make Variable-Rate Application Pay</p>
Northern Region	<p>Herbicide Resistance—Cropping with Herbicide Resistance</p> <p>Yellow Spot—Management to Reduce the Risk of Yellow Spot</p>
Southern Region	<p>Herbicide Resistance—Cropping with Herbicide Resistance</p> <p>Summer Fallow Management—Make Summer Weed Control a Priority</p> <p>Yellow Leaf Spot—Management to Reduce the Risk of Yellow Leaf Spot</p>
Southern and Western regions	<p>Rhizoctonia—Management to Minimise Rhizoctonia Disease in Cereals</p>
Western Region	<p>Barley Powdery Mildew—Control Strategies for Powdery Mildew</p> <p>Herbicide Resistance—Cropping with Herbicide Resistance</p> <p>Summer Fallow Management—Make Summer Weed Control a Priority</p> <p>Yellow Spot—Management to Reduce the Risk of Yellow Spot</p>
Grain and Graze 2	<p>Making a Mixed Farming System Work for You—East South Australia</p> <p>Making a Mixed Farming System Work for You—Eyre Peninsula</p> <p>Making a Mixed Farming System Work for You—Northern Region</p> <p>Making a Mixed Farming System Work for You—Northern Victoria</p> <p>Making a Mixed Farming System Work for You—Southern New South Wales</p> <p>Making a Mixed Farming System Work for You—Southern Victoria</p> <p>Making a Mixed Farming System Work for You—Western Australia</p>
Top Paddock	<p>Adapting to Hotter Conditions and More Variable Summer Rainfall in Northern Growing Regions</p> <p>Adapting to Hotter Conditions and More Variable Summer Rainfall in Southern Growing Regions</p> <p>Adapting to Hotter Conditions and More Variable Summer Rainfall in Western Growing Regions</p> <p>Greenhouse Gas Emissions from Grain Production (national)</p> <p>How GRDC is Helping Grain Growers to Adapt their Businesses to Australia's Changing Climate</p> <p>Multi-week Forecasts for the Northern Region</p> <p>Multi-week Forecasts for the Southern Region</p> <p>Multi-week Forecasts for the Western Region</p> <p>Reducing Fertiliser Nitrogen Loss and Nitrous Oxide Emissions (Northern and Southern regions)</p> <p>Storing Soil Carbon to Reduce Greenhouse Gas Emissions (national)</p> <p>The Impacts of Increasing Carbon Dioxide in Northern Grain Growing Regions</p> <p>The Impacts of Increasing Carbon Dioxide in Southern Grain Growing Regions</p> <p>The Impacts of Increasing Carbon Dioxide in Western Grain Growing Regions</p> <p>Using Legumes to Reduce Nitrogen Loss and Nitrous Oxide Emissions (national)</p>
Guides	
Back Pocket	<p><i>Nozzle Selection for Boom, Band and Shielded Spraying</i></p> <p><i>Stored Grain Pests Identification</i></p>
Sowing and harvest	<p><i>South Australia Sowing Guide 2012</i></p> <p><i>South Australian Crop Harvest Report 2012</i></p>

Table 33: New GRDC publications in 2011–12 *(continued)*

Guides <i>(continued)</i>	
Varieties	<i>Wheat Variety Guide for Western Australia 2012</i> <i>Barley Variety Guide for Western Australia 2012</i> <i>Queensland 2012 Wheat Varieties Guide</i> <i>Variety Sowing Guide—Victoria</i>
Newsletters	
HoRiZon (high-rainfall zones)	Issue 3 (March 2012) Issue 4 (June 2012)
Grains Research Update	Northern Region: issues 61, 62, 63 and 64 Southern Region: issues 12, 13, 14, 15, 16 and 17
Farm Business Update	Southern Region: July 2011, February 2012
CLIMAG (Managing Climate Variability Program)	Edition 21 (August 2011) Edition 22 (March 2012)
Newspapers	
Ground Cover and Ground Cover supplements	Six issues, all with supplements: <ul style="list-style-type: none"> • Issue 93: International Collaboration—Shared Solutions to Common Issues • Issue 94: Crop Protection—An Integrated Approach • Issue 95: Mixed Farming—Flexible Fields—Crop, Pasture or Both • Issue 96: Soil Biology Initiative—Harnessing the Soil's Secrets • Issue 97: More Profit from Nutrition—Making Crop Nutrition More Hit and Less Miss • Issue 98: Crop Sequencing—Flexible Farming
Tools	
Hard copy	2012 Paddock Diary 2012 Farm Gross Margin and Enterprise Planning Guide Stored Grain Pests Identification Poster
Electronic	Weeds: the Ute Guide phone app (Southern Edition)

a Hard copies of this booklet cost \$10 in addition to postage and handling.

GRAINS RESEARCH AND DEVELOPMENT CORPORATION SELECTION COMMITTEE

Senator the Hon Joe Ludwig
Minister for Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Minister

Grains Research and Development Corporation Selection Committee Report 2011-12

This report summarises the activities of the Grains Research and Development Corporation (GRDC) selection committee from 1 July 2011 to 30 March 2012, pursuant to section 141 of the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act), in relation to the nomination of seven directors for appointment to the GRDC Board.

Establishment of the selection committee

The GRDC selection committee was established under the PIERD Act for the purpose of nominating to you seven persons for appointment as directors of the GRDC.

I was appointed by you as presiding member on 27 May 2011, for the period ending 30 June 2014. On 11 July 2011, following nominations made by the GRDC's representative industry organization Grain Producers Australia (GPA), the selection committee was appointed as follows:

- Mr David Crombie
- Mr Terry Enright
- Prof Alistar Robertson
- Ms Fiona Simson
- Ms Jane Walton
- Mr Andrew Weidemann

Selection Process

Applications were called through advertisements placed in the following newspapers:

Friday 24 June, 1 July The Financial Review
Saturday 25 June, 2 July The Weekend Australian
Week of 27 June the Rural Press

Details of the director vacancies were also distributed through a range of electronic networks covering websites for GRDC, Women on Boards Organisation, the Australian Rural Leadership Foundation and Nuffield Australia Farming Scholars. A total of 164 applications were received, of which 48 (30% of total) were received from female applicants and 4 from existing directors. The GRDC's representative industry organisation, Grain Producers Australia was also invited to nominate candidates for consideration by the selection committee. Existing GRDC directors were also invited to apply.

A search was conducted of the Department for Agriculture, Forestry and Fisheries *Balance* database as well as the *AppointWomen* database.

Applications closed on 8 July 2011.

In accordance with the PIERD Act, the advertisements called for written applications against the following criteria:

- Grains production, processing and marketing
- Environmental and ecological matters
- Science and technology
- Technology transfer
- Management and conservation of natural resources
- Economics
- Administration of research and development
- Finance and business management
- Sociology
- Public administration

All candidates were also required to have:

- An understanding of corporate governance and directors' responsibilities
- Good communication skills and the capacity to represent GRDC to all stakeholders

The GRDC Chair and its Managing Director were consulted and provided the selection committee with a detailed briefing on the Corporation and its strategic direction immediately prior to the short listing process.

In developing the shortlist, the selection committee took into account the core selection criteria contained in the PIERD Act, along with other criteria agreed as important including:

- Strong strategic thinking
- Commercial sensitivity to grain production
- Awareness and understanding of the international research & development environment in both public and private sectors
- Demonstrated experience in commercial deal brokerage
- Geographical diversity of production experience and knowledge

The selection committee met on 28th July 2011 to review the applications. The committee unanimously agreed to a shortlist of 16 candidates for interview, including 4 women and 3 existing directors.

Interviews were conducted on 11 and 12 August 2011 at the Stamford Plaza Hotel, Sydney Airport. Two of the shortlisted applicants were unable to attend in person and undertook telephone interviews. One candidate was unable to attend due to having undergone surgery immediately prior to the date and detailed discussions were conducted by telephone with the candidate, the candidate's referees and the Chair of GRDC.

Following interviews the selection committee made its final decisions, taking into account the collective balance of expertise and experience in board affairs required by the PIERD Act.

Board Appointments

Upon completion of the selection process, the GRDC selection committee reported to you with seven nominations for your consideration. You appointed six nominees for a term commencing 4 November 2011 and ending 30 September 2014 and requested the committee to provide you with a further nomination. The seventh nominee was appointed by you commencing 8 March 2012 and ending 30 September 2014. The appointments included:

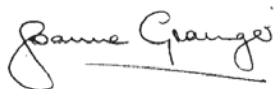
- Mr Richard Brimblecombe new appointment resident of Queensland
- Dr Jeremy Burdon new appointment resident of the Australian Capital Territory
- Ms Jennifer Goddard reappointment resident of the Australian Capital Territory
- Mr Kim Halbert new appointment resident of Western Australia
- Prof Robert Lewis new appointment resident of South Australia
- Mrs Sharon Starick new appointment resident of South Australia
- Mr John Woods new appointment resident of New South Wales

Expenses

Item	\$
selection committee and applicant's travel, accommodation and expenses	27,211.55
Advertising	11,816.53
Selection Committee members' fees (excluding the Presiding Member)	6,372.00
Presiding Member's fees	20,787.06
Secretariat Costs (supporting the selection committee)	4,772.27
Total (Excluding GST)	70,959.41

Following notification of your appointment of the seventh director, I formally abolished the GRDC selection committee pursuant to section 129 of the PIERD Act on 23 March 2012.

Yours sincerely



Joanne Grainger
 Presiding Member
 Grains Research and Development Corporation Selection Committee
 30 July 2012

In confirmation of electronic copy sent by email Monday, 6 August 2012

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Abbreviations list

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABC	Australian Broadcasting Corporation
ACPGF	Australian Centre for Plant Functional Genomics
ADWIP	Australian Durum Wheat Improvement Program
APVMA	Australian Pesticides and Veterinary Medicines Authority
AVRDC	World Vegetable Center
CAC Act	<i>Commonwealth Authorities and Companies Act 1997</i>
CAIGE	CIMMYT–Australia–ICARDA Germplasm Evaluation
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DGT	diffusive gradients in thin films
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FBM	Farm Business Management
FOI Act	<i>Freedom of Information Act 1982</i>
GM	genetically modified
GPA	Grain Producers Australia Limited
GPS	Global Positioning System
Grains Industry National RD&E Strategy	<i>Grains Industry National Research, Development and Extension Strategy</i> , April 2011
GRDC	Grains Research and Development Corporation
GST	goods and services tax
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IPS	Information Publication Scheme
NMIP	National Mungbean Improvement Program
NVT	National Variety Trials
PICSE	Primary Industry Centre for Science Education
PIERD Act	<i>Primary Industries and Energy Research and Development Act 1989</i>
POAMA	Predictive Ocean Atmosphere Model for Australia
R&D	research and development
RD&E	research, development and extension
RDCs	rural R&D corporations
SAM	Southern Annular Mode
SARDI	South Australian Research and Development Institute
SLG	Senior Leadership Group
SMS	Short Messaging Service
TFP	total factor productivity
WHS	work health and safety

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