Australian Government

Grains Research and Development Corporation

GRDC ANNUAL REPORT 2010–2011

GRDC

Grains Research & Development Corporation

www.grdc.com.au

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.

Irrigated grains are an increasingly important part of Rob O'Connor's Tasmanian enterprise. Photo: Catherine Norwood

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 2010–11

- The GRDC invested $140 million in more than 900 projects across 230 organisations, employing approximately 2,500 researchers, administrators and agribusiness personnel. **Pages 148–173**
- External and internal financial analysis of GRDC projects showed benefit to cost ratios ranging from 1.2:1 to 19.3:1. **Page 17**
- The Managing Climate Variability program, which supports a range of research and information activities to help farmers to manage risk and make business decisions under changing climate conditions, was extended. **Page 29**
- MyCrop—a diagnostic tool for wheat, which brings together soil and crop diagnostic information within a logical, easy-to-use electronic format—was made available online. **Page 33**
- The National Integrated Weed Management Initiative devised and adopted a national plan, in consultation and collaboration with growers, researchers and other cross-sectoral organisations. **Page 34**
- The National Invertebrate Pest Initiative adopted a national plan, including work to better understand the threats posed by insecticide resistance and increase industry awareness of threats across all invertebrate pest species. **Page 34**
- Grain and Graze 2, the second phase of a program to build on and increase the sustainability of mixed farming practices and the resilience of mixed farming businesses, commenced across all three grain-growing regions. **Page 35**
- PestFax Map—an interactive risk management tool to address pest and disease threats in the Western Australian grain belt, with easy-to-view maps showing current and previous occurrences of crop pests and diseases—was made available online. **Page 37**
- Breeding programs released new, improved crop varieties:
  - six wheat varieties
  - two field pea varieties
  - two lentil varieties
  - one triticale variety
  - one peanut variety. **Pages 44–47**
- A not-for-profit company, Wheat Quality Australia Limited, was established to manage the new wheat variety classification system. **Page 45**
- Managed environment facilities started to deliver reliable, high-quality data about the performance of breeding lines under water-limited conditions. **Page 47**
- All Australian winter cereal, pulse and canola breeders participated in National Variety Trials. **Page 49**
- Three novel grain products for use in food—high-amylose wheat, ultra-low gluten barley and omega-3 canola—moved significantly closer to commercialisation, as did safflower oil with potential for industrial uses. **Page 56**
- The GRDC supported three scholarships as part of a pilot program of training awards for Indigenous Australians. **Page 66**

Figure 1 Total grain production and cropping area, 2000–01 to 2010–11

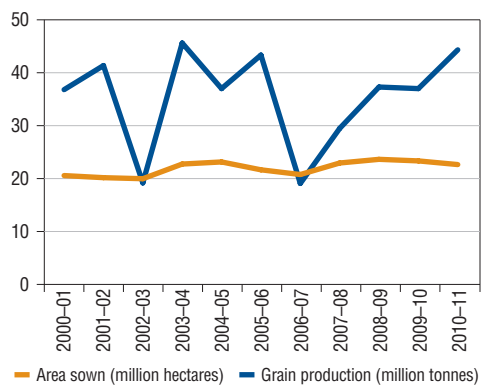
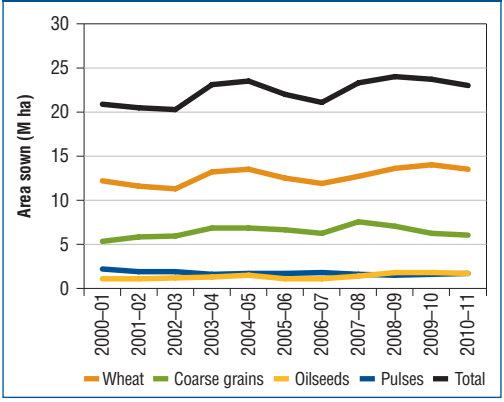


Figure 2 Area sown to grains by crop type, 2000–01 to 2010–11



- Thousands of copies of GRDC publications were distributed around Australia, including fact sheets, the *Ground Cover* newspaper, *Ground Cover* supplements, *Ground Cover* DVDs, research reports, Ute Guides, audio CDs, paddock diaries, Back Pocket Guides, grain grower and technical adviser booklets, *Grains Research Update* newsletters and web-based information packages. **Pages 179–180**
- The GRDC supported 11 Travel Awards, eight Industry Development Awards, 29 conferences and 55 new training scholarships, including 20 Agricultural Training Awards, 10 Grains Industry Undergraduate Honours Scholarships, one Grains Industry Visiting Fellowship and 21 Grains Industry Research Scholarships. **Pages 66–67**
- More than 3,000 people attended the GRDC Research Updates and specialist workshops on topics including precision agriculture, irrigation in grains and wide row spacing/stubble management.
- The *Grains Industry National Research, Development and Extension Strategy* (the National Grains RD&E Strategy) was published, and the first investment under the strategy was approved.
- The GRDC received gold awards from the Institute of Public Administration Australia ACT for the printed and online versions of its Annual Report 2009–10, and received a silver award for the printed version of the annual report (as well as being a finalist in the online report category) in the Australasian Reporting Awards.

Challenges in 2011–12

Factors that are expected to influence the business environment in 2011–12 include:

- implementation of the National Grains RD&E Strategy, which provides a guide to enable greater cooperation between some of the key investors in Australian grains RD&E
- the need to lift productivity growth in the face of a generalised productivity growth slow-down
- the importance of demonstrating the impact of RD&E on the profitability, productivity and sustainability of the grains industry so that the benefits achieved through the GRDC's investment activities are clear to stakeholders
- the need to understand both the effects of agriculture on greenhouse gas emissions—to prepare the industry for a low-carbon economy—and the effects of climate change on agriculture
- significant characteristics of the Australian and global grain markets, including
  - changes in grain-marketing arrangements
  - the rate of recovery from the global financial crisis
  - global food security issues, including policies affecting the availability of grain to the export market
  - volatility in grain prices and the cost of inputs relative to grain prices
  - changing demand for grain and grain products.

The GRDC will also continue to focus on improving its operations in areas related to the investment process, business processes, engagement with stakeholders and international alliances.

Figure 3 GRDC income in 2010–11

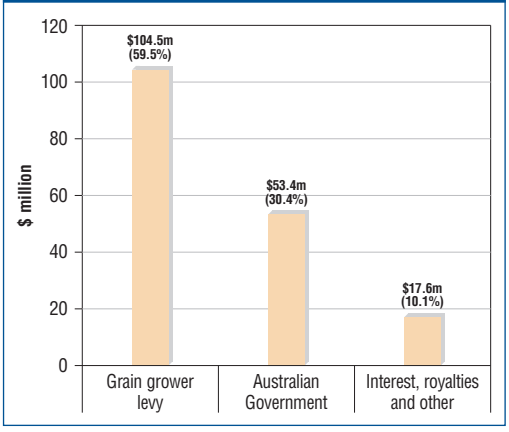
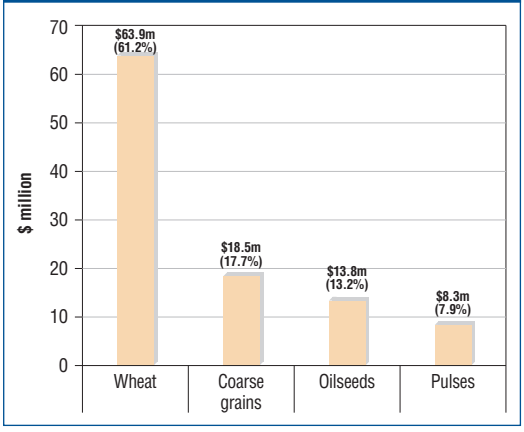


Figure 4 GRDC grain grower levy by crop type in 2010–11



Highlights of 2010–11

Table 1 Five years at a glance

	2010–11		2009–10	2008–09	2007–08	2006–07[a]
GRDC						
Revenue	$175.5m	▲	$143.8m	$150.4m	$127.2m	$98.6m
Expenditure	$154.1m	▲	$133.4m	$121.3m	$102.5m	$118.2m
Operating surplus/(deficit)	$20.8m	▲	$9.8m	$28.5m	$24.1m	($19.8m)
Total assets	$206.0m	▲	$176.7m	$159.1m	$117.5m	$106.0m
Total equity	$149.3m	▲	$128.5m	$118.7m	$89.7m	$65.6m
Industry contributions	$104.5m	▲	$74.1m	$89.1m	$76.6m	$50.9m
Commonwealth contributions	$53.4m	▲	$50.1m	$43.9m	$37.6m	$35.8m
R&D expenses	$140.7m	▲	$116.8m	$106.3m	$89.1m	$105.6m
Employee benefits	$6.9m	▲	$6.4m	$6.1m	$5.8m	$5.6m
Suppliers	$5.7m	▲	$5.6m	$5.2m	$5.1m	$5.1m
Number of full-time GRDC staff[b]	48	▼	50	49	47	44
Number of projects	900	–	868	771	611	680
Grains industry						
Estimated number of grain farms[c]	20,993[d]	–	20,993	22,082	22,006	20,097
Number of grain crops covered by R&D levies	25	–	25	25	25	25
Estimated gross value of production[e]	$12,701m	▲	$8,588m	$10,749m	$10,733m	$5,006m
Total grain production—summer and winter crops ('000 tonnes)[f]	44,743	▲	37,330	37,609	29,748	19,188

a Figures for 2006–07 have been restated in accordance with a new accounting policy regarding grant income.
b Number of full-time GRDC staff as at 30 June each year.
c 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 2006–07 to 2009–10 restate the estimated numbers of grain farms shown in previous GRDC annual reports following ABARES advice that previous estimates had included non-grain crops.
d No updated estimate for 2010–11 was available at the time of publication.
e Latest ABARES estimates for the gross value of production of grains and oilseeds, excluding rice—from the June 2011 *Australian Commodities* report.
f Latest ABARES estimates for total summer and winter crop production, excluding cotton seed and rice—from the June 2011 *Australian Crop Report*.

Figure 5 GRDC expenditure in 2010–11

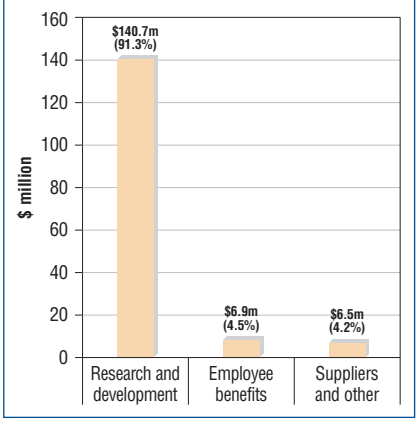
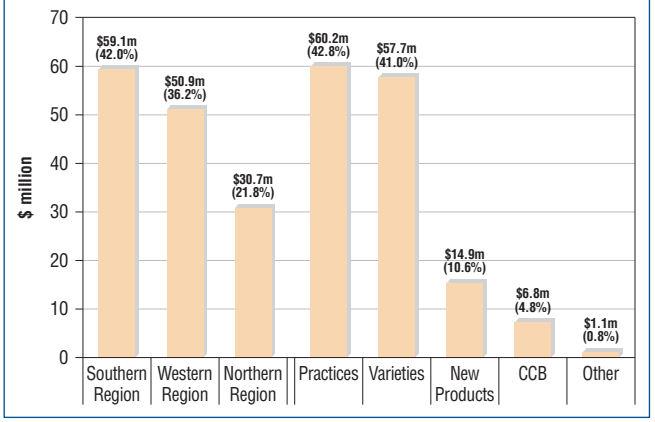


Figure 6 R&D investment by line of business and region in 2010–11



Letter of transmittal

Australian Government
Grains Research and Development Corporation

GRDC
Grains Research & Development Corporation

6 October 2011

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 2011, 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).

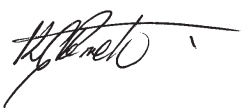
The GRDC is confident that its performance in 2010–11 contributed to the industry's and the government's vision for a profitable, internationally competitive and ecologically sustainable Australian grains industry. This achievement is consistent with the GRDC's responsibility to plan, execute and report against the:

- objects of the PIERD Act as they apply to the GRDC
- planned outcomes of *Prosperity through Innovation*, the corporation's five-year 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 and Companies (Report of Operations) Orders 2008 (Finance Minister's Orders).

The attached report of operations was made in accordance with a resolution of the corporation's directors on 28 September 2011 and presents fairly the information required by the Finance Minister's Orders.

Yours sincerely



Keith Perrett
Chair

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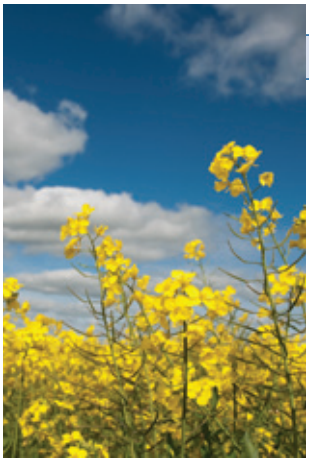

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PART 1

Overview

Canola. Photo: GRDC

About the GRDC

Purpose

The Grains Research and Development Corporation (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 GRDC assists the 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 R&D, to reduce fragmentation and duplication, and to help address industry-wide issues such as biosecurity and climate change.

Organisational outcome

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.

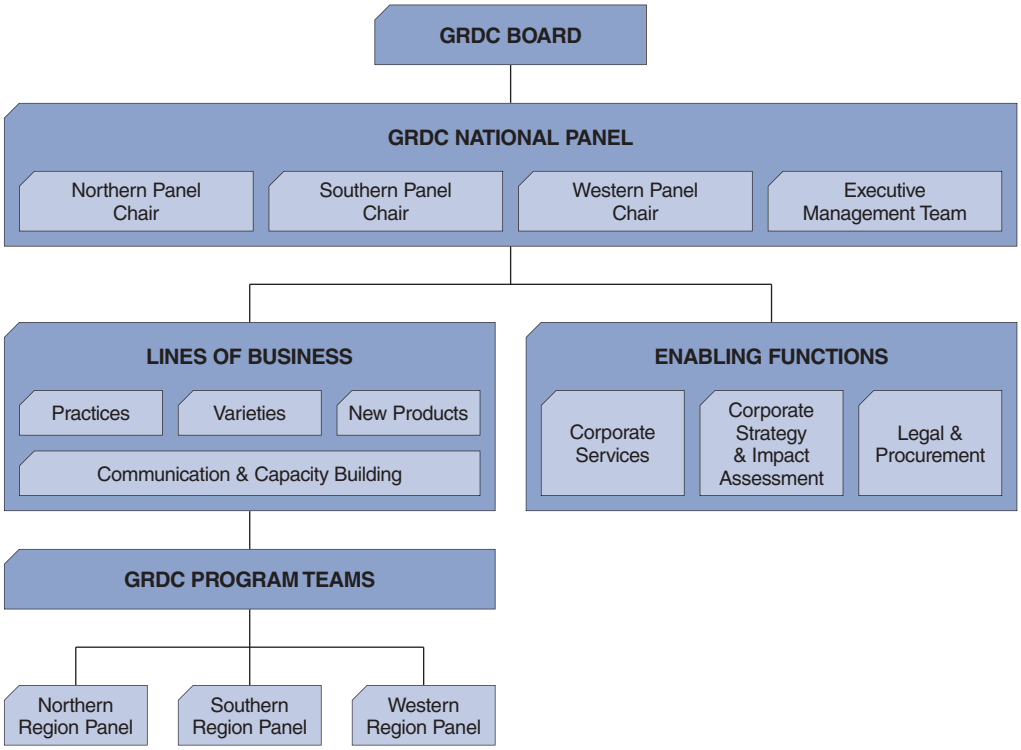
The Australian Government will match the levy up to a limit of 0.5 percent of the three-year rolling average of the gross value of production of the 25 leviable crops.

Grain Producers Australia members and the GRDC Board working together to maximise the returns to growers from research investment. Photo: GRDC

Structure

The organisational structure of the GRDC is shown in Figure 7.

Figure 7 GRDC structure, 2010–11



Note: For the purposes of performance reporting against the GRDC Annual Operational Plan 2010–11 and *Prosperity through Innovation*, the corporation's five-year Strategic R&D Plan 2007–12, each line of business corresponds to an output group. The fourth output group, Communication & Capacity Building, is a combination of communication and capacity-building programs managed within the other three output groups.

Board

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.

At 30 June 2011, the Board comprised eight Directors: Keith Perrett (Chair), John Harvey (Managing Director), Nicole Birrell, Colin Butcher, Jenny Goddard, Steve Marshall, Timothy Reeves and Graeme Robertson. More details on the roles and backgrounds of the Board members are provided in Part 3.

Executive Management Team

The Executive Management Team (EMT) has seven members: John Harvey (Managing Director) and the executive managers from each of the six management groups. At 30 June 2011, the executive managers were Gavin Whiteley (Corporate Services), Leecia Angus (Corporate Strategy & Impact Assessment), Geoff Budd (Legal & Procurement), Stephen Thomas (Practices and Communication & Capacity Building) and Vince Logan (New Products); the position of Executive Manager Varieties and Communication & Capacity Building was vacant.

The EMT 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 EMT meets regularly, and maintains and updates an annual business schedule.

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

Lines of business and enabling functions

At the operational level, the GRDC's organisational structure is divided into three lines of business, described as 'output groups' for performance reporting purposes: Practices, Varieties and New Products. A fourth output group, Communication & Capacity Building, delivers the outputs of the communication and capacity-building programs that are managed within the three lines of business.

The lines of business are supported by three enabling functions: Corporate Services, Corporate Strategy & Impact Assessment, and Legal & Procurement.

Advisory panels and program teams

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

Regional panels

The three regional advisory panels, covering the northern, southern and western grain-growing regions of Australia, 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 regional panels develop and monitor regional investment priorities for their regions, identify investments that respond to the national priorities of grain growers and the Australian Government, and make recommendations to the National Panel. They work closely with grower groups and organisations and interact formally with local research advisory committees, which refer research issues to the panels.

Figure 8 provides an overview of the geographical, environmental and agricultural characteristics of the three grain-growing regions.

National Panel

The National Panel comprises the three regional panel chairs, the GRDC's Managing Director and the GRDC's executive managers.

The National Panel addresses national R&D priorities across the GRDC's investment portfolio, takes advice from program teams and advances recommendations to the Board. The National Panel also assists the Board to maintain links with grain growers, the Australian Government, state and territory governments and research partners.

Program teams

The GRDC has three program teams, each composed of program managers, members from each regional panel, an executive manager and a panel chair. Depending on the size and complexity of the portfolio, some program teams cover several subprograms.

The program team is responsible for developing, implementing and reviewing investment strategy and advising on proposed investments within its output group. Other activities include evaluating projects, prioritising potential investment opportunities and monitoring project performance.

The Southern Panel Spring Tour in 2010 included a visit to the Bayer CropScience product demonstration trial site at Pinery, SA. (From left) Rob Griffith, Bayer Technical Adviser; Chris Blanchard, Southern Region panel member; Alok Kumar, Plant Breeding Project Manager; Greg Skinner, Bayer National Technical Advisory Manager; Paul Wilcox, Bayer Business Development Manager; Andrew Rice and Richard Konzag, Southern Region panel members; Geoff Budd, Executive Manager Legal & Procurement; Andy Barr, Southern Region panel member; Andrew Reese, Bayer Agronomist; Colin Butcher, GRDC Board member. Photo: GRDC

Figure 8 GRDC regions

NORTHERN REGION

Features:

- tropical and subtropical climate
- high inherent soil fertility
- yield dependency upon conservation of soil moisture from subtropical rainfall
- large winter and summer cropping enterprises
- diversity in crop choice
- need for better-adapted pulses
- premium high-protein wheats for export and domestic markets
- high potential yields
- competition with cotton
- feed grain for livestock.

Alexander Burnheim's mungbean crop. Photo: Brad Collis

SOUTHERN REGION

Features:

- temperate climate
- relatively low soil fertility
- yield dependency upon reliable spring rainfall
- smaller mixed farming enterprises involving winter cropping and livestock production
- diverse production patterns and opportunities
- large and diverse domestic markets
- phase farming innovation
- increases in intensive livestock production and demand for feed grain.

Victorian based consultant Simon Severin from Dogshun Medlin Ag Management inspecting a wheat crop. Photo: Paul Jones

WESTERN REGION

Features:

- Mediterranean climate
- low soil fertility
- yield dependency upon good winter rains as spring rainfall is generally unreliable
- large winter cropping enterprises
- narrower range of crop options
- dominant export market, smaller domestic market
- leading grain storage practice
- ease of transport access to South-East Asia.

Gavin Hill uses a low-drift spraying set-up as part of his weed management system at his business near Holt Rock in WA's eastern grain belt. Photo: Nicole Baxter

Planning and reporting approach

The GRDC is a statutory corporation, operating as a research investment body on behalf of Australian grain growers and the Australian Government. As well as its responsibilities under the PIERD Act, the corporation has accountability and reporting obligations set out in the *Commonwealth Authorities and Companies Act 1997* (CAC Act) and in the Commonwealth Authorities and Companies (Report of Operations) Orders 2008. The GRDC is a portfolio agency of the Australian Government Department of Agriculture, Fisheries and Forestry.

Table 2 shows the elements of the approach the GRDC adopts to meet its corporate planning and reporting obligations as a statutory corporation.

In line with the corporation's enabling legislation, the GRDC Board communicates its strategic directions and performance objectives through a five-year strategic R&D plan that delivers:

- a statement of the GRDC's objectives and priorities
- an outline of the GRDC's strategies to achieve those objectives and priorities.

The GRDC's Strategic R&D Plan 2007–12, *Prosperity through Innovation*, took effect from July 2007. The plan provides a framework for investment and delivery of outputs and outcomes that will address the Australian Government's National Research Priorities and Rural R&D Priorities, as well as the priorities of Australian grain growers, over the 2007–12 period. These priorities, and the GRDC's achievements in meeting them in 2010–11, are discussed in more detail in Part 2.

Each year's planned activities are outlined in operational terms in an annual operational plan, and in terms of an outcome-based performance measurement framework in the portfolio budget statements. This annual report details the GRDC's achievements against its planned outputs set out in the GRDC Annual Operational Plan 2010–11 and its planned outcome identified in the 2010–11 portfolio budget statements. The output groups used for reporting purposes correspond to the three lines of business and the communication and capacity-building programs that underpin the GRDC's business strategy and operations.

The corporation uses the Australian National Audit Office *Better Practice Guide: Public Sector Governance* to assess its overall approach and ongoing development. The GRDC's corporate governance in 2010–11 is discussed in detail in Part 3.

The GRDC's drivers for action, corporate and output group objectives, strategies and future directions are summarised in Figure 9.

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 R&D 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 R&D 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, summarises the planned deliverables, outcomes, performance information and financial statements for a given financial year.

[a] Available at www.grdc.com.au/director/about/corporategovernance.

Figure 9 Overview of the GRDC performance framework, 2010–11

Role of the GRDC described in the *Primary Industries and Energy Research and Development Act 1989* **Refer page 2**	Australian grain grower priorities **Refer pages 22–23**	Australian Government: National Research Priorities **Refer pages 24–27**	Australian Government: Minister's R&D Priorities **Refer pages 25–27**	Australian Government: Rural R&D Priorities **Refer pages 24–27**

Prosperity through Innovation: **Strategic Research and Development Plan 2007–12**	**Annual Operational Plan 2010–11**	**Portfolio Budget Statements 2010–11**

Corporate objective	Australian grain growers effectively competing in global grain markets			
Corporate strategies	Coordinate a national grains R&D agenda and portfolio	Deliver against Australian Government priorities	Grow and leverage total grains R&D investment	Ensure R&D is market driven
Performance indicators/ outputs	**Refer pages 14–15**	**Refer page 15**	**Refer page 15**	**Refer pages 15–16**

Objectives	**Output Group 1—Practices** Better practices developed and adopted faster	**Output Group 2—Varieties** Growers have access to superior varieties that enable them to effectively compete in global grain markets	**Output Group 3—New Products** Deliver new products and services (both on farm and off farm) that will assist growers to effectively compete in global grain markets	**Output Group 4—Communication & Capacity Building** Increase the awareness and capacity to optimise adoption of grains research outputs
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	• 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	• 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—demonstrate stakeholder return on investment	• Ensure planned, targeted, measured communication • Coordinate a national approach to building industry and research capacity • Leverage delivery through partnerships • Develop demand-driven publications and products
Performance indicators/ outputs	**Refer pages 40–42**	**Refer pages 53–54**	**Refer pages 60–62**	**Refer pages 73–76**

Outcome	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.
Future	The GRDC be recognised as a leader in setting, coordinating and facilitating a national grains R&D agenda driven by market signals that would enable grain growers to compete on world markets, and deliver against Australian Government priorities.

Report from the Chair and Managing Director

The year 2010–11 saw many challenges and opportunities facing the grains industry. Extraordinary weather events were experienced in the northern and southern parts of Australia, resulting in an extremely wet harvest and, in some areas, the worst flooding on record—many growers face the challenge of having to repair damaged soils which have been badly compacted by harvesting machinery. In Western Australia, growers experienced severe drought and poor yields.

On the research, development and extension (RD&E) front, the adverse seasonal conditions affected trial results, and many trials had to be repeated.

In addition, the threat of a major locust plague in August and September 2010 coupled with a mouse plague in 2011 had growers across the southern and northern parts of Australia spraying and baiting to ensure that crop losses were kept to a minimum.

The following sections summarise the GRDC's performance and grains industry production in 2010–11, and describe some key results achieved for the grains industry during the reporting period.

Keith Perrett
Chair

John Harvey
Managing Director

GRDC performance

The GRDC's Strategic R&D Plan 2007–12, *Prosperity through Innovation*, clearly defines the strategies and expected performance indicators for the output groups. This annual report covers the fourth year of implementation of the five-year strategic plan.

The GRDC is successfully delivering the planned outputs and meeting the key performance indicators that keep its annual operations in line with the targets of the five-year plan. Part 2 of this annual report provides specific information on the performance of each of the output groups, and shows how it is aligned to industry and government priorities.

The performance report confirms that GRDC-supported projects are providing the leadership and delivering the resources needed to enhance the productivity, competitiveness and sustainability of the grains sector in Australia.

Grains industry production

Despite the unusual conditions, overall grains industry production remained strong in 2010–11. As reported by the Australian Bureau of Agricultural and Resource Economics and Sciences, compared to results for 2009–10:

- the production of winter grains, oilseeds and pulses increased by 19 percent or 6.7 million tonnes, to 42 million tonnes from 35.3 million tonnes
- the production of wheat and barley increased 19 percent and canola production rose 11 percent, while chickpea and lupin production declined more than 20 percent
- summer crop production increased by 37 percent or 0.7 million tonnes, to 2.7 million tonnes from just under 2 million tonnes, due primarily to a 47 percent increase in sorghum production.

Overall, in 2010–11 grains industry production increased 20 percent or 7.4 million tonnes to 44.7 million tonnes from 37.3 million tonnes the previous year and had an estimated gross value of production of $12.7 billion.

National Grains RD&E Strategy

As described in last year's annual report, in 2009–10 a national strategy was developed for grains RD&E, through a committee comprising grain growers and representatives from the GRDC, the state departments of agriculture, the Australian Government, CSIRO and universities. In 2010–11, the strategy was finalised and endorsed by the Primary Industries Standing Committee and the Primary Industries Ministerial Council.

Over 1,800 copies of the full strategy were distributed nationally to participants involved in the strategy consultative process. In early June 2011, 41,000 copies of a brochure entitled *Grains Industry National Research, Development and Extension Strategy—Snapshot* were distributed nationally to growers and industry.

The *Grains Industry National Research, Development and Extension Strategy* (National Grains RD&E Strategy) will drive the GRDC's collective investments in RD&E to optimise inputs and investment from both the public and private sectors.

GRDC Regional Cropping Solutions

While the National Grains RD&E Strategy has a national approach, the GRDC recognises that growers require more effective delivery of region-specific RD&E programs to drive growth in productivity, profitability and sustainability. The GRDC Regional Cropping Solutions initiative established in 2010–11 will focus entirely on regional RD&E delivery, complementing the National Grains RD&E Strategy and enabling the GRDC to have a better understanding of local production issues.

The initiative will build regional development and extension capacity among growers and advisers, and provide a network of skilled and informed facilitators to link, support and inform regional planning groups. It is aimed at increasing profitability and delivering measurable productivity gains by shortening the length of the adoption cycle for the things that matter most to growers.

IA Watson Grains Research Centre

The National Grains RD&E strategy is founded on linking regional RD&E centres with private sector breeding, national centres of research and research programs that have a regional delivery focus.

The GRDC believes that capacity and capability building at the IA Watson Grains Research Centre at Narrabri (New South Wales) is critical to the future adoption of R&D outcomes in the GRDC's Northern Region. Over five years, commencing in 2010–11, the GRDC has committed funding to assist the centre to construct glasshouses, build regional field phenotyping capacity and improve links with grower groups and private sector agronomists to ensure that research results are tailored for adoption in the Northern Region.

International grains research links

International collaboration on grains R&D is about achieving mutual benefits and advancing global agriculture. Although, on a global scale, Australia is a small investor in grains and agricultural R&D, in many respects it is 'punching above its weight' when it comes to the results and developments achieved.

In 2010–11 the GRDC supported more than 900 research projects, of which around 18 percent involved international links. Many involved co-funding from government bodies, commercial companies or not-for-profit organisations in other countries.

The GRDC has longstanding formal research alliance agreements with the International Maize and Wheat Improvement Center (CIMMYT) in Mexico and the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria.

These very successful alliances have not only benefited farmers in the developing world but also provided Australian plant breeders with germplasm and landraces with unique genes for disease resistance and climate adaptation. In addition, the alliance agreements provide a framework for information sharing under the International Treaty on Plant Genetic Resources for Food and Agriculture.

The GRDC has recently entered into a memorandum of understanding as the first step towards establishing a third strategic alliance, with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India. This alliance will deliver germplasm and breeding tools, including molecular marker technology, to Australia's pulse-breeding programs.

Australian Cereal Rust Control Program

Currently, cereal rust costs the Australian grains industry $174 million, and breeding and fungicide controls prevent potential losses of $1.67 billion, each year.

The Australian Cereal Rust Control Program (ACRCP):

- delivers to growers new commercial wheat and barley varieties with improved rust resistance
- raises grower awareness, through the Rust Bust campaign, of the importance of management strategies to reduce the risk of disease outbreak
- plays an important role in addressing global rust threats, and assists Australia to be prepared for incursions of rust pathotypes, through the Borlaug Global Rust Initiative.

The threat to world wheat production from stem rust strain Ug99 has resulted in renewed global investment in agricultural R&D. Australia's recent research advances through the ACRCP are at the forefront of global work in this area. This investment protects Australian grain growers from future losses through rust pathotype incursion and mutation which could result in Australian varieties becoming more susceptible.

Omega-3 oil from canola

The GRDC, CSIRO and Nuseed entered into a $50 million research collaboration which will use leading-edge gene technology to develop and commercialise a canola plant that will provide an alternative and sustainable source of long-chain omega-3 oils.

Long-chain omega-3 fatty acids in the diet are essential for heart and brain health, child and infant development, and reducing inflammation, and have other health benefits. Projections show that the traditional source of omega-3 oils, marine fish,

will not be able to sustainably keep up with rapidly increasing consumer demand for these healthy oils. Plant-based omega-3 oil production provides a sustainable, long-term solution to meeting the growing demand.

The alternative long-chain omega-3 canola oil will provide Australian growers with an exciting new variety for domestic and international grain markets. Pending achievement of research milestones, it is expected that the first elite canola line trials will start in 2013 and that a variety will be ready for commercial launch in 2016.

Ultra-low gluten barley

Approximately 10 percent of Australians, including the 1 percent of the population who have coeliac disease, avoid foods containing wheat because of gluten intolerance. To provide a cereal product that meets the requirements of this consumer sector, the GRDC, in collaboration with CSIRO, the Walter and Eliza Hall Institute and Melbourne Health, is supporting a project to develop an ultra-low gluten barley variety, by identifying and combining mutations in the genes encoding the gluten family.

It is envisaged that the ultra-low gluten barley line will be suitable for the production of premium low-gluten beer as well as a range of other low-gluten products for the consumer. In 2010–11 the project generated a barley line in which no gluten can be detected using current detection methods. The project is currently looking at commercialisation of a low-gluten barley product with an interested commercial partner.

Wheat Quality Australia

Wheat classification is the categorisation of a wheat variety into classes based on processing and end product quality, to deliver grain of consistent physical quality, processing performance and end-product quality to customers and end users.

Originally, wheat variety classification and related activities were funded and administered by AWB International. Since the deregulation of bulk wheat exports in 2008, these activities have been funded by the GRDC, as an interim measure at the request of the Australian Government and grain growers, pending the development of an industry-based permanent model for wheat classification.

Through the interim Wheat Classification Council and Variety Classification Panel, the GRDC and the wheat industry tested the classification process, and determined a long-term future for wheat variety classification through the formation of Wheat Quality Australia Limited (WQA). WQA is a not-for-profit company, limited by guarantee. It is owned in partnership by the GRDC and Grain Trade Australia, an industry body that provides a range of standards and services to support commercial activities across the grains supply chain.

WQA commenced operations in January 2011, assuming all the responsibilities previously undertaken by the Wheat Classification Council and the Variety Classification Panel. The formation of WQA ensures that the industry has a sustainable wheat classification system, which will improve the value of Australian wheat for producers, marketers, processors and consumers and enhance the competitiveness of the Australian grains industry.

Managing spray drift

In response to the Australian Pesticides and Veterinary Medicines Authority's (APVMA) updated label requirements for spray drift management, which have the potential to result in new buffer zones upwind of sensitive areas for ground-based spray application of up to 300 metres, the cross-industry National Working Party on Pesticide Applications was set up in March 2010. This collaboration between industries and rural R&D corporations will avoid duplication, maximise returns on investment and ensure appropriate outcomes.

In 2010–11, the GRDC played a leadership role in the working party's efforts to help grain growers to understand and implement changes to reduce spray drift, and worked with the authority to provide realistic and practical risk management.

The GRDC also initiated new research, to be conducted over the next three years as part of a $1 million research commitment, to develop tools and models to help grain growers reduce spray drift. The first output, an interim spray drift model for coarse spray quality, reflecting data that was previously not available, was submitted to the APVMA in 2010–11.

Improvements to National Variety Trials

The National Variety Trials (NVT) program represents the largest independent variety evaluation program in the world: in 2010–11, 632 trials were conducted across more than 260 locations covering the breadth of the Australian winter grains cropping region. NVT provides growers with an unparalleled source of varietal performance information for winter cereals, oilseeds and pulses.

Since it was established, in 2004–05, the NVT program has rapidly evolved, through both innovation and, in some cases, necessity. In the 2011 season, measures to further improve rigour within all canola and wheat trials were put in place. Fungicide control will now be delivered 'in-furrow'

across the 168 canola trials planted. This will significantly improve grower confidence and the validity of future results, which will not rely on variable fungicide seed coat treatments to control major diseases such as blackleg.

In wheat, a directive to control stripe rust has been given for current and future trial seasons. This will deliver more accurate variety rankings in regard to water-limited yield potential and quality performance across the 197 environments tested in the NVT program. Improved continuity of reliable trial data will deliver greater returns on investment by bolstering long-term performance data, enabling growers and advisers to make more effective variety decisions.

Managed environment facilities

Three managed environment facilities were established in 2010–11, at Merredin (Western Australia), Yanco (southern New South Wales) and Narrabri (northern New South Wales). These centres aim to accelerate the development of breeding lines that have been identified as being able to capture more of a limited water supply, and use limited water more effectively, for increased crop yield and quality.

Located at sites that are typically water limited and represent major grain production areas, the facilities have available irrigation and rainout shelters to simulate different patterns of water supply over a crop's growing period. They will provide world-class field and associated facilities for the accurate and reliable phenotyping of germplasm. By using novel production technologies, they will deliver increased and sustainable yield and quality in broadacre crops. In addition, the three sites will continue to provide support to other grains-related research projects addressing grower priorities in their specific areas.

Farm business management

Previously, the GRDC's major focus was on agronomic and production factors across the farm, such as varieties, seeding rates, row spacing, crop protection and nutrient management. Now, growers are increasingly asking for more advice on ways to fit the various components together to gain the best effect. Growers now see profitability, better-targeted inputs and management of risk as the major drivers to profit.

Knowing that each farmer and farm business is unique, and that a 'one-size-fits-all' approach will not work, the GRDC is coordinating a Farm Business Management Initiative. The initiative involves workshops, intensive training courses for advisers, specialist farm business management updates, the development of resource material, and work with farming systems groups to build capacity in managing profit and risk among consultants and growers.

GRDC regional panels

One of GRDC's key strengths is its regional advisory panels, which play a vital role in determining the corporation's strategic investment program. The three panels, each representing one of the GRDC's three regions, are made up of grain growers, agribusiness practitioners, scientists and the GRDC's executive managers.

In December 2010 the GRDC advertised the regional panel positions, which were due to become vacant on 30 June 2011. A total of 117 applications were received across the three regions. In each region, a panel selection committee was established to shortlist the potential regional candidates, and an interview committee interviewed the shortlisted applicants and put forward a recommendation to the Board for consideration. The new regional panel members took up their positions on 1 July 2011.

The GRDC farewells Peter Reading

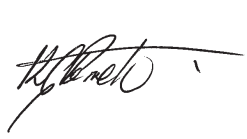
After a long and valued contribution to the GRDC, Peter Reading has moved on. Peter was appointed Managing Director of the GRDC in February 2004 and retired in February 2011.

During his time with the GRDC, Peter oversaw the reorganisation of Australia's wheat, barley and pulse breeding efforts, which resulted in breeding programs with a strong national and commercial focus. He also steered development of the National Grains RD&E Strategy.

The year ahead

Over the next 12 months we will be addressing some key elements of the National Grains RD&E Strategy, which will necessitate the restructuring of some of the research undertaken and improve the efficiency of national R&D programs. We will also be determining the GRDC's future RD&E priorities, in consultation with growers and industry, to compile the corporation's next five-year strategic RD&E plan.

We would like to sincerely thank the GRDC Board, panel members (both continuing and retired), key industry and research partners and the GRDC's hard-working and dedicated staff for their commitment to the GRDC in 2010–11.



Keith Perrett
Chair

John Harvey
Managing Director

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 3 lists significant events of which the GRDC notified the Minister for Agriculture, Fisheries and Forestry during 2010–11, as well as the dates on which the Minister made announcements or decisions of particular significance to the GRDC.

Table 3 Significant events, 2010–11

Date	Event
12 October 2010	Senator the Hon. Joe Ludwig, Minister for Agriculture, Fisheries and Forestry, advised the GRDC of the reappointment of Keith Perrett as Chair of the GRDC.
15 October 2010	The GRDC submitted the GRDC's 2009–10 Annual Report to the Minister.
29 October 2010	The Minister approved the GRDC's 2009–10 Annual Report for tabling. The report was tabled in parliament on 16 November 2010.
3 November 2010	The Minister approved the GRDC's 2010–11 Annual Operational Plan.
28 March 2011	The GRDC Chair wrote to the Minister to advise of the commencement of John Harvey as Managing Director on 1 March 2011.
28 April 2011	The GRDC submitted the GRDC's 2011–12 Annual Operational Plan to the Minister.
30 June 2011	The Minister approved the GRDC's 2011–12 Annual Operational Plan.

Developments since the end of the financial year

In August 2011, the GRDC was restructured into four business groups: Research Programs; Regional Grower Services; Commercial; and Corporate Services. The restructure is to increase the focus on delivering outcomes to growers.

When the GRDC Board approved this annual report on 28 September 2011:

- there had been no other significant changes in the state of affairs of the GRDC since the end of the financial year
- no other significant changes in the operations of the GRDC were expected.

Photo: Paul Jones

PART 2

Our Performance

Photo: Paul Jones

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, *Prosperity through Innovation*; the Annual Operational Plan 2010–11; and the 2010–11 Portfolio Budget Statements for the Department of Agriculture, Fisheries and Forestry.

This section describes the GRDC's corporate performance in 2010–11, 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 eight R&D project clusters
- findings on farm financial performance and total factor productivity in the grains industry, collated through regular surveys by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)
- results of the second year of information gathering under the GRDC–ABARES Harvesting Productivity initiative.

The details of the performance of each output group against established performance indicators and targets are shown in the output group sections of Part 2.

Corporate strategies

Table 4 provides examples of how the GRDC progressed against its performance measures for 2010–11 and its objectives and strategies for 2007–12.

Table 4 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	The GRDC has taken a lead role in supporting the development and implementation of the *Grains Industry National Research, Development and Extension Strategy* (the National Grains RD&E Strategy). The GRDC partially supports the National Grains RD&E executive officer and is an active member of its implementation committee. The GRDC also: • plays a central role in coordinating industry responses to emerging issues, such as locust control • creates forums for researchers from across Australia to share ideas on current RD&E needs and opportunities in areas such as soils, weeds, pulses for break crops, and wheat and barley breeding • works with specialist national coordinating groups such as the Wheat Breeders' Reference Group, the Australian Winter Cereals Pre-Breeding Alliance and the End Point Royalty Steering Committee. The GRDC contributed to many policy and planning processes during 2010–11, including: • the Productivity Commission's inquiry into the rural R&D corporation (RDC) model • the development of the – Rural R&D Council National Strategic Rural R&D Investment Plan – Patent Amendment (Human Genes and Biological Materials) Bill 2010 – 2011 Strategic Roadmap for Australian Research Infrastructure – Collaboration with China: Current Situation and Future Prospects Consultation Survey – 2011 statutory review of the *Gene Technology Act 2000*.

Table 4 **Corporate overview** *(continued)*	
Indicator	**Performance**
Strategy: Coordinate a national grains R&D agenda and portfolio *(continued)*	
Key GRDC investments demonstrate national coordination with research partners	The GRDC's first major investment emerging from the National Grains RD&E Strategy was approved in 2011. The investment with the University of Sydney will build grains RD&E capacity for the Northern Region. Other key investments in which the GRDC played a national coordinating role include: • the Australian Winter Cereals Pre-Breeding Alliance • the National Brassica Improvement Program • Pulse Breeding Australia • the alliance with the International Maize and Wheat Improvement Center (CIMMYT) • the alliance with the International Center for Agricultural Research in the Dry Areas (ICARDA).
Strategy: Deliver against Australian Government priorities	
Ongoing endorsement by the Minister for Agriculture, Fisheries and Forestry on meeting the Australian Government priorities	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 2010–11 addressed the Australian Government's: • 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 • Minister's R&D Priorities—productivity improvement, maintaining and improving international market access opportunities, value chain effectiveness and efficiency, sustainable environmental resource management, climate change, biosecurity, workforce, skills, education, diversity, collaboration and evaluation.[a] The GRDC's Annual Operational Plan 2011–12 was approved by the Minister on 30 June 2011.
Strategy: Grow and leverage total grains R&D investment	
Significant evidence of leveraging total grains R&D investment	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: • in the Future Farm Industries program, it leveraged $2.6 from research partners • in the Partners in Grain program, it leveraged $1.4 from research partners • in the Mungbean Breeding program, it leveraged $1.7 from research partners. 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.
Strategy: Ensure R&D is market-driven	
Significant evidence of market signals being taken into account in R&D investments	The GRDC considered grower R&D 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. 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. The GRDC's structure and processes ensure engagement with the supply chain by: • 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.

Table 4 Corporate overview *(continued)*	
Indicator	**Performance**
Strategy: Ensure R&D is market-driven *(continued)*	
Significant evidence of market signals being taken into account in R&D investments (continued)	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. Examples of projects in which the GRDC worked with co-investors from the supply chain during 2010–11 include: • work to improve canola quality • a study of the biochemistry and genetics of protein modification and fermentability in malting barley • a pilot brewing evaluation for malting barley lines destined for export • wheat variety classification.

[a] Table 12 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.

Grain grower feedback

In 2010, the GRDC obtained detailed feedback from 1,201 growers across Australia, covering the GRDC's three production regions and key agroecological zones, through its Grower Survey. The GRDC commissions IPSOS-Eureka Social Research Institute to conduct 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 5 present the GRDC's track record of achievement against selected key performance indicators over the period from 2004 to 2010.

Table 5 GRDC performance against selected key performance indicators, 2004 to 2010, by proportion of growers surveyed (percent)

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

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-2012.

Impact assessments

The GRDC undertook impact assessment studies of eight clusters of projects in 2010–11 as part of the core business process 'to evaluate the impact of its R&D and report to stakeholders'. 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 6 summarises the costs and benefits of the project clusters in dollar terms, while Table 7 summarises the economic, environmental and social benefits of the project clusters.

Table 6 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)
Future Farm Industries	14.7	9.7	1.5:1	5.0
Grains Research Updates	5.6	2.8	2.0:1	2.8
Harrington Weed Seed Destructor	28.2	2.6	10.8:1	25.6
Mungbean Breeding Program	46.2	2.4	19.3:1	43.8
National Invertebrate Pest Initiative	3.4	2.9	1.2:1	0.6
Partners in Grain	3.8	1.1	3.5:1	2.7
Registration of Minor Use Chemicals	27.9	2.1	13.3:1	25.8
Wheat Variety Classification Scheme	110.3	17.1	6.5:1	93.2

Note: Dollar amounts are calculated in present value terms.

Table 7 Benefits identified by impact assessments of GRDC projects

Economic benefits	Environmental and social benefits
Future Farm Industries	
• Potentially higher valued land-use option of a cereal suited to saline and waterlogged land. • Increased profitability for some mixed farming systems from increased use of lucerne via phase farming. • Increased profitability from use of other perennials in mixed farming systems. • Reduced income variability for some mixed farming systems due to strengthening the livestock enterprise without reducing cropping intensity. • Reduced recharge of groundwater due to increased use of perennials.	• Increased area of perennials in mixed farming systems leading to reduced erosion and soil loss from increased ground cover in summer and autumn. • Potential for reduced use of crop chemicals from control of disease and some weeds via rotations. • Increased capacity in farming systems research in Australia. • The presence of 'more green in the landscape' leading to reduced farmer stress during the summer–autumn period. • Reduced variability of community income in some regions with mixed farming systems.
Grains Research Updates	
• Increased profitability from more rapid adoption. • More effective and efficient planning and delivery of services to growers. • Improved input into government and rural policy.	• Increased awareness of industry challenges. • Improved environmental stewardship. • Strengthened Australian rural and regional networks.

Table 7 Benefits identified by impact assessments of GRDC projects *(continued)*

Economic benefits	Environmental and social benefits
Harrington Weed Seed Destructor	
• Reduced number of applications of chemicals in weed control and hence reduced cost of existing chemicals. • Avoidance of future requirements for new chemicals so reducing future weed control costs as chemical costs increase in real terms. • Higher farm profitability through avoidance of some suboptimal rotational constraints for weed control (such as grazing, haymaking or other crops). • Higher level of organic matter build-up in soils, enhancing crop yields, soil health (biodiversity), nutrient availability and moisture retention capacity, compared with other forms of seed removal and destruction. • Potentially higher yields from reduced weed competition. • Potentially more robust cropping systems able to cope with climatic changes. • Potentially higher market returns for grain that is produced under best management practices in relation to the environment. • Potential for export of equipment or royalty income from sales of technology overseas.	• Reduced air pollution from reduced burning of chaff/straw for other forms of seed removal. • Enhanced soil biological activity and higher soil biodiversity. • Potentially reduced losses of native vegetation from fires. • Reduced likelihood of chemicals entering the external environment, due to reduced use of chemicals on farm. • Improved long-term viability of cereal farming and rural communities. • Reduced occupational health and safety risk through reduced use of fire.
Mungbean Breeding Program	
• Contribution to release of two varieties with higher yields and reduced grading loss. • Contribution to future releases of higher yielding varieties with higher levels of disease resistance. • Improved quality leading to increased demand and/or price premiums. • Increased potential for use of mungbeans in crop rotations, potentially leading to – lower incidence of weeds and diseases throughout the rotation – less requirement for herbicides, fungicides and nitrogen supplements, leading to lower costs – increased yield in other crops. • Increase in the capital value of mungbean germplasm between 2003 and 2011.	• Reduced use of nitrogen fertiliser and other chemicals, leading to – reduced export of chemicals off farm – improved farmer wellbeing – potential positive impact on regional wellbeing.
National Invertebrate Pest Initiative	
• Increased profitability from practice change. • Positive reputation in markets where integrated pest management is valued. • Improved understanding of pests in common with pastures, cotton, and horticulture.	• Reduced use of pesticide. • Improved productivity through more sustainable practices. • Enhanced skills and capacity building in the grains supply chain. • Improved biosecurity. • Benefits to other growers through reduced spread of pest resistance. • Improved perception of the environmental stewardship of the grains industry.

Table 7 Benefits identified by impact assessments of GRDC projects *(continued)*

Economic benefits	Environmental and social benefits
Partners in Grain	
• Increased productivity (such as more effective marketing and reduced cost) of grain farms due to the contributions of those benefiting from the project. • Spin-off productivity benefits to other grain farms not directly involved with the project. • Spin-off benefits to livestock producers and other primary industries.	• Natural resource management benefits, particularly through improved chemical management and reduced export of chemicals off farm. • Increased personal wellbeing of participants and farm families, through education and training. • Increased contribution of participants to agribusiness and grains industry activities. • Increased involvement in community activities among participants.
Registration of Minor Use Chemicals	
• Increased profitability and reduced risk from increased availability of more effective registered chemicals. • Maintenance of grain markets. • Reduced risk of maximum residue level (MRL) contravention in industries based on grains industry products. • Improved industry input into government rural policy on chemical use. • Reduced trade risk of MRL contravention in grain imports.	• More sustainable cropping from increase in area sown to pulses and enabling of quality assurance programs. • Improved stewardship. • Reduced health risk to growers from chemicals. • Safer grain products for consumers in Australia and overseas.
Wheat Variety Classification Scheme	
• Sustained brand names which maintain the high-quality image of Australian wheat. • Consistent quality of aggregated wheat parcels marketed. • Lower storage and handling costs. • More efficient and transparent pricing. • Improved varietal decisions by growers. • Greater certainty for wheat breeders, resulting in more efficient breeding.	• Capacity building along the value chain.

Emerald Farming Systems Grower Update in the Northern Region. Photo: John Cameron

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* (AAGIS). The results presented below for farm financial performance and industry productivity trends draw heavily on the AAGIS results.

Financial performance

The latest farm financial performance results from ABARES indicate that the financial performance of grain-producing farms, which include cropping specialists and mixed crop–livestock farms, improved in 2010–11 in the Northern and Southern regions, as a result of higher grain and oilseed prices, together with large increases in grain and oilseed production in New South Wales, Victoria, Queensland and South Australia—even though high rainfall and flooding in the eastern states led to crops being lost or downgraded in quality. It is estimated that in some eastern states more than 50 percent of wheat and barley harvested was downgraded to feed quality. However, grain and oilseed yields were high and feed grain prices held up, resulting in better than expected cash receipts for weather-damaged crops.

In the Southern Region, receipts from crops increased by around one-third; average farm cash income more than doubled, to $154,514 from $70,912 in 2009–10; and farm business profit rose to $61,504 from a loss of $5,837 in 2009–10. In the Northern Region, average farm cash income rose to $108,131 from $101,457 in 2009–10 and farm business profit rose to $13,082 from a loss of $23,779 the previous year.

In contrast, the financial performance of grain producing farms in the Western Region declined in 2010–11, despite the generally high quality of grain produced and increased prices, because production of winter grain, oilseeds and pulses in Western Australia was around 40 percent lower as a result of drought. The widespread drought conditions caused average farm cash income in the west to fall 11 percent to $92,517, and the average farm business loss to almost double to $95,037 in 2010–11 from a loss of $47,733 in 2009–10.

Nationally, total cash receipts from grain crops of around $573,000 per farm in 2010–11 were around 15 percent higher than the $500,000 in cropping receipts the previous year. Total cash costs rose 7 percent to $443,000 per farm in 2010–11, reflecting:

- increased costs in the eastern states for harvesting and marketing a larger crop
- higher chemical costs due to increased weed growth
- higher labour costs, contract expenditure and interest payments
- higher repairs and maintenance costs, particularly for flood-affected farms.

Overall, grain-producing farms recorded an average farm cash income of around $129,700 per farm in 2010–11, up 53 percent from $84,900 in 2009–10, and a modest farm business profit of around $20,100 (compared to a loss of $17,150 the previous year)—even with the west affected by drought.

Grain-producing farms continued to record higher average farm cash incomes in 2010–11 than other broadacre industries, although there was substantial variation across the states. Average farm cash incomes in 2010–11 were $160,000 for cropping specialist farms; $88,000 for mixed crop–livestock farms; $85,000 for sheep–beef farms; $80,000 for sheep farms; and $33,000 for beef farms.

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 2008–09. (Results to 2010–11 will become available in two years time.) The results show that the grains industry has achieved productivity gains above the long-term average for broadacre agriculture. Cropping specialists and mixed crop–livestock farms achieved average annual TFP growth of 1.9 percent and 1.4 percent, respectively, compared with the broadacre industry average of 1.3 percent (Table 8).

Table 8 Average total factor productivity growth by broadacre industry, 1977–78 to 2008–09 (percent per year)

Industry	Input growth	Output growth	Total factor productivity growth
Total broadacre	–0.9	0.5	1.3
Cropping specialists	0.9	2.8	1.9
Mixed crop–livestock	–1.8	–0.4	1.4
Beef	–0.1	1.2	1.3
Sheep	–2.1	–1.7	0.4

Source: ABARES 2011, Australian grains: Financial performance of grain producing farms 2008–09 to 2010–11, 11.1 Canberra.

Over the past 30 years, productivity in the grains industry has been driven by significant technological advances and improved farming practices. Across the GRDC's three grain-growing regions, the productivity of cropping specialists has grown more strongly in the Western Region (2.4 percent a year) than the Northern Region (2.0 percent) and Southern Region (1.8 percent). The strong performance of farms in the Western Region is due, in part, to a more consistent climate and even topography, which have enabled more intensive cropping, as reflected in the higher growth of input use in the Western Region (Table 9).

Table 9 Average total factor productivity growth by GRDC production region, 1977–78 to 2008–09 (percent per year)

Region	Input growth	Output growth	Total factor productivity growth
Northern	–0.8	1.3	2.0
Southern	1.4	3.2	1.8
Western	1.9	4.2	2.4

Source: ABARES 2011, Australian grains: Financial performance of grain producing farms 2008–09 to 2010–11, 11.1 Canberra.

Harvesting Productivity

The GRDC–ABARES Harvesting Productivity initiative was established 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. In the second year of the initiative, the two broad drivers of productivity growth—technical change and technical efficiency change—were examined.

The average growth rate of technical change among cropping specialists fell from 2.0 percent a year for the period 1977–78 to 1999–2000 to 0.4 percent a year over the past decade or so. Technical change is a measure of improvements in best practice over time (through adoption of new technologies and farm management practices) and has been the main driver of long-term productivity growth. Beyond the recent run of unfavourable seasons, grain growers have cited fewer 'breakthrough' technologies since the 1980s and 1990s as a contributing factor, possibly linked with the reduced intensity of public agricultural R&D investment.

Technical efficiency among cropping specialists has also declined, at an average annual rate of 0.3 percent a year since 1977–78. Technical efficiency change captures the rate at which farms approach best practice through the diffusion and adoption of innovations that are already available. The data suggest that the gap between best practice farms and farms on average has been steadily widening over many years. A number of factors could constrain innovation adoption by growers, including various capacity constraints (such as a lack of business acumen, financial resources, skilled labour and access to public and private extension services). However, even with adequate capacity to innovate, some farmers might lack the necessary willingness to innovate because of contrary attitudes to learning and innovation, risk aversion or personal motivations.

Research priorities

Each year the GRDC tailors its investment portfolio to best address the R&D priorities identified by its key customer groups: Australian grain growers and the Australian Government.

Australian grain grower priorities

Australian grain growers' R&D priorities were identified during the development of *Prosperity through Innovation* 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.

Key priorities identified were:

- farm management
  - integrated farming practices and technologies
  - integrated management of weeds, diseases and pests
  - herbicide resistance management
- variety development
  - biotechnology for improving genetic gain
  - superior new varieties
- environmental
  - responses to climate change
  - improved water use efficiency
  - sustainability and resource management
  - soil health and biology
- new and innovative product development
- capacity building
  - improving skills, training and education in agriculture
  - farm business management.

Table 10 shows how GRDC investments and activities in 2010–11 directly addressed these priorities.

Table 10 Investments and activities to meet grain grower priorities in 2010–11

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*	• Work to establish an Australian national blackleg resistance rating system for canola breeding material and commercial varieties. • Work to develop a blackleg disease resistance management initiative for canola, with strategies to reduce yield loss based on cultivars with a greater durability of resistance against the blackleg fungus. • Support for a large number of integrated pest management, disease management and weed management (including herbicide resistance management) projects. • Work on identifying diseases through molecular diagnostics. • The registration of minor-use chemicals for the grains industry. • Work to better manage rust by using fungicide strategically and understanding adult plant resistance. • Applied research on necrotrophic fungal pathogens.
Variety development	
Biotechnology for improving genetic gain *Superior new varieties*	• Germplasm enhancement projects to: – improve genetic resistance to wheat streak mosaic virus, crown rot and yellow spot in wheat – improve frost tolerance in wheat and barley – develop high salinity tolerance in winter cereals – identify the genetic and phenological basis of head loss in malting barley. • Specific breeding projects to: – develop wheat varieties that have substantially higher yields and are better adapted to Australia's harsh environments than existing commercial varieties – develop and commercialise high-amylose wheat suitable for growing in Australia and the United States – increase the yield and improve the reliability of durum grain production – develop pulses with better adaptation to water-limited environments – develop herbicide-tolerant pulses.

Table 10 Investments and activities to meet grain grower priorities in 2010–11 *(continued)*

Priorities	Examples of relevant GRDC investments and activities
Environmental	
Responses to climate change *Improved water-use efficiency*	• The identification of genes that enable crops to tolerate heat, frost and drought, and breeding to increase the rate of adaptation of crops to climate change. • The extension of the Managing Climate Variability program, to improve multiweek forecasting, seasonal forecasting and tools for forecasting, and to establish the Climate Champions program. • The adoption of a climate change communication strategy to ensure that knowledge, information and technology generated through research is provided to growers in preparation for the likely impacts of climate change. • Crop breeding for improved water-use efficiency.
Sustainability and resource management *Soil health and biology*	• Work to improve – soil quality, through greater use of pulses and pastures in the farming system – water infiltration, through better understanding of non-wetting soils – nitrogen-use efficiency, through better understanding of ammonia loss from surface-applied nitrogen fertiliser. • Work to establish a national quality assurance system to improve industry confidence in microbial products, such as soil inoculants, and thereby promote their use in agriculture.
New and innovative product development	
	• Feasibility studies looking into new ways to produce fertiliser that are cheaper and more energy efficient and environmentally sustainable than current fertiliser products. • Work to develop a probe for rapid on-farm soil testing, to enable the cost-effective, real-time collection of moisture and nutrient data. • A project exploring a range of new technologies, for on-farm and commercial use, for their potential to control or eradicate insect pests of stored grain.
Capacity building	
Improving skills, training and education in agriculture *Farm business management*	• Work to facilitate the exchange of knowledge between grower groups. • Workshops on particular topics such as precision agriculture, irrigation in grains and wide row spacing/stubble management. • Vavilov–Frankel Fellowships to support researchers from developing countries to conserve and use plant genetic resources. • Sponsorships of events such as the National Youth Science Forum and grower representative organisation conferences. • Examination of the potential to expand training opportunities to engage a wider selection of Indigenous people in the Australian grains industry. • Support to assist individuals or small groups to improve their level of understanding of particular issues by attending a conference or travelling to acquire knowledge to benefit the Australian grains industry. • National Partners in Grain, which delivers training and mentoring programs to develop leadership and business skills in women and young people in the Australian grains industry.

Seeding into the night on Andrew Messina's property near Mullewa, WA. Photo: Evan Collis

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 RDCs by the Minister for Agriculture, Fisheries and Forestry in May 2007
- a letter written to the GRDC Chair by the Minister for Agriculture, Fisheries and Forestry in February 2010.

Table 11 shows the relationships between the government's research priorities and the associated goals.

Table 12 shows how GRDC investments and activities addressed the priorities in 2010–11. The total expenditure allocated to each of the Australian Government's priorities is shown in detail in Appendix A.

Table 11 Australian Government research priorities and associated goals

National Research Priorities (NRP)			
An environmentally sustainable Australia	***Promoting and maintaining good health***	***Frontier technologies for building and transforming Australian Industries***	***Safeguarding Australia***
A1: Water—a critical resource A2: Transforming existing industries A3: Overcoming soil loss, salinity and acidity A4: Reducing and capturing emissions in transport and energy generation A5: Sustainable use of Australia's biodiversity A6: Developing deep earth resources A7: Responding to climate change and variability	B1: A healthy start to life B2: Ageing well, ageing productively B3: Preventive healthcare B4: Strengthening Australia's social and economic fabric	C1: Breakthrough science C2: Frontier technologies C3: Advanced materials C4: Smart information use C5: Promoting an innovation culture and economy	D1: Critical infrastructure D2: Understanding our region and the world D3: Protecting Australia from invasive diseases and pests D4: Protecting Australia from terrorism and crime D5: Transformational defence technologies

Rural R&D Priorities (RRDP)				
Productivity and Adding Value	***Supply Chain and Markets***	***Natural Resource Management***	***Climate Variability and Climate Change***	***Biosecurity***
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	
Innovation Skills	***Technology***
Improve the skills to undertake research and apply its findings	Promote the development of new and existing technology

Table 11 Australian Government research priorities and associated goals *(continued)*

Minister's R&D Priorities (MRDP)					
Productivity improvement	***Maintaining and improving international market access opportunities***	***Value chain effectiveness and efficiency***	***Sustainable environmental resource management***	***Climate change***	***Biosecurity***
To generate new knowledge, which will lead to improved technology that will be adopted by producers to increase productivity	Through work to combat pests and diseases that can potentially be obstructive to trade and to guide production decisions in accordance with the requirements of consumers	Investment in research and development must extend beyond the farm gate to ensure the whole value chain is able to operate at optimum levels	To build and share our knowledge to ensure our soils, water and vegetation are managed properly and invasive pests are controlled	To reduce greenhouse gas emissions and improve soil management, and assist producers to adapt and change farming practices whilst boosting productivity	Maintain our research capability to prevent and deal with disease outbreaks, particularly as such biosecurity threats are expected to become more prevalent with climate change

Supporting the Minister's R&D Priorities			
Workforce, skills, education	***Diversity***	***Collaboration***	***Evaluation***
RDCs should be taking a stronger role in educating future scientists, improving the knowledge and skills of producers and encouraging people to work in the sector	RDCs should take a greater role in building strong leadership capacity in the sector and encourage a diversity of people in primary industries, including a greater role for Indigenous Australians, women and young people	The national Primary Industries Research, Development and Extension Framework has progressed well to date, but it is important to maintain the momentum in 2010, to finalise the sector plans, develop the cross-sectoral plans and work through implementation	RDCs should support the current joint RDC evaluation process, to demonstrate returns on investment and guide future investment decisions

Grains Industry National Research, Development and Extension Strategy Implementation Committee. (From left) Andrew Weidemann, Ray Marshall, Paul Grieve, Wayne Newton, Roger Leigh, John Harvey, Mark Sweetingham, Pauline Mooney, Jeremy Burdon, Rajini Wheatcroft, John Oliver. Photo: Kerry Regan, DAFWA

Table 12 Investments and activities to meet the Australian Government priorities in 2010–11

Priorities	Examples of relevant GRDC investments and activities
RRDP: *Productivity and adding value* ***MRDP:*** *Productivity improvement*	• Projects focused on achieving quantifiable and measurable change through sequencing to manage water and nutrient cycles and break disease and crop weed cycles. • Management and breeding to achieve yield levels and stability and grain quality objectives for wheat, canola and barley in the high-rainfall zones, under current climate conditions and future climate scenarios. • Projects to: – increase the yield and improve the reliability of durum grain production – increase the profitability of cropping systems in Western Australia, using lupins, oats, oilseeds and pulses – develop wheat varieties that have substantially higher yields and are better adapted to Australia's harsh environments than existing commercial varieties.
NRP: *Promoting and maintaining good health* ***RRDP:*** *Supply chain and markets* ***MRDP:*** *Maintaining and improving international market access opportunities* *Value chain effectiveness and efficiency*	• Market research to determine consumer attitudes, perceptions and dietary practices in relation to cereals, wholegrain foods and other products that contain wheat. • Work to improve food quality and end-use market acceptance of Australian pulses. • Collaborative research to develop and commercialise high-amylose wheat suitable for growing in Australia and the United States.
NRP: *An environmentally sustainable Australia* ***RRDP:*** *Natural resource management* ***MRDP:*** *Sustainable environmental resource management*	• Crop breeding for improved water-use efficiency. • Work to improve: – soil quality, through greater use of pulses and pastures in the farming system – water infiltration, through better understanding of non-wetting soils – nitrogen-use efficiency, through better understanding of ammonia loss from surface-applied nitrogen fertiliser.
NRP: *An environmentally sustainable Australia* ***RRDP:*** *Climate variability and climate change* ***MRDP:*** *Climate change*	• The identification of genes that enable crops to tolerate heat, frost and drought, and breeding to increase the rate of adaption of crops to climate change. • The extension of the Managing Climate Variability program, to improve multiweek forecasting, seasonal forecasting and tools for forecasting, and to establish the Climate Champions program. • The adoption of a climate change communication strategy to ensure that knowledge, information and technology generated through research is provided to growers in preparation for the likely impacts of climate change.
NRP: *Safeguarding Australia* ***RRDP:*** *Biosecurity* ***MRDP:*** *Biosecurity*	• A pre-breeding project to incorporate better genetic resistance to wheat streak mosaic virus into elite Australian wheat germplasm. • Work to establish an Australian national blackleg resistance rating system for canola breeding material and commercial varieties. • Work to develop a blackleg disease resistance management initiative for canola, with strategies to reduce yield loss, based on cultivars with a greater durability of resistance against the blackleg fungus. • Support for a large number of integrated pest management, disease management and weed management (including herbicide resistance management) projects.

Table 12 Investments and activities to meet the Australian Government priorities in 2010–11 *(continued)*

Priorities	Examples of relevant GRDC investments and activities
NRP: *Safeguarding Australia* ***RRDP:*** *Biosecurity* ***MRDP:*** *Biosecurity* *(continued)*	• Work on identifying diseases through molecular diagnostics. • The registration of minor-use chemicals for the grains industry. • Work to better manage rust by using fungicide strategically and understanding adult plant resistance. • Applied research on necrotrophic fungal pathogens.
NRP: *Frontier technologies for building and transforming Australian industries* ***RRDP:*** *Innovation skills* ***MRDP:*** *Workforce, skills, education* *Diversity*	• Work to facilitate the exchange of knowledge between grower groups. • Workshops on particular topics such as precision agriculture, irrigation, and wide row spacing/stubble management. • Vavilov–Frankel Fellowships, to support researchers from developing countries to conserve and use plant genetic resources. • Sponsorships of events such as the National Youth Science Forum and grower representative organisation conferences. • Examination of the potential to expand training opportunities to engage a wider selection of Indigenous people in the Australian grains industry. • Support to assist individuals or small groups to improve their understanding of particular issues by attending a conference or travelling to acquire knowledge to benefit the Australian grains industry. • National Partners in Grain, which delivers training and mentoring programs to develop leadership and business skills in women and young people in the Australian grains industry.
NRP: *Frontier technologies for building and transforming Australian industries* ***RRDP:*** *Technology*	• Work to develop a probe for rapid on-farm soil testing, to enable the cost-effective, real-time collection of moisture and nutrient data. • Feasibility studies looking into ways to produce fertilisers that are cheaper and more energy efficient and environmentally sustainable than current fertiliser products. • Work to establish a national quality assurance system to improve industry confidence in microbial products, such as soil inoculants, and thereby promote their use in agriculture. • A project exploring a range of new technologies, for on-farm and commercial use, for their potential to control or eradicate insect pests of stored grain. • Pursuit of new technologies to significantly increase the yield of wheat.
MRDP: *Collaboration*	• Membership of the committee developing the Primary Industries Ministerial Council's National Primary Industries RD&E Framework. • A significant contribution to formulating the national strategy for the grains sector, including the provision of data about regional RD&E capacity and strategic needs by the GRDC regional panels. • Planned significant investment to implement the national RD&E framework.
MRDP: *Evaluation*	• Evaluation (undertaken as a joint process with the other RDCs) of the longer term economic, social and environmental impacts of RD&E investments, including wheat breeding, crop agronomy, near-infrared calibration and a cluster from each of the GRDC's New Products and Communications & Capacity Building output groups. • Impact assessments of project clusters. • Assessment of the feasibility of a predictive tool to estimate the impact that investing in certain priorities will have on grains industry productivity. • Assessment of GRDC performance through stakeholder surveys.

Notes: 'NRP' priorities are the National Research Priorities outlined by the Prime Minister in December 2002.
'RRDP' priorities are the Rural R&D Priorities announced to the RDCs by the Minister for Agriculture, Fisheries and Forestry in May 2007.
'MRDP' priorities are the priorities identified in a letter written to the GRDC Chair by the Minister for Agriculture, Fisheries and Forestry in February 2010.

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 four lines of 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 effects in the short, medium and long terms.

Nitrous oxide emissions

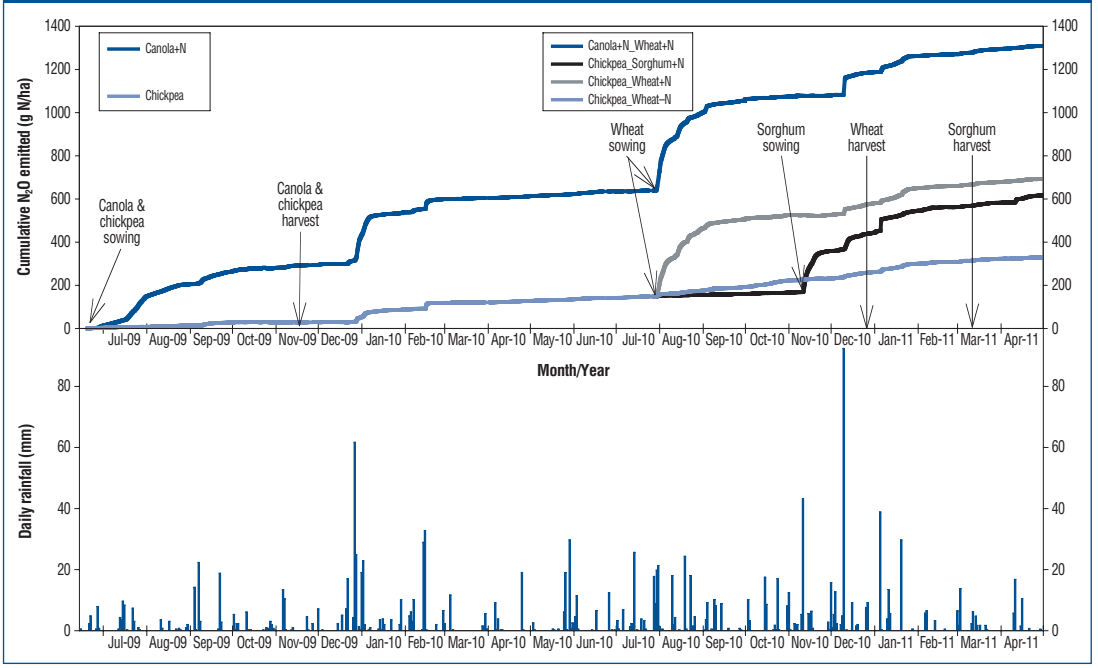
The Nitrous Oxide Research Program has a network of automated greenhouse gas measuring systems situated in all major agroclimatic zones and farming systems in Australia. It is the most comprehensive agricultural nitrous oxide monitoring network in the world.

Data collected in 2010–11 show that nitrous oxide emissions from agricultural soils vary from less than 0.03 kilograms of nitrogen per hectare per day in coarse-textured soils in Western Australia to 1.00 kilogram of nitrogen per hectare per day in the high-rainfall soils of south-eastern Victoria. The magnitude of emissions is related to rainfall and to the production of biomass (which provides the decomposable carbon source to fuel the denitrification process).

Nitrous oxide emissions from soils during the growth of three different crop legumes (chickpeas, faba beans and field peas) in the medium-rainfall northern grain-growing zones were found to be very low, and all were significantly less than the emissions from canola treated with urea fertiliser.

At the program's site at Tamworth, New South Wales, based on nearly two years of continuous measurement in four cropping rotations, a fourfold difference was observed in the cumulative nitrous oxide emissions 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



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 aims to quantify the soil carbon stocks that exist under various management practices across Australia's agricultural regions.

Since it commenced, in April 2009, the program has collected 15,272 soil samples. The samples are being used to provide a snapshot of the current stock of soil organic carbon in cropping soils across Australia.

In 2010–11, the program also evaluated the NDM (gamma-neutron density meter), a more efficient and effective way of measuring the bulk density of soil. Determining the bulk density is essential for calculating the soil organic carbon stock number required in carbon-trading schemes. The NDM can measure bulk density quickly, without the need to take samples.

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 these resources effectively.

In 2010–11, the program invested in research to:

- assess and manage heat stress in cereals
- understand frost risk
- model the links between climate drivers and regional climate
- improve weather forecast accuracy, particularly for multiweek forecasting
- model the impact of temperature extremes in Western Australia.

On-farm demonstrations

To help farmers adapt to and mitigate climate change effects, the National Adaptation and Mitigation Initiative is demonstrating technology and knowledge on farm, at 25 demonstration sites across northern, southern and western Australia.

The initiative is engaging with farmer groups and researchers to demonstrate established techniques and new research outcomes. The on-ground demonstrations give farmers and advisers direct access to locally relevant information which will help them to maintain or enhance the viability of their farms.

Climate Kelpie

The Climate Kelpie website is a 'one-stop shop' for climate risk management information and tools. It provides links to the best available tools and information about climate, helping farmers and advisers to make farm business decisions.

The website's content is sourced from the Bureau of Meteorology and the Managing Climate Variability program. To locate relevant information quickly, farmers can filter the content by selecting their region and their commodity from a map or a list.

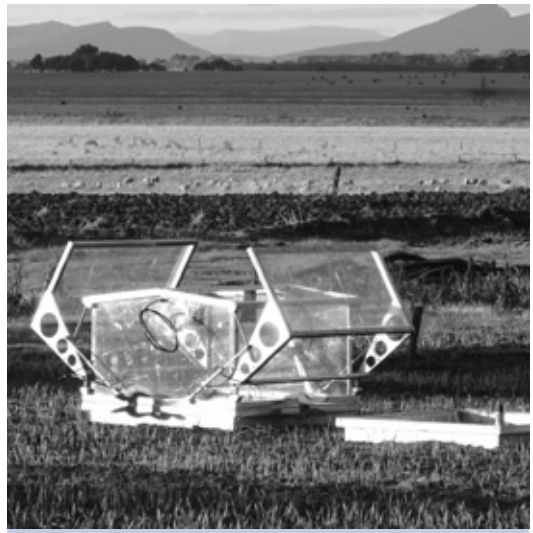
In the six months to 30 June 2011, 5,384 visitors looked at 13,725 pages on Climate Kelpie.

Climate Champions

Through the Managing Climate Variability program, 21 grain growers, representing Queensland, Western Australia, New South Wales, Victoria and South Australia, have been selected as Climate Champions.

These growers are keen to understand how increased climate variability will play out in their regions, and how they can adapt to the changes while continuing to run a sustainable and financially viable farm business. The Climate Champions program gives them the opportunity to assess new tools, information and management practices coming out of climate-related research, and to influence the research while it is still underway.

As Climate Champions, they share their new knowledge and their on-farm experiences with their peers, and provide feedback about the concerns and needs of grain growers to the GRDC.



A manual chamber for measuring nitrous oxide emissions.
Photo: Sally Officer, DPI Vic

Collaboration

By collaborating with other organisations, the GRDC is able to increase the return on its investment and deliver greater benefits to the Australian grains industry. Effective partnerships enable the GRDC to leverage resources and research capability; share market knowledge, technologies and intellectual property; and reduce the risk associated with particular investments.

As well as its research and commercialisation partners, the GRDC builds strong relationships with a wide range of other organisations with an interest in the grains value chain, in Australia and overseas. They include:

- government departments and agencies
- universities and other research organisations
- commercial plant breeders, seed companies, agricultural companies and advisers
- grain marketers, exporters and end users.

Strategic approach

Collaboration is at the heart of the GRDC's approach to enhancing the profitability and sustainability of the Australian grains industry.

Table 13 shows how the GRDC uses effective collaboration to implement the four corporate strategies set out in its Strategic R&D Plan 2007–12, *Prosperity through Innovation*.

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; RDCs and participants from other rural industries	Work with partners to identify and respond to major rural issues, such as climate change, water-use efficiency and soil health. Share information on management issues such as project management, legal agreements, records management and intellectual property. Support and participate in cross-sectoral programs such as: • Grain and Graze 2 • National Integrated Weed Management Initiative • National Invertebrate Pest Initiative • National Working Party on Pesticide Applications • Managing Climate Variability • 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	Play a leadership role in implementing the *Grains Industry National Research, Development and Extension Strategy*. Work with partners to tackle industry-wide issues such as: • 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 and water-use efficiency • value chain issues, including end point royalties • capacity building and extension of R&D outcomes.

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

Partners	Approach
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	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. Facilitate communication between parties, especially pre-breeding researchers and breeders, to ensure that commercial drivers are reflected in breeding programs. Develop more effective tools for identifying and meeting market preferences, such as variety classification and choice analysis.
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	Find and engage with potential investors, in Australia and overseas, including by: • 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. Cooperate with research partners, and promote cooperation within the grains industry, to optimise economies and synergies. Provide capital at crucial stages in the development of technology and intellectual property. 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. 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. Make use of Australia's intellectual property protections, such as plant breeder's rights, as an incentive for investment.

RDC = rural research and development corporation; **RD&E** = research, development and extension

Table 4 in the 'Corporate performance' section provides examples of projects which achieved significant leverage through effective collaboration in 2010–11. Details of all the GRDC's investments in collaborative projects, including the research partners involved, are provided in Appendix C.

International activities

The GRDC's collaborations with organisations overseas both broaden the resources available to the Australian grains industry, and further international RD&E efforts with potential benefits for the wider Australian community.

In 2010–11, the GRDC continued to support the International Maize and Wheat Improvement Center (CIMMYT), based in Mexico, and the International Center for Agricultural Research in the Dry Areas (ICARDA), based in Syria. This longstanding collaboration enables the pre-breeding and breeding communities in Australia to have targeted access to superior germplasm and associated data.

The GRDC facilitates access to CIMMYT and ICARDA wheat and chickpea germplasm through formal strategic alliances. The GRDC works with both organisations on a suite of research projects, run as the CIMMYT–Australia–ICARDA Germplasm Evaluation (CAIGE) program, that ultimately benefit Australian grain growers as well as farmers in the developing world.

Under the CAIGE program, the GRDC funds strategic research projects at CIMMYT and ICARDA (about $1.9 million was invested in 2010–11), and supports Australian wheat breeders to travel to the research centres to select promising germplasm for further evaluation in Australia.

In 2010–11, the GRDC and ICARDA also collaborated to implement the International Crop Information System (ICIS) database system. The system enables integrated management of global information on crop improvement and management, for both individual crops and farming systems, and promotes the efficient flow of data and delivery of ICARDA germplasm to Australia.

Establishing effective linkages with the research centres of the Consultative Group on International Agricultural Research, such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), is a core strategy for the GRDC. In 2010–11, the GRDC and ICRISAT began developing a strategic alliance to underpin a collaborative pre-breeding research program for pulses and sorghum.

The GRDC's involvement in international research collaborations is described in the reports on performance for the individual output groups. One example is an ongoing project, represented in Australia by Murdoch University, to develop pre-emptive measures against the possible incursion of Russian wheat aphid into Australia.

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 2010–11, noteworthy visitors included:

- a nine-person delegation from the Ministry of Agriculture, Korea, in July 2010
- the Head—Crop Research Informatics Laboratory of CIMMYT and the Director—Resource Planning and Marketing of ICRISAT, in August 2010
- a 27-person delegation from the Association of Argentine Cooperatives, in November 2010
- a Professional Research Associate from the College of Agriculture and Bioresources, University of Saskatchewan, Canada, in February 2011
- a two-person delegation from Japan Tobacco Inc., in February 2011
- the Director General and the Director—Resource Planning and Marketing of ICRISAT, in April 2011.

International visitors to the GRDC in April 2011. (From left) Peter Ninnes, ICRISAT Director—Resource Planning and Marketing, William D Dar, ICRISAT Director General and John Harvey, GRDC Managing Director. Photo: GRDC

Output Group 1—Practices

The Practices output group develops and promotes 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 aligns sustainable production systems research at a farm level with broader, community-based land use initiatives.

The Extension and Grower Programs area is focused on improving the timeliness, relevance and quality of information packages on offer to customers. Alliances between growers and advisers are becoming 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 packages and tailors information that is regionally specific, and delivers it to growers and advisers through appropriate networks.

The integration of natural resource management practices into cropping systems is essential for the long-term viability of the grains industry. The GRDC has significant partnerships with a range of bodies established by the Australian Government and state governments to deal with environmental issues.

The further development of research and delivery platforms and relationships with extension networks will continue to accelerate RD&E outcomes.

Table 14 summarises the achievements of the Practices output group against its performance measures for 2010–11 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.

contents

Diagnostic agronomy

The diagnosis of poor crop performance in a paddock is a complex task. With the advent of yield mapping and precision agriculture more detailed information has become available to help growers and advisers to develop solutions.

Some paddocks have sections which consistently perform poorly. Agronomists are increasingly looking at a number of paddock zones and attempting to determine the causes, and potential remedies, of poor yields. This has brought an increasing level of intensity to growers' desire to diagnose problems and seek agronomic advice. Accurate symptom diagnosis most often relies on field experience and expertise. Younger agronomists and growers gain this experience over time by working with more experienced professionals and accessing the vast amount of information that is available.

A range of decision aids have been produced to help with this process for several discrete parts of agronomy. However, aids are not always easy to find or readily available. There is nothing that comprehensively covers all potential paddock and crop symptoms in one resource.

In partnership with the Department of Agriculture and Food, Western Australia (DAFWA), a wheat diagnostic tool, MyCrop, has been developed to bring together existing soil and crop diagnostic tools and place them within a logical electronic framework. The tool is found at www.agric.wa.gov.au/mycrop.

The tool can be delivered via a CD or accessed online, including via a personal digital assistant. This portability means that images and information can be taken into the field for comparison and visual identification.

The tool starts by using a simple process that allows the user to determine paddock/zone yield potential by using a modified French and Schultz model. This will assist the user to determine whether further diagnosis is needed. Paddock records can be used to compare yields against yield potential. If a paddock has been consistently underperforming, it is likely that soil or landscape constraints exist and should be identified.

Weed management

In 2010–11, new types of herbicide resistance were discovered in a number of weed species in Australia; examples include resistance to paraquat in ryegrass, and resistance to glyphosate in windmill grass and fleabane. Such discoveries highlight the increasing rate of herbicide resistance development and the need to integrate non-chemical and cultural approaches with strategic herbicide use to effectively manage weeds.

In response to these challenges, a national integrated weed management (IWM) plan was developed by the GRDC-supported National Integrated Weed Management Initiative, in consultation with growers and researchers. To ensure that the plan would be applicable for farming systems that combine grain production with other enterprises, such as cotton production or grazing, discussions were held with the Cotton Research and Development Corporation (CRDC) in the north and Meat and Livestock Australia (MLA) in the south.

The GRDC has seen clear benefits from its longstanding commitment to investing in IWM. For example, the latest GRDC Grower Survey showed a rapid increase in the adoption of IWM practices among Australian grain growers, from 43 percent of growers surveyed in 2008 to 57 percent in 2010. Recent GRDC-supported projects have demonstrated the effectiveness of non-chemical weed management approaches such as seed collection and destruction (through the development of the Harrington Weed Seed Destructor) and genetic improvement of crop competitiveness (through research conducted by the University of Adelaide and DAFWA). Modelling suggests that a combination of those approaches results in a natural decline in populations of weeds such as ryegrass and wild radish; research to validate and quantify the effects is underway.

Drawing on such experience, the GRDC used the new national IWM plan as a focus for planning investments in areas such as emerging weed issues in the Southern Region and IWM in the crop–fallow system in the Northern Region. Investment in a new project on improved glyphosate resistance management, in 2010–11 and 2011–12, is one example.

Pest management

Integrated pest management

The benefits of integrated pest management (IPM) for maintaining beneficial invertebrate populations and reducing the threat of insecticide resistance are widely recognised. The 2010 GRDC Grower Survey indicated that around 40 percent of Australian grain growers were practising IPM, and the rate of adoption of IPM was increasing.

However, IPM adoption continues to face challenges. For example, the savings achieved by reduced use of insecticides are often consumed by the costs of surveillance. In 2010–11, to address some of the ongoing challenges, a national IPM plan was developed through the GRDC-supported National Invertebrate Pest Initiative.

The plan recommends tailoring future research to:

- clearly identify the business proposition for IPM adoption
- improve knowledge of the appropriate use of control thresholds, modelling and on-farm surveillance programs.

The GRDC's investments in IPM research in 2010–11 included work to better understand the threats posed by insecticide resistance, and to increase industry awareness of threats across all invertebrate pest species.

The research, which includes expanded studies on sucking pests, such as aphids, builds on other GRDC-supported work on chewing pests, such as helicoverpa species and diamondback moth. It includes molecular studies on the mechanisms of resistance, to increase understanding of the risks related to cross-resistance to other insecticides while building management strategies to reduce future risks.

Pesticide technology

The GRDC's Minor Use Program helps to make permits available for the use of a range of pesticides in minor pulse and oilseed crops, offsetting a shortfall in market investment in generic, off-patent pesticide technology. The program supports a significant number of emergency permits for industry use of pesticides to control key pests in localised areas. In 2010–11 this included permits for control of disease in pulses, weeds in lupins, diamondback moth in canola and head blight in wheat.

The program also includes the ongoing development of industry-initiated applications to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for improved registered label options for generic pesticides for use in major crops (through category 25 applications). The first such application

was approved by the APVMA in 2010; other applications are pending approval. This investment will significantly broaden the scope of cost-effective pest control options for growers, and will ensure that GRDC research outcomes on pesticide use are incorporated into improved label registrations.

The GRDC is discussing opportunities to improve the coordination of these activities with stakeholders such as Horticulture Australia Limited, the Rural Industries Research and Development Corporation and Plant Health Australia.

In 2010–11, the GRDC also invested in the work of the National Working Party on Pesticide Applications to address issues resulting from the APVMA's proposed regulation of the spray application of certain agricultural chemicals. This foundational investment contracts Plant Health Australia to facilitate cross-industry coordination of the working party and investment in conducting science-based research and model development. The primary aim is to validate the continued use of grower best practice for pesticide application using current drift-reduction technologies.

Crop sequences

During 2010–11 the GRDC successfully established a range of projects under its Crop Sequencing Initiative, which aims to:

- achieve quantitative and measurable improvements in crop production, farm profitability and resource condition by appropriate crop sequencing, within five years
- facilitate capacity building and empower the agricultural community across the region to participate in RD&E, access information and training, and benefit from the full spectrum of GRDC-supported research.

The initiative will help growers and advisers to identify viable alternative crops and make effective crop-sequencing decisions, through a combination of tactical and strategic farming systems RD&E.

Five regional projects are now in place, and a national coordinator has been appointed to facilitate the development of strong and effective links between the projects and integrate findings for the benefit of all regions. The project teams meet regularly to share skills, data and ideas. While the soils and environments differ between areas, many common principles apply, and participants are benefiting greatly from observing and discussing different approaches to similar issues.

Also funded under the Crop Sequencing Initiative, in partnership with DAFWA, a trial has commenced to examine the place of break crops in farming systems, through bio-physical and whole-farm economic analysis.

Trial work undertaken during 2010 at Katanning, Western Australia, tested 100 different crop sequences in a trial designed to accurately measure the break crop effect. This work was backed up by investigations into some of the reasons why farmers do or do not get a break crop effect from crops such as canola, field peas, lupins or oats in dryland farming systems of southern Australia. This work will improve understanding of the effects of crop sequences on wheat for the duplex soils of the southern wheat belt.

Mixed farming

Grain and Graze 2

The second phase of the Grain and Graze program commenced in 2010–11. Over four years, Grain and Graze 2 aims to:

- achieve increased water-use efficiency and regional profitability, and improved sustainability of mixed farming businesses, through better soil cover, reduced erosion and improved non-arable native vegetation
- strengthen the resilience of mixed farming businesses, by equipping farmers to make complex decisions in relation to climate, market and natural resource management challenges.

The program is supported and coordinated by the GRDC, with partial funding from the Australian Government's Caring for our Country initiative. It is delivered by regional partners including state government agencies, research institutions, grower groups, agronomists and landholders.

Grain and Graze 2 has projects in seven regions: Northern, which includes areas of south-east Queensland and northern New South Wales; Southern New South Wales; Northern Victoria; Southern Victoria; East South Australia; Eyre Peninsula; and Western Australia. Each region has a management committee, composed of growers, advisers and researchers, to direct projects at the local level.

During 2010–11, more than 3,200 growers participated in activities conducted by Grain and Graze 2, including demonstration days and workshops. A detailed baseline survey was completed, drawing on interviews with 2,400 farmers and 155 advisers across Australia. Results from this and future surveys will enable the GRDC to monitor grower knowledge, skills, aspirations and attitudes over the life of the program, and to measure the relationship between participation and practice change.

One of the program's strengths is the direct involvement of farmers and farming groups in local trials and extension activities. Some trials are already underway; for example, trials have commenced in Northern Victoria to test crops with potential to be grown for forage or grain in a changed climate with more regular summer rainfall.

EverCrop™ and EverCrop Decide

In partnership with the Future Farm Industries Cooperative Research Centre, the GRDC has established the EverCrop™ and EverCrop Decide projects to investigate the roles that perennials can play in addressing current and future production and sustainability challenges for mixed farming enterprises in three agroecological zones: the uniform rainfall zone of southern New South Wales, the Northern Agricultural Region of Western Australia, and the low-rainfall Mallee zone of South Australia and Victoria.

The projects' activities include field work at research facilities; on-farm trials; economic modelling; and the publication of technical reports (three reports were published in 2010–11). Examples of the findings so far include:

- Southern New South Wales has a history of using perennials, especially lucerne, in cropping systems. Economic modelling suggests that greater use of perennials such as lucerne and chicory, combined with higher stocking rates, could increase whole-farm profitability.
- The use of subtropical pasture grasses, such as panic (*Panicum maximum*) and Rhodes grass (*Chloris gayana*), is being explored in the Northern Agricultural Region. Bio-economic modelling suggests that their use is likely to be restricted to poorer sands and meat production rather than grain-dominant enterprises.
- The most commonly grown perennial in the low-rainfall Mallee is Old Man Saltbush (*Atriplex nummularia*). Increased use of saltbush could assist mixed farmers to remove livestock from crop stubbles over the summer–autumn period, thus reducing erosion risk.

Through these key findings the economic role of perennials in mixed farming enterprises is being established.

Extension

Precision agriculture education and training

In response to a need to make information on precision agriculture (PA) more widely available, in 2010–11 the University of Sydney developed eight PA education and training modules for the GRDC. The developers considered the great variety of PA knowledge levels and information requirements within the diverse grains industry, and designed the modules to be interacted with at multiple levels to suit the skills and needs of different target audiences.

The project has developed more than 450 pages of materials that provide information on the major topics relevant to adopting PA in the Australian grains industry. The modules can be easily accessed on CD or online, through the Australian Centre for Precision Agriculture, for use in self-education or in developing training workshops.

Agribusiness reference groups

The GRDC recognises the important, and expanding, role that agronomic advisers play in the Australian grains industry. In 2010, the GRDC Grower Survey indicated that:

- retail agronomists play an influential role in changing farm practices for 70 percent of growers
- consultant agronomists or fee-for-service advisers are a key influence for 68 percent of growers
- 44 per cent of growers pay for agronomic advice.

The GRDC consults widely with agribusiness groups representing fee-for-service and retail agronomy firms involved with the grains industry. Since the expansion of groups in South Australia and Western Australia in 2010–11, this has included discussions with groups in all states. The aim is to deliver the best outcomes for Australian grain growers by speeding the adoption of research findings; identifying RD&E priorities; and partnering to conduct extension programs and other activities.

Examples of the contributions made by agribusiness reference groups in 2010–11 include:

- providing comments and contributions to the content and quality of the GRDC's fact sheet on late season herbicide use
- hosting a series of teleconferences, involving the GRDC, government agencies and other industries, in anticipation of the plague locust outbreak, to help coordinate the logistics of supplying products and information to growers
- coordinating agribusiness responses to the GRDC's proposed delivery and extension model.

Training and mentoring for advisers

While agronomic consultants are technically highly skilled, they have few structured opportunities to improve their skills in information delivery. As a result, in 2010–11 the GRDC commenced a project to provide a training and development program, specifically for the grains industry, which builds the information delivery skills and techniques of experienced agronomists and extension personnel.

The program engages experienced advisers who have made a significant contribution within their region, have a long-term vision for the industry, and wish to further their leadership, extension and mentoring skills. Through training in mentoring and coaching, the participants are equipped to transfer their skills to members of farming systems groups and less experienced agronomists.

At the first session, held in Canberra in March 2011, participants engaged with staff of the GRDC and received training to improve their understanding of farmers' decision-making processes, the extension and adoption process, and the psychology of change. Participants reported that they had valued their interaction with the GRDC and the opportunity to discuss current RD&E projects.

Understanding practice change through consultation with extension professionals

In 2010–11, the GRDC supported the commencement of a project to measure and understand change in grain growers' adoption of farming technology and perceptions associated with specific practice changes. A team of farming practice adoption specialists have been working with organisations that can provide expert regional and technical input on practices and factors influencing adoption across states and subregions.

As the first step towards ongoing industry input, stakeholders were invited to take part in workshops to contribute to the planning of the project. The workshops, held in Adelaide and in Swan Hill, Victoria, helped review existing data and identify information gaps and needs which included priority subregions.

Participants will be provided with ongoing mentoring to ensure that the adult learning and skills development techniques used during the course are implemented.

Online resources

PestFax Map, an interactive risk management tool to address pest and disease threats in the Western Australian grain belt, was launched at the GRDC–DAFWA Western Australian Agribusiness Updates in 2010–11.

Developed with GRDC support by DAFWA and the University of Western Australia, PestFax Map features easy-to-view maps showing current and previous occurrences of crop pests and diseases.

The maps assist users to predict the likelihood that a pest or disease is heading into a particular area. This information can potentially be used to predict outbreaks of pests and diseases, to help growers devise appropriate management strategies or to help agribusinesses make decisions about the supply of products relating to pest and disease outbreaks.

GRDC Western Region panel member Anna Butcher with DAFWA Senior Researcher Art Diggle at the launch of the PestFax Map at the 2011 Perth Agribusiness Crop Updates.
Photo: Nicole Baxter

PestFax Map draws on data collected from 15 years worth of reports to PestFax, a DAFWA service which provides weekly updates on pest and disease observations and control measures. The tool is accessible through the PestFax website.

Publications

For grain growers in parts of southern Australia, after one of the wettest summers on record, the 2011 cropping season has huge potential to produce a large crop—provided that the right approaches are taken to crop nutrition, seeding systems and crop management. Growers will face particular challenges in areas such as stubble management, weed management, crop nutrition and pest and disease control.

In 2010–11, the GRDC released a guide, initiated by the Southern Panel, to help growers take full advantage of the soil moisture in their cropping systems. Called *Making the most of a wet summer in the Southern Region*, it brings together available knowledge on issues facing growers and provides a reference framework for decision making in the coming season.

The full guide is available on the GRDC website and was distributed to all growers and advisers in the Southern Region prior to sowing time in 2011.

CASE STUDY:

Improving the accuracy of weather forecasting

Improving the accuracy and skill of weather and climate forecasts is a major objective of the Managing Climate Variability (MCV) program, a collaboration between rural R&D corporations that is managed by the GRDC. The goal is to accelerate improvements in the accuracy and value of weather forecasts (typically out to two weeks) and climate forecasts (longer than two weeks), for the benefit of rural producers, and to leverage outcomes that might otherwise not be possible.

Through partnerships with the Bureau of Meteorology and CSIRO, the program has delivered a new statistical forecasting scheme for Australia, based on sea surface temperatures; and the first operational dynamical climate model, the Predictive Ocean Atmosphere Model for Australia (POAMA).

Unlike statistical systems that rely on historical observations, dynamical forecasts use mathematical equations of ocean and atmosphere dynamics to provide a picture of evolving climate systems, enabling them to model future climate. The POAMA model was first deployed in 2002, and its most recent version (POAMA 1.5) was used to successfully predict the 2010–11 La Niña event and its subsequent demise.

The research funded through MCV shows considerable promise. POAMA has reached the point where it is skilful enough to replace statistical models. The program is now focusing on improving the accuracy of the new dynamical climate model forecasts, initially for the two-week to season time scale, and ensuring that the new forecasts are made available to agricultural producers.

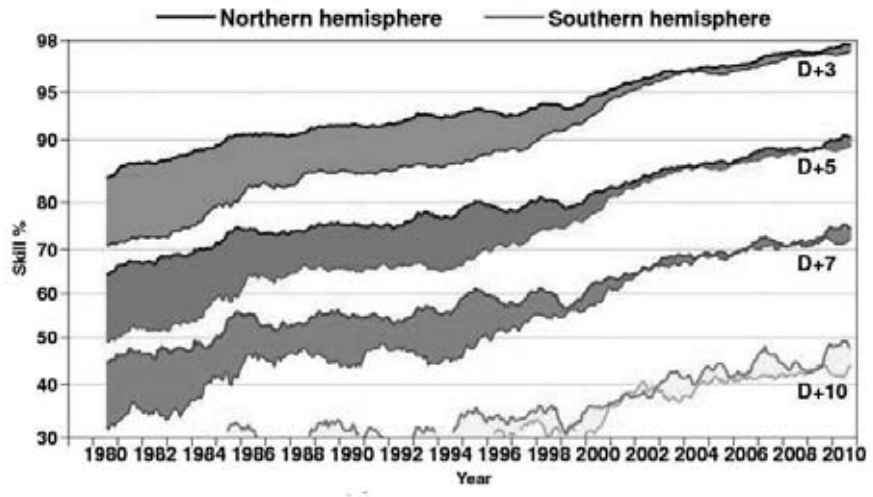
An example of the skill improvements which may be possible is shown by the improvement in weather forecasts (out to 10 days) using dynamical models, as illustrated in Figure 11. Skill, shown as a percentage on the vertical axis, is a measure of the agreement between forecast and observed weather or climate patterns. The figure shows huge gains in forecast skill—for example, forecasts at seven days are now approaching the accuracy of three-day forecasts in the 1980s, and 10-day forecasts are becoming feasible. Development of the POAMA dynamical forecasts has contributed to the narrowing gap between southern and northern hemisphere forecasts.

A project recently completed by the Department of Agriculture and Food, Western Australia, CSIRO and the Bureau of Meteorology achieved forecasting skill of 70 percent for some regions of Western Australia, using POAMA.

The research also demonstrated the potential economic value to Western Australian grain growers of seasonal climate forecasts using POAMA. For south-west Western Australia, the potential for increases in gross margin of $67 per hectare was demonstrated by basing the application of nitrogen fertiliser at sowing on forecast seasonal rainfall, rather than average seasonal rainfall.

Building a skilful dynamical model is a major achievement, and opens up the opportunity for better forecasts in future, better representation of climate change, and forecasts for many more variables, such as solar radiation, evaporation and wind.

Figure 11 Improvement in the forecast skill using dynamical climate modelling, three-day, five-day, seven-day and ten-day forecasts, 1980 to 2010



Source: European Centre for Medium-Range Weather Forecasts.

CASE STUDY:

Working together to contain spray drift

In 2010 the Australian Pesticides and Veterinary Medicines Authority (APVMA) reviewed the use of certain agricultural herbicides and pesticides, and commenced a process to implement new regulations for chemical spray application. The GRDC has been a leader in coordinating the industry response to the review and the proposed regulations.

Attendees at the National Working Party on Pesticide Applications meeting in April 2011. (From left) Rohan Rainbow, GRDC Manager Crop Protection; Andrew Hewitt, Centre for Pesticide Application and Safety, University of Queensland; Greg Kauter, Cotton Australia; Brad Wells, Horticulture Australia Limited. Photo: Greg Kauter

The APVMA review raised concerns that growers could face the imposition of large mandatory spray buffer zones under specific circumstances. Under the proposed regulations, label instructions for new and existing chemicals, including phenoxy herbicides such as 2,4-D and MCPA, could require mandatory downwind no-spray (buffer) zones of up to 300 metres for spray applied at ground level.

In response to such concerns, rural industry participants—including producer and industry associations, government agencies, RDCs, chemical companies, and groups representing the grains, horticulture, grape and wine, sugar, cotton and new crop sectors—formed the National Working Party on Pesticide Applications, in March 2010.

The working party was established to coordinate industry-led research into improved technologies which reduce the risk of spray drift, and demonstrate that current use of these technologies by growers exhibits good stewardship.

The GRDC is a major investor in the working party, and is represented on its executive committee, which was endorsed by a meeting of more than 50 stakeholder representatives in April 2011. The meeting also resolved that the working party would:

- provide a forum to help growers and other stakeholders to understand current APVMA policies and work with regulators to achieve realistic and practical risk management
- facilitate the development of a national training framework for pesticide application which would support the implementation of drift reduction technologies (to reduce mandatory buffer distances); best management practice; and improved product efficacy.

The GRDC's direct investments in spray drift research during 2010–11 included a project to obtain data on newer spray nozzles which produce coarser droplets, reducing spray drift. Results from this research have been provided to the APVMA. It is hoped that such evidence of the effects of using current drift reduction technologies will lead to a reduction of mandatory buffer zones.

Ashley Ramm uses a self-propelled boom spray fitted with low-drift nozzles. Photo: Evan Collis

Table 14 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 2010–11		
$60.18 million		
Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Identify and develop profitable, innovative and integrated practices and technologies		
Water-use efficiency in targeted agroecological zones increases by 10%	• Crop sequencing initiative established.	Successful establishment of five regional projects and the position of a national coordinator for the Profitable Crop Sequencing Initiative.
The area of cropping land with retained stubble increases by 10%	• Second phase of the Grain and Graze program. • Regional strategies developed to increase area sown to broadleaf crops, including pastures and cotton.	Successful establishment of Grain and Graze 2 across seven grain-growing regions. Regional project plans developed and in place to achieve quantitative and measurable improvements in production, profit and resource condition by including more broadleaf crops in the rotation.
Effective management of weed, disease and insect biosecurity risks	• New national integrated weed management (IWM) plan in place based on program logic and including other RDC collaborators. • New national integrated pest management (IPM) plan in place based on program logic and including other RDC collaborators. • Development, with stakeholder organisations, of improvements to the Minor Use Program and generic pesticide labelling.	A national IWM plan, based on program logic, developed through the National Integrated Weed Management Initiative; consultations included the Cotton Research and Development Corporation (CRDC) and Meat and Livestock Australia. A national IPM plan, based on program logic, developed through the National Invertebrate Pest Initiative; consultations involved the CRDC and the Rural Industries Research and Development Corporation. Improvement in grower access to effective pesticide technology through increased resourcing of the Minor Use Program and negotiated access to Australian Pesticides and Veterinary Medicines Authority category 25 approvals.

Table 14 Practices overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Ensure active grain grower involvement and commitment		
Improved information flow to and from growers through enhanced relationship with agribusiness	• Agribusiness and research advisory committee priority issues provided as pages on the GRDC website. • GRDC presences at events previously not attended (for example AgQuip). • Regional programs developed in partnership with growers, researchers, agribusiness, and natural resource management bodies.	Priorities available for download through the GRDC website, via: • agribusiness—www.grdc.com.au/narg • research advisory committees—www.grdc.com.au/rac. GRDC participation at the Royal Adelaide Show and AgQuip agricultural field days to present the latest RD&E information. Call for submissions on a consultation paper, *Investment analysis of research, development and extension issues in Australian grain farming systems*. Expansion of regional agribusiness reference groups in South Australia and Western Australia to give national coverage. Establishment of the Grain and Graze 2 program, partially funded through the Australian Government's Caring for our Country initiative, in partnership with growers, researchers, agribusiness and natural resource management bodies.
Improved prioritisation of issue-based programs	• Improved processes that recognise regional differences, to identify and prioritise critical RD&E questions.	GRDC Regional Cropping Solutions initiative established to enable growers and their advisers to better identify and prioritise local farming systems issues and RD&E questions. Facilitation and coordination services in place across south-eastern Australia and Western Australia. Appointment of facilitators to support the Regional Cropping Solutions initiative.
Undertake targeted extension and adoption through appropriate delivery channels		
Customer relationship management database upgraded and implemented	• Customer relationship management (CRM) database upgraded with accurate demographic profiling.	Use of a data-matching service to increase phone numbers on the CRM. Integration of GRDC 2010 Grower Survey data into the CRM to improve segmentation of the customer base. Increased *Ground Cover* subscribers with email addresses on the GRDC CRM from 4,735 to 5,542 (17% increase).

Table 14 Practices overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Undertake targeted extension and adoption through appropriate delivery channels *(continued)*		
Enhanced use of GRDC website by customers	• GRDC website enhanced to attract greater use by customers, including through regionally based web content.	Website redevelopment to improve navigation and functionality. Enhancements to search engine to improve quality. Enhanced CRM campaigns targeting regionally based content on the GRDC website. Hard copy version of *Ground Cover* enhanced with regionally specific online newsletters sent via the CRM database.
	• Implementation of RD&E portfolio with Google Maps™ technology.	All historical projects geocoded, with facility for ongoing mapping of projects. Current projects available online at www.grdc.com.au/mappedprojects.
Enhance sustainable management of natural resources		
Grain growers adapting to climate change and mitigating on-farm greenhouse gas emissions	• Improvements in climate change management achieved, through better climate forecasts and more efficient use of nitrogenous fertiliser.	Increased accuracy of the seasonal forecast provided through the Predictive Ocean Atmosphere Model for Australia.
	• Cross-sector support for climate change initiatives maintained.	Renewed commitment to the Climate Change Research Strategy for Primary Industries among research partners.
	• Partnership with the Department of Agriculture, Fisheries and Forestry on nitrous oxide and soil carbon research maintained and expanded to include adoption activities with farming systems groups where appropriate.	Management of the national nitrous oxide research program, participation in the Soil Carbon Program and establishment and management of the National Adaptation and Mitigation Initiative.
Grain growers improving soil condition and managing nutrient inputs	• Implementation of the environmental plan, including demonstrated improvements in soil sustainability (especially the management of water-repellent soils).	Establishment of two projects to develop economic management of water-repellent soils.
	• Improved adoption of precision agriculture (PA) technologies through understanding key constraints and initiating required extension and training programs.	Surveys conducted, and results published and distributed, on the understanding and use of PA technologies by growers. In the Southern and Western regions, participation by farming systems groups in activities, education and training programs to assist the adoption of PA. In the Northern Region, commencement of PA education and training programs.

What's in the RD&E pipeline for 2011–12?

- 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.
- Development of a pilot diagnostic framework to identify the reasons for suboptimal crop performance in a range of regions and crops and the use of the framework to address those constraints.
- Continuation of the successful Variety Specific Agronomy program in the Western Region, focusing on the management and performance of some of the new crop cultivars being released.
- Improvement of integrated weed management in the Northern and Southern regions, with growers adopting suitable practices to manage weeds based on lifecycle and seed bank data as well as herbicide resistance assessment.
- Surveillance of key fungal diseases for the development of fungicide resistance nationally to allow strategic management of fungicide effectiveness.
- A focus on delivering outcomes to Southern and Western growers for the management of *Rhizoctonia* fungal disease. This will include determining the impact of crop choice and summer weed management on *Rhizoctonia* levels, quantifying the effect of different soils on disease severity, and providing advice on the steps that growers can take to minimise losses.
- Expansion of the GRDC Updates program to include economic analysis of data presented. Growers will have access to 'dollar return per hectare' analysis of research outcomes, in contrast to the current gross margin analysis.
- 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.

David Gooden, who received a GRDC-supported Nuffield Australia Farming Scholarship in 2009–10 to study herbicide use, sees better spray drift management as a chance for Australia to develop world's best practice. Photo: Kellie Penfold

Output Group 2—Varieties

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

Varieties also supports 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 invests to facilitate an industry-wide approach to improving data collection, for industry-good purposes and to increase the efficiency of end point royalty (EPR) collection.

Table 15 summarises the achievements of the Varieties output group against its performance indicators for 2010–11 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.

contents

Wheat

Australian Grain Technologies

Australian Grain Technologies Pty Ltd (AGT) was founded in 2002. It is owned by the University of Adelaide, the South Australian Research and Development Institute, Vilmorin & Cie (a subsidiary of Groupe Limagrain), and the GRDC.

AGT has a national wheat-breeding strategy, with breeding nodes in New South Wales, South Australia, Victoria and Western Australia. The company has an integrated seed production and distribution capability through which it commercialises proprietary and licensed varieties of wheat, durum, triticale and peas.

In 2010–11, AGT released four new wheat varieties:
- one conventional variety—Estoc$^{\Phi}$
- three herbicide-tolerant varieties—Justica CL Plus$^{\Phi}$, Kord CL Plus$^{\Phi}$ and Sabel CL Plus$^{\Phi}$. These varieties carry two genes for resistance to the imidazolinone herbicides used in the Clearfield® production system, and are the first wheat varieties of their kind to be released in Australia.

InterGrain

InterGrain Pty Ltd was founded in 2007 by the Western Australian Government and the GRDC. Initially set up as a wheat-breeding company, InterGrain began breeding barley in 2010 after acquiring DAFWA's barley-breeding program. In 2010–11, the company had five wheat and two barley breeders developing varieties for New South Wales, South Australia, Victoria and Western Australia.

In 2010–11, Monsanto purchased a 19.9 percent share in InterGrain. The involvement of Monsanto is based on a collaboration agreement which gives InterGrain access to new germplasm and high-throughput molecular marker technologies and, in the long term, to biotechnology traits.

During 2010–11 InterGrain released two new soft wheat varieties: Kunjin$^{\Phi}$ and Wedin$^{\Phi}$.

HRZ Wheats

HRZ Wheats Pty Ltd was established in 2003 as the commercial arm of a CSIRO breeding program specialising in milling wheat varieties for the high-rainfall zone. Its current shareholders are CSIRO, New Zealand's Institute for Plant and Food Research, Landmark Operations Ltd, and the GRDC. The company targets milling-type wheat varieties for the high-rainfall zones in New South Wales, South Australia, Victoria and Western Australia. Although there were no new varieties released in 2010–11, new and promising material is coming through the HRZ Wheat variety development pipeline.

Wheat variety classification

Following the deregulation of wheat marketing in 2008, the GRDC (on request from the Minister for Agriculture, Fisheries and Forestry) put in place interim arrangements to guarantee the continuation of the wheat variety classification system previously undertaken by AWB International.

Following extensive industry consultations by the interim Wheat Classification Council during 2009–10, an industry proposal emerged which called for a standalone, independent organisation to host future wheat classification. The GRDC and Grain Trade Australia partnered to implement the proposal. In December 2010, a not-for-profit company, Wheat Quality Australia Limited (WQA), was established to manage the wheat variety classification system.

Under WQA, new wheat varieties are assessed for their inherent grain quality characteristics and allocated to groups or classes which support specific processing and end-product quality requirements set by export and domestic markets. WQA is not concerned with grain receival standards, which remain the responsibility of Grain Trade Australia.

Barley

The formation of Barley Breeding Australia (BBA) in 2006 consolidated six local breeding programs into three breeding nodes, one in each GRDC region, to enhance collaboration, germplasm exchange and efficient use of resources. BBA has been largely successful; during its five-year term the BBA parties have registered seven named barley varieties for plant breeder's rights.

However, since the inception of BBA the industry has seen significant changes, including the deregulation of grain marketing, global consolidation of malting and brewing supply chains, entry into Australia of barley varieties from private programs overseas, and increasing pressure on investment priorities for government and industry stakeholders.

In 2009–10, the BBA Advisory Board accepted the recommendations of a review which found that barley breeding in Australia should adopt a more commercial, market-based approach, to become self-funded through EPR income in the medium to long term. The review recognised that nodes might employ different business models and require different lead times to achieve sustainability. The BBA partners supported the review recommendation and resolved not to extend BBA beyond the end of its term in June 2011.

As a result the BBA parties wound up the business of Barley Breeding Australia during 2010–11. The parties have committed to continue to support barley breeding and the barley industry in accordance with the National Grains RD&E Strategy.

Pulses

Pulse Breeding Australia

Established in 2006 as an unincorporated joint venture, Pulse Breeding Australia (PBA) enables five temperate pulse breeding programs (chickpeas, lentils, field peas, faba beans and lupins) to work together to deliver improved varieties to growers faster.

In 2010 the GRDC commissioned a review of the business structure and processes of PBA. The review found that the establishment of PBA had been a considerable improvement on the previously fragmented, costly and competitive breeding programs. There is now a high degree of rationalisation, focused alignment, reduced duplication and fragmentation, and much greater interagency communication and collaboration.

However, the review also found that, despite significant achievements, the aggregate position of pulse cropping has not improved. Pulses are still

The PBA Chickpea Release Advisory Group meeting at the GRDC. (From left) Col Douglas (DEEDI), Larn McMurray (SARDI), Jon Thelander (Seednet), Gordon Cumming (Pulse Australia), Brondwen MacLean (GRDC), Russ Martin (NSW DPI), Kristy Hobson (NSW DPI), Simon Crane (Seednet), Ted Knights (NSW DPI). Photo: GRDC

seen by many growers as being unreliable and difficult to grow, although there is a trend towards growers specialising in growing pulses in the agroecological areas best suited to existing varieties. The considerable challenges that are still to be addressed include obstacles to accessing new technologies and the inflexibility and inherently high overhead costs of research partners.

Despite the challenges, the GRDC has been successfully working with PBA research partners to deliver better pulse varieties to growers. Four of the five breeding programs have released varieties with significantly improved characteristics, particularly in the areas of increased disease resistance and quality. Nine PBA varieties have been released since PBA's commencement, four of these in 2010–11, and a further three will be released in 2011–12.

The GRDC has also invested in a program of capacity building for PBA. Two PBA researchers are undertaking part-time postgraduate studies on topics of direct relevance to their breeding programs and a further three students have been identified to commence studies through PBA.

Peanuts

In the past few years, the Peanut Company of Australia (PCA) has reported a number of peanut lots with earthy or musty flavours, grown in certain regions of north Queensland. This is a major concern for the industry, as processed product has been returned from international and domestic customers.

Investigations have revealed that one of the causal components may be 2-methylisoborneol (2-MIB). The compounds 2-MIB and geosmin are common organic volatile chemicals with a musty or earthy odour and flavour.

In 2010, the GRDC, along with PCA, the University of New South Wales and the University of the Sunshine Coast, commenced a project to investigate off-flavour contamination in peanuts. The project is the first in the world to study the incidence and causes of this problem. It has three major components:

- analytical studies
- biological and ecological studies of organisms that produce 2-MIB and geosmin
- extension of the research findings to growers and industry.

The project is training two postgraduate students, providing expertise in off-flavour contamination and related analysis, biology and management that may later be extended to research in other areas of the Australian grains industry.

In 2010–11, accurate, rapid and low-cost analytical and sampling procedures were developed.

An improved understanding of the ecology and biology of the causal organisms was achieved, including the findings that 2-MIB volatiles originating from a 'hotspot' within a bulk storage container could contaminate surrounding product without direct physical contact.

New releases

Five new pulse varieties were released in 2010–11:

- PBA Blitz$^{\Phi}$ is a high-yielding medium-sized red lentil that is slightly rounder and significantly larger than the current main variety, Nugget. Although suited to all current lentil areas, PBA Blitz$^{\Phi}$ is particularly suited to shorter season areas where its combination of early to mid season flowering, early maturity, high yield and good disease resistance will improve lentil reliability and increase production.
- PBA Jumbo$^{\Phi}$ is a high-yielding, large-seeded red lentil. It is suited to most current lentil growing areas and has consistently yielded around 15 percent more than the current standard variety, Aldinga. It also has excellent milling quality.
- PBA Oura$^{\Phi}$ and PBA Percy$^{\Phi}$ are being released concurrently to provide growers with superior field pea options in regions prone to bacterial blight. Both varieties produce Australian dun type grain suitable for human consumption export or stock-feed markets; have high yield potential; are broadly adapted; perform relatively well in short growing seasons and low-rainfall climates; and have good levels of resistance to bacterial blight. These varieties provide growers with the option of growing either an erect semi-dwarf type (PBA Oura$^{\Phi}$) or a conventional type (PBA Percy$^{\Phi}$) to suit on-farm practices.
- Tingoora$^{\Phi}$ is a high-oleic, ultra-early maturing peanut variety, specifically developed to assist dryland peanut growers to better manage climate variability. Because of its very early maturity (105–110 days) it can avoid end-of-season drought and related aflatoxin risk. It has high kernel yield potential in both low-yielding and high-yielding environments and therefore offers cropping system flexibility, including early and late planting options in irrigated and dryland systems.

Canola

Blackleg is the most serious disease of canola in Australia. Before sowing, canola growers require information on the blackleg resistance of each cultivar to determine which ones will be appropriate for their regions and management systems. This information is provided through blackleg ratings, which are developed by screening National Variety Trials lines, commercial cultivars

and advanced seed company lines in disease nurseries in all canola-growing states.

The GRDC, with industry partners, invests in a screening system that ensures that blackleg ratings are available to growers by March, in time for each year's planting decision. The information is disseminated to all Australian canola growers. The system is managed by a review committee and is quality assured.

In 2010–11, extra sites and years were included in the ratings analysis—the 2010 analysis used seven years of data, whereas previously only three years of data was used. In addition, data from a further eight disease nurseries was received from private breeding companies.

Advanced lines from private canola-breeding companies were also screened across four different stubble types, to identify stable blackleg resistance and collect data relevant to blackleg management. This information helps to determine which cultivars get commercialised for which regions and whether seed-coated fungicides are used.

Triticale

The GRDC investment in the National Triticale Improvement Program brings together the breeding programs at AGT and the University of Sydney to develop triticale varieties for grain-only or dual-purpose (grazing and grain) use. This arrangement leads to greater efficiency through enhanced collaboration, germplasm exchange, and resources sharing. During 2010–11 the AGT component of the program released Chopper$^{\Phi}$, a new spring-type triticale variety for grain use only.

Pre-breeding in winter cereals

Managed environment facilities

Water-use efficiency is a major factor in determining the yield of crops experiencing drought or water stress. Although a number of traits—such as alternative dwarfing genes, high transpiration efficiency or reduced tillering—have been demonstrated to improve water-use efficiency, many of those traits have yet to be incorporated into variety releases. This is partly because of the limited capacity of breeding programs to screen for certain traits, but also because of the inability to validate the traits in realistic field environments. Reliable screening for performance under water-limited conditions has been a major challenge.

Managed environment facilities, which permit selection under controlled stress in realistic environments, are becoming increasingly important in both private and public research organisations.

The Phenomobile developed by CSIRO and equipped with multispectral cameras and other apparatus to capture a wealth of physiological data in experimental plots at the managed environment facilities. Photo: CSIRO

In such facilities, water availability can be controlled, reducing the effects of annual changes in water availability and increasing confidence in line performance under water limitation. The facilities also give pre-breeding and breeding groups the opportunity to meaningfully compare line performance, testing lines side by side under the same controlled conditions.

Together with its research partners, the GRDC has established three managed environment facilities, at Merredin in Western Australia, Yanco in southern New South Wales and Narrabri in northern New South Wales. The availability of irrigation and rain-out shelters at the facilities allows breeders to accurately generate water stress patterns typical of selected growing regions across the wheat belt. Data quality is enhanced by benchmarking activities across the three sites, based on the most recent physiological and genetic tools available, including remote sensing and web-accessible data capture and processing modules.

Six one-year projects were conducted in 2010–11; apart from generating a wealth of useful data, they served to fine-tune the facilities in their establishment phase. Eight GRDC-funded three-year projects will start in the 2011–12 season.

Rain-out shelters at the Merredin (WA) managed environment facility. Photo: GRDC

Grain functionality

Even more than grain attributes at receival, the intrinsic functionality characteristics of grain make the difference in achieving premium prices and customer preference.

The ability to identify individual subunits of glutenins with high and low molecular weight is a key element in selecting early for desirable functionality characteristics. 'Glutenin' describes a large family of highly similar proteins that determine not only grain hardness but also dough-making and baking properties. Minimal differences between members of the glutenin family have significant effects on those properties.

A GRDC-supported project conducted by Murdoch University produced a valuable tool, in the form of molecular markers, to enable breeders to identify those small differences in glutenins at an early stage in the breeding process. The project also developed a mass spectrometry–based methodology that can discriminate between multiple glutenin gene variants (alleles), which can be provided as a service to breeders.

Gene discovery and new technologies

Australian Centre for Plant Functional Genomics

With GRDC support, the Australian Centre for Plant Functional Genomics has been researching the identification of genes controlling drought tolerance of wheat in Mediterranean-type production environments (which occur in parts of South Australia and Western Australia). Wheat production in these environments is dependent upon rainfall during the growing season. The availability of water is cyclic, with a succession of rainfall and drought periods from flowering to grain-filling stages.

Working with elite wheat germplasm, the centre employed a multidisciplinary approach to determine the genetic and molecular bases of drought tolerance. Transcriptomics, metabolomics and proteomics technologies were applied to investigate plant cellular responses to cyclic drought. The resulting information was combined with comprehensive field evaluation data to identify regions of the wheat genome (quantitative trait loci or QTL) associated with yield under drought stress, and to target the genes potentially responsible for drought tolerance.

During 2010–11, the centre made a significant breakthrough, identifying a candidate gene underlying one of four target wheat QTL controlling yield and its components under drought stress. The candidate gene has been identified for the QTL-6A, controlling grain size and flag leaf width, and is the wheat version of a gene that controls grain weight and yield in rice. Importantly, a survey of wheat-breeding program lines has revealed that this gene is consistently associated with high yields in the field. Identification of the gene could result in a robust tool for the selection of drought-tolerant breeding lines.

International Wheat Genome Sequencing Consortium

Bioplatforms Australia Limited (BPA) provides services and scientific infrastructure in the specialist fields of genomics, metabolomics, proteomics and bioinformatics. As well as Australian Government investment, BPA is supported by investments from state governments, research institutes and commercial entities. In 2010–11, BPA and the GRDC formed a new wheat genomics investment partnership.

The partnership funds a joint project between Murdoch University and the Australian Centre for Plant Functional Genomics that will define the structure of wheat chromosome 7A, one of the 21 wheat chromosomes. Project outputs will represent the Australian contribution to the International Wheat Genome Sequencing Consortium (IWGSC), an international group of plant scientists, breeders and growers dedicated to sequencing the wheat genome to accelerate wheat improvement. As well as accelerating the delivery of the complete wheat genome sequence, the project will benefit Australian researchers by providing early access to information from other IWGSC groups.

The project aims to:

- produce new molecular markers to validate the association of genes encoding components of yield to demonstrable improvements in yield, for a range of Australian environments
- identify new genes that can be targeted for breeding, including wheat quality genes and genes for yield under water limitation
- engage with the IWGSC to target any chromosomal region of the wheat genome that is of interest to Australian agriculture
- renew interest in university-based study of wheat, attracting funds and student talent into the area, to build future capacity for the grains industry.

National Variety Trials

National Variety Trials (NVT) is a national program of comparative crop variety testing that was established to provide the Australian grains industry with access to robust independent results on the performance of recently released grain varieties. All winter cereals, pulse and canola breeding programs participate in the NVT program, which is funded by the GRDC and managed by Australian Crop Accreditation Systems Ltd.

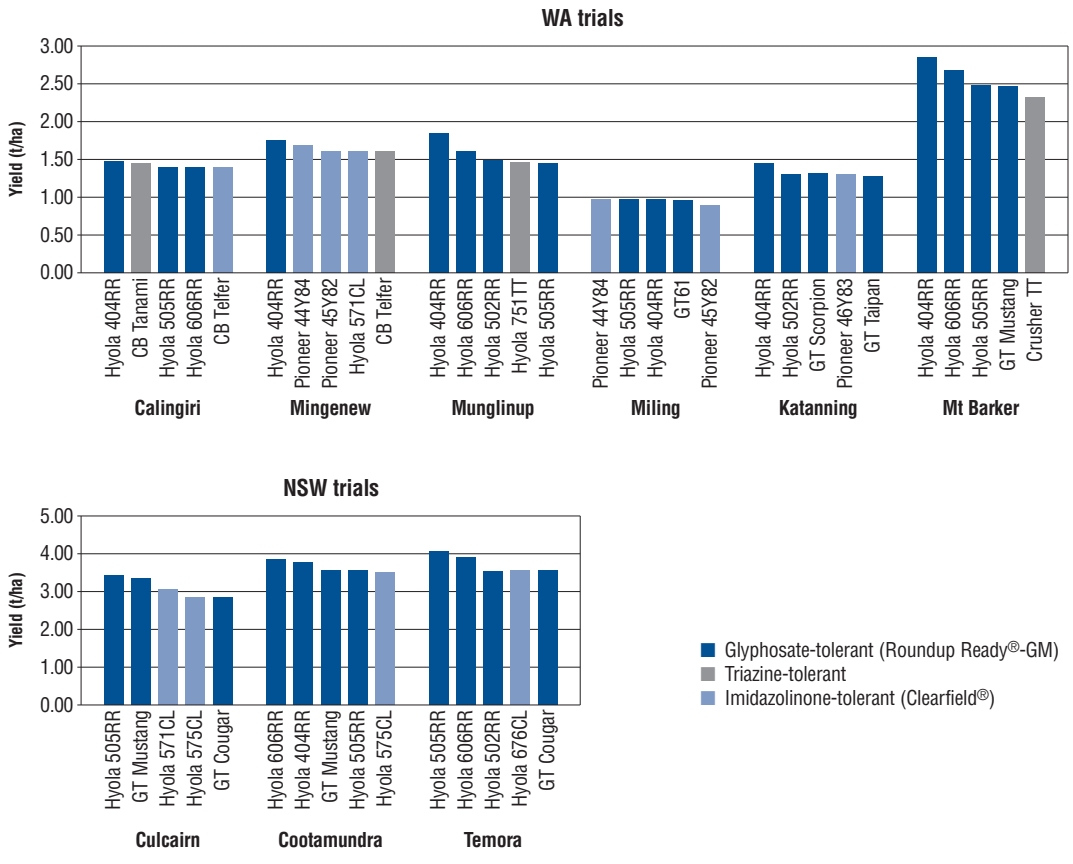
In 2010, the NVT program conducted 632 trials at more than 260 locations across Australia. The 2010 season was a very challenging one, with severe drought conditions in Western Australia and above-average rainfall, leading to widespread flooding, in much of the eastern cropping area of Australia. A total of 59 trials had to be abandoned as a result of seasonal conditions, and a further five did not meet the program's stringent data quality requirements and thus were not published.

The results of the remaining 568 trials were published on the NVT website (nvtonline.com.au) and in state department of agriculture crop sowing guides.

NVT trials containing genetically modified (GM) canola were again conducted in 2010. Eighteen trials commenced; all of five Victorian trials and two of five New South Wales trials were abandoned as a result of extremely wet weather and bird damage, and two of eight Western Australian trials were abandoned because of drought conditions.

The trials were designed as multiple chemistry trials, to enable the comparison of varieties across different herbicide tolerance classes (glyphosate, triazine and imidazolinone). Results revealed that varieties from each herbicide tolerance class were represented in the leading five varieties of different Western Australian trials, while glyphosate-tolerant (GM) and imidazolinone-tolerant varieties performed best in New South Wales trials, as Figure 12 shows.

Figure 12 Highest yielding canola varieties in National Variety Trials in Western Australia and New South Wales, 2010–11



In 2010, 15 NVT regional advisory committees were established to assist industry to provide input into the management of NVT trials. All but two committees (those representing the Australian high-rainfall zone and central Victoria) have met at least once to discuss changes to enhance the value of the NVT program to growers. These meetings have resulted in changes to a number of NVT trial management practices, including the NVT program policy regarding the fungicide treatment of trials. From the 2011 season, the fungicide management of trials will be altered to reflect district best practice, with all trials sprayed for the control of stripe rust when required.

The NVT program recently implemented a system for updating the NVT website daily while harvest data is being processed, so that program data is distributed to industry within 24 hours of processing.

The GRDC continued to partner with state departments of agriculture to support delivery of NVT data to industry. In 2010, GRDC supported the production and distribution of state department of agriculture crop sowing guides in Queensland, South Australia, Victoria and Western Australia.

CASE STUDY:

Suppressing weeds with competitive wheat cultivars

Competition for nutrients has a major negative effect on crop productivity, particularly for current Australian wheat varieties which compete poorly with weeds. This is of special concern where weeds are herbicide resistant. The build-up of weed seedbanks is also a serious management issue, even with the use of herbicides. Improved competitive ability has the potential to improve wheat yield and restrict weed seedbank increases.

As part of a GRDC-supported project at the University of Adelaide, the effect of early-vigour wheat lines with different levels of suppression on weed seedbank build-up was simulated over many crop cycles, using the Resistance and Integrated Management (RIM) tool to evaluate the performance of different integrated weed management practices. As shown in Figure 13, results indicate that early vigour achieves sustainable levels of weed control when used as part of an integrated weed management package.

The outcome of the simulation confirmed the need to develop weed-competitive wheat genotypes, suitable for inclusion in Australian wheat-breeding programs, through targeted breeding. During 2010, an extensive field trial program was conducted to evaluate the competitive ability of the wheat lines in this project. These experiments involved continuation of trials established during 2009, designed to study the effects of different environments as well as effects of different seeding rates and weed species on competitive ability.

Through targeted wheat breeding selecting for high early vigour, highly vigorous parents were used in a series of crosses to include alternative dwarfing genes, disease tolerance and grain quality traits. Approximately 7,000 wheat lines were produced and phenotyped. The most vigorous and agronomically suitable lines were selected and screened in the presence of weeds to determine their ability to tolerate and suppress weeds. The selected materials express a much higher early vigour and competitive ability than current commercial wheat varieties.

The yields of some experimental lines were greater than those of the current commercial variety Wyalkatchem$^{\Phi}$, which is remarkable, considering that the lines were primarily selected for high vigour and not for yield. These results clearly indicate that there is no measurable trade-off between increased vigour and yield under dryland conditions. Increased early vigour does not result in excessive pre-anthesis water use which in turn would reduce water availability during grain fill and could lead to reduced yield and grain size. Early ground coverage by early-vigour lines increases shading of the soil and thus reduces evaporation, which means more water remains available for transpiration.

Another unexpected observation was that pre-harvest sprouting in the experimental early-vigour lines was significantly reduced compared to the commercial checks used during the 2010–11 growing season, which was characterised by above-average rainfall and generalised high levels of sprouting.

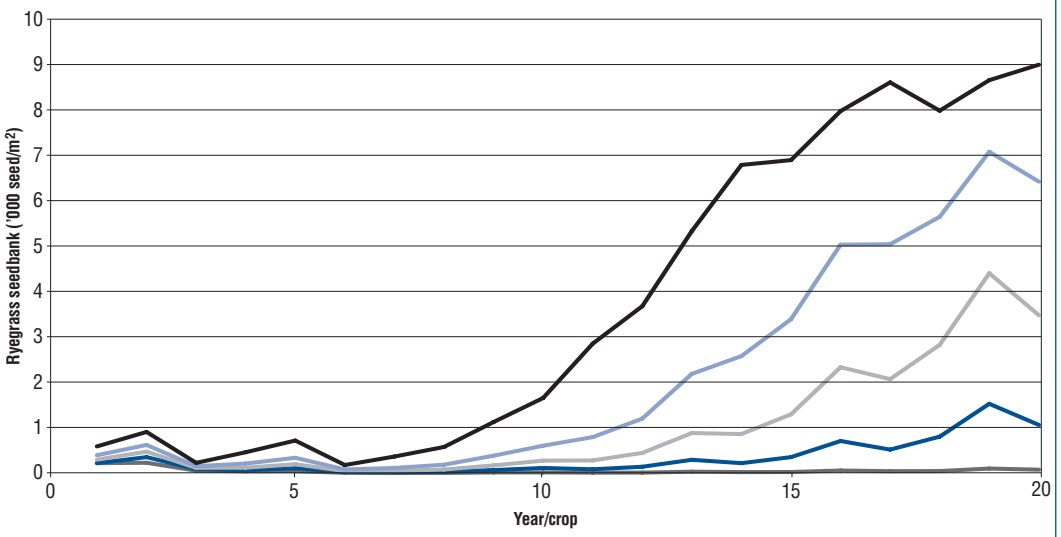
Selected high-vigour lines have shown excellent competitiveness across multiple trials and locations in South Australia and Western Australia, with high levels of ryegrass suppression compared to the commercial varieties. The most

Juan Juttner, GRDC Manager Gene Discovery, inspects a canola trial at Wagga Wagga, NSW. Photo: GRDC

weed-suppressive line reduced ryegrass by a further 60 percent compared to Yitpi(b), which is one of the most competitive commercial varieties.

Wheat lines developed in this project, incorporating high competitive ability with suitable agronomic plant traits, are now entering wheat-breeding programs. Their translation into new commercial varieties will provide wheat growers with a valuable new option for integrated weed management.

Figure 13 Comparison of effects of weed management strategies on the ryegrass seedbank



Strategies:

- S1= normal seed rate (50 kg/ha) and management practices
- S2= sowing at high seed rate (80 kg/ha)
- S3 = sowing at high seed rate but using a wheat cultivar that provides 30% additional weed suppression
- S4 = same as S3 but using a cultivar that provides 50% additional weed suppression
- S5 = a cultivar with 50% weed suppression combined with windrow burning after barley.

CASE STUDY:

Aligning variety trials with industry practice for stripe rust

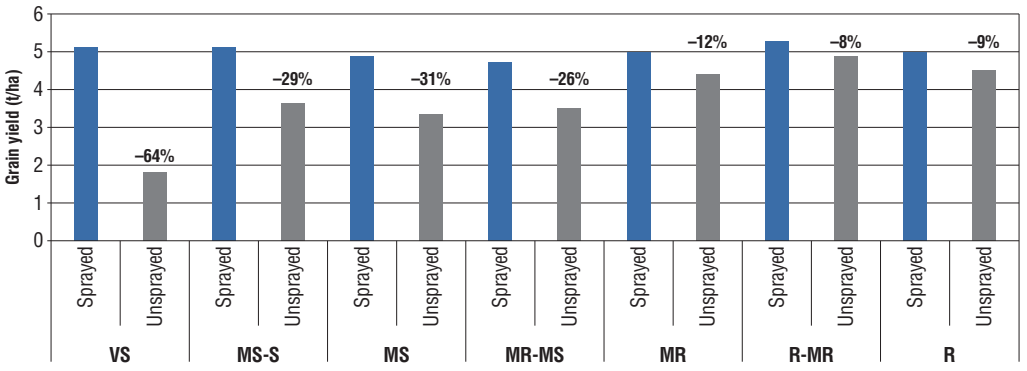
Recent GRDC-supported research has shown that wheat diseases cause the Australian grains industry average annual losses of $76 per hectare of wheat grown. While this impact is most keenly felt by Australian wheat farmers, diseases also affect researchers and agronomists conducting wheat research and extension field trials.

Stripe rust in particular has the potential to significantly impact plant performance and trial results, including yield assessment data. Large field trial programs, such as the GRDC-funded National Variety Trials (NVT) program, which aims to provide growers with robust and independent data regarding the regional performance of new varieties of grain crops, are consistently affected by stripe rust outbreaks.

Since its inception, the NVT program has maintained a policy of not spraying wheat trials for rust. In 2008, the NVT program was formally reviewed; one of the key recommendations from this review was that the impact of this policy on the quality of data provided to industry should be assessed. In particular, it was acknowledged that in some seasons and specific regions the application of fungicides to control stripe rust was common district practice, even on wheat varieties which meet current minimum stripe rust disease standards (MS in Western Australia and MR-MS in the other grain-growing states). Therefore, in those regions the NVT program protocols were not aligned with district best practice.

In response to the review, approximately 20 per cent of the 2010 NVT wheat trials were converted to four replicate trials, with two replicates sprayed with fungicides in response to stripe rust infection and two replicates left unprotected. Comparison of sprayed versus unsprayed yield data revealed that stripe rust had a statistically significant impact upon the yield of varieties with a resistance rating of less than R-MR (Figure 14).

Figure 14 Yield losses of varieties in New South Wales NVT wheat trials due to stripe rust infection, in the presence and absence of fungicide control, grouped by varietal resistance rating



VS = very susceptible
MS-S = moderately susceptible to susceptible
MS = moderately susceptible
MR-MS = moderately resistant to moderately susceptible
MR = moderately resistant
R-MR = resistant to moderately resistant
R = resistant

Source: Greg Brooke, Industry and Investment New South Wales.

Based on the 2010 NVT results, the NVT fungicide-use policy has been amended to permit trials to be sprayed for control of stripe rust when required. This change in policy has been endorsed by industry, based upon the need to manage NVT trials according to regional common practice, which in the 2010 season involved the widespread use of fungicides to manage the stripe rust epidemic. The change in policy ensures that data extended to industry reflects varietal performance under standard agronomic practice.

The use of fungicides in NVT wheat trials does not mark a departure from GRDC R&D support to facilitate the improvement of varietal disease resistance. NVT continues to maintain a policy of not accepting wheat lines entered into NVT if they do not meet minimum rust resistance standards.

Table 15 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 2010–11		
$57.67 million		
Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Build and sustain world-leading breeding programs		
Average annual increase in yield (as measured in NVT trials) for wheat, barley, canola, sorghum and pulses	• Average annual increase in yield (as measured in NVT trials) of: – 1.0 percent for wheat – 1.0 percent for barley – 1.5 percent for canola – 1.5 percent for sorghum – 2.0 percent for pulses.	New wheat and barley varieties with yields up to 10 percent higher than current dominant cultivars.
	• The release of improved varieties of wheat, barley, canola, pulses and summer coarse grains that benefit the Australian grains industry.	Release of: • six new wheat varieties • two new field pea varieties • two new lentil varieties • one new peanut variety • one new triticale variety.
Commercial breeding programs meeting minimum disease standards	• 90 percent of wheat second-year entries in NVT trials continue to meet minimum disease standards for rust resistance.	More than 90 percent of second-year entries met minimum disease standards for rust resistance.
	• 90 percent of canola entries in NVT trials continue to have blackleg resistance scores of 7 or above.	Blackleg ratings of 7 or greater for over 90 percent of canola varieties that were released in 2010–11 and targeted at blackleg-prone areas.
Research partners continue to invest in breeding programs where market failure exists	• Where market failure exists, the GRDC's research partners contribute at least 50 percent of the costs of running the breeding program.	Research partners contribute more than 50 percent of the running costs of the breeding programs for chickpeas, lentils, lupins, field peas, mungbeans, soybeans, peanuts, vetch, oats and durum wheat.
Efficient and cost-effective royalty collection systems in place	• By 2010, royalty compliance is greater than 80 percent nationally (measured by consolidating breeding program data).	The system for automatic deduction of EPRs from grower payments was consolidated, with 28 grain handlers and traders now supporting this simplified system of EPR collection.

Table 15 Varieties overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Build and sustain world-leading breeding programs *(continued)*		
Cost-efficient breeding programs	• Breeding population size is expanding or being maintained on reduced resources.	All pulse breeding programs expanding in population size. Advances achieved in developing new germplasm with increased resistance to: • phytophthora root rot • ascochyta blight • botrytis • root-lesion nematodes.
Focus pre-breeding research on key traits		
Nationally coordinated pre-breeding research with a focus on agreed key traits and effective international linkages	• New traits and selection methods developed for use by Australian breeding programs.	Work by the Australian Durum Wheat Improvement Program on root adaptive traits to improve durum performance on adverse soils. Stable durum lines with chromosome sections from bread wheat, containing crown rot resistance attributes, obtained by the University of Southern Queensland.
Evidence that genes, germplasm and enabling technologies developed in GRDC-supported pre-breeding research are being used in breeding programs	• Effective extension and delivery mechanisms in place for pre-breeding outputs.	Industry licensing of: • 190 sorghum lines • 93 canola lines, of which 23 lines have blackleg resistance attributes and 70 have grain quality attributes.
Develop a path to market for genetically modified crops		
Delivery platforms developed for genetically modified crops in Australia	• Technical milestones achieved towards developing genetically modified herbicide-resistant lupins.	Increased transformation efficiency of lupins that has generated a high number of herbicide resistant events; outputs are undergoing further testing before proceeding to field trials.
Facilitate faster adoption of superior varieties		
Increased use of NVT results by paid grower advisers	• NVT results used by 80 percent of paid advisers to assist growers with variety selections.	2010 Grower Survey showing that 68 percent of paid advisers make reference to NVT when assisting their clients to select varieties.
Breeder participation in NVT	• At least 90 percent of relevant breeding programs participate in NVT.	All Australian cereal, pulse and canola breeders participated in NVT during 2010–11.

What's in the RD&E pipeline for 2011–12?

- Two new projects at the University of Adelaide and CSIRO Plant Industry that will focus on the molecular basis of pre-harvest sprouting.
- A new CSIRO project that will focus on introgression and the generation of molecular markers for field-level crown rot resistance in barley.
- 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.
- 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 expand the brassica germplasm base in Australia through collaboration with China and India.
- 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:
  - acid soil tolerance
  - reduced severity of net form net blotch disease
  - improved end-use quality.

At the launch of the two new Pulse Breeding Australia (PBA) lentil varieties at the Royal Adelaide Show were (from left) SARDI pulse agronomist Larn McMurray, SA Minister for Agriculture the Hon. Michael O'Brien MP and GRDC Manager Pulse Breeding Brondwen MacLean. Photo: GRDC

Output Group 3—New Products

The New Products output group comprises New Grain Products and New Farm Products and Services. The two investment areas target 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.

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

Table 16 summarises the achievements of the New Products output group against its performance measures for 2010–11 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.

New grain products

The New Grain Products portfolio identifies and develops 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 is also a key theme for this portfolio.

Sophisticated electronics and guidance systems dominate modern tractor cabs, but component complexity may be discouraging a lot of growers from adopting some of the related PA systems. Photo: Brad Collis

contents

Food products

GRDC investments in new grain food products focus on the development and commercialisation of novel grains with additional health benefits for easy incorporation into grain-based foods.

Highlights from the portfolio in 2010–11 include:

- Potential commercialisation partners showed sufficient interest in high-amylose wheat material to warrant field trials of the best high-amylose wheat lines at sites in North America. The field trials will generate data that will be useful in developing a data package to support deregulation should a decision to go to market in North America and Australia be made.
- The ultra-low gluten barley project reached a milestone in product development with the generation of a line in which no gluten can be detected (using current detection methods). The project also reached a significant step towards commercialisation with the submission of a business and marketing plan for a commercial product from an interested commercial partner.
- The GRDC, along with technology co-owner CSIRO, entered an alliance with Nuseed to use gene technology to develop and commercialise a canola plant that provides a sustainable alternative to the current marine sources of omega-3 oil. The new canola variety is targeted to be commercially available by 2016. The initial market for the oil will be in the aquaculture industry, where the oil may replace fishmeal, particularly for farmed salmon. Use in human food supplements is also an intended market for the oil.

Feed products

Interest in using near-infrared (NIR) calibrations grew, across the livestock feed manufacturing sector. The GRDC has licensed the commercial development of the NIR calibrations to the Pork CRC Ltd. In 2010–11, 17 licence holders, four commercial milling groups, six laboratories and five plant-breeding companies used the technology. A major feed manufacturer has taken the next step in implementing the calibrations by fitting them on the feed mill processing line to measure nutritive value in real time.

Industrial uses

The GRDC seeks to identify opportunities for the use of Australian grains for both existing and innovative industrial purposes.

The Crop Biofactories Initiative is a joint investment between the GRDC and CSIRO that aims to engineer safflower seeds with fatty acid compositions that match specific industrial applications, to replace products that are currently manufactured from petrochemical feed stocks. In 2010–11, the initiative made significant progress toward each of the three target oils in safflower. The initiative continues to engage with potential commercialisation partners to share positive results.

To assist with the commercialisation of a new industrial safflower variety, the GRDC accessed improved safflower germplasm from international safflower gene banks, and will multiply the lines during 2011 to generate seed for field evaluation in 2012. These lines may yield germplasm that is better suited to the Australian production environment and may fill the gap in available safflower varieties for growers.

A project with the University of Sydney is assessing the conditions required for, and chemical products that result from, the use of hot-compressed water technology to process cereal crop residues such as wheat and barley straws. The project has shown that a number of high-value chemicals can be made from cereal straws. The next step for the project is to determine the economic feasibility of using this processing technology to process cereal straws.

New farm products and services

The new farm products and services portfolio focuses on inputs for the grains industry that improve productivity and profitability. Those with the greatest potential to deliver benefits to the grains industry are subjected to careful market evaluation, and a business case is developed to justify each potential investment.

Highlights from the portfolio in 2010–11 include:

- A third prototype of the Harrington Weed Seed Destructor was produced by CGS Engineering in Western Australia and tested successfully in the field. Enhancements included improvements to the chaff transfer system and a reduction in the overall weight of the machine by around 1,000 kilograms. An expression of interest process was launched to find a commercial partner.
- A scoping study to test the choice analysis theory on Australian wheat markets was undertaken. Key export partners submitted responses to a questionnaire designed to determine the relative value of specific grain quality and functional traits. A larger project will be contracted in 2011–12.
- Several PhD scholarships were awarded, in areas including entomology, plant pathology and agricultural engineering. These strategic placements are the start of a concerted attempt to ensure that core capacity in important research areas is maintained into the next generation and that senior researchers are involved in mentoring new students.
- Formulation and field trials for projects investigating snail biocontrol and Metarhizium biopesticide were begun in 2010–11.

The three prototypes of the Harrington Weed Seed Destructor on the Harringtons' farm at Wagin, WA, during harvest 2010.
Photo: Nicole Baxter

CASE STUDY:

Extracting effective, affordable fertiliser from waste

Steadily increasing fertiliser prices—reflected in a 60 percent increase in the fertiliser price index since 2005—have placed significant cost pressures on Australian grain growers. It is likely that prices will continue to steeply increase, as global supplies of phosphorus, potassium and oil are diminished and suppliers find it increasingly difficult to satisfy the demand for fertilisers derived from those commodities for food production. This provides a strong incentive for the grains industry to investigate alternative nutrient sources.

The GRDC has invested in a project to locate nutrient resources (including manures) and assess their potential for processing into high-value fertiliser products ideally suited for agricultural usage. The project has focused on the use of new technologies and techniques to extract key nutrients from readily available waste streams.

Large quantities of biosolids and manures are produced in Australia. Although their use as a fertiliser substitute is common, because nutrients are present in relatively low concentrations the value of the raw materials as fertilisers is typically very low. Combined with factors such as limited availability of nutrients to plants, nutrient losses through volatilisation, high transport costs and difficulties with spreading the raw materials, this often renders the products economically unviable.

However, with assistance from emerging technologies, there is potential to concentrate the nutrients in these waste streams to produce high-value, easy-to-use products.

The first stage of the project, the identification of potential nutrient resources, was completed in 2010. The results indicate that almost 30 percent of Australia's annual agricultural requirement for phosphorus could be extracted from waste streams, and that there is a supply of potassium in excess of current needs. The full report on the location, volume and analysis of waste streams will be made available on the GRDC website in late 2011.

In the second stage of the project, completed in late 2010, the nutrient resources were assessed for their potential to provide economically feasible fertiliser and energy products using newly developed processing techniques. Case studies were developed for the most ideally suited resources, to fully examine the investment potential.

In 2011–12, the GRDC plans to invest in several pilot plants for generating fertiliser from waste. The expectation is that industry will be an active partner in this process, guiding the types and quality of products to be produced to optimise the benefits for grain growers.

Nitrogen and phosphorus based fertilisers make up the largest part of most growers' input costs. Photo: Kellie Penfold

CASE STUDY:

Supplying a fish-free alternative for long-chain omega-3

Tissue-cultured canola plants' including omega-3 gene stacks. Photo: CSIRO

An Australian research alliance is leading the international race to break the world's reliance on fish stocks for its supply of the vital dietary nutrient long-chain omega-3.

DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) long-chain omega-3 fatty acids have well-documented roles in heart and brain health, child and infant development, reducing inflammation and other health functions. Fish are the primary source of these fatty acids.

Over the past decade, as awareness of their health benefits has increased, the inclusion of long-chain omega-3 extracts in diets—as supplements or in processed foods—has grown exponentially. The rate of growth in consumer demand can no longer be sustainably supplied from wild fish stocks, so the race is on to find potential new sources which can sustainably satisfy the demand.

The GRDC, CSIRO and Nuseed have joined together to bring pioneering Australian grains research into the race, through the Long-chain Omega-3 Canola Oil Research Collaboration, announced in April 2011.

The three parties have signed two major agreements to develop and market plant-made, DHA-rich long-chain omega-3 oils, using world-leading biotechnology. The first agreement is a collaborative research project to achieve a series of development milestones and complete a broad range of studies. The second agreement is a global exclusive commercial license to Nuseed for existing and co-developed long-chain omega-3 intellectual property.

The new collaboration aims to have crop trials completed by 2014 and seed for the new canola commercially available in 2016.

This exciting Australian collaborative project takes a whole-of-chain approach, combining scientific, research and agricultural expertise with commercial support. The GRDC is pleased to play an important role in a project that will present growers with an exciting varietal opportunity in both domestic and international grain markets.

Table 16 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 2010–11		
$14.90 million		
Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Identify national and international technology relevant to the grains industry		
Identify six new technologies and at least one new international supplier, including unsolicited offers	• Analysis of a survey report from a waste-to-fertiliser project as a basis for a decision on the implementation of case studies.	Move to pilot plant in 2011–12 based on the results of 2011 report and further design planning.
	• Scoping of opportunities in nutrient use and water-use efficiency in preparation for investment in July 2011.	Completion of the scoping and presentation of the results to GRDC panels.
	• Engagement of an international machinery manufacturer to develop the next generation of the Harrington Weed Seed Destructor.	Launch of expression of interest.
	• Evaluation and contracting of potential new investments in novel compounds and practices for protection of stored grain.	New project contracted to examine the potential of modified grain protectant powders.
	• Work building on the experiences gained in the barley variety identification project to begin the process for wheat.	Planning sessions held in 2011 for work to commence in 2011–12.
	• Scoping of further export development opportunities where targeted R&D investments open up precompetitive positions for Australian grain.	Presentation to GRDC panels of a business case for a potential project based on gaining a better understanding of wheat use in Indonesia.
	• A new project to assess novel technology to generate value-added biofuels and chemicals from Australian grain crops.	Determination of processing conditions for a number of cereal straws to generate high-value chemicals.
	• A new project to assess methods for extracting canola meal proteins with improved functionality for incorporation into human food products.	Completion of an initial survey of meal proteins from common canola varieties and development of methods for extracting proteins.

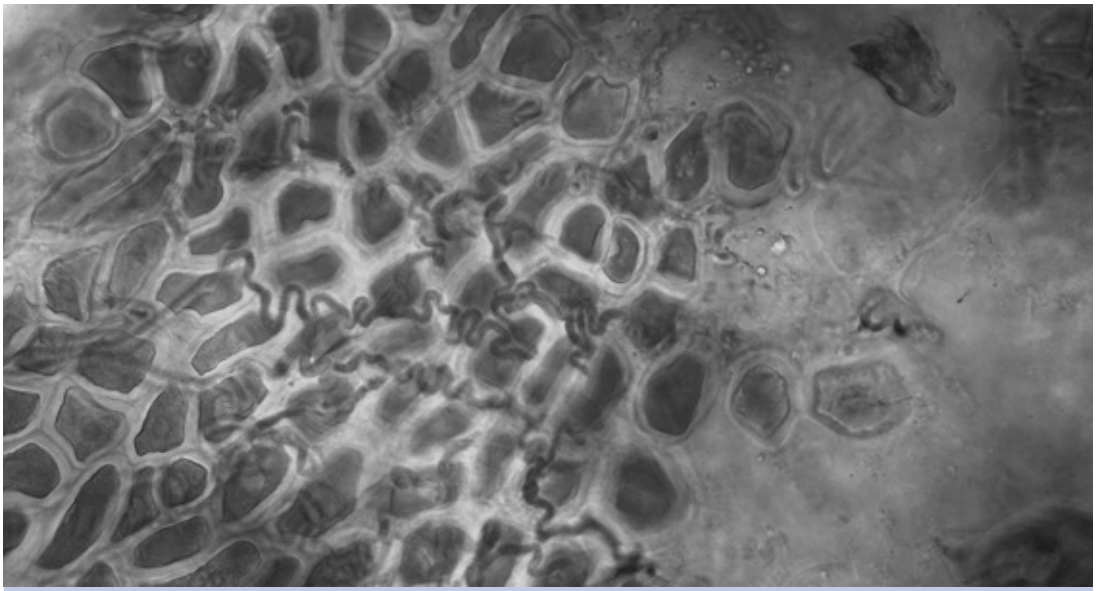
Table 16 New Products overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Develop partnerships to deliver new technology		
Existing and new partnerships to deliver technology to growers	• Commercial strategies and, where appropriate, engagement with commercial parties for: – MEMS-IR technology – barley variety identification – snail biocontrol – outputs of the Crop Biofactories Initiative – coeliac-friendly barley – high-amylose wheat – omega-3 canola.	Contracting of an instrumentation development project based on the MEMS-IR technology along with investigation into the wider potential of the device. Commercial test for variety identification to be launched in 2012 based on work to date. Contracting of commercial groups to produce formulated product for the phased integration of the snail biocontrol product into farming systems. Continued engagement with potential commercial partners for outputs from the Crop Biofactories Initiative. Continued engagement by Arista Cereal Technologies with commercial partners for high-amylose wheat. A business evaluation agreement executed with a commercial partner for ultra-low gluten barley. A research collaboration agreement and commercial licence agreement executed with CSIRO and Nuseed to develop omega-3 canola.
	• Engagement of key commercial partners for the final phase (registration and market delivery) of the GLO2 grain fumigant project.	Licensing contracting begun with a commercial partner.
	• Development of a path to market and commercial partnerships for the Harrington Weed Seed Destructor.	Commercialisation plan completed and expression of interest launched.
Undertake product development to meet market requirements		
New products identified and market assessments undertaken and new products tested under market conditions	• A commercial licence for *Metarhizium* isolates, following successful trials under the current research licence.	Commencement of discussions with commercial companies.
	• Commercial-scale field trials of nematode isolates to evaluate efficacy in controlling snail populations.	Commencement of field trials of a commercially formulated product.
	• Field trials of snail-baiting actives.	Termination of the program because the baits were not successful.
	• A commercial arrangement for coeliac-friendly barley following successful product trials.	Business case presented by a commercial partner and further product development work to be undertaken.

Table 16 New Products overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Build robust business cases that demonstrate stakeholder return on investment		
Development of robust business cases to justify GRDC investment and to attract co-investment	• A path to market study for MEMS-IR adapted into a commercial business case for a chosen pathway. • Adaptation of the Chinese noodle project to align with new opportunities offered by the strategic relationship with a Chinese partner, and presentation of a business case.	Commercialisation plan written with independent expertise. Re-contracting of project and first milestones completed.

MEMS-IR = micro-electrical mechanical systems infrared



Fungal endophyte growing among cells of a cereal grain, viewed at 400 x magnification. Photo: David Hume

What's in the RD&E pipeline for 2011–12?

- Development of a viral-based insecticide for the control of diamondback moth in canola.
- Research into biopesticidal options for the alleviation of crown rot in cereals.
- Evaluation of potential biological options for the control of pathogenic nematodes in cereals.
- The design and construction of a pilot plant for the conversion of liquid waste streams into economically viable fertiliser.
- A choice analysis approach to define end user needs for wheat functionality.
- Extension of variety identification technology into wheat.
- Evaluation of potential commercial opportunities for wheat with high lutein content.

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 produces high-quality, innovative communication products to meet grains industry needs. The output group invests 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. The output group uses a combination of printed, electronic and video channels to reach growers. A social media strategy is being developed as a platform to further interact and communicate with stakeholders.

Communication & Capacity Building takes part 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 supports 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 18 summarises the achievements of the Communication & Capacity Building output group against its performance measures for 2010–11 and its objectives and strategies for 2007–12. The following sections describe some of the results of the output group's work during the year.

contents

Communication campaigns

A range of innovative communication campaigns were effectively implemented nationally and in the three regions. These integrated approaches to address priority issues identified by the regional panels and National Panel have resulted in tangible outcomes for grain growers and the Australian Government. The campaigns all include the development and implementation of a communication strategy which outlines specific objectives and results in the development of a range of communication products and information packages.

In 2010–11 four national campaigns and four regional campaigns were developed and implemented. The national topics were climate, productivity and profitability, panel profiles and wheat breeding. The regional campaigns covered root lesion nematodes and crown rot in the north and south, and non-wetting soils and frost in the west.

National campaigns

A key element of the climate campaign is the national network of 21 Climate Champions. The Climate Champions are grain farmers who tell the stories of how they learned about, tried and adopted new farming practices that helped them to create successful businesses which minimise losses in the bad years and maximise profitability in the good ones. The practices relate to a range of the GRDC's RD&E investments; examples include no-till farming, trash retention in sugar cane, stubble retention, crop rotation, mounding of crops, and methods of preserving water in the soil and coping with non-wetting soils. Video case studies of the farmers and their practices have been published on the Climate Kelpie website and are proving very popular. The Climate Champion farmers are capitalising on this popularity, attending field days, meeting with farmer groups and giving media interviews. Together, they have garnered 186 media items over a 12-month period since March 2010—an average of one item every two days. The climate communication campaign has also developed non-technical summaries of 42 GRDC climate investments and produced content for 18 *Top Paddock* fact sheets.

The productivity and profitability communication campaign aims to increase growers' awareness of the value of the GRDC levy and GRDC investments. In 2010–11 activities focused on the theme 'The Way We Were—20 Years of GRDC' and a national competition inviting grain growers to reflect on how the GRDC had contributed to on-farm change and increased productivity over the past 20 years. The launch of the competition included the distribution of national media releases and the production of four YouTube videos of the GRDC Chair promoting the initiative and encouraging growers to take part. The campaign launch received media uptake in over 50 media outlets and reached an audience of more than 1.3 million Australians; the YouTube launch videos received 550 hits. The competition winners—Tony White from the Western Region, Anne Williams from the Northern Region and Craig Reynolds from the Southern Region—will go on an international study tour in August 2011, to visit some of the world's leading grains research facilities and learn about the GRDC's international collaborations.

The panel profiles campaign aims to increase growers' awareness of the GRDC panel members, and build understanding of the role of the GRDC panels in feeding grower research priorities into the GRDC's annual RD&E investment plan. There were three elements to the campaign in 2010–11: profiling existing panel members, encouraging people working in the grains industry to apply for the new round of panels in early 2011, and profiling the new panel members. The campaign produced information packages for each panel member, which were sent to regional media and rural weekly newspapers (printed and online versions) and uploaded to the GRDC's website and YouTube channel http://www.youtube.com/user/theGRDC. When the new panels were announced, profiles were added or updated as required, and media releases were distributed at local, state and national levels, resulting in around 70 media clips. The current profiles are available on the GRDC's website and YouTube channel.

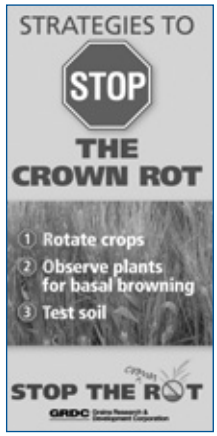
The wheat breeding campaign focused on informing grain growers of the change to the GRDC's investment in wheat breeding in Australia. The corporation no longer invests grower levies in commercial breeding, but invests in pre-breeding in areas that target growers' commercial priorities, such as tolerance to drought, frost and salinity, and disease resistance. This was communicated through the placement of several feature articles in newspapers across Australia and the development and distribution of a fact sheet for growers.

'The Way We Were—20 Years of GRDC' competition winners:
(Right): **Craig Reynolds, Southern Region**
(Below): **Anne Williams, Northern Region**
(Bottom): **Tony White, Western Region**

Regional campaigns

The regional communication campaigns were very successful in achieving their stated objectives.

The root lesion nematodes communication strategy was developed based on results of a survey of 112 growers and advisers. Key outcomes included participation in two field days at root lesion nematode study sites with the Queensland Department of Employment, Economic Development and Innovation (DEEDI); the production of 12 videos for YouTube; and participation at two GRDC grower updates where presentations on root lesion nematodes were filmed and made available online via VCASMO. The campaign also resourced the development of several communication products, including three banners; a digital information display and interactive survey for use by researchers at field days; an online map to show DEEDI's soil-testing results for nematodes between 1998 and 2002; and a blog for researchers to keep information on nematodes in one place and up to date.



The crown rot communications campaign successfully used the tagline 'Stop The Rot' and a play on the words 'Rotate, Observe, Test' to raise awareness of crown rot, its implications and recommended management strategies. The multifaceted campaign delivered key messages through feature stories and media releases in the print media; multimedia, including DVDs featuring interviews with researchers and growers; and direct-mailed brochures. The campaign drew together existing GRDC and researcher literature plus material generated specifically for the campaign into an information pack which was distributed to growers and advisers at the GRDC Updates.

The non-wetting soils campaign produced three media releases and two feature articles. The campaign strategy was updated and refocused to engage effectively with growers, in consultation with the Western Regional Panel.

The frost campaign produced four media releases, three feature articles and 10 grower group and consultant communication products. The campaign strategy was updated and refocused to engage more effectively with growers in the west, and to align with the pre-breeding frost strategy developed in 2011.

Media

A full day of interactive media and presentation skills training was provided to 42 GRDC panel members to increase their confidence in dealing with the media. 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, and to interact effectively with the media.

Information packages

In 2010–11 the GRDC provided pre-packaged content on the most recent research results relevant to grower needs, in readily accessible and user-friendly formats that meet the needs of a diverse range of customers.

The GRDC developed and produced three episodes of Ground Cover TV and distributed it to all grain growers who receive *Ground Cover*; distributed 42 packaged Driving Agronomy radio programs to commercial radio; and produced 36 Over the Fence videos and written articles for FarmOnline and print media. All of the new video content was made available through the GRDC's YouTube channel.

Publications

Grower fact sheets

In consultation with growers, researchers, industry representatives (including the National Agribusiness Reference Group), and GRDC regional panel members and program managers, Communication & Capacity Building identifies suitable topics for the GRDC's popular series of fact sheets for growers.

The timing and delivery channels for each fact sheet are determined to fit the subject matter and its intended audience. The majority of fact sheets are distributed as inserts in the GRDC's *Ground Cover* newspaper, and made available at grains industry events. Additional reprints are often required to meet demand from interested parties such as grower groups, agribusinesses, agricultural colleges and agronomists. All fact sheets are available in electronic format through the GRDC website.

In 2010–11, 38 fact sheets, covering both national and regional issues, were published and distributed. Three editions were published as targeted responses to emerging issues in relation to retaining seed (saving weather-damaged grain for seed), mouse management, and fertiliser toxicity. As emerging issues were identified, the GRDC ensured that the fact sheets moved quickly through all stages of production, so that growers would have access to the information they needed to make well-informed on-farm decisions.

Ground Cover newspaper and supplements

The GRDC's bi-monthly newspaper *Ground Cover* continued to deliver relevant and timely research information to growers in 2010–11.

In the past, the newspaper focused on delivering information about agronomic factors across the farm. Growers are increasingly asking for more advice on the best way to fit together the various components of available knowledge, to gain the best effect—not only in terms of production, but also in terms of profitability, use of inputs and management of risk.

In response to this trend, a new regular column was introduced in the January/February 2011 edition of *Ground Cover*. Entitled *Dollar$ and ene*, the column is aimed at keeping grain growers up to date with the latest information on farm business management. Themes addressed in the column have included debt retirement, decision making, tax strategies and succession planning. Dedicating a regular, branded column to the topic of farm business management is one of seven new investments by the GRDC in the Farm Business Management Initiative.

In addition, the GRDC published the *Ground Cover* Farm Business Management Supplement in 2010–11, to highlight some of the work being undertaken by the GRDC to assist farm business decision making at a number of levels.

GRDC 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 the knowledge and learning outcomes that the recipients gain through these awards.

During 2010–11 the GRDC undertook a review of all GRDC training awards offered under the Communication & Capacity Building program. The GRDC is now implementing recommendations from the review, including amending award criteria, modifying application forms and reporting requirements, enabling application forms to be submitted electronically, and offering additional opportunities for students with an interest in agriculture.

Education and training scholarships

The GRDC offers six categories of scholarships to support education and training in areas which may ultimately benefit the Australian grains industry. The scholarships awarded in 2010–11 are summarised in Table 17; more details are provided in Appendix B.

Grains Industry Indigenous Training Awards is a new category of student support that commenced as a pilot program in 2010–11. The awards assist individuals of Aboriginal or Torres Strait Islander background to undertake work placements, tertiary study and other forms of training approved by the GRDC. The aim is to develop new skills, build

Table 17 Education and training scholarships granted in 2010–11

Title	Eligible candidates	Period	No.
Agricultural Training Awards (ATA)	Students undertaking full time study at a recognised vocational education and training provider institution.	1 year	20
Grains Industry Undergraduate Honours Scholarships (UHS)	Students of excellence proceeding to undergraduate honours study in a field relevant to the future of the Australian grains industry.	1 year	10
Grains Industry Research Scholarships (GIRS)	Students of excellence proceeding to postgraduate study in a field relevant to the future of the Australian grains industry.	3 years	21
Grains Industry Indigenous Training Awards (ITA)	Indigenous Australians undertaking work placements, tertiary study and other forms of training approved by the GRDC.	Up to 3 years	3
Grains Industry In-Service Training Awards (IST)	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 (VF)	Overseas R&D personnel who are able to enhance programs supported by the GRDC with their specific skills.	2–12 months	1

Keith Perrett, GRDC Chair, was Australia's first Farm Industry Leader of the Year, receiving the honour in September 2010 from Peter Knoblanche, Rabobank. Photo: Kondinin Group

relationships and provide capacity in grains RD&E among Indigenous Australians, and for recipients to acquire new information that will contribute to the sustainability and profitability of the Australian grains industry.

Travel Awards

The GRDC granted 11 Travel Awards in 2010–11 to individuals or small groups wishing to attend a conference or undertake travel that may ultimately benefit the Australian grains industry.

Travel Award recipients are selected on their individual merits against the selection criteria and the GRDC's priority research areas. The main criteria used in evaluating applications include:

- the likely benefit to the Australian grains industry
- the scope of the proposed plan for communicating the learnings 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

The GRDC granted eight Industry Development Awards in 2010–11. These awards allow groups of Australian grain growers to take part in study tours or 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.

Conference sponsorships

The GRDC sponsors organisations that wish to conduct a conference, workshop, seminar or field day that will directly benefit the Australian grains industry. Twenty-nine were sponsored in 2010–11.

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 2010–11 the GRDC's contribution included support for programs for high school students; research grants for university students, researchers and growers; and professional development opportunities for future leaders.

Programs for secondary school students

Primary Industry Centre for Science Education

The GRDC's support for the Primary Industry Centre for Science Education (PICSE) is seeking to increase participation in post-compulsory science education, particularly in tertiary agricultural science, to address current and predicted skill shortages in the grains industry.

The GRDC is part of the PICSE initiative, a partnership funded by the Australian Government, universities, rural R&D corporations and primary industry bodies to attract students into tertiary science and increase the number of professionals in agribusiness and research institutions.

The program operates through eight activity centres around Australia, at which science educators work with teachers and students to explore agrifood science and career opportunities. It delivers class activities, teachers' professional development, teaching resources, student camps and student industry placement programs.

Each year PICSE adds to its collection of teaching resources. These resources are selected annually to reflect topical issues in the grains industry, and relevant work being undertaken by GRDC researchers. They are produced as a collaborative output from all the activity centres and made freely available to all teachers both inside and outside the PICSE network. In 2010–11 the resources included the following topics:

- Organic Chemistry—Its Role in Industry
- Biology in Context—Advances in Plant Genetics
- Science Taking You Places—An Introduction to Scientific Enquiry (years 7–9)
- The Science that Supports our Primary Industries (years 10–12)
- Chemistry and Biology Interactive Lessons—Science Linking with Primary Industries.

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 degrees and to explore associated careers. The experience involves presentations, debates, personal development sessions and visits to science, research and engineering facilities.

The forum encompasses two 12-day intensive residential programs held at the Australian National University in Canberra, and one 12-day intensive residential program held at the University of Western Australia in Perth. In 2010–11, a total of 450 year 12 science students took part.

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

The forum includes follow-up seminars and visits to various university campuses and industry sites around Australia, each involving between 50 and 150 students from the residential programs. 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.

BHP Billiton Science Awards

The GRDC has been a partner in the prestigious BHP Billiton Science Awards since 2007. The GRDC's aim in sponsoring the awards is to build capacity by providing incentives and recognition for students with potential to excel in Australian rural industries.

BHP Billiton, CSIRO and the Australian Science Teachers Association work with the association of science teachers in each state and territory to select finalists for the awards.

The GRDC Prize for Sustainable Agriculture in 2010–11, for the best entry related to agriculture with an environmental sustainability focus, was presented to Sam Quinn, from Lyneham High School in the Australian Capital Territory, for his project entitled 'Is an activated carbon filter effective at reducing the pH level of greywater so that it is safe for use on plants?'.

CSIRO undergraduate summer school

The GRDC is a sponsor of the CSIRO Plant Industry Summer Studentship 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

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

To qualify, applicants must be aged between 18 and 35 and working or studying in an agricultural, fisheries, food, forestry or natural resource industry. Applicants are required to submit a proposal for an innovative project that could be completed within 12 months, and addresses a significant issue facing rural industries. Winners are selected from a competitive field from across Australia, based on their projects' potential benefit to Australia's rural industries.

In 2010–11, Timothy March won the GRDC Award with his project entitled 'Hi-SELECT genotyping assay: Development of an open-source, customisable, and high-throughput genotyping assay for the plant-breeding industry'.

Presentation of the Department of Agriculture, Fisheries and Forestry Science and Innovation Award for Young People in Agriculture to Timothy March by Senator the Hon. Joe Ludwig, the Minister for Agriculture, Fisheries and Forestry.
Photo: Steve Keo

Nuffield Australia Farming Scholarships

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

These scholarships give 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 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. The scholars are expected to actively spread the knowledge and understanding they have gained, to benefit their farming sector.

The 2010–11 GRDC scholars are:

- Craig Duffield, from Ramco in South Australia, who plans to visit Brazil, Canada, the United Kingdom and the United States to study the future of the family farm in marginal areas.
- Michael Foss, from Bruce Rock in Western Australia, who plans to visit New Zealand, South America, the United Kingdom and the United States, to study corporate and family farming structures and the impact they have on issues such as productivity, profitability, the environment and R&D.
- Aaron Sanderson, from Ayr in Queensland, who will travel to countries such as Brazil, Cambodia, Thailand and Vietnam to study on-farm practices and systems in wet tropical areas and how they may relate to food production in similar environments in Northern Australia.

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 over 18 months, during which participants attend seven sessions spread over 60 days, 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 2010–11 were:

- David Jochinke, from Murra Warra, Victoria. David is a self-employed, third-generation farmer primarily producing cereal, pulse and oilseed crops as well as finishing prime lambs as a secondary enterprise. He plans, manages and executes daily operational activities related to the production of crops as well as livestock nutrition, husbandry and welfare on his 2,000 hectare property.
- Andrew Rice, from Parkes, New South Wales. Andrew is an agricultural consultant with more than 16 years experience in providing integrated technical and management advice to farmers and grain growers in central-west New South Wales. Andrew is an active member of a mixed farming business that includes a winter crop (wheat, barley and canola), beef cattle for yearling production, and merino sheep for wool and lamb production.

Nuffield Australia Farming Scholarship recipients. (From left) Michael Foss, Craig Duffield, Aaron Sanderson. Photos: GRDC

Vavilov–Frankel Fellowships

The GRDC supports the conservation and use of plant genetic resources through the Vavilov–Frankel Fellowship Fund, which enables outstanding young scientists (aged 35 years or under) to carry out relevant, innovative research outside their own countries for a period of three to 12 months. Applicants must demonstrate the importance and benefit of their proposed research to their home country, and indicate how it will be applied upon their return. In this way, the Vavilov–Frankel Fellowship Fund helps countries to build the scientific capacity they need to effectively manage and use plant genetic resources.

Proposals that might be supported by the GRDC must be carried out at an Australian research institute, address one of the research topics in the announcement, and meet at least one of the following four criteria:

- target a species that is a priority for both Australia and the home country
- work on any of the GRDC's 25 leviable crops
- target an alternative, neglected or underutilised species with either environmental or economic potential for Australia
- use biotechnology in support of efficient use of plant genetic resources.

In 2010–11 the GRDC supported Li Ling, a pea breeder at the Liaoning Institute of Cash Crop in China. Li is Coordinator of the Chinese Edible Beans Industry Technical System, and her research is aimed at better understanding the environmental background of China's collection of roughly 1,400 pea varieties. Li will be working in the Biosciences Research Division of the Department of Primary Industries, Victoria.

China and Australia have previously shared pea diversity to boost their breeding programs, but many of the Chinese accessions would be more useful if location data could be used to infer responses to biotic and abiotic stresses. Li plans to convert existing information for collecting sites to geographic coordinates, and combine this with climate and soil data for the various sites. The work is the first phase of a larger project which will test whether pre-screening of this sort results in a better set of accessions with the traits required by a breeding program than a random selection from the gene bank.

Nick Willey (right), development biologist at the Dow AgroSciences field station at Breeza, NSW, mentors high school student James Stewart. Photo: Dow AgroSciences

CASE STUDY:

Training advisers for the fight against foliar diseases

Foliar diseases cause significant yield losses to grain crops across Australia. Effective management of diseases requires a diverse range of management decisions—from selecting the right mix of genetics for a given environment, seasonal situation and cropping history, to choosing a foliar fungicide or seed or soil treatment—as well as a good understanding of the agronomic system of a grain-growing enterprise. Both crop yield and grower revenue could be increased by improving the ability of farm advisers to work with growers to combat diseases.

In 2010–11, the GRDC recognised that existing education programs did not allow sufficient depth of coverage and time for advisers to learn and practise the use of a range of management options in a cohesive strategy for disease management. As a result, the GRDC supported the development of a nationally accredited training workshop for grains advisers on the management of cereal foliar diseases.

After a small number of pilot training courses proved successful, Independent Consultants Australia Network facilitated the development of a technical training course with pathologists, researchers, agribusiness and the GRDC.

Course participants learn to effectively:

- identify and name key cereal growth stages and emergence of the important leaves
- relate the impact of environment and day degrees on crop and disease development to the economic management of foliar diseases in cereals
- relate the impact of environment on plant part contribution to yield and economic management of foliar disease
- understand modes of action for key fungicide groups
- identify key intervention points for disease management in cereals and relate this to environment and genetics to formulate cost-effective disease management plans
- identify canopy management interactions and be able to relate this to decisions on foliar disease management
- identify key cereal foliar disease symptoms in wheat and barley.

Training courses were held in six regional centres across Australia in 2010–11, and more are planned for 2011–12.

(Left-right–Front row) Agronomists Sarah Hyde (Narrogin-Corrigin), Holly Swarbrick (Kojonup), and Tristan Cornwall (Narrogin) with (Back row) Geoff Thomas, Plant Pathologist with DAFWA.

Michael Durant (Albany) and Lisa Leonhardt (Lake Grace), Agronomists from Landmark, checking the growth stage of cereals at a technical workshop.

Fungicide workshop hosted by Bayer and the GRDC in Albany, WA, in March 2011.
Photos: Craig White, Bayer CropScience

CASE STUDY:

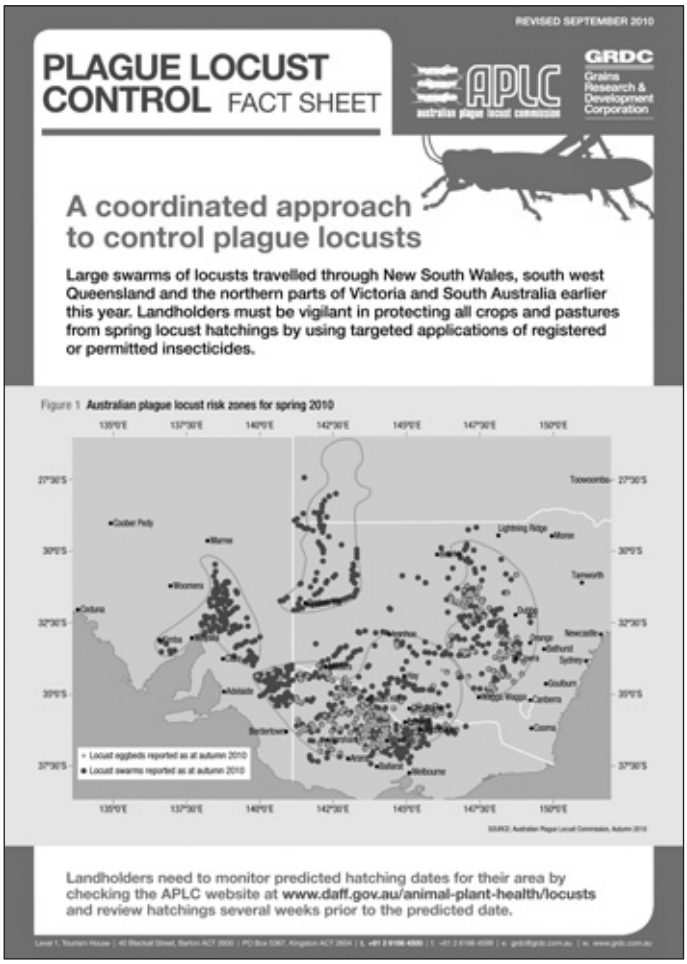
Combating locusts through knowledge and cooperation

In April 2010, widespread locust activity occurred in New South Wales, south-west Queensland and the northern parts of South Australia and Victoria. During autumn there was significant egg laying and, due to below-average temperatures and continuing rainfall, it was predicted that large numbers of hatchings would occur in spring.

In early August 2010, a meeting between the Australian Pesticides and Veterinary Medicines Authority, the GRDC-supported National Agribusiness Reference Group, the Australian Plague Locust Commission and relevant state agriculture departments identified an urgent need to provide timely and current information on plague locust control to grain growers.

Over a two-week period, the GRDC facilitated the writing, production and distribution of a plague locust control fact sheet. The document went through 23 drafts in that short time, to capture all the edits, comments and issues raised by contributors. It contained information on estimated spring hatching dates, the use of registered or permitted insecticides for locust control, and withholding periods of various chemicals.

In late August 2010, 28,280 copies of the fact sheet were mailed to growers in the 'at risk' areas. Bulk copies were also provided to fee-for-service advisers, retail advisers, government advisers, service industry advisers, researchers, associations and farmer groups in New South Wales, South Australia and Victoria.



In September 2010, a revised version of the fact sheet was produced, updating the estimated spring hatching dates and chemical withholding periods. In total, including both the August and September versions, 43,280 copies of the plague locust control fact sheet were printed and distributed.

In addition, the GRDC received a request from the Australian Plague Locust Commission for assistance in providing crop maturity dates and crop harvesting dates for 22 grain and pasture crops over 28 regions in New South Wales, South Australia and Victoria. The GRDC obtained and collated the information from departmental agronomists located in each of the regions across the three states. This information enabled the commission to cost-effectively determine when and where spray banding should occur as locusts hatched.

It was very rewarding for the GRDC to take part in such a major collaborative effort between agencies, and to be able to provide growers and advisers with timely and accurate information that would help them respond to the pest outbreak safely and effectively.

Table 18 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 Coordinate a national approach to building industry and research capacity Leverage delivery through partnerships Develop demand-driven publications and products		
Investment budget for 2010–11		
$6.80 million		
Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Ensure planned, targeted, measured communication		
Implementation of a revised GRDC communications strategy	• Implementation of a GRDC communication strategy that identifies the needs of stakeholders, key messages and processes for evaluation. • Facilitation of delivery of research outputs to a wide audience, building on existing regional delivery channels.	Implementation of a communication strategy with strong performance across the GRDC. Delivery of a new approach for issues-based communication campaigns.
Increased awareness of the GRDC and its research outcomes	• National issues-based campaigns developed and implemented to increase awareness of priority issues including: – GRDC profitability and productivity objectives – wheat breeding – climate change. • Regional issues-based communication campaigns developed and implemented to increase awareness of priority issues. • Increase in unaided awareness of the GRDC, through targeted communication activities (from 68 percent in 2006 to 90 percent in 2011). • Increased understanding of the GRDC and its role as measured through independent research surveys.	Delivery of national issues-based campaigns on: • climate • productivity and profitability • panel profiles • wheat breeding. Delivery of regional issues-based communication campaigns for: • root lesion nematodes • crown rot • non-wetting soils • frost. GRDC engages IPSOS-Eureka to conduct the Grower Survey every two years; the next survey will be conducted in 2011–12. GRDC engages IPSOS-Eureka to conduct the Grower Survey every two years; the next survey will be conducted in 2011–12.

Table 18 Communication & Capacity Building overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Ensure planned, targeted, measured communication *(continued)*		
Increased awareness of the GRDC and its research outcomes *(continued)*	• 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.	Publication of bi-monthly *Ground Cover* supplements on: • climate • precision agriculture • grain storage • biosecurity • capacity building • international collaboration.
Delivery of a strategic media program focused on grower activity on-farm to ensure information is delivered when it can be of most benefit	• National media program managed to deliver high-quality, timely media products to inform stakeholders of RD&E outcomes and activities. • Increase (over established benchmarks) in national media coverage of research activities and outputs for the GRDC and its research partners. • Increase in favourable GRDC mentions in the media (over established benchmarks).	Distribution of more than 500 media products. A total of 3,252 press articles and broadcast reports, representing an increase of 25 percent compared to 2,592 in 2009–10 and 44 percent compared to 2,257 in 2008–09. Consistent upward trend in the average favourability of press coverage since media analysis commenced in 2006–07, with favourability ratings of: • 55.0 in 2006–07 • 56.1 in 2007–08 • 57.4 in 2008–09 • 60.2 in 2009–10 • 60.7 in 2010–11. Increase in the volume of favourable press coverage to 2,283 articles, representing an increase of 12 percent compared to 2,042 in 2009–10 and 15 percent compared to 1,976 in 2008–09. Increase in the volume of reports identified as containing media release content: • across all three growing regions—to 2,179 reports, representing an increase of 47 percent compared to 1,485 in 2009–10 and 95 percent compared to 1,115 in 2008–09 • in the Southern Region—to 1,176 reports, representing an increase of 69 percent compared to 697 in 2009–10 • in the Western Region—to 476, representing an increase of 37 percent compared to 347 in 2009–10 • in the Northern Region—to 527, representing an increase of 20 percent compared to 441in 2009–10.

Table 18 Communication & Capacity Building overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Ensure planned, targeted, measured communication *(continued)*		
Increased awareness and understanding of the role and function of the GRDC's regional panels	• Campaigns implemented focused on regional panel profile and activities in each region.	Production of profile case studies, videos and media releases for each panel member, and distribution of media releases seeking nominations for the 2011–13 panels and announcing the new panel members.
	• The proportion of growers who are aware of the GRDC's regional panels increased to 65 percent by 2010.	Growers' awareness of panels will be measured in the next Grower Survey, to be conducted in 2011–12.
Regular monitoring of current and emerging issues	• Grains industry and corporate issues monitored and targeted communication tools developed to assist in the exchange of information and delivery of consistent messages.	Effective management of issues, including development of talking points and question and answer packages for a range of issues, including genetic modification, mouse control, rust and the GRDC levy.
Leverage delivery through partnerships		
Recognition of strong cooperative research partnerships	• Increased favourable mentions of the GRDC's research activities and outputs and those of its research partners.	100 percent of GRDC media products were approved by research partners and acknowledge the partner organisation.
	• Increase in positive media coverage (over established benchmarks) for print and electronic media.	Continued positive media environment, reflected in the 60.7 percent average favourability rating of coverage in 2010–11. Successful media strategy in which media release activity drove favourable reporting.
	• Establishment of a national grains communication network.	Funding provided to commence the national grains communication network in 2011–12.
Increased collaboration in R&D communication and extension activities between the GRDC and research partners	• Publication of materials in collaboration with RDCs, research partners, industry partners and government to meet grower and industry needs.	Publication of the *Beneficial Insects Back Pocket Guide* for the Northern Region, in collaboration with the Cotton RDC.
	• Identification of opportunities for the GRDC to work collaboratively with other RDCs, research partners, industry partners and governments to deliver information in ways that reduce duplication, better target stakeholders and are more cost effective.	Publication of the plague locust control fact sheet, in collaboration with Australian Government agencies, four state departments of agriculture and agribusiness. Collaborative displays at conferences, including the National Farmers' Federation conference and the Australian Bureau of Agricultural and Resource Economics and Sciences Outlook conference, and other industry events. Regular attendance at joint RDC communication manager meetings.
	• A pilot communication and extension workshop held in Western Australia.	Funding to conduct the pilot communication and extension workshop in 2011–12.
	• Joint communication efforts with other RDCs.	Development and distribution of a joint RDC brochure.

Table 18 Communication & Capacity Building overview *(continued)*

Performance for 2010–11		
Performance indicators	**Targets**	**Achievements**
Develop demand-driven publications and products		
Enhanced information tools to account for industry issues and emerging technologies to enhance adoption by the grains industry and the wider community	• Production of electronic media including audio, video and other electronically based content. • National 'Over the Fence' case studies, including media articles and video content, distributed to rural press and online publishers. • Ground Cover TV program developed and delivered to growers, including through Web 2.0 platforms. • Pre-recorded content of the national radio program Driving Agronomy delivered to radio stations. • Fact sheets, both national and regional, published and distributed to all grains industry stakeholders.	Development of the GRDC YouTube channel, www.youtube.com/user/theGRDC. Production of 12 Over the Fence case studies in each region, on topical issues. Production of three editions of Ground Cover TV, distributed to over 32,000 stakeholders. Production and distribution of 42 radio segments distributed to commercial radio stations throughout Australia. Publication and distribution of 32 fact sheets (both regional and national) to grain growers and industry.
Coordinate a national approach to building industry and research capacity		
A nationally coordinated agricultural research capacity-building strategy	• Evidence that key stakeholders understand the GRDC's capacity-building strategy.	Key information contained on the GRDC website. Communication strategy and talking points developed.
Support of a range of activities designed to build skills and expertise that will equip the Australian grains industry with the capacity to continuously innovate	• 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.	Support for: • 11 Travel Awards • 8 Industry Development Awards • 55 new training scholarships, including 21 Grains Industry Research Scholarships and 10 Undergraduate Honours Scholarships • 29 conferences • 3 Nuffield Australia Farming Scholarships • 2 Australian Rural Leadership Program participants.

RDC = rural R&D corporation; **RD&E** = research, development and extension

What's in the RD&E pipeline for 2011–12?

- Support for 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.
- Support for travel awards, conferences and workshops to maximise targeted awareness of the research outcomes of GRDC-supported projects.
- Publication of a suite of fact sheets on spray application, which will address Australian Pesticides and Veterinary Medicines Authority spray requirements as well as technology and techniques for optimising the use of chemicals and controlling spray drift.

Enabling functions

The GRDC's three enabling functions—Corporate Services, Corporate Strategy & Impact Assessment and Legal & Procurement—are 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 *Primary Industries and Energy Research and Development Act 1989* (PIERD Act) and the *Commonwealth Authorities and Companies Act 1997* (CAC Act), and equip individual output groups to deliver their targeted outputs.

Outlined in this section, and throughout this annual report, are key activities undertaken by the Corporate Services, Corporate Strategy & Impact Assessment and Legal & Procurement groups during 2010–11.

GRDC Finance team members. (From left) Carmen Jiang, Contract Payments Officer; Nino Divito, Accountant Reporting and Danielle Jakubowski, Manager Finance. Photo: GRDC

Business process review

The GRDC is improving its business processes specifically in relation to weaknesses and improvements identified within the GRDC's five core business processes. In 2010–11, the areas of focus were:

- capacity building—in 2010 the GRDC undertook a review of all initiatives offered under the Communication and Capacity Building output group. The review looked at areas of improvement for existing awards, new opportunities that could be utilised and consistency with the GRDC Capacity Building Strategy. As a result, the GRDC implemented recommendations from the review ranging from amendment to award criteria, modified application forms and reporting requirements, electronic submission of application forms and additional opportunities for students with an interest in agriculture
- evaluation of progress reports—in February 2011, the GRDC National Panel approved a change in the process for the evaluation of annual progress reports. The change allows managers to assess reports and defer to regional panel members and/or relevant expertise for advice. This created greater efficiency by allowing managers to assess reports directly, rather than through a multistep process, and by reducing the travel time and administrative workload of panel members.

Portfolio analysis

In 2010–11, the GRDC continued to undertake R&D portfolio analysis to provide more effective and efficient selection of investments.

One of the primary goals of the GRDC's portfolio management is to achieve a balanced portfolio of projects in terms of the following parameters:

- project type (strategic basic, applied, experimental development, extension, commercialisation and 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
- level of 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 more than 900 individual projects examined independently.

These clusters have formed the basis of assessment of expected relative benefit flow:

- on-farm
- to industry
- to the broader community.

Clusters of projects are also commonly assessed for impact, rather than individual projects. Further information on the GRDC's program of impact assessments is provided in Part 2.

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.

Portfolio monitoring and reviews

'Portfolio monitoring' is a broad term that covers a range of activities undertaken by the GRDC 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 in 2010–11 included more than 900 projects, at various stages of development, spread across four output groups.

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
- developing business cases, terms of reference and timeframes for a limited number of formal reviews of targeted investment areas. Four formal reviews were conducted in 2010–11, covering the Australian Cereal Rust Control Program, the National Oat Breeding Program, the Cereal Endophyte Program and the Future Farm Industries Cooperative Research Centre.

The GRDC recognises the important role that agribusiness plays in the grains industry broadly and specifically in relation to RD&E. The focal point for communication with the agribusiness community is through the National Agribusiness Reference Group (NARG). GRDC Managing Director, John Harvey, briefs members of NARG in Canberra in March 2011. Photo: GRDC

At the project level, portfolio monitoring involves an annual assessment of each project, by way of an annual progress report that identifies progress against the aims and milestones of the project. Satisfactory progress reports must be submitted to the corporation before further payments are made to research providers.

Other GRDC portfolio monitoring activities in 2010–11 included:

- financial audits of a selected group of projects
- external visits to research providers' facilities, including research laboratories and sites where field trials are carried out
- internal monitoring procedures to assess the performance and efficiency of administrative activities associated with managing the large investment portfolio. This includes tracking the status of progress reports against internal performance targets and producing summary reports for the Board, management and staff.

Information technology

The GRDC's information technology (IT) environment supports and maintains the integrity and continued functioning of the records and project management software. In 2010–11, the upgrading of existing systems to ensure continued high availability and enhanced functionality was a major focus.

A number of reporting enhancements were made during the year to give GRDC program managers and project administrators better access to financial statistics across their project portfolios. During December 2010, the GRDC implemented a system to improve the transparency of the application and approval processes for capacity-building initiatives.

Commercialisation

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

The GRDC achieves its objective in commercialising research outputs through:

- ensuring commercialisation activities are aligned with the GRDC's four core strategies and are 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 2010–11 is described below.

New crop varieties

In 2010–11, 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.

Field peas. Photo: Ty Kirby

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 EPRs, 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 2010–11, the new crop varieties commercialised (that is, new varieties for which there is a significant amount of seed available commercially to growers) comprised:

- six wheat varieties—Estoc$^{\Phi}$, Justica CL Plus$^{\Phi}$, Kord CL Plus$^{\Phi}$, Sabel CL Plus$^{\Phi}$, Kunjin$^{\Phi}$, and Wedin$^{\Phi}$
- one field pea variety—PBA Twilight$^{\Phi}$
- two lentil varieties—PBA Jumbo$^{\Phi}$ and PBA Blitz$^{\Phi}$
- one triticale variety—Chopper$^{\Phi}$
- one peanut variety—Tingoora$^{\Phi}$.

Snails are costing some farmers almost $60,000 a year in crop losses. Photo: GRDC

New products

In 2010–11 the GRDC sent the third prototype of the Harrington Weed Seed Destructor (HWSD) into the field for trialling. This model included significant improvements such as a pneumatic chaff transfer system (formerly an auger), integrated safety systems, and dramatically reduced overall weight (around 1,000 kilograms lighter). Almost 400 hours of operation in the field on a range of crops and crop densities gave the research team a strong indication of the robustness of the mill and effectiveness of the upgraded model.

The previous prototype was also in the field in the 2010 season, being compared to two well-known approaches to weed seedbank control: chaff carts and windrow burning. Weed counts in June 2011 showed the HWSD to be at least comparable in effectiveness, with the advantage of not removing the nutrient content of the straw and chaff from the field.

In early 2011 the GRDC ran an expression of interest process to find a partner to commercialise the HWSD concept. The successful applicant is likely to be announced towards the end of 2011.

Farmers in the Southern Region have been eagerly anticipating the development and commercialisation of the new biocontrol product for snails and slugs. These beneficial nematode isolates have shown strong promise in laboratory trials on all four species of Mediterranean snails as well as a range of crop-damaging slugs. Following a process run in early 2011, commercial companies were approached to provide bulked-up volumes of the isolates in field-ready formulations. Field trials are planned for spring 2011 and autumn 2012, and a commercial release may follow shortly after.

The research phase of the new stored-grain fumigant GL02 finished in 2010–11, and partners were sought to take the product through the regulation process. GL02 has similar physical attributes to dichlorvos and will fill an important gap as dichlorvos is phased out of certain uses. The GRDC expects the regulatory package to be completed by early 2012 and a submission to the relevant regulatory bodies to follow soon after. Depending on the speed of the regulation process, GL02 may be available to the market by 2014.

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 adoption of 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 19 describes the companies in which the GRDC had shares or membership at 30 June 2011. In most cases the GRDC also nominated one or more directors to the company's board.

Table 19 Companies in which the GRDC had shares or membership as at 30 June 2011

Name	Activity	GRDC role
Companies limited by guarantee		
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.
CRC National Plant Biosecurity Ltd	Serves as the management company for the Cooperative Research Centre (CRC) for National Plant Biosecurity.	Is a member of the company and provides a research contract.
Grain Foods CRC Ltd	Develops innovative grain products.	Is a member of the company and provides a research contract. Nominates a director.
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.
Companies limited by shares		
Arista Cereal Technologies Pty Ltd	Undertakes development of high-amylose wheat.	Is a 22 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 in the company, in return for providing funding of $10 million over five years.
Australian Grain Technologies Pty Ltd	Undertakes commercial wheat breeding.	Is a 39 percent shareholder and provides research contracts. Nominates three of the seven directors.
Australian Weed Management Pty Ltd	Served as the management company for the CRC for Australian Weed Management; now manages commercialisation of CRC intellectual property.	Has a beneficial interest in one share of the company.
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 31 percent shareholder. Nominates one director.
HRZ Wheats Pty Ltd	Develops high-yielding milling wheat varieties for Australia's high-rainfall zone.	Is a 36 percent shareholder. Nominates one director.

Table 19 Companies in which the GRDC had shares or membership as at 30 June 2011 *(continued)*

Name	Activity	GRDC role
Companies limited by shares *(continued)*		
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.

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.

In August 2010 InterGrain and Monsanto announced a new wheat breeding collaboration. (From left) Rob Delane, DAFWA Director General; Peter O'Keeffe, Monsanto; Bryan Whan, InterGrain Chief Executive Officer, Keith Perrett, GRDC Chairman; Dale Baker, InterGrain Chairman and Peter Wells, InterGrain director. Photo: Monsanto

Patents

During 2010–11, 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 distribution of the patents among the GRDC's three lines of business is:

1 Practices—one patent family
2 Varieties
  - Gene Discovery—two patent families
  - Germplasm Enhancement—14 patent families
  - Pulse and Oilseed Breeding—one patent family
3 New Products
  - New Farm Products and Services—four patent families
  - New Grain Products—13 patent families.

Plant breeder's rights

In 2010–11, 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 2011, the GRDC co-owned 140 plant varieties covered by PBR and 22 PBR applications.

Trademarks

At 30 June 2011, the GRDC held nine trademarks, with three pending, either in its own right or jointly.

PART 3

Our Organisation

Harvesting on the Boyle family's farm near York, WA.
Photo: Evan Collis

Board

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 15, 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 15 Members of the GRDC Board in 2010–11

Directors as at 30 June 2011

Keith Perrett

Chair (Non-executive)

Appointed:
1 October 2007, reappointed until 30 September 2013

Chair:
Remuneration Committee

Keith farms his 1,000 hectare Gunnedah property in northern New South Wales. He produces wheat, barley, cotton, sunflower, sorghum, sheep and cattle.

He is the Chairman of the National Rural Advisory Council, which advises the Minister for Agriculture, Fisheries and Forestry on rural issues, including Exceptional Circumstances declarations.

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.

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.

John Harvey

Managing Director

Appointed:
1 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.

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. He was also a member of the Australian Winter Cereals Pre-Breeding Alliance.

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.

Figure 15 Members of the GRDC Board in 2010–11 *(continued)*

Directors as at 30 June 2011

Nicole Birrell

M.Sc (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, most recently as Head of Operational Risk and Compliance for the ANZ's Institutional Financial Services division.

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.

She is a member of the audit and risk management committees in each of these organisations.

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.

Jenny Goddard

BComm (Hons in Economics)

Director (Non-executive)

Appointed:
11 November 2008 until 30 September 2011

Member:
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.

Colin Butcher

MBA (Curtin University), 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 ChemCert Western Australia and is a previous director of both CBH Ltd and Grain Pool Pty Ltd. He has extensive experience in the grains industry and has represented the interests of grain producers at state and national levels.

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. He was Managing Director of Goodman Fielder Ingredients Ltd from 1993 to 1998 and Technology Director of Goodman Fielder Ltd from 1999 to 2001.

Steve became a director of Go Grains Health & Nutrition Limited in 2008.

He was a director of the Rural Industries Research and Development Corporation from June 2002 and Deputy Chair until May 2008. He was also a director of the Australian Rural Leadership Foundation from 2005 to 2007.

Figure 15 Members of the GRDC Board in 2010–11 *(continued)*

Directors as at 30 June 2011

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. He has worked for 40 years in agricultural research, development and extension, mostly focused on sustainable agriculture in Australia and overseas. His professional career includes positions in the Department of Agriculture, Victoria; Foundation Professor of Sustainable Agricultural Production, Adelaide University (1992 to 1995); and Director General of the International Maize and Wheat Improvement Center (CIMMYT) (1995 to 2002).

His other roles have included: Member, United Nations Millennium Project Task Force on Hunger; Senior Expert, Food and Agriculture Organization of the United Nations; Member, European Commission Expert Group for Evaluation of Framework Projects; Chair, Academic Advisory Board on International Community and Development Studies, Deakin University; Professorial Fellow, Melbourne University; Adjunct Professor, Queensland University of Technology; and Adjunct Professor, Deakin University. He is a former President of the Australian Society of Agronomy. Timothy has received several international and national honours, including the Centenary Medal for service to Australian society.

Professor Graeme Robertson
BScAg (Hons), PhD in plant physiology (Oxford), 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, responsible for agribusiness, horticulture, viticulture, environmental biology, rangeland science and aquaculture programs.

Graeme's career has included 10 years as Director General of the Western Australian Department of Agriculture. He was the inaugural Chair of the Land and Water Resources Research and Development Corporation and served on a number of state and national boards and committees related to agriculture and land resource management.

Graeme was awarded a Rhodes Scholarship in 1970; 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.

Departing member

Peter Reading
BScAg (Hons), FAICD

Managing Director (Executive)

Appointed:
February 2004

Retired:
28 February 2011

Peter was the Managing Director of the GRDC from 2004 to 2011.

Peter graduated from the University of Sydney with an honours degree in agricultural science. He commenced postgraduate studies in agronomy before leaving university to work for American Cyanamid in Australia, Asia and the United States; Incitec in Australia; British Oxygen Group in Australia and Asia; and the Grain Pool in Western Australia.

Peter Reading's farewell. (From left) Terry Enright (GRDC Chair 2002–07), Peter Reading, Keith Perrett (current GRDC Chair) and Senator the Hon. Richard Colbeck, former Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry.
Photo: GRDC

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.

GRDC directors are appointed for approximately three-year terms. The appointments of six current members of the Board are due to conclude on 30 September 2011.

On 27 May 2011, the Minister appointed Joanne Grainger as the Presiding Member of the Selection Committee, for three years commencing on 27 May 2011, and asked her to establish a Selection Committee and begin the process to select between five and seven GRDC directors.

On 11 July 2011, the Minister appointed David Crombie, Terry Enright, Alistar Robertson, Fiona Simson, Jane Walton and Andrew Weidemann as the Selection Committee, along with Joanne Grainger.

Board Secretary

Geoff Budd, GRDC Executive Manager Legal & Procurement, is the Board Secretary. The role of the Board Secretary is to:

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

Committees

The Board receives formal reports from its committees, and any decisions the Board makes in relation to the reports are recorded in the minutes of the subsequent Board meeting. Terms of reference are in place for each of the committees described in Table 20.

Table 20 Board committees as at 30 June 2011

Committee	Role	Membership
Finance, Risk and Audit Committee	Assist the Board in fulfilling its corporate governance responsibilities. Review the corporation's financial reporting process, internal control system, risk management strategy and processes, internal and external audits, and process for monitoring compliance with laws and regulations and the Board's code of conduct. Review the corporation's financial statements.	At least three non-executive directors.
Remuneration Committee	Review and make recommendations to the Board on matters relating to the remuneration and performance of the Managing Director. Review advice from the Managing Director on remuneration and performance policy for the corporation.	The Chair, the Deputy Chair and one other director.

Meetings

The GRDC Board holds six to seven meetings every 12 months, teleconferences as required, and tours to GRDC regions. During 2010–11 the Board held three meetings in Canberra and one meeting in each of Melbourne, Perth, Brisbane and Sydney. Directors joined the regional panels on their Spring Tours in September 2010.

Each director's attendance at meetings during the year is set out in Table 21.

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. To request a copy of the manual, telephone the GRDC on 02 6166 4500 or send an email to grdc@grdc.com.au.

Induction and training

New Board members go through a formal induction process, and there is a process of continuous education for all directors.

Disclosure of interests

Directors must comply with the *Commonwealth Authorities and Companies Act 1997* (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.

Relationship with the Executive Management Team

The Executive Management Team has an advice and implementation role in relation to the Board. The team 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.

Table 21 Attendance at Board and Board committee meetings, 2010–11

Members	Board		Finance, Risk and Audit Committee		Remuneration Committee	
	Meetings attended	Meetings held and eligible to attend	Meetings attended	Meetings held and eligible to attend	Meetings attended	Meetings held and eligible to attend
Directors at 30 June 2011						
Nicole Birrell	7	7	4	4		
Colin Butcher	7	7	4	4		
Jenny Goddard	7	7	4	4		
John Harvey	3	3	2	2		
Steve Marshall	5	7	1	2	5	5
Keith Perrett	7	7			5	5
Timothy Reeves	6	7			5	5
Graeme Robertson	6	7	2	2		
Director ceased during 2010–11						
Peter Reading	4	4	2	2		

Executive Management Team

The Executive Management Team (EMT) has seven members: the Managing Director and the executive managers from each of the six management groups. The management structure as at 30 June 2011 is shown in Figure 7 in Part 1.

The EMT 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 EMT meets regularly, and maintains and updates an annual business schedule.

Information on the roles and backgrounds of the EMT members is shown in Figure 16.

Managing Director

Peter Reading, who was appointed as Managing Director of the GRDC in 2004, retired from the position in February 2011. During his time with the GRDC, Peter oversaw the reorganisation of Australia's wheat, barley and pulse breeding efforts into nationally coordinated breeding programs with a strong commercial focus. He also displayed great leadership in steering the development of the *Grains Industry National Research, Development and Extension Strategy*. His contributions to the GRDC and the Australian grains industry are highly valued.

John Harvey commenced as Managing Director on 1 March 2011. John has 25 years of experience in rural RD&E, including 12 years as a soil conservationist and extension agronomist. He has been a senior member of the GRDC management team since 1997, a period that has seen major changes in the grains industry, particularly in farming systems technologies and crop development. In his role as Managing Director, John's leadership skills and diverse primary industries experience will help to strengthen national collaboration in grains RD&E.

Figure 16 Members of the GRDC Executive Management Team in 2010–11

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. He is a member of the Australian Winter Cereals Pre-Breeding Alliance.

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 Practices and Communication & Capacity Building[a]

Stephen joined the GRDC in March 2009. He manages all aspects, including performance, of the GRDC's R&D investments in the 'better practices developed and adopted faster' pathway.

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.

Figure 16 Members of the GRDC Executive Management Team in 2010–11 *(continued)*

Vince Logan

Executive Manager
New Products

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 R&D investment in the 'new products' pathway.

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 Strategy &
Impact Assessment

Leecia joined the GRDC in 2005 as Manager Wheat and Barley Breeding. She was appointed Executive Manager Corporate Strategy & Impact Assessment, in May 2009. Leecia manages the development of the corporate strategy, regional panel and program support, and impact assessment of RD&E investments.

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.

Geoff Budd

Executive Manager
Legal & Procurement

Geoff joined the GRDC in January 2001 as Corporate Lawyer, from private practice as a commercial lawyer employed by a national law firm. He was appointed General Counsel and Board Secretary in 2004 and Executive Manager Legal & Procurement in 2009.

Geoff manages the GRDC's legal, procurement, risk management and compliance areas. He is also the GRDC Board Secretary, providing administrative support to the Board. He represents the GRDC as a director of Pulse Australia Limited and was a director of Single Vision Grains Australia Limited.

Geoff has a Master of Laws specialising in intellectual property and is a graduate of the Australian Rural Leadership Program and a fellow of the Australian Institute of Company Directors. He holds a current legal practising certificate and membership of the Australian Capital Territory Law Society.

Gavin Whiteley

Executive Manager
Corporate Services

Gavin joined the GRDC in January 2005.

Gavin manages the GRDC's corporate support activities, ensuring their integration, where appropriate, and their value-added contribution to the GRDC's business planning and operations. He is a Director of Agrifood Awareness Australia Limited and was a Director of Single Vision Grains Australia Limited.

Gavin has a strong background in agribusiness, having previously held executive level roles in the beef, cotton and chicken-meat industries. He and his family own grain and livestock properties in central-west New South Wales. Prior to joining the GRDC, Gavin was Regional General Manager—Riverina with Bartter Enterprises, based at Griffith, New South Wales.

He holds an honours degree in agricultural economics and an associate diploma in farm management. He is a member of CPA Australia, a Fellow of the Australian Institute of Company Directors and a graduate of the Australian Rural Leadership Program.

[a] Responsibility for the Communication & Capacity Building output group is shared by the Executive Manager Practices, the Executive Manager Varieties, and the Manager Communications.

Note: Executive Manager Varieties and Communication & Capacity Building[a]—This position was vacant at 30 June 2011.

Staff

Staff are employed under section 87 of the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act), which provides that the terms and conditions of employment are to be determined by the GRDC.

The Minister for Agriculture, Fisheries and Forestry has directed the GRDC to adopt the Australian Government Bargaining Framework. The corporation is in the process of complying with this direction.

As at 30 June 2011, there were 48 permanent full-time employees, including the Managing Director. The gender mix consisted of 24 females and 24 males. A staff list is provided in Table 22.

Table 22 Staff as at 30 June 2011

	Position	Occupant
Managing Director's area	Managing Director	John Harvey
	Executive Assistant	Wynette Neil
	Manager Communications	Kylie Paulsen
	Communications Coordinator	Alex Wiber (T)
Corporate Services	Executive Manager	Gavin Whiteley
	Manager Finance (A)	Nino Divito
	Accountant—Reporting (A)	Johan Pienaar (T)
	Contract Payments Officer	Carmen Jiang
	Accounts Payable Officer	Ada Chen
	Manager Human Resources	Wendy Neil
	Records Management Coordinator	Ross Thompson
	Travel Coordinator	Sarah Smith
	Receptionist	Michelle Priest (P)(T)
		Sara Gordon (P)(T)
	Administrative Assistant	Helen Moffat (T)
	Manager IT Facilities	Tavis Hamer
	Network Administrator	Bob Watson
	Network Support Officer	Brendan Lawler
Legal & Procurement	Executive Manager	Geoff Budd
	Corporate Lawyer	James Macintyre
	Compliance Officer	Catherine Wells
	Manager Procurement and Contracting	Cathy Stewart
	Contracts Coordinator	Klaudia Skazlic
Corporate Strategy & Impact Assessment	Executive Manager	Leecia Angus
	Impact and Business Analyst	Vincent Fernandes
	Corporate Strategist Evaluation and Reporting	Zoltan Lukacs
	Panel Support Officer (National)/Internal Business Processes	Noelia Grech
	Panel Support Officer (South)/Panel Engagement Processes	Carolyn Pearson
	Panel Support Officer (West)/Portfolio Balance	Vacant
	Panel Support Officer (North)/Administrative Support	Ben Maroney
Practices	Executive Manager	Stephen Thomas
	Administrative Coordinator (A)	Lucinda Staley
	Manager Crop Protection	Rohan Rainbow
	Manager Agronomy Soils and Environment	Martin Blumenthal
	Administrative Coordinator	Penelope Vaile

GRDC IT team members. (From left) Brendan Lawler, Network Support Officer; Bob Watson, Network Administrator and Tavis Hamer, Manager IT Facilities. Photo: GRDC

Table 22 Staff as at 30 June 2011 *(continued)*

	Position	Occupant
Practices (continued)	Project Manager Climate Change	Jan Edwards
	Manager Validation and Adoption	Stuart Kearns
	Manager Extension and Grower Programs	Tom McCue
	Webmaster	Vacant
	Manager Publications	Maureen Cribb
	Project Manager Practices	Tanya Robinson
	Project Manager Practices	Zoe Morosini
Varieties	Executive Manager	Vacant
	Coordinator Varieties and Capacity Building	Merrilyn Baulman
	Manager Gene Discovery	Juan Juttner
	Manager Germplasm Enhancement	Jorge Mayer
	Administrative Coordinator	Wendy Bosci
	Project Manager Plant Breeding	Tom Giles
	Project Manager Pre-Breeding	Omid Ansari
	Manager Wheat and Barley Breeding	Andreas Betzner
	Manager Pulse/Oilseed Breeding	Brondwen MacLean
	Administrative Coordinator	Nicole Carney
New Products	Executive Manager	Vince Logan
	Administrative Coordinator	Bettina Garrett
	Manager New Farm Products and Services	Paul Meibusch
	Manager New Grain Products	Jody Higgins

A = acting, P = part time, T = temporary

Note: Two staff members were absent on maternity leave on 30 June 2011: Danielle Jakubowski (Manager Finance) and Peta McKinnon (Administrative Coordinator)

Staff location

All GRDC management groups, including the professional staff who manage research contracts and investment opportunities, are housed in offices at the following Canberra address:

Grains Research and Development Corporation
First Floor
40 Blackall Street
BARTON ACT 2600

The GRDC owns one floor of Tourism House at 40 Blackall Street. The GRDC does not own any research facilities.

Advisory panels and program teams

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 and three program teams. This network helps to ensure that GRDC investments are directed towards the interests of all its stakeholders and the strategic objectives of its programs.

National Panel

The National Panel comprises the three regional panel chairs, the GRDC's Managing Director and the GRDC's executive managers. The National Panel addresses national R&D priorities across the GRDC's investment portfolio and advances recommendations to the Board.

In assisting the Board, the panel's key advice functions include reviewing program investment plans; reviewing budget development and allocations; recommending strategic changes in allocations; arbitrating issues of investment allocation and investment strategy; and endorsing review recommendations. The National Panel also plays a major role in communicating with research partners and stakeholders.

Regional panels

The three regional 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. Regional panel members also participate as members of program teams.

The regional panels develop and monitor the strategic direction for the regional elements of the GRDC's R&D investments (details of the regions are provided in Figure 8 in Part 1). Supported by the GRDC program managers, panel members assess investment proposals from the point of view of regional needs, gaps in the R&D portfolio, quality of the proposal and risk. The panels are responsible for ensuring that investment strategy is responding to the regional and national priorities of stakeholders.

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

In December 2010, the GRDC advertised nationally for positions on the GRDC regional panels for a term commencing 1 July 2011. Applications closed on 7 March 2011. The GRDC received 114 applications from across Australia and three from New Zealand. The successful applicants will commence their two-year term from 1 July 2011.

Panel members as at 30 June 2011 are listed in Table 23. Biographical information on panel members is available from the GRDC's website and YouTube channel.

Western Regional Panel members. (From left) Narelle Moore, Anna Butcher, Ralph Burnett, Richard Oliver, Neil Young, Fran Hoyle and Peter Roberts. Absent: Merrie Carlshausen, Leecia Angus and John Harvey. Photo: GRDC

Table 23 Regional panel membership as at 30 June 2011

	Chair	Deputy Chair	Members	
Northern Regional Panel	James Clark	John Sheppard	David Freebairn Richard Heath Penny Heuston Vince Logan Jodi McLean	Aaron Sanderson Rob Taylor Gavin Whiteley Bill Yates
Southern Regional Panel	David Shannon	Mark Peoples	Andrew Barr Chris Blanchard Geoff Budd Merna Curnow Richard Konzag	Allan Mayfield Andrew Rice Peter Schwarz Stephen Thomas
Western Regional Panel	Neil Young[a] Peter Roberts[b]	Richard Oliver	Leecia Angus Ralph Burnett Anna Butcher Merrie Carlshausen	Tracey Gianatti[c] John Harvey Frances Hoyle Narrelle Moore

[a] Concluded his term as Chair in April 2011. [b] Appointed as Chair in April 2011. [c] Resigned in January 2011.

Program teams

Each of the GRDC's three program teams comprises program managers, panel members from each of the three regions, an executive manager and a panel chair. Depending on the size and complexity of the portfolio, some program teams comprise several subprograms (as shown in Table 24).

Each program team is responsible for developing, implementing and reviewing the investment strategy and advising on proposed investments within its output group. Other activities include evaluating projects, prioritising potential investment opportunities and monitoring project performance.

Table 24 Program teams as at 30 June 2011

Program team	Subprogram teams
Practices	• Agronomy, soils and environment • Crop protection • Validation and integration • Extension and grower programs
Varieties	• Pre-breeding • Breeding
New Products	• New grain products • New farm products and services

Southern Regional Panel members. (From left) Geoff Budd, Richard Konzag, Allan Mayfield, Mark Peoples, Merna Curnow, Peter Schwarz, David Shannon, Andrew Rice, Andrew Barr and Chris Blanchard. Absent: Stephen Thomas. Photo: GRDC

Accountability

The GRDC is accountable to its two key customer groups—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, including the GRDC. During 2010–11, Senator the Hon. Joe Ludwig was the Minister for Agriculture, Fisheries and Forestry.

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 and the GRDC's achievements in meeting them during 2010–11 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.

The GRDC is complying with the directions.

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 in the process of achieving compliance with this direction.

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 2011, 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.

In August 2010, GPA became successor to the Grains Council of Australia (GCA), maintaining the same business number and performing the legislative roles and prescribed functions previously undertaken by the GCA.

Grains industry priorities

In setting directions for 2010–11 (the fourth year of *Prosperity through Innovation*, 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 2010–11. The priorities and the GRDC's achievements in meeting them during 2010–11 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 2011–12 was provided to GPA in December 2010 for comment. The final Stakeholder Report 2011–12 was provided to GPA in March 2011.

The GRDC also prepares a Growers' Report. 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 2009–10 report was circulated to growers and other *Ground Cover* subscribers in November 2010.

Industry levy rates

In 2010–11, 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 following legislation:

- *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 2010–11 are recorded in Note 4B of the Notes to the Financial Statements.

The GRDC paid the Australian Government Department of Agriculture, Fisheries and Forestry $598,827.18 for the collection and management of levies in 2010–11.

Consultation arrangements

The GRDC paid GPA $24,285 plus GST for its participation in consultations with the corporation during 2010–11. 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 paid GPA $4,925.73 (GST inclusive) in 2010–11 towards its cost of participating in the National Working Party on Pesticide Applications.

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

The GRDC met some out-of-pocket costs for three grain growers nominated by GPA—Andrew Weidemann (Victoria), Ray Marshall (Western Australia) and Wayne Newton (Queensland)—to represent grain growers during development of the National Primary Industries Research, Development and Extension Framework.

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, as discussed in the 'Board' section of Part 3.

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 2010–11 is presented on pages 106–107.

Judicial decisions and reviews by outside bodies

In 2010–11, the GRDC was not affected by judicial decisions.

On 15 February 2010 the Productivity Commission commenced a review of the RDCs, including the GRDC. The GRDC lodged two submissions to the review.

The Productivity Commission provided its final report to the Australian Government on 10 February 2011. The government released the final report on 15 June 2011 together with its preliminary response.

The Productivity Commission's inquiry examined the effectiveness of the RDC model, including whether the current level of funding should be maintained and whether there are any impediments to effective and efficient functioning of the model.

The Productivity Commission recommended a decrease in the cap on the government's matching funding, from 0.50 percent of the industry's gross value of production to 0.25 percent.

In the government's preliminary response, the Minister for Agriculture, Fisheries and Forestry announced that the government will not adopt the Productivity Commission's recommendation to reduce the government's matching funding, but there are opportunities for improvement in the efficiency and effectiveness of the RDC model. The government will develop a final response to the Productivity Commission report, following further consultation with stakeholders.

Information about the review, including all public submissions, is available on the Productivity Commission website, www.pc.gov.au. The government response is available on the Department of Agriculture, Fisheries and Forestry website, www.daff.gov.au.

Corporate governance

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 2010–11 included:

- an external review of business risks, commenced through Oakton
- monthly reviews of business and fraud risks
- testing of the Business Continuity Plan and Information Technology Disaster Recovery Plan.

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 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 EMT 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 commenced an external business risk assessment in June 2011, and will complete it early in 2011–12.

The GRDC also conducts a fraud risk assessment every two years. During 2008–09 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 2009 to 2011. Oakton provided the final Fraud Risk Assessment and Fraud Control Plan in early 2009–10.

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 GRDC's Legal & Procurement team prepares a Business Risk Assessment Report and a Fraud Control Action Plan. The EMT, 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 EMT 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 updated and risks were rerated in early 2010 to implement new 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 has been collected and reported that complies with the *Commonwealth Fraud Control Guidelines*.

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 2011 benchmarking survey rated the GRDC at 7.6 out of 10—the 'peer group' of 22 small agencies' average was 6.2 out of 10, and the GRDC topped several elements in the peer group. The GRDC rated:

- relatively high on accounting and responsibility, integration and risk management policy and objectives
- relatively low on communication and training.

The GRDC received two gold awards at the Institute of Public Administration Australia (IPAA) Annual Report Awards for 2009–10. (From left) Andrew Metcalfe, IPAA ACT President; Geoff Budd, Executive Manager Legal & Procurement; Zoltan Lukacs, Corporate Strategist Evaluation and Reporting; Terry Moran, Secretary of the Department of the Prime Minister and Cabinet. Photo: IPAA

Quality assurance

The GRDC's Quality Management System has ISO9001:2008 quality assurance accreditation from BSI Management Systems.

In 2010–11, regular internal audits were conducted by a contracted certified auditor over two days every two months. In September 2010 and May 2011 successful external surveillance audits were conducted by BSI Management Systems and the GRDC certification to the ISO9001:2008 standard was continued.

In addition, the EMT 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 17 shows the results of the quality audits and other feedback in 2010–11. The audits demonstrate that the Quality Management System based on ISO9001:2008 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.

Environmental objectives

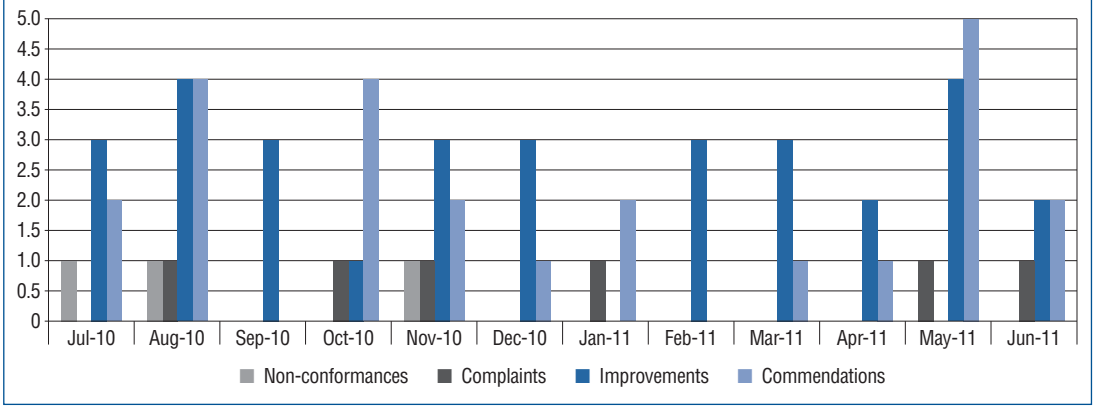
The GRDC is required to report annually on its performance in relation to ecologically sustainable development and other environmental issues discussed in section 516A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The principles of ecologically sustainable development 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 policy is reflected in the GRDC Strategic R&D Plan 2007–12, *Prosperity through Innovation*, and the Environmental Plan, *A Responsible Lead: An Environmental Plan for the Australian Grains Industry*. The Environmental Plan complements the Strategic R&D Plan 2007–12, adding more detail regarding environmental priorities, and is consistent with GPA's environmental policy.

Figure 17 Results of quality audits, 2010–11



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 12 in Part 2).

A key element in the implementation of the Environmental Plan is partnerships with regional natural resource management bodies, which have a responsibility for achieving a range of resource targets in Australia. Key issues for the industry are adaptation to climate change, management of greenhouse gas emissions, and management of soil erosion, soil acidification, nutrient loss and salinity. The implications for grain production include the identification of traits, breeding of cultivars and development of practices that allow for improved environmental outcomes.

The GRDC's commitment to addressing these issues is demonstrated in the identification of new RD&E investments in:

- reducing chemical use through integrated management approaches for weeds, pests and diseases
- improving soil ground cover through minimum tillage and use of pastures in rotation
- water-use efficient farming systems
- managed environment facilities to assist in testing varieties for water-use efficiency traits.

Other investments also address issues that have environmental outcomes, such as the improvement of soil quality, the minimisation of nutrient loss and the management of soil acidity. The Grain and Graze program being conducted by the GRDC, in partnership with the Australian Government's Caring for our Country initiative, universities, state departments and grower groups, is just one example. Part 2 of this annual report includes more discussion on how GRDC investments helped to achieve environmental objectives.

At the operational level, the environmental policy relating to the GRDC's corporate office commits the GRDC to managing its RD&E activities with minimal impact on the environment, consistent with relevant legislation.

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 2011 has been lodged with the Privacy Commissioner. The online digest may be viewed at the commissioner's website, www.privacy.gov.au.

Pollination of peanut flowers is one stage in the breeding process that could lead to a new variety with higher levels of calcium and antioxidants. Photo: Clarissa Collis

Freedom of information

For the period from 1 July 2010 to 30 April 2011, the GRDC, as an Australian Government statutory authority, is required by sections 8 and 9 of the *Freedom of Information Act 1982* (FOI Act) to include the following information in its annual report:

- details of the organisation, including its functions and decision-making powers
- any arrangements that the GRDC has for outside participation in its policy formulation or decision making
- the types of documents the GRDC holds
- the GRDC's freedom of information procedures, facilities and contact details
- documents and processes that the GRDC uses to make decisions in relation to the funding of R&D projects (the section 9 statement).

From 1 May 2011, under recent reforms to the FOI Act, the GRDC is 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 requirement to publish a section 8 statement in an annual report. An agency plan showing what information is published in accordance with the IPS requirements is accessible from the GRDC website.

Details of the organisation

Details of the organisation of the GRDC, particularly its structure, functions and statutory responsibilities, are provided in Part 1 and Part 3 of this annual report.

External participation

The GRDC consults extensively with grain growers, industry representatives and advisers and researchers to tailor its investment portfolio. These consultation processes are described in many parts of this annual report, particularly the 'Research priorities', 'Collaboration' and output group sections of Part 2, and the 'Advisory panels and program teams' and 'Accountability' sections of Part 3.

Documents

The following is a list of documents held or published by the GRDC:

- corporate documents—such as the annual report, strategic R&D plan, annual operational plan, research reports and newsletters—which are supplied free to the public on request while stocks are available and/or are displayed on the GRDC's website
- industry-specific publications, which are supplied free to the public on request while stocks are available, displayed on the GRDC's website and/or sold to the public on a partial cost-recovery basis
- applying and reporting documents—such as the investment plan; current tenders and expressions of interest; documents related to travel, training and industry development awards and conference sponsorships; and research progress reports—which are available on the GRDC's website
- general administrative documents, including project and personnel files.

For more information about the GRDC's information product line, see Appendix D and the GRDC website.

Procedures and contact details

Applicants may discuss the nature and scope of an intended request under the FOI Act or seek advice on freedom of information matters. Whenever possible, the freedom of information officer will help applicants to identify relevant documents.

If a request is approved, the applicant will be provided with either a copy of the documents or the opportunity to inspect them at the GRDC's office.

Any refusal to grant access will be supported by a statement of reasons, together with a statement advising the applicant of their rights to request that the decision be reviewed.

Any enquiries about matters relating to freedom of information should be directed during normal working hours to:

Freedom of Information Officer
Grains Research and Development Corporation
PO Box 5367
KINGSTON ACT 2604
Telephone: 02 6166 4500
Facsimile: 02 6166 4599

Section 9 statement

The GRDC submits an annual statement to the National Archives of Australia as required under section 9 of the FOI Act. The statement outlines the documents and processes the GRDC uses to make decisions in relation to the funding of R&D projects. A copy of the statement can be viewed on the National Archives of Australia website, www.naa.gov.au.

A full list of projects funded by the GRDC is also available in Appendix B.

FOI requests

The GRDC received no requests under the FOI Act during 2010–11.

People management

The GRDC values its people highly and recognises that attracting, developing and retaining the right staff is fundamental to the ongoing success of the organisation. 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 as it equips itself to meet the challenges of the future.

Performance management

Excellent performance is encouraged through the GRDC performance management process. 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.

Recruitment, retention and succession management

During 2010–11, five people were recruited to fill vacancies and one person moved roles within the GRDC.

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.

A formal succession planning and talent management process takes place yearly, when all staff are rated according to their potential to succeed in certain roles. Staff who are 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.

Workforce 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 2010–11, several staff members continued formal study and other members of staff attended short courses and conferences. The GRDC is proud to have supported:

- four employees who undertook academic studies in such subjects as contract law, conflict of interest, financial management, strategic management and governance and risk management
- 24 employees who attended self-development and leadership training programs.

All members of staff attended TRIM records management system training refresher sessions. A group of staff attended a training session on business continuity; an emergency evacuation and business continuity exercise was an important part of this training.

All staff attended a training session on bullying and harassment, which consisted of a video demonstrating examples of bullying, a discussion, and a review of the GRDC's policies and procedures around bullying and harassment.

The Health and Safety Representative attended training related to Health and Safety Management Arrangements and a course in handling mail safely.

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 R&D and GRDC initiatives.

Enterprise agreement

Following extensive negotiations conducted throughout 2010–11, the GRDC's staff and management bargaining representatives have reached agreement on a draft enterprise agreement. The draft agreement has been approved by the Australian Public Service Commission and submitted to the Minister. Once the Minister approves the draft agreement, GRDC staff will vote on it. If approved, it will be lodged with Fair Work Australia for review.

As a result of feedback received from staff during negotiations, all position descriptions are currently being reviewed externally to ensure accurate representation of roles and fair remuneration for work performed.

Equal employment opportunity

Staff are employed under terms and conditions consistent with the *Equal Employment Opportunity (Commonwealth Authorities) Act 1987* and the equal opportunity employment policy set out in the GRDC Operating Manual.

Two female members of staff were on maternity leave at 30 June 2011, with two more planning to take maternity leave after July. The GRDC has registered with Centrelink as a participant in the Paid Parental Leave scheme which will commence on 1 July, and staff will benefit from the new financial support from the government as well as the GRDC's paid maternity leave. Consistent with a wish to support staff members who have family responsibilities, the GRDC is hoping to accommodate reasonable requests from staff members who require flexible working arrangements in order to meet their family commitments while remaining in the workforce.

The GRDC continues to welcome new members of staff both from within Australia and from around the world and is proud that its workforce continues to enjoy cultural diversity while remaining harmonious and cohesive.

Analysis of the GRDC workforce for 2010–11 shows that, compared to last year, both the gender profile and the age profile remained steady. Table 25 shows the age and gender profile of GRDC staff for the past two reporting periods.

Disability strategies

In addition to offering terms and conditions consistent with equal employment opportunity, the GRDC ensures that its employment policies and procedures comply with the requirements of the *Disability Discrimination Act 1992*. The GRDC seeks to remove obstacles that may discourage people with disabilities from contributing to the work of the GRDC.

Occupational health and safety

The GRDC recognises the value of a healthy work environment and healthy staff, and aims to provide a safe, healthy and productive workplace for all employees and visitors. Under the umbrella of the *Occupational Health and Safety Act 1991* and the *Safety Rehabilitation and Compensation Act 1988*, the GRDC's occupational health and safety activities:

- emphasise the prevention of injury, encourage a healthy lifestyle and seek to enhance the engagement and wellbeing of staff during their time with the GRDC
- encourage a cooperative approach to building a safe workplace environment, and acknowledge that safety is everyone's business in the GRDC.

During 2010–11, the Health and Safety Representative met weekly with the Manager Human Resources to discuss issues and review the GRDC's health and safety procedures. In resolving issues, the GRDC focused on encouraging communication between staff and managers, and responding in a timely manner. The Health and Safety Representative made a report to the EMT at each monthly meeting and more often as required. The GRDC's Health and Safety Management Arrangements were reviewed and expanded.

Table 25 Breakdown of staff by age and gender, 2009–10 and 2010–11

	2009–10		2010–11	
	Number	Percentage	Number	Percentage
20–30 years	6	12	8	17
31–40 years	17	34	14	29
41–50 years	14	28	12	25
51–60 years	12	24	13	27
>60 years	1	2	1	2
Female	23	46	24	50
Male	27	54	24	50
Total	**50**	**100**	**48**	**100**

Employees experiencing injuries or illness are offered support and flexibility for their transition back into the workplace. The GRDC has four qualified First Aid Officers and six fire wardens.

In 2010–11, the GRDC funded the participation of 42 members of staff in the Global Corporate Challenge, which involves teams aiming to walk over 10,000 steps each day over a 16-week period. The increase in exercise in what could otherwise be a sedentary office lifestyle encourages staff to be active, and the benefits of good health flow back to the organisation in the form of renewed staff vigour, vitality and productivity.

Table 26 provides a summary of other activities undertaken during 2010–11 to promote the health and wellbeing of staff and ensure that they have a safe environment in which to work.

Table 26 GRDC occupational health and safety performance in 2010–11

Indicators	Performance
Health and wellbeing initiatives	The GRDC offered to staff, free of charge: • flu vaccinations (annually) • fresh fruit (twice weekly) • opportunities to participate in health promotion and fitness programs • a smoke-free workplace and access to related literature and/or quit programs • counselling, for staff members and members of their families, through the IPS Worldwide Employee Assistance Program. Workstation assessments were carried out for new or relocated staff, and workstation adjustments were made as recommended.
Training and awareness of occupational health and safety (OH&S) requirements	Important activities included: • comprehensive induction information for new staff members on OH&S and the importance given to health and wellbeing by the GRDC • training on – emergency procedures, for new staff – bullying and harassment, for all staff – building evacuation and fire drill training, for all staff – senior first aid training, for three staff members – business continuity management, for a team of 12 staff members – defensive driver training for all new staff who will be frequently required to drive as part of their role • Comcare-accredited training for the Health and Safety Representative • a presentation about the Employee Assistance Program. The Staff OH&S Committee was implemented, and the GRDC's OH&S policies were reviewed and extended.
Improved internal security arrangements	Compliance with the Protective Security Manual continued to be implemented in stages. The internal alarm system was tested and found to be working well. The body corporate that owns the GRDC's accommodation is preparing to implement a new building management system to better control airconditioning and building access.
Workplace facilities maintained to a high standard	Activities to ensure that facilities were well maintained included: • 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 • annual radiation check of microwave ovens • regular inspection of smoke detectors • regular cleaning of carpets.
Statistics of any accidents or dangerous instances	No injuries occurred on the GRDC premises during 2010–11.
Investigations conducted, including notices given	No requests were received from staff and no undertakings were given by the GRDC. No directions or notices were given to the GRDC.

Financial Statements

Rowan McCreery 'on the road to controlled traffic' has started with a tracked tractor to reduce compaction. Photo: Evan Collis

Independent auditor's report

INDEPENDENT AUDITOR'S REPORT

To the Minister for Agriculture, Fisheries and Forestry

I have audited the accompanying financial statements of Grains Research and Development Corporation (the Corporation) for the year ended 30 June 2011, which comprise: a Statement by Directors and Chief Financial Officer; Statement of Comprehensive Income; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments; Schedule of Asset Additions and Notes to and forming Part of the Financial Statements, including a Summary of Significant Accounting Policies.

The Directors' Responsibility for the Financial Statements

The directors of the 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 the directors determine is necessary to enable the preparation of the financial statements that 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 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

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT
Phone (02) 6203 7300 Fax (02) 6203 7777

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 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 Grains Research and Development Corporation's financial position as at 30 June 2011 and of its financial performance and cash flows for the year then ended.

Australian National Audit Office

Michael Owens

Senior Director

Delegate of the Auditor-General

Canberra

8 August 2011

Statement by directors and chief financial officer

In our opinion, the attached financial statements for the year ended 30 June 2011 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 .....

Mr K G Perrett
CHAIRMAN
8 August 2011

Signed .....

Mr J E Harvey
MANAGING DIRECTOR
8 August 2011

Signed .....

Mr G F Whiteley
CHIEF FINANCIAL OFFICER
8 August 2011

Statement of comprehensive income

FOR THE PERIOD ENDED 30 JUNE 2011

	Notes	2011 $'000	2010 $'000
EXPENSES			
Research and development	3A	**140,660**	116,751
Employee benefits	3B	**6,867**	6,453
Supplier expense	3C	**5,753**	5,572
Depreciation and amortisation	3D	**402**	377
Write-down and impairment of assets	3E	**369**	4,217
Total expenses		**154,051**	133,370
LESS:			
OWN-SOURCE INCOME			
Own-source revenue			
Interest	4A	**7,219**	7,015
Industry contributions	4B	**104,496**	74,065
Project refunds	4C	**899**	784
Royalties	4D	**2,961**	2,412
Grants income	4E	**5,987**	8,924
Other	4F	**573**	541
Total own-source revenue		**122,135**	93,741
Gains			
Sale of assets	4G	**—**	4
Total gains		**—**	4
Total own-source income		**122,135**	93,745
Net cost of services		**31,916**	39,625
Revenue from Government	4H	**53,397**	50,071
Share of (deficit) of associates and joint ventures accounted for using the equity method	5D	**(659)**	(598)
Surplus attributable to the Australian Government		**20,822**	9,848
OTHER COMPREHENSIVE INCOME			
Changes in asset revaluation reserves	6B	**(45)**	—
Total other comprehensive income		**(45)**	—
Total comprehensive income		**20,777**	9,848
Total comprehensive income attributable to the Australian Government		**20,777**	9,848

The above statement should be read in conjunction with the accompanying notes.

Balance sheet

AS AT 30 JUNE 2011

	Notes	2011 $'000	2010 $'000
ASSETS			
Financial assets			
Cash and cash equivalents	5A	**50,249**	33,905
Trade and other receivables	5B	**23,834**	11,763
Investments in managed funds	5C	**117,866**	115,412
Investments accounted for using the equity method	5D	**126**	544
Investments—other	5E	**7,533**	7,902
Total financial assets		**199,608**	169,526
Non-financial assets			
Land and buildings	6A, D	**5,498**	5,694
Infrastructure, plant and equipment	6B, D	**242**	312
Intangibles	6C, D	**267**	259
Other	6E	**392**	918
Total non-financial assets		**6,399**	7,183
Total Assets		**206,007**	176,709
LIABILITIES			
Provisions			
Employee provisions	7A	**1,259**	1,233
Total provisions		**1,259**	1,233
Payables			
Suppliers	8A	**1,038**	2,014
Research and development	8B	**54,395**	44,924
Total payables		**55,433**	46,938
Total Liabilities		**56,692**	48,171
Net assets		**149,315**	128,538
EQUITY			
Retained surplus		**64,069**	55,683
Asset revaluation reserve		**3,316**	3,361
Capital commitment reserve		**200**	182
Contracted research reserve		**81,730**	69,312
Total equity		**149,315**	128,538

The above statement should be read in conjunction with the accompanying notes.

Statement of changes in equity

FOR THE PERIOD ENDED 30 JUNE 2011

	Retained surplus		Asset revaluation reserve		Contracted research reserve		Capital commitment reserve		Total equity	
	2011 $'000	2010 $'000	**2011 $'000**	2010 $'000	**2011 $'000**	2010 $'000	**2011 $'000**	2010 $'000	**2011 $'000**	2010 $'000
Opening balance										
Balance carried forward from previous period	**55,683**	50,439	**3,361**	3,361	**69,312**	62,269	**182**	2,621	**128,538**	118,690
Adjusted opening balance	**55,683**	50,439	**3,361**	3,361	**69,312**	62,269	**182**	2,621	**128,538**	118,690
Comprehensive income										
Other comprehensive income	**—**	—	**(45)**	—	**—**	—	**—**	—	**(45)**	—
Surplus for the period	**20,822**	9,848	**—**	—	**—**	—	**—**	—	**20,822**	9,848
Total comprehensive income	**20,822**	9,848	**(45)**	—	**—**	—	**—**	—	**20,777**	9,848
of which:										
Attributable to the Australian Government	**20,822**	9,848	**(45)**	—	**—**	—	**—**	—	**20,777**	9,848
Transfers between equity components	**(12,436)**	(4,604)	**—**	—	**12,418**	7,043	**18**	(2,439)	**—**	—
Closing balance as at 30 June	**64,069**	55,683	**3,316**	3,361	**81,730**	69,312	**200**	182	**149,315**	128,538
Closing balance attributable to the Australian Government	**64,069**	55,683	**3,316**	3,361	**81,730**	69,312	**200**	182	**149,315**	128,538

The above statement should be read in conjunction with the accompanying notes.

Cash flow statement

FOR THE PERIOD ENDED 30 JUNE 2011

	Notes	2011 $'000	2010 $'000
OPERATING ACTIVITIES			
Cash received			
Industry contributions		**104,426**	74,252
Commonwealth contributions		**43,728**	59,578
Interest		**6,950**	6,365
Grants income		**5,115**	10,347
Other		**5,456**	4,520
Total cash received		**165,675**	155,062
Cash used			
Research and development		**130,690**	110,272
Employees		**6,839**	6,256
Suppliers		**6,730**	4,292
Net GST paid		**2,352**	2,704
Total cash used		**146,611**	123,524
Net cash from operating activities	9(B)	**19,064**	31,538
INVESTING ACTIVITIES			
Cash received			
Investments		**3,000**	—
Total cash received		**3,000**	—
Cash used			
Purchase of property, plant and equipment		**189**	103
Investments		**5,290**	24,988
Shares		**241**	5,646
Total cash used		**5,720**	30,737
Net cash (used by) investing activities		**(2,720)**	(30,737)
Net increase in cash held		**16,344**	801
Cash and cash equivalents at the beginning of the reporting period		**33,905**	33,104
Cash and cash equivalents at the end of the reporting period	5A, 9(A)	**50,249**	33,905

The above statement should be read in conjunction with the accompanying notes.

Schedule of commitments

AS AT 30 JUNE 2011

	2011 $'000	2010 $'000
BY TYPE		
Commitments payable		
Capital commitments		
Investments[1]	**200**	182
Total capital commitments	**200**	182
Other commitments		
Operating leases[2]	**266**	301
Research projects forward program[3]	**213,360**	174,326
Total other commitments	**213,626**	174,627
Commitments receivable		
GST recoverable on commitments	**(19,421)**	(15,875)
Total commitments receivable	**(19,421)**	(15,875)
Net commitments by type	**194,405**	158,934
BY MATURITY		
Commitments payable		
Capital commitments		
One year or less	**200**	182
From one year to five years	**—**	—
Total capital commitments	**200**	182
Research project commitments		
One year or less	**100,360**	92,617
From one to five years	**113,000**	81,709
Over five years	**—**	—
Research projects commitments	**213,360**	174,326
Operating lease commitments		
One year or less	**171**	149
From one year to five years	**95**	152
Over five years	**—**	—
Total operating lease commitments	**266**	301
Commitments receivable		
One year or less	**(9,139)**	(8,433)
From one year to five years	**(10,282)**	(7,442)
Over five years	**—**	—
Total commitments receivable	**(19,421)**	(15,875)
Net commitments by maturity	**194,405**	158,934

NB: Commitments are GST inclusive where relevant.

The above statement should be read in conjunction with the accompanying notes.

Schedule of commitments

AS AT 30 JUNE 2011 *(continued)*

1 Capital commitments for 2010–11 are GRDC's commitment to purchase shares in Novozymes Biologicals Australia Pty Ltd.

2 Operating leases comprise:

Nature of the lease	*General description of leasing arrangement*
Motor vehicles—staff	Leased as part of salary packages No contingent rentals exist
Photocopier and franking machine	Rental agreements for a period of 5 years exist for the photocopier and franking machine, after this time they are 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 2011.

The above statement should be read in conjunction with the accompanying notes.

Schedule of asset additions

FOR THE PERIOD ENDED 30 JUNE 2011

The following non-financial non-current assets were added in 2010–11:

	Land	Buildings	Other Infrastructure, Plant & Equipment	Intangibles	Total
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
By purchase—other	**—**	**—**	**82**	**107**	**189**
Total additions	**—**	**—**	**82**	**107**	**189**

The following non-financial non-current assets were added in 2009–10:

	Land	Buildings	Other Infrastructure, Plant & Equipment	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000
By purchase—other	—	—	78	25	103
Total additions	—	—	78	25	103

The above statement should be read in conjunction with the accompanying notes.

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*. Its primary objective 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:

- Finance Minister's Orders (FMO) for reporting periods ending on or after 1 July 2010; and
- 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:

- The valuation of unlisted shares held by the Corporation (as detailed in note 1.13) 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 accounting 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, amendments to standards or interpretations 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 101	Presentation of Financial Statements – October 2010 (Compilation)	Minimal impact on financial disclosure
AASB 132	Financial Instruments: Presentation – June 2010 (Compilation)	Minimal impact on financial disclosure

Other new standards, amendments to standards or interpretations 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, amendments to standards or interpretations 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 (Compilation)	Changes to presentation, however no significant impact on financial statements
AASB 107	Statement of Cash Flows – October 2010 (Compilation)	Changes to presentation, however no significant impact on financial statements
AASB 118	Revenue – October 2010 (Compilation)	Changes to presentation, however no significant impact on financial statements
AASB 119	Employee Benefits – October 2010 (Compilation)	Changes to presentation, however no significant impact on financial statements
AASB 121	The Effects of Changes in Foreign Exchange Rates – October 2010 (Compilation)	Minimal impact on use and how to report the effects of changes in exchange rates in the financial statements
AASB 124	Related Party Disclosures – December 2009 (Principal)	Preliminary assessment suggests the impact is minimal. May result in the granting of partial exemptions with certain disclosure requirements.
AASB 137	Provisions, Contingent Liabilities and Contingent Assets – October 2010 (Compilation)	Impact on recognition criteria and measurement in relation to provisions, contingent liabilities and contingent assets and additional disclosure requirements
AASB 139	Financial Instruments: Recognition and Measurement – October 2010 (Compilation)	Changes to recognition and measurement, however no significant impact on financial statements
AASB 1031	Materiality – December 2009 (Compilation)	No significant impact on financial statements
AASB 2010–2	Amendments to Australian Accounting Standards arising from Reduced Disclosure Requirements [AASB 1, 2, 3, 5, 7, 8, 101, 102, 107, 108, 110, 111, 112, 116, 117, 119, 121, 123, 124, 127, 128, 131, 133, 134, 136, 137, 138, 140, 141, 1050 & 1052 and Interpretations 2, 4, 5, 15, 17, 127, 129 & 1052] – June 2010	Does not affect financial measurement or recognition, so it is not expected to have impact on financial result or position. May reduce some note disclosures in financial statements

Note 1: Summary of Significant Accounting Policies *(continued)*

1.4 NEW AUSTRALIAN ACCOUNTING STANDARDS *(continued)*

Future Australian Accounting Standard Requirements (continued)

Standard/Interpretation		Impact on the Corporation
AASB 2010–7	Amendments to Australian Accounting Standards arising from AASB 9 (December 2010) [AASB 1, 3, 4, 5, 7, 101, 102, 108, 112, 118, 120, 121, 127, 128, 131, 132, 136, 137, 139, 1023 & 1038 and Interpretations 2, 5, 10, 12, 19 & 127] – December 2010	This amendment may have an impact as AASB 9 is a new standard and it changes the requirements of numerous standards

Other new standards, amendments to standards or interpretations 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.

Revenues 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.

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.*

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.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.7 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.

1.8 INFRASTRUCTURE, 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.

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 & equipment	Market selling price

Following initial recognition at cost, property, plant and equipment are carried at fair value less subsequent accumulated depreciation and accumulated impairment losses. Valuations are 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 depends upon the volatility of movements in market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is 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 are 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 infrastructure, 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:

	2011	2010
Buildings on leasehold land	**25 years**	25 years
Other infrastructure, plant & equipment	**3 to 12 years**	3 to 12 years

Note 1: Summary of Significant Accounting Policies *(continued)*

1.8 INFRASTRUCTURE, PLANT AND EQUIPMENT *(continued)*

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 (2010: $NIL).

Impairment

All assets were assessed for impairment at 30 June 2011. 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.

1.9 INTANGIBLES

Software

These intangible assets comprise software for internal use. 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:

	2011	2010
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 2011.

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 plans assets (if any) out of which the obligations are to be settled directly.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.10 EMPLOYEE BENEFITS

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

Provision is made for separation and redundancy benefit payments. 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.

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 as an administered item.

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 (2010: $NIL).

1.11 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.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.12 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.

1.13 FINANCIAL ASSETS

The Corporation classifies its financial assets in the following categories:

- financial assets at fair value through profit or loss;
- held-to-maturity investments;
- available-for-sale financial assets; and
- 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:

- have been acquired principally for the purpose of selling in the near future;
- are derivatives that are not designated and effective as a hedging instrument; or
- are a part 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.

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 profit and loss for the period.

1.13 FINANCIAL ASSETS *(continued)*

Available-for-sale financial assets (continued)

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: 19.10%);
- Arista Cereal Technologies Pty Ltd (holding: 22.50%);
- InterGrain Pty Ltd (holding: 27.42%); and
- Canola Breeders Western Australia Pty Ltd (holding: 30.72%).

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 these investments based on the Corporation's estimate of the trading performance of each company. A review of the trading performance will be done annually and the provision adjusted accordingly. 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. The loss is recognised in the Statement of Comprehensive Income.

Note 1: Summary of Significant Accounting Policies *(continued)*

1.14 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).

1.15 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.

1.16 TAXATION

The Corporation is subject to taxation (other than income tax) under the laws of the Commonwealth under section 46(1) of the *Primary Industries and Energy Research and Development Act 1989*.

Revenues, expenses and assets are recognised net of Goods and Services Tax (GST) except:

- where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- for receivables and payables.

1.17 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 2011 the Corporation held no contingent liabilities or contingent assets.

Note 2: Events After the Reporting Period

The Corporation had no events occurring after the reporting date that would significantly affect its ongoing structure and financial activities.

Note 3: Expenses

NOTE 3A: RESEARCH AND DEVELOPMENT

2011	Cross-commodity $'000	Coarse grains $'000	Grain legumes $'000	Oilseeds $'000	Wheat $'000	Total $'000
National	**75,653**	**3,067**	**8,436**	**567**	**4,368**	**92,091**
Northern region	**9,989**	**—**	**843**	**265**	**844**	**11,941**
Southern region	**18,701**	**1,920**	**230**	**575**	**886**	**22,312**
Western region	**11,842**	**—**	**938**	**775**	**761**	**14,316**
TOTAL	**116,185**	**4,987**	**10,447**	**2,182**	**6,859**	**140,660**
2010	95,879	6,608	5,072	3,099	6,093	116,751

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.

	2011 $'000	2010 $'000
NOTE 3B: EMPLOYEE BENEFITS		
Salaries and wages	**5,900**	5,489
Superannuation		
Defined contribution plans	**709**	633
Defined benefits plans	**76**	133
Leave and other entitlements	**27**	198
Separation and redundancies	**155**	—
Total employee benefits	**6,867**	6,453
NOTE 3C: SUPPLIERS		
Goods and services		
Staff travel and accommodation	**1,108**	1,145
Consultants	**55**	28
Panel expenses	**1,089**	928
Program team expenses	**418**	663
Communications	**97**	128
Corporate governance	**299**	327
Corporate services	**1,387**	1,143
Legal and procurement	**227**	220
Levy collection costs	**599**	551
Other	**443**	426
Total goods and services	**5,722**	5,559
Goods and services are made up of:		
Provision of goods—external parties	**111**	139
Rendering of services—external parties	**5,611**	5,420
Total goods and services	**5,722**	5,559

Note 3: Expenses *(continued)*

	2011 $'000	2010 $'000
NOTE 3C: SUPPLIERS *(continued)*		
Other supplier expenses		
Operating lease rentals – external parties		
Minimum lease payments	**31**	13
Total other supplier expenses	**31**	13
Total supplier expenses	**5,753**	5,572
NOTE 3D: DEPRECIATION AND AMORTISATION		
Depreciation:		
Infrastructure, plant and equipment	**107**	90
Buildings	**196**	196
Total depreciation	**303**	286
Amortisation:		
Intangibles:		
Information Management System	**14**	18
Software	**85**	73
Total amortisation	**99**	91
Total depreciation and amortisation	**402**	377
NOTE 3E: WRITE-DOWN AND IMPAIRMENT OF ASSETS		
Investments (shares) – revaluation decrement	**369**	4,217

Note 4: Income

	2011 $'000	2010 $'000
REVENUE		
NOTE 4A: INTEREST		
Deposits	**7,364**	6,680
Negotiable certificates of deposit	**—**	—
Sub-total interest income	**7,364**	6,680
Management fee	**(309)**	(283)
Revaluation of investments	**164**	618
Total interest	**7,219**	7,015
NOTE 4B: INDUSTRY CONTRIBUTIONS		
Coarse grains	**18,509**	14,243
Grain legumes	**8,277**	6,115
Oilseeds	**13,794**	8,573
Wheat	**63,916**	45,134
Total industry contributions	**104,496**	74,065

Note 4: Income *(continued)*

	2011 $'000	2010 $'000
REVENUE *(continued)*		
NOTE 4C: PROJECT REFUNDS		
Cross commodity	**687**	530
Coarse grains	**119**	10
Grain legumes	**7**	116
Oilseeds	**77**	33
Wheat	**9**	95
Total project refunds	**899**	784
NOTE 4D: ROYALTIES		
Coarse grains	**542**	775
Grain legumes	**481**	448
Oilseeds	**381**	79
Wheat	**1,545**	1,090
Other	**12**	20
Total royalties	**2,961**	2,412
NOTE 4E: GRANTS INCOME		
Commonwealth	**5,483**	7,723
Industry	**504**	1,201
Total grants income	**5,987**	8,924
NOTE 4F: OTHER REVENUE		
Levy penalties	**97**	92
Groundcover advertising income	**218**	184
Publications revenue	**46**	82
Other income	**212**	183
Total other revenue	**573**	541
GAINS		
NOTE 4G: SALE OF ASSETS		
Non-current assets held for sale		
Proceeds from sale	**—**	4
Carrying value of assets sold	**—**	—
Net gain from sale of assets	**—**	4
REVENUE FROM GOVERNMENT		
NOTE 4H: REVENUE FROM GOVERNMENT		
Commonwealth contributions	**53,397**	50,071
Total revenue from Government	**53,397**	50,071

Note 5: Financial Assets

	2011 $'000	2010 $'000
NOTE 5A: CASH AND CASH EQUIVALENTS		
Interest bearing cheque account	**460**	607
Money market call account	**38,949**	22,949
Business online saver account	**10,840**	10,349
Total cash and cash equivalents	**50,249**	33,905
NOTE 5B: TRADE AND OTHER RECEIVABLES		
Goods and services		
Goods and services – related entities	**15,996**	6,257
Goods and services – external parties	**2,117**	598
Total receivables for goods and services	**18,113**	6,855
Other receivables		
GST receivable from the Australian Taxation Office	**5,721**	4,908
Total other receivables	**5,721**	4,908
Total trade and other receivables	**23,834**	11,763
Receivables are aged as follows:		
Not overdue	**22,762**	11,677
Overdue by:		
0 to 30 days	**1,040**	43
31 to 60 days	**5**	—
61 to 90 days	**—**	18
more than 90 days	**27**	25
	1,072	86
Total receivables	**23,834**	11,763

All receivables are expected to be recovered in no more than 12 months.

No indicators of impairment were found for trade and other receivables.

Receivables for goods & services

Credit terms are net 7 days (2010: 7 days).

NOTE 5C: INVESTMENTS IN MANAGED FUNDS		
BT Individually Managed Fund At market value	**59,051**	57,465
UBS Individually Managed Fund At market value	**58,815**	57,947
Total investments	**117,866**	115,412

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.

Note 5: Financial Assets *(continued)*

	2011 $'000	2010 $'000
NOTE 5D: INVESTMENTS ACCOUNTED FOR USING THE EQUITY METHOD		
Investments in associates:		
Novozymes Biologicals Australia Pty Ltd	**71**	257
HRZ Wheats Pty Ltd	**55**	287
Total equity accounted investments	**126**	544
All such investments are expected to be recovered in more than 12 months.		
Summarised financial information of associates:		
Balance sheet		
Assets	**1,070**	1,564
Liabilities	**777**	338
Net assets	**293**	1,226
Statement of comprehensive income		
Income	**643**	735
Expenses	**2,610**	2,191
Net (deficit)	**(1,967)**	(1,456)
Share of associates' net (deficit)		
Share of net (deficit) before tax	**(659)**	(598)
Income tax expense	**—**	—
Share of associates' net (deficit) after tax	**(659)**	(598)

Details of investments accounted for using the equity method

Name of entity	Principal activities	Reporting date	Ownership 2011 %	Ownership 2010 %
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**	40.3

* Incorporated in Australia

Note 5: Financial Assets *(continued)*

	2011 $'000	2010 $'000
NOTE 5E: INVESTMENTS – OTHER		
Shares in unlisted companies		
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
Arista Cereal Technologies Pty Ltd	**3,200**	3,200
Provision for diminution in share value	**(1,752)**	(1,752)
	1,448	1,448
InterGrain Pty Ltd	**7,200**	7,200
Provision for diminution in share value	**(5,392)**	(5,392)
	1,808	1,808
Canola Breeders Western Australia Pty Ltd	**800**	800
Provision for diminution in share value	**(759)**	(390)
	41	410
Total investments – other	**7,533**	7,902

The shares held are ordinary shares.

All such investments are expected to be recovered in more than 12 months.

NOTE 5F: INVESTMENTS IN CONTROLLED ENTITIES

Grains Research and Development Corporation held 100% equity in Single Vision Grains Australia Limited. It was inactive in 2010–11, and was deregistered on 3 February 2011.

Note 6: Non-Financial Assets

	2011 $'000	2010 $'000
NOTE 6A: LAND AND BUILDINGS		
Leasehold land – fair value	**1,000**	1,000
Total land	**1,000**	1,000
Buildings on leasehold land – fair value	**4,890**	4,890
Accumulated depreciation	**(392)**	(196)
Total buildings	**4,498**	4,694
Total land and buildings	**5,498**	5,694

Note 6: Non-Financial Assets *(continued)*

NOTE 6B: INFRASTRUCTURE, PLANT AND EQUIPMENT

	2011 $'000	2010 $'000
Infrastructure, plant and equipment – fair value	**242**	467
Accumulated depreciation	**—**	(155)
Total infrastructure, plant and equipment	**242**	312
Movement in asset revaluation reserve		
Increment for land	**—**	—
Increment for buildings	**—**	—
Decrement for Infrastructure, plant and equipment	**(45)**	—
Total movement in asset revaluation reserve	**(45)**	—

No revaluation decrements were expensed during the year (2010: $NIL).

All revaluations are conducted in accordance with the revaluation policy stated at Note 1. An independent valuer, the Australian Valuation Office, conducted a formal revaluation of land and buildings as at 30 June 2009. It has been assessed that the carrying amount of land and buildings does not materially differ from fair value at 30 June 2011.

A formal revaluation of plant and equipment was conducted by the Australian Valuation Office as at 30 June 2011.

No indicators of impairment were found for infrastructure, plant and equipment.

No Infrastructure, plant or equipment is expected to be sold or disposed of within the next 12 months.

NOTE 6C: INTANGIBLES

	2011 $'000	2010 $'000
Information Management System – at cost	**725**	696
Accumulated amortisation	**(702)**	(688)
Total Information Management System	**23**	8
Software – at cost	**448**	399
Accumulated amortisation	**(303)**	(218)
Total software	**145**	181
Intellectual property – at cost	**99**	70
Accumulated amortisation	**—**	—
Total intellectual property	**99**	70
Total intangibles	**267**	259

No indicators of impairment were found for intangible assets.

No intangibles are expected to be sold or disposed of within the next 12 months.

Note 6: Non-Financial Assets *(continued)*

NOTE 6D: ANALYSIS OF INFRASTRUCTURE, PLANT, EQUIPMENT AND INTANGIBLES

Table A – Reconciliation of the opening and closing balances of infrastructure, plant and equipment (2010–11)

	Leasehold Land $'000	Buildings on Leasehold Land $'000	Other Infrastructure, Plant & Equipment $'000	Total $'000
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*	—	—	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**

* Disaggregated additions information are disclosed in the Schedule of Asset Additions.

Table B – Reconciliation of the opening and closing balances of infrastructure, plant and equipment (2009–10)

	Leasehold Land $'000	Buildings on Leasehold Land $'000	Other Infrastructure, Plant & Equipment $'000	Total $'000
As at 1 July 2009				
Gross book value	1,000	4,890	395	6,285
Accumulated depreciation and impairment	—	—	(71)	(71)
Net book value 1 July 2009	**1,000**	**4,890**	**324**	**6,214**
Additions*	—	—	78	78
Revaluations and impairment recognised in other comprehensive income	—	—	—	—
Depreciation expense	—	(196)	(90)	(286)
Disposals:				
other disposals	—	—	—	—
Net book value 30 June 2010	**1,000**	**4,694**	**312**	**6,006**
Net book value as at 30 June 2010 represented by:				
Gross book value	**1,000**	**4,890**	**467**	**6,357**
Accumulated depreciation and impairment losses	**—**	**(196)**	**(155)**	**(351)**
Net book value 30 June 2010	**1,000**	**4,964**	**312**	**6,006**

* Disaggregated additions information are disclosed in the Schedule of Asset Additions.

Note 6: Non-Financial Assets *(continued)*

NOTE 6D: ANALYSIS OF INFRASTRUCTURE, PLANT, EQUIPMENT AND INTANGIBLES *(continued)*

Table C – Reconciliation of the opening and closing balances of intangibles (2010–11)

	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*	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**

* Disaggregated additions information are disclosed in the Schedule of Asset Additions.

Table D – Reconciliation of the opening and closing balances of intangibles (2009–10)

	Information Management System $'000	Software $'000	Intellectual Property $'000	Total $'000
As at 1 July 2009				
Gross book value	696	381	63	1,140
Accumulated amortisation and impairment	(670)	(145)	—	(815)
Net book value 1 July 2009	**26**	**236**	**63**	**325**
Additions*	—	18	7	25
Amortisation expense	(18)	(73)	—	(91)
Net book value 30 June 2010	**8**	**181**	**70**	**259**
Net book value as at 30 June 2010 represented by:				
Gross book value	**696**	**399**	**70**	**1,165**
Accumulated amortisation and impairment	**(688)**	**(218)**	**—**	**(906)**
Net book value 30 June 2010	**8**	**181**	**70**	**259**

* Disaggregated additions information are disclosed in the Schedule of Asset Additions.

Note 6: Non-Financial Assets *(continued)*

	2011 $'000	2010 $'000
NOTE 6E: OTHER NON-FINANCIAL ASSETS		
Accrued interest	**230**	127
Accrued income	**144**	774
Prepayments	**18**	17
Total other non-financial assets	**392**	918

No indicators of impairment were found for other non-financial assets.

Accrued interest

The interest rates range from 3.47% to 5.21% (2010: 3.87% to 4.50%) and the frequency of payments is monthly.

Note 7: Provisions

	2011 $'000	2010 $'000
NOTE 7A: EMPLOYEE PROVISIONS		
Leave	**1,259**	1,233
Total employee provisions	**1,259**	1,233
Employee provisions are expected to be settled in:		
No more than 12 months	**1,091**	1,075
More than 12 months	**168**	158
Total employee provisions	**1,259**	1,233

Note 8: Payables

	2011 $'000	2010 $'000
NOTE 8A: SUPPLIERS		
Trade creditors – external parties	**454**	279
Accrued expenses – external parties	**584**	1,735
Total supplier payables	**1,038**	2,014

All supplier payables are expected to be settled within 12 months.

Settlement is usually made net 30 days.

NOTE 8B: RESEARCH AND DEVELOPMENT		
Research and development	**54,395**	44,924
Research and development payables are expected to be settled in:		
No more than 12 months	**54,104**	44,506
More than 12 months	**291**	418
Total research and development payables	**54,395**	44,924

Note 9: Cash Flow Reconciliation

		2011 $'000	2010 $'000
NOTE 9(A): RECONCILIATION OF CASH AND CASH EQUIVALENTS AS PER BALANCE SHEET TO CASH FLOW STATEMENT			
Cash and cash equivalents as per:			
Cash Flow Statement		**50,249**	33,905
Balance Sheet	5A	**50,249**	33,905
Difference		**—**	—
NOTE 9(B): RECONCILIATION OF NET COST OF SERVICES TO NET CASH FROM OPERATING ACTIVITIES:			
Net cost of services		**(31,916)**	(39,625)
Add revenue from Government		**53,397**	50,071
Add share of (deficit) of associates		**(659)**	(598)
Adjustments for non-cash items			
Depreciation/amortisation		**402**	377
Net write down of financial assets		**369**	4,217
Share of net loss of associates		**659**	598
Revaluation of investments		**(164)**	(618)
Changes in assets/liabilities			
(Increase)/decrease in receivables		**(11,428)**	9,344
(Increase)/decrease in prepayments		**(1)**	7
(Increase)/decrease in employee provisions		**26**	197
(Increase)/decrease in payables		**8,379**	7,568
Net cash from operating activities		**19,064**	31,538

Note 10: Directors' Remuneration

	2011	2010
The number of non-executive directors of the Corporation included in these financial statements are shown below in the relevant remuneration bands:		
$30,000—$59,999	**6**	6
$60,000—$89,999	**1**	1
Total	**7**	7
Total remuneration received or due and receivable by directors of the Corporation	**301,090**	288,230

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 (Chairman)
Ms Nicole Birrell
Mr Steve Marshall (Deputy Chairman)
Prof. Timothy Reeves
Ms Jennifer Goddard
Mr Colin Butcher
Prof. Graeme Robertson
Mr Peter Reading (Executive Director 1/7/2010 – 28/2/2011)
Mr John Harvey (Executive Director 1/3/2011 – 30/6/2011)

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

	2011 $	2010 $
NOTE 12A: SENIOR EXECUTIVE REMUNERATION EXPENSE FOR THE REPORTING PERIOD		
Short-term employee benefits:		
Salary	**1,283,323**	1,384,766
Annual leave accrued	**25,236**	6,238
Performance bonuses	**128,297**	181,978
Total short-term employee benefits	**1,436,856**	1,572,982
Post-employment benefits:		
Superannuation	**185,148**	186,939
Total post-employment benefits	**185,148**	186,939
Other long-term benefits:		
Long service leave	**(6,415)**	46,030
Total other long-term benefits	**(6,415)**	46,030
Termination benefits	**155,250**	—
Total	**1,770,839**	1,805,951

Notes

1. Note 12A was prepared on an accrual basis (so the performance bonus expenses disclosed above differ from the cash "Bonus paid" in Note 12B).
2. Note 12A excludes acting and part-year service where remuneration expensed was less than $150,000.

NOTE 12B: AVERAGE ANNUAL REMUNERATION PACKAGES AND BONUS PAID FOR SUBSTANTIVE SENIOR EXECUTIVES AS AT THE END OF THE REPORTING PERIOD

	As at 30 June 2011					As at 30 June 2010				
Fixed elements and bonus paid[1]		Fixed elements					Fixed elements			
	Senior Executives no.	Base salary $	Super & Allowances $	Total package $	Bonus paid[2] $	Senior Executives no.	Base salary $	Super & Allowances $	Total package $	Bonus paid[2] $
Total remuneration (including part-time arrangements)										
$150,000 to $179,999	2	159,174	14,326	173,500	20,618	2	152,752	13,748	166,500	19,380
$180,000 to $209,999	1	189,908	17,092	207,000	24,000	4	183,716	16,534	200,250	22,385
$210,000 to $239,999	2	193,578	17,422	211,000	24,357	—	—	—	—	—
$270,000 to $299,999	1	270,000	24,300	294,300	26,393	—	—	—	—	—
$390,000 to $419,999	—	—	—	—	—	1	370,321	33,329	403,650	108,000
Total	6					7				

Notes

1. This table reports on substantive Senior Executives who are employed by the Corporation as at the end of the reporting period. Fixed elements are based on the employment agreement of each individual – each row represents an average annualised figure (based on headcount) for the individuals in that remuneration package band (i.e. the 'Total' column).
2. Represents average actual bonuses paid during the reporting period. The 'Bonus paid' is excluded from the 'Total' calculation (for the purpose of determining remuneration package bands). The 'Bonus paid' within a particular band may vary between financial years due to factors such as individuals commencing with or leaving the Corporation during the financial year.

Variable elements

With the exception of performance bonuses, variable elements are not included in the 'Fixed elements and bonus paid' table above. The following variable elements are available as part of senior executives' remuneration package:

(a) Performance bonuses – up to 15% of annual remuneration package, dependent on Board approval and both Corporation and individual performance.
(b) Leave entitlements—20 days annual leave per annum, 10 days sick leave per annum and 13 weeks long service leave after 10 years of service.
(c) Allowances—travel allowance and motor vehicle allowance.
(d) Other—professional development training, professional association membership and Qantas Club membership.

Note 12: Executive Remuneration *(continued)*

NOTE 12C: OTHER HIGHLY PAID STAFF

During the reporting period, there were NIL employees whose salary plus performance bonus were $150,000 or more (2010: NIL). These employees did not have a role as Senior Executives or Directors and are therefore not disclosed as Senior Executives in Note 12A and Note 12B.

Note 13: Remuneration of Auditors

	2011 $	2010 $
The cost of financial statement audit services provided to the Corporation was:		
Australian National Audit Office	**25,300**	24,100

Note 14: Financial Instruments

	2011 $'000	2010 $'000
NOTE 14A: CATEGORIES OF FINANCIAL INSTRUMENTS		
Financial assets		
Loans and receivables:		
Cash and cash equivalents	**50,249**	33,905
Trade and other receivables	**18,113**	6,855
Total	**68,362**	40,760
Available-for-sale:		
Shares in unlisted companies	**7,533**	7,902
Total	**7,533**	7,902
Fair value through profit or loss (designated):		
Managed funds	**117,866**	115,412
Total	**117,866**	115,412
Carrying amount of financial assets	**193,761**	164,074
Financial liabilities		
At amortised cost		
Payables	**54,849**	45,203
Total	**54,849**	45,203
Carrying amount of financial liabilities	**54,849**	45,203

	2011 $'000	2010 $'000
NOTE 14B: NET INCOME AND EXPENSE FROM FINANCIAL ASSETS		
Loans and receivables		
Interest revenue (note 4A)	**1,764**	1,409
Net gain from loans and receivables	**1,764**	1,409
Available-for-sale		
Impairment (note 3E)	**(369)**	(4,217)
Net (loss) from available-for-sale	**(369)**	(4,217)
Fair value through profit or loss (designated)		
Interest revenue (note 4A)	**5,455**	5,606
Net gain from fair value through profit and loss	**5,455**	5,606
Net gain from financial assets	**6,850**	2,798

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 subsequent to initial recognition at fair value, grouped into Levels 1 to 3 based on the degree to which the fair value is observable.

Level 1 fair value measurements are those derived from quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2 fair value measurements are those derived from inputs other than quoted prices included in Level 1 that are observable for the asset or liability either directly (that is, as prices) or indirectly (that is, derived from prices).

Level 3 fair value measurements are those derived from valuation techniques that include inputs for the asset or liability that are not based on observable market data.

	Level 1	Level 1	**Level 2**	Level 2	**Level 3**	Level 3
	2011 $'000	2010 $'000	**2011 $'000**	2010 $'000	**2011 $'000**	2010 $'000
Financial assets at fair value						
Fair value through profit or loss	**117,866**	115,412	**—**	—	**—**	—
	117,866	115,412	**—**	—	**—**	—

There were no transfers between Level 1 and 2 in the period.

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	Not past due nor impaired	**Past due or impaired**	Past due or impaired
	2011 $'000	2010 $'000	**2011 $'000**	2010 $'000
Cash and cash equivalents	**50,249**	33,905	**—**	—
Receivables	**17,041**	6,769	**1,072**	86
Managed funds	**117,866**	115,412	**—**	—
Shares in unlisted companies	**21**	21	**7,512**	7,881
	185,177	156,107	**8,584**	7,967

Ageing of financial assets that are past due but not impaired for 2011

	0 to 30 days	**31 to 60 days**	**61 to 90 days**	**90+ days**	**Total**
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
Receivables	**1,040**	**5**	**—**	**27**	**1,072**
	1,040	**5**	**—**	**27**	**1,072**

Ageing of financial assets that are past due but not impaired for 2010

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	$'000	$'000	$'000	$'000
Receivables	43	—	18	25	86
	43	—	18	25	86

Note 14: Financial Instruments *(continued)*

NOTE 14D: CREDIT RISK *(continued)*

The following assets have been individually assessed as impaired:

	2011 $'000	2010 $'000
Shares in unlisted companies	**7,512**	7,881

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 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 2011

	On demand	Within 1 year	1 to 2 years	2 to 5 years	> 5 years	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Payables	**—**	**54,558**	**292**	**—**	**—**	**54,850**
	—	**54,558**	**292**	**—**	**—**	**54,850**

Maturities for non-derivative financial liabilities 2010

	On demand	Within 1 year	1 to 2 years	2 to 5 years	> 5 years	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Payables	—	44,785	418	—	—	45,203
	—	44,785	418	—	—	45,203

The Corporation has no derivative financial liabilities in both the current and prior year.

NOTE 14F: MARKET RISK

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 below details the interest rate sensitivity analysis of the Corporation at the reporting date, holding all other variables constant. A 175 basis point (2010: 75 basis point) change is deemed to be a possible change and is used when reporting interest rate risk.

	Risk variable	Change in risk variable	**Effect on**		Effect on	
			Profit or loss	**Equity**	Profit or loss	Equity
			2011 $'000	**2011 $'000**	2010 $'000	2010 $'000
Interest rate risk	Interest	+1.75%	**(4,573)**	**(4,573)**	(1,710)	(1,710)
		–1.75%	**4,574**	**4,574**	1,711	1,711

The method used to arrive at the possible change of 175 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.

175 basis points is considered reasonable because it is reasonably possible that there will be greater volatility compared to that which has been experienced in recent years.

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 following table details the effect on the profit and equity as at 30 June from a 15 per cent favourable/unfavourable change in AUS dollars against US dollars with all other variables held constant.

	Risk variable	Change in risk variable	**Effect on**		Effect on	
			Profit or loss	**Equity**	Profit or loss	Equity
			2011 $'000	**2011 $'000**	2010 $'000	2010 $'000
Currency risk	USD	+15%	**17**	**17**	88	88
		–15%	**(23)**	**(23)**	(113)	(113)
Currency risk	CAD	+12%	**—**	**—**	1	1
		–12%	**—**	**—**	(1)	(1)

Note 14: Financial Instruments *(continued)*

NOTE 14F: MARKET RISK *(continued)*

Currency risk (continued)

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.

A standard rate of 15 per cent is considered reasonable because it is reasonably possible that there will be greater volatility compared to that which has been experienced in recent years, however, not to the extent of the extraordinary volatility experienced in 2010–11.

Other price risk

The Corporation is not exposed to other price risk.

Note 15: Compensation and Debt Relief

No compensation or debt relief payments were made during the reporting period (2010: $NIL).

Note 16: 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 2011. The Corporation operates predominantly in one industry, the grains industry and in one geographical area, being Australia.

NOTE 16A: NET COST OF OUTCOME DELIVERY

	Outcome 1		Total	
	2011	2010	**2011**	2010
	$'000	$'000	**$'000**	$'000
Expenses				
Departmental	**154,051**	133,370	**154,051**	133,370
Total	**154,051**	133,370	**154,051**	133,370
Other own-sourced income				
Departmental				
Interest	**7,219**	7,015	**7,219**	7,015
Industry contributions	**104,496**	74,065	**104,496**	74,065
Project refunds	**899**	784	**899**	784
Royalties	**2,961**	2,412	**2,961**	2,412
Grants income	**5,987**	8,924	**5,987**	8,924
Other revenue	**573**	541	**573**	541
Sale of assets	**—**	4	**—**	4
Total other own-sourced income	**122,135**	93,745	**122,135**	93,745
Net cost/(contribution) of outcome delivery	**31,916**	39,625	**31,916**	39,625

Outcome 1 is described at Note 1.1.

Note 16: Reporting of Outcomes *(continued)*

NOTE 16B: MAJOR CLASSES OF DEPARTMENTAL EXPENSES, INCOME, ASSETS AND LIABILITIES BY OUTCOMES

	Outcome 1		Total	
	2011	2010	**2011**	2010
	$'000	$'000	**$'000**	$'000
Expenses				
Research and development	**140,660**	116,751	**140,660**	116,751
Employees	**6,867**	6,453	**6,867**	6,453
Suppliers	**5,753**	5,572	**5,753**	5,572
Depreciation and amortisation	**402**	377	**402**	377
Write-down of assets	**369**	4,217	**369**	4,217
Total expenses	**154,051**	133,370	**154,051**	133,370
Income				
Revenues from Government	**53,397**	50,071	**53,397**	50,071
Interest	**7,219**	7,015	**7,219**	7,015
Industry contributions	**104,496**	74,065	**104,496**	74,065
Project Refunds	**899**	784	**899**	784
Royalties	**2,961**	2,412	**2,961**	2,412
Grants	**5,987**	8,924	**5,987**	8,924
Other revenue	**573**	541	**573**	541
Gain on sale of assets	**—**	4	**—**	4
Total income	**175,532**	143,816	**175,532**	143,816
Assets				
Cash and cash equivalents	**50,249**	33,905	**50,249**	33,905
Trade and other receivables	**24,208**	12,664	**24,208**	12,664
Investments in managed funds	**117,866**	115,412	**117,866**	115,412
Investments accounted for using the equity method	**126**	544	**126**	544
Investments—other	**7,533**	7,902	**7,533**	7,902
Land and buildings	**5,498**	5,694	**5,498**	5,694
Infrastructure, plant and equipment	**242**	312	**242**	312
Intangibles	**267**	259	**267**	259
Other non financial assets	**18**	17	**18**	17
Total assets	**206,007**	176,709	**206,007**	176,709
Liabilities				
Employee provisions	**1,259**	1,233	**1,259**	1,233
Suppliers payables	**1,038**	2,014	**1,038**	2,014
Research and development payables	**54,395**	44,924	**54,395**	44,924
Total liabilities	**56,692**	48,171	**56,692**	48,171

Outcome 1 is described at Note 1.1.

Appendices

Harvesting. Photo: Evan Collis

Appendix A—Expenditure on government research priorities

The following tables summarise the total expenditure allocated against the Australian Government's National Research Priorities and priorities for rural R&D within the 2010–11 financial year (see Table 12 in Part 2 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 27a 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				Other	Total
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3	D4		
Practices	8.77	13.77	3.00				7.52						0.27			9.88			16.23		0.74	60.18
Varieties		0.47	0.15				8.77						28.46		5.53	0.95			10.92		2.42	57.67
New Products							0.13			1.72			6.08	1.63					3.82		1.52	14.90
CCB																6.80						6.80
CSIA													0.07			1.01					0.03	1.11
Total	**8.77**	**14.24**	**3.15**				**16.42**			**1.72**			**34.88**	**1.63**	**5.53**	**18.64**			**30.97**		**4.71**	**140.66**

CCB = Communication & Capacity Building, **CSIA** = Corporate Strategy & Impact Assessment

Table 27b Australian Government National Research Priorities, percentage values (%)

	An environmentally sustainable Australia							Promoting and maintaining good health				Frontier technologies for building and transforming Australian industries					Safeguarding Australia				Other	Total
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3	D4		
Practices	6.24	9.78	2.13				5.35						0.19			7.03			11.54		0.52	**42.78**
Varieties		0.34	0.11				6.23						20.23		3.93	0.68			7.76		1.72	**41.00**
New Products							0.09			1.22			4.33	1.16					2.72		1.08	**10.60**
CCB																4.84						**4.84**
CSIA													0.05			0.71					0.02	**0.78**
Total	**6.24**	**10.12**	**2.24**				**11.67**			**1.22**			**24.80**	**1.16**	**3.93**	**13.26**			**22.02**		**3.34**	**100.00**

CCB = Communication & Capacity Building, **CSIA** = Corporate Strategy & Impact Assessment

Table 28 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	%	$m	%
Practices	16.96	12.05	0.74	0.52	8.58	6.10	7.52	5.35	16.23	11.54	9.88	7.03	0.27	0.19			**60.18**	**42.78**
Varieties	14.86	10.57	2.42	1.72	0.15	0.11	8.77	6.23	10.92	7.76	6.48	4.61	14.07	10.00			**57.67**	**41.00**
New Products	3.03	2.15	1.63	1.16			0.13	0.09	3.83	2.72			6.11	4.35	0.18	0.13	**14.91**	**10.60**
CCB											6.80	4.84					**6.80**	**4.84**
CSIA	0.06	0.05	0.03	0.02							1.01	0.71					**1.10**	**0.78**
Total	**34.91**	**24.82**	**4.82**	**3.42**	**8.73**	**6.21**	**16.42**	**11.67**	**30.98**	**22.02**	**24.17**	**17.19**	**20.45**	**14.54**	**0.18**	**0.13**	**140.66**	**100.00**

CCB = Communication & Capacity Building, **CSIA** = Corporate Strategy & Impact Assessment

Appendix B—GRDC project list

Number	Title	Expenditure $
	PRACTICES	
	Agronomy, Soils and Environment	
CCC00004	High Yielding Irrigated Grains in Cotton Farming Systems	219,697
CSA00016	Putting precision agriculture on the ground in WA	250,000
CSA00019	Soil Carbon Research Program	173,000
CSA00020	Economic assessment of nutrient use efficiency of the Australian grains industry	102,472
CSA00021	Enhancing the capability of the Australian grains industry to improve nutrient-use efficiency	150,518
CSA00025	Water-use efficient farming systems for the Mallee	352,471
CSE00051	Pest suppressive landscapes–linking integrated pest management and natural resource management	334,256
CSO00041	A fundamental understanding of biochar—implications and opportunities for the grains industry	285,101
CSP00110	Water balance of conservation farming systems in SA and NSW	80,195
CSP00115	Improving productivity by rotating wheat varieties in wheat-on-wheat systems	137,151
CSP00127	Water balance of conservation farming systems in WA 2	75,650
CSP00132	Optimising the integration of dual-purpose crops in the high-rainfall zone	348,216
CSP00134	Biodiversity management in the high-rainfall zone for conservation and provision of ecosystem services	209,121
CSP00135	A molecular approach to unravel the dynamics of disease-suppressive microbial communities	155,000
CSP00136	A national research project for climate-ready crops	234,000
CSP00138	Manipulating biological processes that improve nitrogen supply to cereal crops	93,232
CSP00139	Novel solutions for managing non-wetting soils	225,015
DAF00003-3	National Adaptation and Mitigation Initiative coordination project	79,351
DAN00119	*Brasssica juncea* agronomy	150,000
DAN00129	Development of agronomy packages for new varieties in NSW	386,340
DAN00131	Developing agronomic solutions to improve barley yield and grain quality in the Northern Region	168,909
DAN00132	Making better fertiliser decisions for cropping systems in Australia	403,204
DAN00138	Barley agronomy for the Southern Region—2010 to 2013	416,842
DAN00144	How much ammonia is lost from surface-applied nitrogen fertiliser in northwest NSW?	150,000
DAN00152	The strategic use of tillage within conservation farming	299,928
DAQ00163	Participatory adaptation and mitigation strategies for climate change on the mixed farms of north-eastern Australia	402,169
DAQ00164	Biological suppression of root lesion nematodes in grain-growing soils	134,034
DAS00088	Advancing site-specific management of weeds and soilborne diseases	169,916
DAS00111	DNA tests for nematode community analysis	175,069
DAV00090	Real-time sensing of crops for management intervention–application of thermal and hyperspectral technologies	149,910
DAV00096	Decreasing nitrous oxide emissions in high-rainfall cropping systems	333,000
DAV00097	The potential of inhibitors for the mitigation of nitrous oxide emissions from animal production systems, in south-eastern Australia	270,000
DAV00099	Harnessing the biological potential of Australian cropping soils	118,564

Number	Title	Expenditure $
DAV00102	Monitoring soil biology with high-resolution genomic technologies	84,388
DAV00105	Suppressive soils–Can we find a microbial fingerprint using 'omics' technology?	109,126
DAV00106	Managing soil biology to improve nitrogen supply in grain production systems	90,500
DAV00108	Demonstrating climate change mitigation and adaptation options through linked and integrated cropping farms in Victoria	617,679
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	325,000
DAV00120	Supporting a global program to establish soil metagenomic databases for iconic grain production trials	36,984
DAW00146	Enhancing paddock profitability–A collaborative, diagnostic approach to cropping systems research	549,654
DAW00147	Variety-specific agronomy for wheat yield and quality in the Western Region	308,826
DAW00161	Increasing the profitability of cropping systems in WA using lupins, oats, oilseeds and pulses	350,000
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	624,200
DAW00204	Delivering agronomic strategies for water-repellent soils in WA	350,084
DGA00001	Durum expansion in SA through improved agronomy	35,000
DHI00001	Rainfall radar for improving agricultural profitability and sustainability	36,050
ERM00001	Reducing nitrous oxide emissions from sugarcane lands	218,250
FFI00003	EverCrop™ and EverCrop Decide: developing the role for perennials in mixed farming systems	557,922
FFI00004	Development of a salt- and waterlogging-tolerant wheat	192,078
GRD4-5	Project Review—Future Farm Industries CRC	5,376
GRD4-5-1	Project Review—Future Farm Industries CRC	1,348
HAL00002	Managing Climate Variability—critical thresholds—Horticulture Australia	27,248
HAL00003	Managing Climate Variability—critical thresholds and climate change impacts/adaptation in horticulture	47,003
LIE00007	Increasing water-use efficiency and decreasing input costs for sustainable and profitable farms in a changing climate	45,000
LWR00007	Contribution to National Program for Sustainable Irrigation	150,000
MCC00004	Undertake the development of a soils strategy	15,356
MCC00005	Project Review—Future Farm Industries CRC	11,945
MCV00002	Improving seasonal forecasts for south-western WA	471,000
MCV00006	Assessing and managing heat stress in cereals	82,000
MCV00007	Teleconnections between climate drivers and regional climate, and model representation of links	233,331
MCV00008	Improving forecast accuracy, especially with improved Indian Ocean initialisation	283,200
MCV00009	Improving multiweek predictions	245,600
MCV00010	Understanding frost risk in a variable and changing climate	136,165
MCV00013	Temperature extremes and cropping in WA	111,502
MCV00014	Managing Climate Variability—communication support	285,399
MCV00015	Managing Climate Variability—program coordinator	87,427
MCV00017	Managing Climate Variability—communication support and administration	9,365
MCV00019	Managing Climate Variability—communication products	2,532

Number	Title	Expenditure $
MCV00022	Managing Climate Variability—program officer	53,766
MCV00023	Managing Climate Variability—program management committee	1,711
MCV00024	Managing Climate Variability—independent chair	6,574
MCV00028	Managing Climate Variability—climate analyser decision support system tools	192,460
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	139,719
MCV00031	Predictions of heat extremes on the multiweek timescale	185,672
MCV00032	Northern Australia–monsoon prediction	36,150
PR114-1	Agronomy reference group	13,548
PR160-1	Inclusion of soil organic carbon in emission trading	10,182
QUT00002	Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils	607,785
QUT00003	Reducing nitrous oxide emissions in irrigated grains–cotton farming systems	87,905
UA00103	DGT (diffusive gradients in thin films) as the soil test of choice for predicting phosphorus requirements of grain crops	269,771
UA00111	Developing chemical methods to mobilise fixed nutrients in cropping soils	300,000
UA00119	Assessing management options for enhanced soil phosphorus availability using rotations	232,293
UA00128	Can arbuscular mycorrhizal fungi be harnessed to enhance nutrition and grain yield in rotations?	103,950
UA00129	Novel approaches to soil nutrition–developing protocols	68,867
ULA00008	Validating subsoil manuring in the high-rainfall zone	137,279
UM00037	Enhanced efficiency fertilisers as mitigation tools for reducing greenhouse gas emissions from intensive agricultural systems in Australia	124,449
UM00044	Climate change research strategy for primary industries participants' agreement	45,000
UMU00030	Making better fertiliser decisions in the WA cropping systems	265,431
UMU00035	Improving profit from fertiliser through knowledge-based tools that account for temporal and spatial soil nutrient supply	410,845
UNE00012	Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management	150,000
UNE00014	Nitrogen and legumes in farming systems–compendium and Excel-based package for improved nitrogen management	63,491
UQ00050	Agronomic packages for improved yield and quality in the Australian peanut industry	205,102
UQ00058	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern NSW and Queensland	376,493
US00044	Next steps in precision agriculture	179,690
USA00005	Improving sowing system technologies for no-till cropping	30,000
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	150,442
UWA00131	Fertiliser management strategies for decreasing on-farm greenhouse gas emissions	344,371
UWA00136	Long term no-till farming systems	250,028
UWA00138	A national soil quality monitoring framework	70,000
UWA00139	Harnessing the nitrogen cycle through novel solutions	178,883
UWA00142	Molecular indicators for soil quality	49,764
UWA00150	Management of microorganisms to unlock the phosphorus bank in soil	82,000
	Agronomy, Soils and Environment Total	**20,472,538**

Number	Title	Expenditure $
	Crop Protection	
AEP00001	Current and potential costs of invertebrate pests in grain crops	38,953
AKC00003	Pathways to registration—Improved pesticide research coordination in the grains industry	90,000
AKC00004	Registration for minor-use chemicals for the grains industry	43,000
AKC00005	Pathways to registration—Tactical pesticide registration program	119,000
CER00002	Study on economic impacts of pulse and oilseed crop diseases in Australia	5,000
CES00001	Surveillance and management of insecticide resistance in green peach aphids and other grain pests	272,224
CSE00046	National Invertebrate Pest Initiative	209,838
CSE00048	Better prediction and management of *Rhizoctonia* disease risk in cereals	265,742
CSE00054	Pest management in grains—research, coordination and industry engagement	622,573
CUR00010	Fungicide benchmarks	175,043
CUR00016	Australian Centre for Necrotrophic Fungal Pathogens Phase 2—Fungicide benchmarks	350,320
DAN00121	Helicoverpa insecticide resistance: monitoring, mechanisms and management 2	108,877
DAN00142	Differential herbicide tolerance of winter crops in south-east Australia—Stage 3	170,000
DAN00143	Northern NSW integrated disease management	620,008
DAN00147	Integrated disease management for cereal and broadleaf crops in southern NSW and northern Victoria	205,106
DAQ00105	Continued delivery of applied solutions to weed issues in central Queensland	119,900
DAQ00130	Management of tobacco streak virus in sunflower and pulse crops	100,000
DAQ00153	Northern Region pulse and grains integrated pest management	250,000
DAQ00154	Northern Region integrated disease management	764,992
DAQ00166	Project review–Australian Cereal Rust Control Program	7,826
DAS00094	Diamondback moth (*Plutella xylostella*) control and insecticide resistance management	232,691
DAS00099	Disease management in a changing farming environment	618,000
DAS00100	Herbicide tolerance screening in the Southern Region with national coordination	150,000
DAS00115	Molecular diagnostics centre for delivery of training and diagnostics for soilborne disease management	300,000
DAV00095	Improving nitrogen and phosphorus management in south-east Australian cropping systems	255,055
DAV00111	Victorian integrated disease management	510,000
DAW00174	In-furrow fungicide options	160,000
DAW00177	Developing integrated pest management guidelines for the WA grain belt and strategies to manage the wheat curl mite's spread of wheat streak mosaic virus	150,000
DAW00191	Evaluating herbicide tolerance of new crop varieties in the Western Region with national coordination	175,000
DAW00196	Communication and development to deliver innovative weed management practices to WA grain growers	220,000
DAW00207	National modelling, risk forecasting and epidemiology of crop diseases	265,000
DAW00208	Project review–Australian Cereal Rust Control Program	10,000
DAW00210	Western Region fungal and viral integrated disease management research and development	887,501
DAW00212	Western Region nematology integrated disease management research and development	147,500
GHD00005	Briefing paper for National Panel outlining the intent and recommended investment for a grains industry stewardship program	4,650
GPA00001	National working party on pesticide application	4,500

Number	Title	Expenditure $
GRD4-2	Project review–Australian Cereal Rust Control Program expenses	10,719
IAC00001	Extending approved use patterns of zinc phosphide products for in-crop mouse control	150,000
ICN00009	National promotion of integrated weed management in Australian cropping systems	142,845
JCR00001	Project review–Australian Cereal Rust Control Program	18,733
KAL00002	Multiple cereal foliar fungicide treatments at different crop growth times in association with some Western Region National Variety Trials	81,300
KTI00001	National Integrated Weed Management Initiative workshop	6,000
MRE00001	Study of surface inversions and sigma theta relationships and development of grower tools to manage spray drift risk	107,700
NPB00006	Development of biosecurity contingency plans and assessment of data for declaring freedom from emergency plant pests	117,606
NPB00008	Russian wheat aphid hypervirulence and Australia's preparedness strategy	113,299
PHA00002	Australian Pesticides and Veterinary Medicines Authority spray drift modelling investment consultancy	80,081
PHA00003	The facilitation of category 25 submissions in the Australian grains industry	230,996
RDE00001	Project review–Australian Cereal Rust Control Program	10,172
SFS00017	Optimising cereal profitability in the high-rainfall zone through integration of disease management and canopy management principles	525,700
SOL00002	Project review—Australian Cereal Rust Control Program	13,567
UA00104	Understanding and management of weed resistance to glyphosate	277,783
UA00105	Emerging weeds in changing farming systems	290,000
UA00113	Improving integrated weed management in conservation farming systems in the Southern Region	399,964
UA00121	Managing the risks of trifluralin resistance in no-till cropping systems	149,432
UA00124	Understanding and management of resistance to group M, group L and group I herbicides	598,590
UM00033	Developing and demonstrating the role of alternative chemistries and integrated management for crop establishment pests	278,878
UM00035	Impact assessment for GM canola in cropping systems	123,563
UM00038	Novel approaches to control fungal diseases of oilseed brassicas in Australia	299,992
UM00039	Understanding pathogenicity risk within the current *Asochyta rabiei* fungal population and development of a revised disease management plan	87,850
UM00042	Staying ahead of blackleg: monitoring and managing host and pathogen	328,595
UM00043	Insecticide resistance and alternative chemistries for mite control	143,752
UQ00047	An interim model for buffer zone reduction in pesticide application from ground sprayers	22,500
UQ00054	Risk assessment and preventative strategies for herbicide resistance in the Northern Region—Phase 3	300,000
UQ00055	Improved options for fleabane control in the Northern Region	175,000
UQ00059	Herbicide tolerance screening of winter crops in the Northern Region—Phase 4	100,000
UQ00060	Core drift reduction technologies database to support the ground application of pesticides (boom sprayer), accommodating nozzles, formulations and adjuvants	265,353
US00052	Canopy architecture of lines contrasting in the 'tin' gene: a trait for improved water-use efficiency and drought adaptation?	31,790
US00053	Adult plant resistance and strategic fungicide use for integrated management of cereal rust	511,120
UWA00124	Efficacy of the Harrington Weed Seed Destructor in targeting weed seeds during the harvest of Australian grain crops	164,230

Number	Title	Expenditure $
UWA00125	Weed Seed Wizard: validation and improvement of a weed management decision support tool	223,921
UWA00134	Developing and promoting integrated pest management in Australian grains	460,133
UWA00144	Building national capacity in education and research in applied entomology	147,506
UWA00146	Australian Herbicide Resistance Initiative–Phase 4	1,100,000
WIC00001	Project review—Australian Cereal Rust Control Program	20,030
	Crop Protection Total	**16,736,999**
	Validation and Integration	
AEA00004	South-eastern Australia Grain and Graze 2 program	459,650
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
CAG00003	Western Region Agribusiness Trial Extension Network	12,500
CCC00005	The role of Bt (*Bacillus thuringiensis*) cotton in pest-suppressive landscapes	30,019
CRA00001	Northern Region Agribusiness Trial Extension Network	12,500
CRC00002	Western Region Agribusiness Trial Extension Network	12,500
CSA00013	Southern Queensland Farming Systems	7,000
CSA00017	Achievable yields for irrigated grains in the Northern Region	435,870
CSA00023	Doing it better, doing it smarter—managing soil water in Australian agriculture	363,946
CSA00024	More good, less bad and ugly—extracting additional value from grain production through selective harvesting	220,717
CSA00026	Grain and Graze 2—national integration	482,850
CSA00027	Adding value to the GRDC's National Variety Trials network	485,000
CSA00029	National integration of crop sequence strategies and tactics	245,205
CSA00030	Benchmarking data	20,000
CSE00055	Crop sequences to manage soil pathogens and reduce the yield gap of Northern Region grain production	250,000
CSP00109	Increasing water-use efficiency in the northern sandplain region of WA	288,870
CSP00111	Identifying farm-scale opportunities to improve water-use efficiency—a nationally coordinated systems approach	257,285
CSP00128	Maximising crop yield in the high-rainfall zone of WA through efficient use of water and nutrients	470,619
CSP00146	Facilitating increased on-farm adoption of broadleaf species in crop sequences to improve grain production and profitability	562,157
CWF00013	Increasing farm water-use efficiency in central-west NSW	364,100
CWF00014	Low Rainfall Collaboration Group—canola project	150,000
CWF00015	Low-rainfall collaboration project	200,000
CWF00016	Profit/risk workshops	100,000
DAN00133	Southern Region Agribusiness Trial Extension Network	12,500
DAN00148	Southern Region Agribusiness Trial Extension Network	12,500
DAN00150	Improving the reliability of sorghum in the western zone	140,392
DAQ00162	Grain and Graze 2—Northern Region	514,500
DAQ00170	Grower solutions for central Queensland	206,683
DAQ00173	Evaluating the role of brassica crops in south-west Queensland and northern NSW grain cropping systems	125,000

Number	Title	Expenditure $
DAQ00174	Cropping solutions for the sugarcane farming systems of the Burdekin	374,998
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
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	1,400,000
ERM00002	Measuring soil evaporation across different soils of the northern cropping zone–stage 2–testing current modelling assumptions	100,000
FFC00005	Validate and integrate canopy management principles into WA cropping systems	156,600
FFC00006	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	488,845
GCM00001	Southern Region Agribusiness Trial Extension Network	12,500
GOA00001	Grower solutions for central NSW	350,000
GRA00001	Southern Region Agribusiness Trial Extension Network	12,500
GRA00002	Southern Region Agribusiness Trial Extension Network	12,275
GSA00003	Northern Region Agribusiness Trial Extension Network	12,500
HFG00006	Managing moisture for improved water-use efficiency in the Southern Region	104,140
IMA00007	Northern Region Agribusiness Trial Extension Network	12,500
KAR00002	2011 tracking survey	50,000
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	233,589
LOL00001	Northern Region Agribusiness Trial Extension Network	12,500
MAF00001	Southern Region Agribusiness Trial Extension Network	12,428
MFM00003	Improving farm water-use efficiency on Kangaroo Island and in the south-east of South Australia	100,000
MGO00001	Coordination of northern farming systems projects	40,000
MIG00012	Grower Group Alliance	319,000
MUN00001	Western Region Agribusiness Trial Extension Network	12,500
NAG00002	Western Region Agribusiness Trial Extension Network	12,500
NGA00003	Grower solutions for northern NSW and southern Queensland	1,000,000
NRS00005	National leadership and mentoring	10,000
OHC00001	Western Region Agribusiness Trial Extension Network	12,500
PAL00017	Better Break Crops—advancing broad leaf cropping	650,000
PIG00006	Project review–Delivering professional development through Partners in Grain	23,000
PR185-1	Cropping in catchments	46
PR205-1	Water-use efficiency workshop	6,705
PR254-1	Water-use efficiency initiative annual forum	17,638
PR93-1	5th World Congress of Conservation Agriculture 2011	24,357
PR93-4	5th World Congress of Conservation Agriculture 2011	46,449
PR93-5	5th World Congress of Conservation Agriculture 2011	32,829
PRI00002	Southern Region Agribusiness Trial Extension Network	28,936

Number	Title	Expenditure $
RDP00005	Southern Region Agribusiness Trial Extension Network	12,120
RDP00007	Southern Region Agribusiness Trial Extension Network	12,500
RMS00002	Southern Region Agribusiness Trial Extension Network	12,500
ROB00001	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	199,158
RPI00008	Southern Region Agribusiness Trial Extension Network	12,500
SCF00001	Western Region Agribusiness Trial Extension Network	12,500
SCF00002	Pastures in crop sequences	39,750
SFS00019	Optimising the profitability of high-rainfall zone cropping in south-west Victoria through improved water-use efficient farming systems	204,317
SFS00020	Southern Victorian Grain and Graze 2 program	351,946
SOD00001	Custom website for the Grain and Graze 2 program	5,685
SYN00003	Western Region Agribusiness Trial Extension Network	12,500
TAP00002	Redevelopment of the IA Watson Centre at Narrabri	20,000
UA00107	Eyre Peninsula Farming Systems 3—responsive farming systems	348,895
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	311,128
URS00003	Cropping in catchments	38,400
UT00016	Improved water-use efficiency of rain-fed and irrigated farming systems in Tasmania	123,865
UT00020	Increasing water-use efficiency in mixed crop–livestock systems in Tasmania	156,488
WWL00002	Realising yield potential through farming systems RD&E—Western Region	167,302
	Validation and Integration Total	**17,410,640**
	Extension and Grower Programs	
ACC00006	Extension and adoption training and support	110,000
ACI00001	Validation of GRDC web 2.0 strategy	24,000
ADW00001	GRDC extension portal	14,320
ASA00004	Electronic conversion of agronomy conference proceedings for the website	20,000
BGC00001	Improving practice of spray drift management techniques	300,000
BWD00016	GM canola agronomy	69,304
CEC00001	Integration of final reports onto the GRDC website	145,000
COR00019	Fact sheets for GRDC website and publication	99,736
CQA00001	Extension provider upskilling—technology adoption	89,850
CSA00028	Empirical studies of farming systems technology adoption	67,500
CWF00017	Delivery of technical workshops to enhance industry knowledge—crop growth	50,000
DAQ00158	Grain storage extension	518,090
DAW00194	Taking precision agriculture to the paddock—increasing the adoption of precision agriculture in the Great Southern region of WA	300,000
DAW00200	Agribusiness Training Program GRDC-subsidised training project	33,000
DAW00211	Grains Research Updates—Western Region	20,000
GGA00003	Grain Gain—leadership for grains industry innovation	167,000
GHD00002	Continuation of GRDC–Agribusiness relationship	120,500

Number	Title	Expenditure $
GHD00004	Review of GRDC historical portfolio for extension opportunities	48,000
GIA00001	GRDC–DAFWA Grains Research Updates—Western Region	100,000
GRD175-1	Industry Development Awards budget	1,080
GRF00001	Queensland Regional Advisory Committee coordination	48,000
ICN00010	Delivery of technical workshops to enhance industry knowledge—foliar disease	20,000
ICN00011	GRDC Research Updates—Northern Region	200,000
IDA00006	IDA—The Facey Group's Beyond the Boundaries study tour	–1,510
IDA10004	IDA—MacKillop Farm Management Group Inc—farming systems and innovation on the Eyre Peninsula	10,000
IDA10007	IDA—Ravensthorpe Agricultural Initiative Network Inc—Ravensthorpe and districts study tour to south-western Queensland	15,000
IDA10009	IDA—Stirling to Coast Farmers—Malting barley varieties study tour	15,000
IDA10012	IDA—Australian Herbicide Resistance Initiative and the Grower Group Alliance—Presentation of harvest weed seed management forums and cropping tour in northern NSW and southern Queensland	15,000
IDA10013	IDA—Maize Association of Australia—Maize exports for specialised markets	15,000
IDA10016	IDA—SEPWA and Liebe Ladies' Wheatbelt Tour	12,910
IDA10202	IDA—Southern DIRT Inc—Southern DIRT making tracks	4,460
IDA10215	IDA—SEPWA Innovation Generation Conference—Esperance port zone delegates	10,350
JLC00013	Final report editing for GRDC website for advisers and growers	95,000
JLC00015	2011 crop management planning guide following an exceptionally wet growing season	49,000
KAR00001	Agronomy advice and support for Australian cropping systems for the GRDC CRM	20,000
MCC00003	Precision agriculture coordination support	27,000
MDE00001	Database-cleansing services for the GRDC CRM	138,000
NCA00008	Improving market signals for the GRDC and the grains industry to enhance delivery to customers	72,000
NCA00009	Intra-maps for the CRM	37,800
NFA00008	Research Advisory Committees—northern and southern NSW	66,000
ORM00001	GRDC Research Updates—Southern Region	499,487
PCT00001	Precision agriculture—Building knowledge, linking agronomy, growers profiting	145,400
PR235-1	Upskilling extension providers—competency-based assessment	1,895
PR246-1	Alternative medium initiative	56,482
RBC00002	Delivery of technical workshops to enhance industry knowledge—understanding National Variety Trials, crop nutrition and water-use efficiency	56,000
RCM00001	GRDC decision support tool audit	30,000
RDC00006	Investing in Youth initiative	10,000
RMP00006	2010 and 2011 GRDC Research Update DVDs and vodcasts	45,000
RRA00015	Ute Guides online and smart-phone application	47,000
RRA00022	GRDC website—end user interviews and usability enhancements	18,000
RRA00023	GRDC website—uploading Northern Region research updates	9,200
RRA00024	GRDC website—customer management system workflow emails	5,400
RRA00025	Metadata revision, harvesting and search engine optimisation alignment	19,700
RRA00026	Uploading *Ground Cover* image library	10,400
RRA00027	Uploading Summer Grains Conference 2010 PDFs and MP3s	9,800
RRA00028	Integrating with Sage CRM to enable single user repository and single sign on	8,000
RRA00029	Redevelopment of the GRDC website (www.grdc.com.au) and content management system development	143,521

Number	Title	Expenditure $
RRA00030	Mobile optimised website	39,000
RRA00031	Ground Cover mobile website	36,000
SAF00004	Research Advisory Committees—South Australia	36,000
SFS00021	GRDC technical workshop—Inter-row sowing and wider spacing workshops and implementing systems to manage heavy stubble loads	76,000
SIT00001	Redevelopment of the GRDC website (www.grdc.com.au) and content management system development—Sitecore Software	59,500
SPA00010	Training and demonstration of precision agriculture in practice	325,250
TFG00001	Tasmanian Research Advisory Committee	12,000
UB00002	Online libraries for the GRDC website—digitisation of GRDC documents for online publication	57,000
UNE00013	Introduction and extension of integrated pest management in northern NSW	100,000
UNE00015	Graduate Certificate and Diploma in Sustainable Grains Production for industry advisors and growers	326,180
UWA00135	Map-based interactive web interface for PestFax	178,300
VFF00006	Research Advisory Committee—Victoria	36,000
	Extension and Grower Programs Total	**5,562,905**
	PRACTICES TOTAL	**60,183,082**
	VARIETIES	
	Cross Varieties	
VR83-1	Varieties commercialisation	37,477
	Cross Varieties Total	**37,477**
	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	99,950
ANU00014	The plasticity and genetic control of root development under mechanical impedance	299,962
ANU00016	Characterisation of effector proteins from necrotrophic fungal wheat pathogens	99,990
ANU00017	Wheat ERECTA/ERECTA-like genes: Isolation and functional evaluation of candidate transpiration efficiency genes	150,000
ANU00018	Identifying wheat germplasm with superior rubiscos for breeding for increased productivity	349,990
BBE00013	Survey of wheat breeders in relation to the molecular marker program and other pre-breeding investments	9,292
BWD00014	Benchmarking study of the economic, agronomic and environmental impacts of GM herbicide-tolerant canola	113,889
COR00026	2011 National Variety Trial Wheat Variety Guide WA—print and mail out	15,611
CSP00099	Triple Rust Initiative	1,200,000
CSP00107	Reverse genetic analysis of novel genes for resistance to necrotrophic fungal pathogens in wheat and barley	380,000
CSP00114	Analysis of plant defence responses to the broad host range fungal pathogen, *Rhizoctonia solani*, using wheat and *Arabidopsis*	142,000
CSP00126	'Overgrowth' mutants of wheat and barley: new sources of genetic variation for growth, yield and grain quality	195,000
CSP00129	Fast-tracking gene discovery in wheat root systems with *Brachypodium distachyon*	200,000

Number	Title	Expenditure $
CSP00130	Identification of wheat quantitative trait loci for maintenance of grain numbers under reproductive-stage water stress conditions	380,000
CSP00143	New strategies for phenotyping reproductive stage frost and chilling tolerance in wheat	281,520
CUR00011	Australian Centre for Necrotrophic Fungal Pathogens, Phase 3—Pleosporales effector delivery	108,750
CUR00012	Australian Centre for Necrotrophic Fungal Pathogens, Phase 3—Pleosporales functional genomics	600,651
DAN00117	Development of molecular markers for application in Australian canola breeding	411,061
DAN00117UQ	Development of molecular markers for application in Australian canola breeding	104,207
DAN00118	Australian Durum Wheat Improvement Program	519,184
DAN00118UA	Australian Durum Wheat Improvement Program	374,969
DAN00123	Quarantine CIMMYT bread wheat germplasm	94,756
DAN00125	Australian winter cereals collection	417,270
DAQ00165	GM solutions to root diseases of cereals—a situation analysis and business case	80,001
DAS00087	Map-based cloning of the scald resistance gene Rrs1'Turk'	99,940
DAV00098	Molecular markers for pulse-breeding programs	300,000
DAV00103	Establishing a SNP genomic resource for the Australian wheat industry	211,944
DAW00170	Development and implementation of molecular markers for narrow-leafed lupin breeding	175,000
ICA00007	Focused identification of germplasm for specific traits	237,020
UA00101	Advancement of new genes for stem and leaf rust resistance from uncultivated relatives of wheat	413,851
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	249,994
UA00125	Reduced severity of net form of net blotch disease in barley	175,051
UA00126	Increasing malt extract and the export competitiveness of Australian barley	350,000
UMU00028	Allele-specific markers for key glutenins	99,788
UMU00037	International wheat genome sequencing consortium assembly of chromosome 7A	150,000
UQ00056	Integrating new technologies to improve yield stability and enhance genetic gain in barley and sorghum breeding programs	300,000
UQ00057	Optimised wheat root architecture for increased yield and yield stability in the face of a changing climate	350,278
US00039	Australian Cereal Rust Control Program	1,634,761
US00045	CIMMYT–ICARDA suite of projects: communication	124,437
UW00003	Statistics for the Australian grains industry	270,004
UW00004	Capacity building for statistics	200,000
UWA00145	Innovative approaches to resistance to necrotrophic pathogens and sap-sucking insect pests	597,783
UWA00147	Genome sequencing in narrow-leafed lupins	499,956
VR174	National Variety Trials program, Round 2	5,524,505
	Gene Discovery Total	**21,592,365**
	Germplasm Enhancement	
ACP00007	Development of a pre-breeding strategy on nutrient use efficiency—a scientific review	4,000
AGP00009	Heat stress tolerance in wheat	34,400
ANU00012	Disease resistance and epidemiology of scald and net form of net blotch	154,159
ATR00011	Development of a pre-breeding strategy on nutrient use efficiency—an economic impact assessment	30,000

Number	Title	Expenditure $
BRE00001	Consultancy—crown rot	21,803
CIM00013	Australian Cereal Rust Control Program—adult plant resistance to wheat rusts	500,000
CIM00014	Identification and utilisation of novel sources of resistance against soilborne pathogens in wheat	328,614
CIM00015	Enhanced delivery of CIMMYT germplasm to Australia	190,096
CIM00016	Enhancement of CIMMYT wheat breeding strategy for drought tolerance and genotypes of relevance to rain-fed areas of Australia	340,152
CSP00096	Crown rot resistant bread wheat through new knowledge of epidemiology and genetics	241,520
CSP00131	Finding the balance between frost tolerance and flowering time in wheat	183,462
CSP00133	New sources of salt tolerance for wheat and barley	149,556
CSP00137	Increasing the capacity of wheat to extract phosphorus from soils	96,000
CSP00140	Use of managed environments to identify and validate traits for improving wheat performance under drought	208,676
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
CSP00148	High-throughput and remote trait measurement	286,533
DAN00122	Durum Industry Development—Fast tracking genetic solutions to crown rot, Phase 2	170,008
DAN00124	Statistics for the Australian grains industry	341,766
DAN00137	Managed environment facility: Yanco	280,805
DAN00141	Evaluation and trait characterisation of elite Australian durum material in managed environment facilities	20,000
DAQ00133	Barley foliar pathogens	136,000
DAQ00142	Wheat pathology in the Northern Region—development of rapid screening methodologies for wheat diseases of importance	152,534
DAQ00151	Manage emergency plant pests threats	2,000
DAQ00167	Germplasm enhancement for crown rot resistance in winter cereals	196,632
DAQ00171	Genetic options for nematode control	410,521
DAS00096	Control of cereal fungal diseases	140,003
DAS00101	Development of molecular markers for cereal cyst nematode resistance and tolerance	34,797
DAS00114	Provision of test reagents for antibody-based late maturity a-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	15,000
DAV00093	Plant genetic resources: Australian Temperate Field Crops Collection	377,730
DAV00104	Victorian Field Crop Nematology Project	389,171
DAW00162	Nationally coordinated frost trials—Western Region	60,000
DAW00173	Market intelligence gathering and market visits for wheat and barley breeders, growers and marketers	7,500
DAW00198	Managed environment facility: Merredin	432,505
DAW00203	Characterising water deficit and benchmarking genetic diversity for key adaptive traits at Merredin, Yanco and Narrabri	222,014
DAW00205	Genetic and phenological basis of head loss in malting barley	150,000
DAW00206	Germplasm enhancement for yellow spot resistance in wheat	301,921
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	251,621

Number	Title	Expenditure $
ICA00008	Breeding chickpea for drought tolerance and disease resistance	252,800
ICA00009	Enhancement of yield and yield stability of spring bread wheat targeted to semi-arid Mediterranean areas	279,000
JDS00005	Manage emergency plant pests threats	2,000
NYC00001	GM Lupin Steering Committee consultancy	1,055
PBB00001	Executive support for the Australian Winter Cereals Pre-breeding Alliance	59,702
PER00001	Assessment of regulatory requirements, costs and timelines for seeking regulatory authorisations for GM lupins in selected export markets	8,685
SHE00003	Project review—CIMMYT–Australia–ICARDA Germplasm Evaluation program	15,000
UA00063	Breeding for frost tolerance in barley	120,000
UA00093	Biochemical and genetic solutions to grain defects elimination and grain quality improvement	164,920
UA00099	Grain defect elimination in wheat	650,000
UA00100	Nationally coordinated frost trials—Southern Region	60,000
UA00112	Development and evaluation of weed competitive wheat cultivars	140,121
UA00114	Frost tolerance in wheat	224,698
UA00115	Improving phosphorus use efficiency in wheat and barley	309,884
UA00116	Investigation of root traits and nutrient efficiency for durum wheat improvement	384,190
UA00120	Breeding tools to predict gene effects influencing adaptation and grain quality in dry environments	246,313
UA00122	Understanding the genetic control of hectolitre weight and screenings under normal growing conditions	150,000
UMU00027	Quantification and pathogen race dissection of disease	108,000
UMU00029	Pre-emptive breeding for Russian wheat aphid resistance	345,000
UMU00036	Integration of an extra glutenin subunit into Australia wheat cultivars	168,464
UQ00043	CIMMYT–ICARDA suite of projects: Database Project	51,152
UQ00049	Rapid introgression of crown rot resistance into hexaploid wheat	185,118
UQ00052	Nationally coordinated frost trials and physiological studies of frost resistance in wheat and barley	180,000
US00051	National managed environment facility: Narrabri	169,348
US00054	Crown rot germplasm enhancement for wheat: University of Sydney and SARDI components	326,360
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	161,544
UWA00129	Generation of GM herbicide-tolerant narrow-leaf lupin	529,558
UWA00133	Improved nitrogen use efficiency in wheat and barley	315,454
UWA00143	Screening for high-yielding cereals in water-limited agricultural landscapes	62,308
VR125-1	GM herbicide tolerant lupins	368,854
VR183-1	Germplasm enhancement for improved frost tolerance in wheat and barley	209
	Germplasm Enhancement Total	**14,129,736**
	Wheat and Barley Breeding	
AGL00009	Report the terms and conditions for access to ticket-by-variety date at point of delivery	1,400
AVI00002	Project review—Dual-purpose crop	2,000
BA00003	Pilot brewing evaluation for malting barley lines destined for export	62,949

Number	Title	Expenditure $
BA00005	Review of industry requirements post–Barley Breeding Australia	4,716
BGR00001	Project review—Oat	18,323
BRI00042	Wheat classification variety operations	45,786
BRI00042-1	Wheat classification variety operations—run-off insurance expenses	28,600
CMB00018	Molecular tools to support SSR and SNP genotyping capabilities in wheat and barley	137,915
CMB00019	Development of diagnostic markers capturing the range of allelic variation for major phenological adaptation genes in barley and wheat	62,085
CMI00001	Executive support to the Chair of the Wheat Classification Council	106,765
CSP00101	Breeding dual purpose feed wheats for the high-rainfall zones	325,000
CUR00015	Barley powdery mildew control	67,170
DAN00101	Barley Breeding Australia—Industry and Investment NSW	173,056
DAN00149	Project review—Dual-purpose crop	1,000
DAQ00110	Barley Breeding Australia—northern node	1,076,586
DAQ00141	Recurrent selection program in hexaploid wheat	72,328
DAS00091	National oat-breeding program for milling and feed end uses	750,000
DAS00102	Breeding stem rust resistant oat using wild avena species	100,000
DAW00151	Barley Breeding Australia—western node	420,000
DAW00186	Barley quality—barley grain defects (blackpoint, pre-harvest sprouting, kernel staining)	215,500
DAW00187	Department of Agriculture and Food Western Australia–Tasmanian Institute of Agricultural Research—China Barley Collaboration	180,000
DCC00002	High-rainfall zone and canola breeders WA—Directors	73,793
ELL00001	Project review—Oat	8,082
GRD4-3-1	Project review—Oat—expenses	4,471
GRD4-6	Project review—Dual purpose crop—expenses	108
HRZ00001	High Rainfall Zone Wheats Pty Limited—Shares purchase	90,846
JCR00002	Project review—Dual purpose crop	2,470
MPC00005	Barley Breeding Australia—Joint venture	19,291
MPC00005-1	Barley Breeding Australia—Joint venture	–115,749
PRO00002	Barley Australia—Directors	15,000
RSE00001	Chair of the Wheat Classification Council	30,000
SOL00003	Project review—Oat	6,564
TAP00001	Selection panel for Barley Improvement North	4,842
TW00003	Project review—Dual-purpose crop	2,224
UA00032	Barley Breeding Australia—southern node	1,799,946
UA00108	Barley quality: Characterisation of genetic variation for alpha amylase alleles	112,285
US00049	National Triticale Improvement Program	589,523
UT00017	Biochemistry and genetics of protein modification and fermentability of malting barley	280,053
UWA00118	Barley improvement through germplasm—coordination, introduction and evaluation	164,686
VR01-5	Barley Breeding Australia	9,045
VR162-1	Wheat classification—delivery on the Wheat Industry Expert Group's recommendations regarding wheat classification and the Wheat Quality Objectives Group	10,902
WQA00001	Wheat Quality Australia Limited	345,000
WQA00002	Wheat variety classification services	190,000
	Wheat and Barley Breeding Total	**7,494,561**

Number	Title	Expenditure $
	Pulse, Oilseed and Summer Coarse Grains	
CSP00104	Australian Soybean Breeding Program	450,000
CUR00014	New technologies and biological concepts for pre-breeding resistance to the ascochyta blight diseases of pea, chickpea, lentil and faba bean	265,000
DAN00094	Australian Chickpea Breeding Program	1,103,485
DAN00108	National Brassica Germplasm Improvement Program	299,999
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
DAN00151	Pulse Breeding Australia: Chickpea national breeding program	1,350,000
DAQ00128	National Mungbean Improvement Program	265,000
DAQ00138	Sorghum Midge Testing Scheme	15,000
DAQ00155	Maize germplasm enhancement and productivity improvement	154,896
DAQ00159	Potential opportunities for Australian maize marketed to South Korea, Japan, Taiwan and Philippines	2,000
DAQ00169	Sorghum Midge Testing Scheme	14,351
DAQ00172	National Mungbean Improvement Program	327,000
DAS00066	Pulse germplasm enhancement—vegetative and reproductive frost tolerance in pulse crops	89,698
DAS00067	Pulse germplasm enhancement—bacterial blight in field pea, pod drop in lentil, and heat stress tolerance in field pea and faba bean	149,033
DAS00086	New vetch varieties for grain and hay production for Australian farmers	229,998
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	244,000
DAS00117 RIRDCE	RIRDC contribution to new common and woolly pod vetch varieties for grain and hay/silage production for Australian farmers	35,000
DAV00071	Australian Field Pea Breeding Program	879,572
DAV00072	Australian Lentil Breeding Program	512,929
DAV00073	Pulse germplasm enhancement—boron and salt tolerance in temperate pulses and durable ascochyta blight resistance in chickpeas	55,328
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	116,700
DAV00117	Pulse Germplasm Enhancement Program—Resistance to biotic stresses	300,000
DAV00118	Pulse Breeding Australia: Field pea breeding program	1,000,000
DAV00119	Pulse Breeding Australia: Lentil breeding expansion	700,000
DAW00181	National lupin breeding for southern Australia	1,165,000
FWC00001	Coordinator for Pulse Breeding Australia	86,000
GBE00001-1	Pulse Breeding Australia: Launch	3,754
MGP00002	Australian National Blackleg Resistance Rating System	–1
MGP00003	Australian National Blackleg Resistance Rating System	125,000
PCA00001	Australian Peanut Genetic Improvement Program	300,000
PCA00002	Investigations into off-flavour contamination in peanuts	102,000
RWF00018	Pulse Breeding Australia: Review of structure and operations	20,000

Number	Title	Expenditure $
UA00097	Australian Faba Bean Breeding Program	760,165
UA00127	Pulse Breeding Australia: Australian faba bean breeding program	999,960
UM00034	Identification of resistance genes in Australian canola cultivars through development of a differential set of blackleg isolates	95,000
UQ00042	Professorial Chair in Crop Science	79,475
UQ00051	Sorghum core breeding	624,830
UWA00119	Higher yielding elite lines of pearl lupin for Australian agriculture	60,000
UWA00121	Improved herbicide tolerance for break crops	202,930
UWA00132	Interspecific hybrids in lupins—stabilisation and trait transfer to fixed lines for lupin crop improvement	149,950
UWA00149	Genome sequencing in chickpea	60,000
VIT00001	Juncea canola development for Australia	300,000
	Pulse, Oilseed and Summer Coarse Grains Total	**14,412,382**
	VARIETIES TOTAL	**57,666,521**
	NEW PRODUCTS	
	Cross New Products	
NP45-1	New products commercialisation	161,565
NP45-4	New products commercialisation	20,972
	Cross New Products Total	**182,537**
	New Farm Products and Services	
AGL00014	Plant nutrition opportunity	16,000
BBE00011	Variety identification validation	24,472
BBE00012	Development of an expression of interest for biological control of nematodes, diamondback moth and pathogenic fungi	47,696
BBE00014	Scoping study to build a business case and investigate the intellectual property and regulatory potential for the rhizobial enhancement platform technology developed by SuperSeed Technologies	30,000
BRI00040	A new baking process for Asia	650,000
BRI00045	Australian wheat for China	242,000
BRI00048	Discreet choice scoping study—Economic values of the important functional characteristics of Australian wheat	45,000
CCP00002	MEMS-IR instrumentation and the market potential in the agriculture and food industry	6,666
CGS00002	Harrington Weed Seed Destructor Prototype 2	2,000
CGS00003	Harrington Weed Seed Destructor Prototype 3	171,000
CLE00001	Project review—Cereal Endophyte Program	12,000
CSE00040	Registration and extension of the use of new ethyl formate formulations on stored grain and for structural treatment	8,080
CSE00045	Microbial tagging for tracking: Root disease biocontrol efficacy and environmental fate of microbial inoculants in crop rotations	146,600
CSE00056	Bio-routes to urea fertilisers	430,231
DAN00134	DNA investigation and long-term storage of barley samples	17,500
DAN00145	National independent quality assurance and germplasm maintenance for *Rhizobium* inoculants	149,652

Number	Title	Expenditure $
DAR00004	Barley variety identification DNA quality testing	65,873
DAR00005	Barley variety identification DNA quality testing	80,000
DAS00110	Novel products to control plant pathogens in broadacre crops	228,042
DAW00197	Barley variety identification statistics: statistical analysis of the sampling procedures for malting barley seed	600
DGQ00003	Combine harvester fires project	4,500
ECE00001	Supply of formulated nematode products	12,000
ENE00001	Supply of formulated nematode products	5,600
FCM00001	Consultancy—Advice for MEMS-IR (micro-electrical mechanical systems infrared) technology	6,087
GRD6-10	Novozymes—Shares	–27,867
GSM00001	Evaluation of protecting stored grain expression of interest proposals	1,200
GTL00001	Endophyte technologies for modern cereals	420,000
IMB00001	Insecticidal peptides from natural predators	399,546
NP72-1	Barley variety identification	6,659
PCB00001	Evaluation of protecting stored grain expression of interest proposals	800
PDH00001	Coordination of beneficial microbe collaboration	3,750
PR228-1	Integrated weed management engineering solutions to herbicide resistance	38,477
RWF00019	Project review—Cereal Endophyte Program	7,000
SAC00001	Use of polymers as biopesticides	114,784
SHE00002	Germplasm collection Armenia, Syria and Georgia	4,000
SHE00004	Project review—Cereal Endophyte Program	5,500
SIL00001	Transportable grain storage feasibility study	48,500
UCS00013	Biological control of pest snails in Australia using native nematodes	60,000
UCS00016	Biopesticides for the Australian grains industry	241,860
UF00007	Beneficial Microbes Program—progressing new microbial products for Australian grain production to commercialisation	251,184
UM00040	Increasing feed grain digestibility: probiotics and enzyme additives	224,317
UMU00032	National Rhizobium Program—Managing rhizobia to maximise nitrogen fixation by legumes in agriculture	450,000
UQ00046	Fertiliser from Waste, Phase I	272,928
US00050	Formulation and application of beneficial microbial inoculants for agriculturally important crops	140,570
USA00008	Weed seed termination method of harvest	75,850
USA00009	Improved functionality of grain storage products	199,790
USA00010	Mechanical weed seed termination at harvest	142,221
USA00012	A scoping study of engineering solutions for soil and plant sensing using infrared technology	232,590
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	69,016
UT00023	The suitability for barley brewing of Australian barley varieties	115,060
UWA00113	Demonstration of UWA microspectrometer technology for assessment of soil and grain parameters in broadacre agriculture	399,190
	New Farm Products and Services Total	**6,298,524**

Number	Title	Expenditure $
	New Grain Products	
APL00001-1	Contribution to the review of the Australian feed grain industry looking at industry trends and R&D completed in the area of feed grains	–15,000
CSA00031	Next generation beneficial microbes—quantifying disease control efficacy, environmental persistence and microbial community impacts	156,009
CSE00049	Crop Biofactories Initiative 2—Joint Innovation Agreement	1,630,930
CSP00112	Wheat starch for specialty markets	200,000
CSP00113	Coeliac-friendly cereals, Phase 4	223,761
CSP00118	Australian Feedgrain Partnership sorghum project	82,000
CUR00008	Market study for product development technologies for nurturing small and medium sized bakeries	20,000
CUR00013	Innovative bread production from Australian wheat using dough sheeting	300,000
DAN00153	Northern NSW safflower evaluation and seed increase	40,000
DRD00002	Improving the utilisation of red wheat by lactating dairy cows	40,000
HAW00001	Purchase shares from the high amylose joint venture company	800,000
JCS00004	Review of the Australian feed grain industry looking at industry trends and R&D completed in the area of feed grains	15,000
NP42-1	Supplementary bid for the CRC for National Plant Biosecurity	5,000
NPB00012	Core participation seed funding for the CRC for National Plant Biosecurity	5,000
NUM00001	Review of commercial opportunities for high lutein wheat	2,000
PCL00005	Enhancing near-infrared spectroscopy calibrations for predicting the nutritional value of grains for livestock	77,578
PCL00006	Dedicated feed grain production systems: An assessment of wheat, barley and triticale systems in Australia	41,025
RCL00001	Grain Foods CRC Ltd—Directors	18,000
RDC00007	Sustainable food and fibre program	9,000
SMC00001	Go Grains Health & Nutrition Limited	25,144
US00048	Assessment of novel technology to generate value-added biofuels and chemicals from Australian grain crops	125,000
USA00011	Impact of pulse-enriched foods in cognitive function and cardio-metabolic health in obese adults	120,000
WJM00004	Coordination of registration of grain storage chemicals	69,920
CFF00002	Novel mechanisms for enhancing wheat yield and quality	1,150,294
CSP00145	Omega-3 canola collaborative research project	900,000
CUR00007	Superior quality lupin breads using low-protein wheat flour	30,000
CUR00009	Modelling processing of bread dough and bread texture—a structural mechanics approach	40,000
GOG00001	Go Grains Health & Nutrition—Membership subscription	250,000
GOG00006	Go Grains Health & Nutrition	100,000
NP83-1	Safflower germplasm improvement program	7,500
NP85-1	Communicating the value of feed grain	6,493
NP89-1	Communicating the value of feed grain—National component	1,659
NPB00004	Grain Hygiene Program for CRC for National Plant Biosecurity	1,800,000
PNP00001	Increasing the value and marketability of feed grains for the grains industry	95,000
UCS00015	Canola proteins for optimal food functionality	51,750
	New Grain Products Total	**8,423,063**
	NEW PRODUCTS TOTAL	**14,904,124**

Number	Title	Expenditure $
	COMMUNICATION & CAPACITY BUILDING	
	Building Research Capacity	
ARL00007	Australian Rural Leadership Foundation	100,000
ATA78	Agricultural Training Award (ATA)—to study at the Longerenong College, Victoria	3,000
ATA79	ATA—to study at the WA College of Agriculture, Cunderdin	3,000
ATA80	ATA—to study at the Longerenong College, Victoria	3,000
ATA81	ATA—to study at the Longerenong College, Victoria	3,000
ATA82	ATA—to study at the WA College of Agriculture, Cunderdin	3,000
ATA83	ATA—to study at the Longerenong College, Victoria	3,000
ATA85	ATA—to study at the Longerenong College, Victoria	3,000
ATA86	ATA—to study at the WA College of Agriculture, Cunderdin	3,000
ATA87	ATA—to study at the Bendigo Regional Institute of TAFE, Victoria	3,000
ATA88	ATA—to study at the Tocal College, CB Alexander Campus, Paterson	3,000
ATA90	ATA—to study at the Longerenong College, Victoria	3,000
ATA91	ATA—to study at the WA College of Agriculture, Cunderdin	3,000
ATA92	ATA—to study at the Longerenong College, Victoria	3,000
ATA93	ATA—to study at the Longerenong College, Victoria	3,000
ATA94	ATA—to study at the Longerenong College, Victoria	3,000
ATA95	ATA—to study at the Longerenong College, Victoria	3,000
ATA96	ATA—to study at the WA College of Agriculture, Cunderdin	3,000
CSD00004	Sponsorship—BHP Billiton Science Awards	30,000
CSP00147	CSIRO Summer Student Program	35,000
DAF00002	2009 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, *Arabidopsis*	6,786
GRS10026	GIRS—(UA) Assessing management options for enhancing soil phosphorus availability using rotations	6,786
GRS10027	GIRS—(UWA) Phosphorus-use efficiency of *Austrodanthonia*	11,311
GRS10028	GIRS—(UMU) Genetic factors and genes underpinning drought response in wheat	14,704
GRS10029	GIRS—(UCS) Manipulation of phosphorus sorption in agricultural soils	565
GRS10030	GIRS—(UNS) Genetic variation in functional food properties of peanuts	20,000
GRS10031	GIRS—(UA) Use of novel wheat (waxy durum) in baking applications	6,786
GRS10034	GIRS—(UA) Identification of the controller of nitrate transport in maize	9,048
GRS10035	GIRS—(CUR) Minimising fungicide resistance	11,311
GRS10036	GIRS—(USQ) Inter-relationships between *Bipolaris sorokiniana* isolates involved in spot blotch, common root rot and black point in winter cereals	9,048
GRS10037	GIRS—(UWA) Evolved glyphosate resistance in wild radish (*Raphanus raphanistrum* L) populations with the use of glyphosate-resistant GM canola	7,918
GRS10038	GIRS—(US) Enhancing plant nutrition with rhizosphere microorganisms	6,786
GRS10039	GIRS—(UWA) Unravelling the cause of black pod disease of narrow-leafed lupin and developing a control solution	9,048
GRS10040	GIRS—(UF) Examining the role of sucrose transporter SUT1 in increasing yield and iron/zinc content in barley	9,048
GRS10041	GIRS—(UQ) Understanding abiotic stress impacts on cereal starch structure and value-added quality through genetic and environmental screening	13,573

Number	Title	Expenditure $
GRS10042	GIRS—(CUR) The integration and validation of precision management tools for mixed farming systems	9,048
GRS10044	GIRS—(UA) Evaluating the salt tolerance of transgenic wheat and barley	10,179
GRS10045	GIRS—(UQ) Genetic variability and physiological mechanisms controlling time to flowering in wheat under high temperatures	18,097
GRS10061	GIRS—(CUR) Comparative genomics of necrotrophic fungal pathogens	13,573
GRS10063	GIRS—(RMIT) Bread-making procedure, product digestibility and impact on sensibility to gluten proteins	9,048
GRS124	GIRS—(UQ) Novel genes regulating plant defence	6,250
GRS125	GIRS—(QUT) Characterisation of the NF-Y family of transcription factors in wheat	5,000
GRS129	GIRS—(UA/ACPFG) Characterisation of transcription factors important in regulating salinity tolerance	15,000
GRS131	GIRS—(US) Novel plasmodesmatal proteins and their role in transport in plants	7,500
GRS134	GIRS—(UF) Characterising the molecular basis of the beneficial plant—endophytic actinobacteria relationship	33,750
GRS135	GIRS—(US) The physiological mechanisms for desiccation tolerance in rhizobia	20,000
GRS136	GIRS—(US) Epidemiology and host resistance of *Fusarium* head blight	5,000
GRS137	GIRS—(UF) Investigating the differences between R protein activation in wheat	30,000
GRS139	GIRS—(US) Rust resistance in cultivated barley (*Hordeum vulgare*)	30,000
GRS140	GIRS—(UCS) The relationship between earliness and vigour in cereals	17,500
GRS141	GIRS—(UQ) Investigation of techniques to rapidly introgress new genes into adapted cereal cultivars	24,812
GRS142	GIRS—(DAS) Genetic and biological characterisation of resistance to root lesion nematode *Pratylenchus* species in wheat	20,000
GRS143	GIRS—(SWI) Molecular analysis of the GSP and puroindoline genes, related to grain hardness and antimicrobial properties	20,000
GRS144	GIRS—(UA) The structural basis of catalysis and substrate specificity in barley xyloglucan endotransglycosylases	17,500
GRS145	GIRS—(ULA) Regulation of the XERO2 gene in *Arabidopsis*	30,000
GRS147	GIRS—(UCS) Investigation of the use of biochar to enhance soil physical and chemical properties under dryland cropping	30,000
GRS148	GIRS—(UNE) Biological indicators and potential amendments to improve soil health crop productivity and profitability	20,000
GRS150	GIRS—(US) Metallic nanoparticle phytosynthesis	30,000
GRS151	GIRS—(UMO) The effect of adsorption of the properties and structure of nanostructured emulsions	30,000
GRS152	GIRS—(UQ) Development and validation of molecular disease resistance markers for use in lucerne breeding	11,500
GRS153	GIRS—(UWA) The effect of biochar on soil nitrogen cycling and associated soil biological community	31,000
GRS154	GIRS—(UMO) Integrated and sustainable control of pest mite and aphid species in the context of climate change	30,000
GRS155	GIRS—(UT) The effect of crop rotation and irrigation on water-use efficiency and soil health of grain crop production in Tasmania	30,000
GRS157	GIRS—(UCS) Improved drought avoidance for water-limited environments in Australian wheat	27,084
GRS158	GIRS—(UF) Analysis of the structure, biochemical properties and mode of action of flax rust resistance proteins	35,325

Number	Title	Expenditure $
GRS159	GIRS—(UQ) Improved knowledge of crown rot pathogen biology and toxigenicity to safeguard market assess of wheat	41,250
GRS160	GIRS—(UA) *Phoma koolunga*: biology and role in ascochyta blight of field peas	36,251
GRS161	GIRS—(ULA) The role of intracellular localisation signals in NHX antiporter regulation in *Arabidopsis*	30,000
GRS162	GIRS—(CUR) Defining the wheat quality requirements for Indian whole-wheat chapati	20,000
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 (*Pisum sativum* L.)	30,000
GRS166	GIRS—(UCS) Health benefits of faba beans	38,100
GRS167	GIRS—(UA) Late maturity alpha-amylase in wheat	30,000
GRS171	GIRS—(ANU) A biochemical approach to understanding *Stagonospora nodorum* 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	30,000
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 *Arabidopsis*	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
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 *Neotyphodium occultans*	26,875
GRS187	GIRS—(UMU) Investigating the method of action of plant growth promoting rhizosphere bacteria-enhancing nodulation in legumes	13,573
GTA10019	Travel Award (TA)—(UA) to attend and present work at the 26th Fungal Genetics Conference(United States)	3,000
GTA10020	TA—(UA) to attend the 4th International Workshop on barley leaf blights (Czech Republic) and visit collaborators (United Kingdom)	4,629
GTA10021	TA—(UA) Australasian Plant Pathology Society conference 2011	1,322
GTA10022	TA—(UF) to present data at the XV Congress on Molecular Plant–Microbe Interactions (Japan)	3,000
GTA10066	TA—(CSP) to work with Research Director at the French National Institute for Agricultural Research (INRA) in Clermont-Ferrand	5,540
GTA10067	TA—(UA) to conduct field experiments on phenotyping/genotyping in Mexico and France	3,458
GTA10118	TA—(UA) to attend the joint EWAC-EUCARPIA (European Wheat Aneuploid Cooperative—European Association for Research on Plant Breeding) Cereals Section Conference (Serbia)	5,500

Number	Title	Expenditure $
GTA10119	TA—(ACS) to attend the Genetically Modified Crops Coexistence Conference	5,733
GTA10122	TA—(RMS) to attend the 5th World Congress on Conservation Agriculture (Brisbane)	1,942
GTA10221	TA—(I&I NSW) to attend the 2011 Annual Convention of the Canola Council of Canada	5,500
IPR00003	Vavilov–Frankel Fellowship	21,527
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	245,500
NYS00002	National Youth Science Forum	50,000
ORD00001	Bruce McClelland Award 2010	5,000
RGH00002	Conference Sponsorship—2010 Australian Summer Grains Conference	3,409
UHS10046	Undergraduate Honours Scholarship (UHS)—(UWA) Effect of cutting and grazing on messina production	10,000
UHS10047	UHS—(UA) Phosphorus speciation in animal manures: Use of solution P-31 nuclear magnetic resonance spectroscopy and isotopic techniques to identify and quantify phosphorous speciation	10,000
UHS10048	UHS—(UWA) Investigation of synergies between photosystem 2 and phytoene desaturase inhibiting herbicides on susceptible, atrazine-resistant and diflufenican-resistant wild radish (*Raphanus raphanistrum*) populations	10,000
UHS10049	UHS—(UQ) Development of rust-resistant peanut genotypes through a single seed descent breeding strategy and speed-breeding technologies	10,000
UHS10051	UHS—(UWA) An economic assessment on twin-sowing	10,000
UHS10052	UHS—(UF) Does the M protein oligomerise upon activation?	10,000
UHS10053	UHS—(UA) Improved barley beta-glucanase for malting and brewing quality	10,000
UHS10054	UHS—(ANU) The role of imprinted micro ribonucleic acid (RNA) in regulating seed size	10,000
UHS10055	UHS—(UA) Investigation of pre-steeping in the reduction of steeping requirements during malting	10,000
UHS10059	UHS—(UWA) Salinity and waterlogging (and these stresses combined) tolerance of Tedera (*Bituminaria bituminosa*)	10,000
UT00019	Primary Industry Centre for Science Education—Phase 3	150,000
VF00018	Visiting Fellowship Award—(UWA) The application of in-vitro techniques to generation acceleration in legumes	25,000
	Building Research Capacity Total	**2,257,618**
	Corporate Communications	
AAC00006	Conference Sponsorship (CS)—Australian Grains Industry Conference 2011	10,000
AAE00001	CS—Australian Agricultural and Resources Economics Society Annual Conference 2011	5,000
ACA00002	Co-publication support for 'Progress and prospects for crop yield across the world'	10,000
ANV00009	Ground Cover TV—National	290,779
AUP00001	A reprint of 'A Guide to Communication for Sustaining Families and Farms'	13,995
AUP00002	Reprint of 'A guide to Succession—Sustaining Families' and farm booklets	21,650
BAE00019	CS—Australian Bureau of Agricultural and Resource Economics and Sciences Outlook Conference 2011	7,273
BER00010	International Grains Research Review	30,771
CAN00003	Warehousing and distribution of the GRDC's publications, periodicals and promotional material 2009–2012	39,322
CFM00009	CS—Crawford Fund Annual Development Conferences 2011	10,000

Number	Title	Expenditure $
CIC00006	Western Region communicator services	119,725
CIC00007	Northern Region communicator services	119,725
CIC00012	Issues-based communication—Wheat breeding	25,177
CIC00014	Issues-based communication—High-rainfall zone	66,254
CIC00015	Issues-based communication—Over the Fence	78,000
CIC00016	Issues-based communication—Panel profiles 2011	63,110
CIC00017	Issues-based communication—Managing herbicide resistance	70,119
CIC00018	Issues-based communication—Grain storage	42,599
COR00017	*Ground Cover* supplements	213,706
COR00018	*Ground Cover* newspaper	1,133,817
COR00020	Ground Cover Direct publication catalogues	40,000
COR00021	Repurposing of research report information for a grower audience	165,000
COR00022	Back Pocket Guides	6,179
COR00023	GRDC articles for *Farming Ahead* magazine	35,760
COR00024	Production of locust management fact sheet	35,133
COR00025	Mail-out of 2011 Ground Cover Paddock Diary and 2011 Farm Gross Margin and Enterprise Planning Guide	48,208
COR00027	Revision, production, printing and distribution of mouse management fact sheet	29,297
COR00028	Grain and Graze 2—Design and printing of brochure	16,392
COR00029	Printing of stored grain extension fact sheets, fumigation booklet and reprints of GRDC fact sheet titles	13,063
COR00030	Issues-based communication—Managing herbicide resistance: 'Your industry needs you'	70,119
DAQ00168	CS—DEEDI Hermitage Research Station Schools' Plant Science Competition	3,500
DAW00214	International Grains Forum and Field Tour 2010	54,545
ECO00004	Issues-based communication—Northern Region: Nematodes	25,989
ECO00005	Climate Champions initiative	85,000
ECO00006	Issues-based communication—Climate strategy implementation	56,000
ECO00007	Panel media and presentation skills training	28,000
ECO00008	Issues-based communication—Northern Region: Nematodes	17,310
GCS10000	CS—Global Herbicide Resistance Challenge	30,000
GCS10001	CS—Golden Grains Exhibit: Ground to Grub—Growing Great Grains!	10,000
GCS10002	CS—23rd Asian-Pacific Weed Science Society Conference	7,500
GCS10003	CS—1st International Crown Rot Workshop for Wheat Improvement	15,000
GCS10004	CS—CCA Cropping Solutions seminars	3,000
GCS10005	CS—7th Australasian Soilborne Diseases Symposium	10,000
GCS10006	CS—Joint meeting of the 4th Asian Conference on Plant Pathology and 18th Biennial Australasian Plant Pathology Society Conference, 'New Frontiers in Plant Pathology for Asia and Oceania'	12,000
GCS10007	CS—Australian Cereal Chemistry Conference	10,000
GCS10009	CS—Wheat breeding 2011 and beyond	20,000
GCS10010	CS—Victorian Farmers Federation Annual Grains Conference	8,000
GCS10012	CS—Enterprising Women—An Inspiring Day Out	5,000
GCS10013	CS—Engineering in Agriculture—Diverse Challenges Innovative Solutions	5,000
GCS10014	CS—17th International Congress on Nitrogen Fixation	20,000
GCS10015	CS—9th Annual Victorian No-till Farmers Association Conference	7,500
GCS10016	CS—Ultimate Adjuvants Workshop	2,000

Number	Title	Expenditure $
GCS10017	CS—18th Australasian Weeds Conference 2012	13,000
GCS10032	CS—Australasian Region of the International Biometrics Society Conference	10,000
GCS10057	CS—WAFarmers 2011 Annual Conference	8,000
GCS10058	CS—Climate Change Research Strategy for Primary Industries Conference	20,000
GCS10106	CS—17th Australian Research Assembly on Brassicas	5,000
GCS10150	CS—Australasia–Pacific Extension Network National Forum 2011—Hitting a moving target—Sustaining landscapes, livelihoods and lifestyles in a changing world	10,000
GCS10151	CS—Farming Ahead 2011	25,000
GCS10152	CS—Partners in Grain 'Networking with our Partners'	8,000
GCS10200	CS—International Botanical Congress 2011	10,000
GCS10201	CS—GRDC Irrigation Update	4,500
GCS10216	CS—3rd Sustainable Phosphorus Summit: a blueprint for a global phosphorus security	20,000
GCS10220	CS—15th Australian Barley Technical Symposium	20,000
GGA00004	CS—2011 Australian Universities Crops Competition	10,000
KDI00020	Communication strategy development and implementation for 'Frost'—Western Region–specific material	30,555
KDI00021	Communication strategy development and implementation for 'Non-Wetting Soils'—Western Region–specific material	17,400
KDI00022	GRDC editorial in *Farming Ahead* magazine	27,000
MAA00006	The 'COB' magazine	15,000
MMO00004	Media monitoring services: Carma	49,000
MMO00005	Media monitoring services	100,000
OBR00002	GRDC's Driving Agronomy	74,000
PCP00001	Technical review and proofreading of adjuvant book	6,960
PIG00005	Delivering professional development through Partners in Grain	300,000
PNS00004	Southern Regional communicator services	199,869
PNS00006	Issues-based communication—Productivity and profitability campaign implementation	30,000
PNS00009	Issues-based communication—Soil biology initiative	17,300
PNS00010	Issues-based communication—Getting GRDC closer to growers: Australian Year of the Farmer	49,320
RBC00003	Field day support and interactive displays 2011	7,873
SAI00003	CS—Agricultural Sustainability—It's Good Business Sense 2011	5,000
SAN00020	CS—13th Annual South Australian No-Till Farmers Association Conference 2011 'No Till Down Under'	10,000
SEP00008	CS—SEPWA harvest debrief	5,000
TEP00001	General Meteorology for Pesticide Application booklet	58,045
TFG00003	CS—Tasmanian Farmers and Graziers Association Annual Conference 2011	5,000
UWA00148	CS—Rhizosphere 3 International Conference	10,000
WAN00019	CS—20th Annual Western Australian No-Tillage Farmers Association Conference	10,000
WDM00008	Paddock Diary 2009–10, 2010–11 and 2011–12	88,995
	Corporate Communications Total	**4,545,334**
	COMMUNICATION & CAPACITY BUILDING TOTAL	**6,802,952**

Number	Title	Expenditure $
	CORPORATE STRATEGY AND IMPACT ASSESSMENT	
AAA00006	Agrifood Awareness Australia Limited (2009–12)	100,000
AGP2	Australian Grain Technologies Pty Ltd—independent directors	40,180
ATR00008	2010 impact assessments	62,800
ATR00009	Impact assessment and portfolio analysis	58,549
ATR00010	2011 impact assessments	78,500
BAE00017	Australian Agricultural and Grazing Industries Survey and Grains Industry Reports: 2009–10, 2010–11 and 2011–12	500,000
BAE00020	Harvesting Productivity initiative 2010–11—work program	85,716
BAE00021	Cost of Grain Production—Supplementary survey in Australian agricultural and grazing industries survey	56,900
CCS64-1	Regional panel specific workshops	17,694
CIN00001	Wheat Quality Australia—Director and Chair	26,192
GRD16-1	Impact assessment	1,522
GRD18-1	National Research, Development and Extension Strategy	33,232
GRD20-2	Australian Export Grains Innovation Centre	1,335
GRD20-3	National Research, Development and Extension Strategy	1,047
GRD20-4	Grains Industry Research, Development and Extension Strategy	2,067
GRD7-5	Seed of Light awards	4,827
PFR00002	Australian Export Grains Innovation Centre consultancy	1,483
PFR00003	Canola Breeders Western Australia—Directors	9,517
PRO00001	Barley Australia—Directors	15,000
QUA00001	Review of the impact assessment/benefit–cost analyses for Western Australian No-tillage Farmers Association and the Australian Cereal Rust Control Program	6,850
	CORPORATE STRATEGY AND IMPACT ASSESSMENT TOTAL	**1,103,411**
	GRAND TOTAL	**140,660,090**

ACS = Alcock Consultancy Services, **ANU** = Australian National University, **ACPFG** = Australian Centre for Plant Functional Genomics, **ATA** = Agricultural Training Award, **CIMMYT** = International Maize and Wheat Improvement Center, **CRC** = cooperative research centre, **CRM** = customer relationship management system, **CS** = Conference Sponsorship, **CSP** = CSIRO Plant Industry, **CUR** = Curtin University of Technology, **DAFWA** = Department of Agriculture and Food, Western Australia, **DAS** = South Australian Research and Development Institution, **DEEDI** = Queensland Department of Employment, Economic Development and Innovation, **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, **I&I NSW** = Industry and Investment New South Wales, **ITA** = Indigenous Training Award, **MEMS-IR** = Micro-electrical mechanical systems infrared, **NSW** = New South Wales, **QUT** = Queensland University of Technology, **RD&E** = research, development and extension, **RIRDC** = Rural Industries Research and Development Corporation, **RMIT** = RMIT University, **RMS** = Rural Management Strategies Pty Ltd, **SA** = South Australia, **SARDI** = South Australian Research and Development Institute, **SEPWA** = South East Premium Wheat Growers Association, **SNP** = single-nucleotide polymorphism, **SSR** = simple sequence repeat, **SWI** = Swinburne University of Technology, **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, **UNS** = University of New South Wales, **UQ** = University of Queensland, **US** = University of Sydney, **USQ** = University of Southern Queensland, **UT** = University of Tasmania, **UWA** = University of Western Australia, **WA** = Western Australia

Summary of GRDC project expenditure		
Practices	Agronomy, Soils and Environment	20,472,538
	Crop Protection	16,736,999
	Validation and Integration	17,410,640
	Extension and Grower Programs	5,562,905
	Total Practices	**60,183,082**
Varieties	Cross Varieties	37,477
	Gene Discovery	21,592,365
	Germplasm Enhancement	14,129,736
	Wheat and Barley Breeding	7,494,561
	Pulse, Oilseed and Summer Coarse Grains	14,412,382
	Total Varieties	**57,666,521**
New Products	Cross New Products	182,537
	New Farm Products and Services	6,298,524
	New Grain Products	8,423,063
	Total New Products	**14,904,124**
Communication & Capacity Building	Building Research Capacity	2,257,618
	Corporate Communications	4,545,334
	Total Communication & Capacity Building	**6,802,952**
Corporate Strategy & Impact Assessment	**Total Corporate Strategy & Impact Assessment**	**1,103,411**
	GRAND TOTAL	**140,660,090**

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
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
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	01 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, DA, GRDC, MLA, PRC	CSP00118	Australian Feedgrain Partnership sorghum project	01 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, 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, GRDC	DAQ00130	Management of tobacco streak virus in sunflower and pulse crops	1 Jul 2008	30 Jun 2011
DPI NSW, DEEDI, GRDC	DAQ00136	Risk assessment and preventive strategies for herbicide resistance in Northern Region, Phase 3	1 Jul 2008	30 Jun 2011
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	DAS00086	New vetch varieties for grain and hay production for Australian farmers	1 Jul 2008	30 Jun 2011
CU, GRDC, HAL, SARDI, UA, UM	DAS00094	Diamondback moth (*Plutella xylostella*) 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	01 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, DPI VIC, GRDC, UM	DAV00109	Wheat–pulse dynamics under elevated nitrous oxide	30 Jun 2010	30 Jun 2011
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
DA, GRDC	DRD00002	Improving the utilisation of red wheat by lactating dairy cows	1 Jan 2009	1 Jan 2012

R&D Partners	Project ID	Project	Start	Finish
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
GRDC, HAL	HAL00002	Managing Climate Variability—critical thresholds—Horticulture Australia	1 Jul 2009	30 Jun 2011
GRDC, LWA	LWR00007	Contribution to National Program for Sustainable Irrigation	1 Jul 2008	30 Jun 2011
CSIRO, DA, DAFWA, GRDC, HAL, MLA, RIRDC, SRDC	MCV00001	Managing Climate Variability program	1 Jul 2009	30 Jun 2011
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
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	MCV00015	Managing Climate Variability—program coordinator	1 Jul 2008	30 Jun 2011
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

R&D Partners	Project ID	Project	Start	Finish
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
GRDC, MLA	MLA00002	Eyre Peninsula grazing cereals roadshow	1 Jun 2010	30 Aug 2010
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	PCL00003	Sorghum lines with enhanced starch availability for pigs and ethanol production	1 Jan 2007	30 Aug 2010
DEEDI, GRDC, PRC, UQ	PCL00005	Enhancing near-infrared spectroscopy calibrations for predicting the nutritional value of grains for livestock	1 Jul 2008	30 Jun 2011
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
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
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

R&D Partners	Project ID	Project	Start	Finish
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	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

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, **BCG** = Birchip Cropping Group, **CRDC** = Cotton Research and Development Corporation, **CU** = Cornell University, **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, **FG** = Facey Group, **FR** = FarmLink Research, **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, **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, **UM** = University of Melbourne, **UNE** = University of New England, **UNSW** = University of New South Wales, **UQ** = University of Queensland, **UT** = University of Tasmania, **UWA** = University of Western Australia

Appendix D—Publications and products

The GRDC has a large number of publications and information products, in print, tape and electronic formats. Many hard copy products are provided free of charge (stocks of some free publications are limited), while others are sold to fully or partially recover the costs of publication. There are some publications which are available only in electronic format and can be found on the GRDC's website at www.grdc.com.au.

The GRDC's website also provides a catalogue of GRDC publications and an online bookshop.

On average, the GRDC's website homepage received approximately 109,500 hits per month in 2010–11. The bookshop received approximately 2,950 hits per month.

Most of the GRDC's reports and publications are publicly available. One new publication was offered for sale during 2010–11: *Disc seeding in zero-till farming systems*. The new publications that were available free of charge are listed below.

Information for grain growers

Booklets

South Australia Sowing Guide 2011
South Australia Crop Harvest Report 2011
Queensland 2011 Wheat Varieties Guide
Wheat Variety Guide for WA 2011
Victorian Winter Crop Summary 2011
Fumigating with phosphine, other fumigants and controlled atmospheres (national)
A Guide to Communication for Farm Families
A Guide to Succession: Sustaining Families and Farms (reprint)

Fact sheets

National

Succession Planning
Canola
GRDC Investment Process
Hygiene and Structural Treatments for Grain Storages
Pressure Testing Sealable Silos
Aeration Cooling for Pest Control
Disc Seeding Systems
Glyphosate Resistance
Mixed Farming
Blackleg Risk Assessor
Late Season Herbicide Use
Stubble Management
Fertiliser Toxicity
Mouse Management
Wheat Breeding Information Sheet
Stem Rust in Wheat
Exotic Pests (revised and reprinted)

Northern Region

Cereal Aphids
Mungbean Leaf Diseases
Crop Placement and Row Spacing
Time of Sowing
Choosing Rotation Crops

Northern and Southern regions

Plague Locust Control (two editions)
Grain Storage Pest Control Guide
Stored Grain Pests—Identification
Retaining Seed

Southern Region

Crop Placement and Row Spacing
Time of Sowing
Choosing Break Crops

Southern and Western regions

Diamondback Moth in Canola
Aphids and Viruses in Pulse Crops
Canola Hay and Silage
Brome Grass

Western Region

Grain Storage Pest Control Guide
Stored Grain Pests—Identification
Crop Placement and Row Spacing
Time of Sowing
Break Crop Benefits

Information for grain growers *(continued)*

Identification guides

Back Pocket Guides

Beneficial Insects (Northern Region)
Beneficial Insects (Southern and Western regions)
Snail Identification and Control (Southern and Western regions)

Tools

2011 Paddock Diary (national)
2011 Farm Gross Margin and Enterprise Planning Guide (South Australia)
Making the most of a wet summer in the Southern Region

Newsletters

HoRiZon (high-rainfall zones)	Issue 1 (September 2010)
	Issue 2 (May 2011)

Information for technical advisers

Booklets

The Current and Potential Costs from Diseases of Barley in Australia
The Current and Potential Costs from Diseases of Wheat in Australia

Grains Research Update newsletters

Northern Region: Issues 56, 57, 58, 59, 60
Southern Region: Issues 6, 7, 8, 9, 10, 11

Information for all users

Ground Cover DVDs

Episode 1 (July–August 2010)
Episode 2 (November/December 2010)
Episode 3 (March–April 2011)

Audio CDs

Driving Agronomy (three versions: Northern Region, Southern Region and Western Region)

Corporate publications

GRDC Annual Report 2009–10
GRDC Growers' Report 2009–10
GRDC Stakeholder Report 2011–12
GRDC Annual Operational Plan 2011–12

Ground Cover Direct publications catalogue:
- November 2010–April 2011
- May–October 2011

Australian grains focus 2010–2011

Ground Cover and *Ground Cover* supplements

Six issues of the newspaper, all with supplements:

Issue 87: Climate—Adapting to climate change
Issue 88: Precision Agriculture—PA moving beyond guidance
Issue 89: Grain Storage—A strategic approach to storage
Issue 90: Biosecurity—Securing Australia's markets
Issue 91: Capacity Building—Growing our human resources
Issue 92: Farm Business Management—Beyond agronomy

Research reports

Stubble retention in cropping systems in Southern Australia
Understanding Australian Wheat Quality

References

Grain being transferred from grain receival silo to grain rail carriages bound for port. Photo: Paul Jones

Abbreviations list

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AGT	Australian Grain Technologies Pty Ltd
APVMA	Australian Pesticides and Veterinary Medicines Authority
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CAIGE	CIMMYT–Australian–ICARDA Germplasm Evaluation
CCB	Communication & Capacity Building
CIMMYT	International Maize and Wheat Improvement Center
CRDC	Cotton Research and Development Corporation
CRM	customer relationship management
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Dairy Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEEDI	Department of Employment, Economic Development and Innovation, Queensland
DPI VIC	Department of Primary Industries, Victoria
EMT	Executive Management Team
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPR	end point royalty
FOI Act	*Freedom of Information Act 1982*
GM	genetically modified
GPA	Grain Producers Australia Limited
GRDC	Grains Research and Development Corporation
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IPM	integrated pest management
IPSOS-Eureka	IPSOS-Eureka Social Research Institute
IR	infrared
IT	information technology
MEMS-IR	Micro-electrical mechanical systems infrared
MLA	Meat and Livestock Australia
NSW DPI	New South Wales Department of Primary Industries
NVT	National Variety Trials
OH&S	occupational health and safety
PA	precision agriculture
PBA	Pulse Breeding Australia
PBR	plant breeder's rights
PIERD Act	*Primary Industries and Energy Research and Development Act 1989*
R&D	research and development
RD&E	research, development and extension

RDCs	rural R&D corporations
RIRDC	Rural Industries Research and Development Corporation
SARDI	South Australian Research and Development Institute
SPAA	Southern Precision Agriculture Association
SRDC	Sugar Research and Development Corporation
TFP	total factor productivity
VAWCRC	Value Added Wheat Cooperative Research Centre
VCASMO	Video broadcast promotion

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