Australian Government

Grains Research and Development Corporation

GRDC Annual Report 2008–09

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.

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 2008–09

Successes

- The GRDC became responsible for Wheat Variety Classification, a system providing bulk export market signals to Australian wheat breeders. More than 40 varieties have been successfully classified under the new system.
- External and internal financial analysis of GRDC projects showed benefit to cost ratios ranging from 1.5:1 to as high as 36:1. The Australian Cereal Rust Control Program benefit to cost ratio of 23:1 was the highest among a group of 'Hero Projects' reviewed across the rural R&D corporations.
- A survey of growers showed that 83 percent of those surveyed believed the GRDC was delivering value in terms of research dollars invested.
- GRDC-supported breeding programs released many new, improved crop varieties:
  - 14 wheat varieties (including two durum varieties), some of which yielded up to 11 percent higher than varieties of comparable quality
  - two barley varieties that are higher yielding than comparable popular varieties—Commander(ᵗ) consistently recorded yields 2 percent to 17 percent higher than the dominant malting varieties
  - two mungbean varieties—Crystal(ᵗ) yielded 20 percent higher than the benchmark variety
  - one desi chickpea variety
  - one faba bean variety.
- More than 50 blackleg-resistant canola lines with higher resistance than existing cultivars, including both polygenic and major gene resistance sources, were accessed by private canola breeders.
- All Australian breeders of wheat, barley, triticale, oats, pulses and canola (including GM canola) took part in the GRDC's National Variety Trials.
- The longstanding strategic alliances between the GRDC, CIMMYT and ICARDA enabled Australian breeding programs to access more than 1,300 elite drought-tolerant and disease-resistant wheat and pulse breeding lines.
- The GRDC was a finalist in the Governance category of the NAB Agribusiness Awards, and the GRDC-supported Pulse Breeding Australia was a finalist in the Technology and Innovation category.
- Fourteen new farming systems investments were established, bringing together grain growers, researchers and agribusiness, to enhance the validation and integration of new technologies in local farming systems.
- Fourteen case studies on the economic benefits of precision agriculture demonstrated an average incremental return of $19 per hectare through the use of precision agriculture methods.

Figure 1: Total grain production and cropping area, 1998–09 to 2008–09

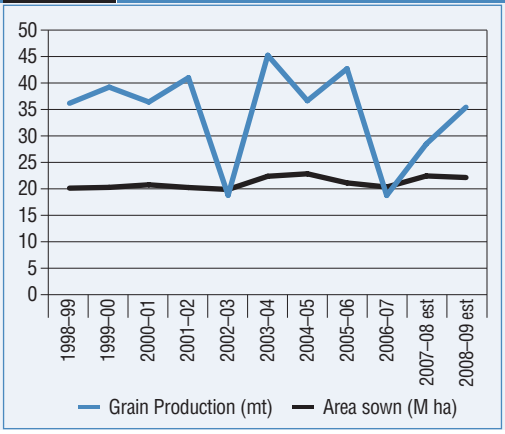
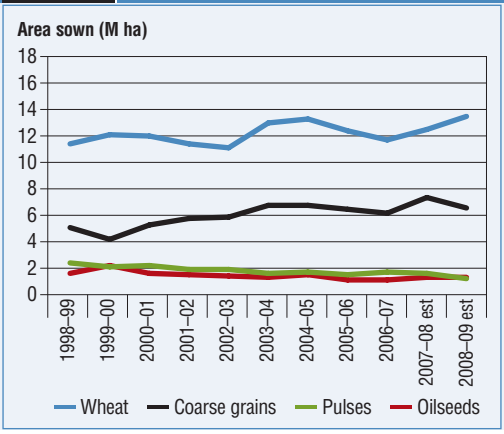


Figure 2: Area sown to grains by crop type, 1998–99 to 2008–09



Highlights of 2008–09

Successes

- TagTeam, a *Rhizobium* inoculant including phosphorous-solubilising microbes for use with grain legumes, was launched.
- The GRDC produced *Grain Market Lingo*, a free publication which provides factual, objective information on price risk management. *Grain Market Lingo* has become a 'must have' resource in many of the grain-marketing workshops held around Australia.
- The GRDC, in collaboration with CropLife Australia, distributed more than 40,000 copies of the *Herbicide Resistance Mode of Action Groups* booklet.
- The GRDC increased collaboration with the Cotton Research and Development Corporation addressing productivity and climate change preparedness in cotton and grain farming systems.
- An international collaboration was established with AgResearch in New Zealand, to research the use of endophytes targeting the control of heat and water stress and insect control in cereals.

Challenges

The GRDC operates in an ever changing grains industry driven by factors such as: evolving national and international market dynamics, including the deregulation of wheat marketing; high volatility of grain prices and input costs; and impacts of climate change.

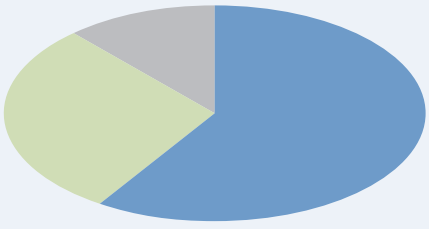
In Australia the grains industry 'supply chain' is experiencing significant changes at all levels, affecting marketing, grain handling/logistics, grower representative organisations, R&D and operations at the farm level.

Factors directly affecting R&D include a declining rate of total factor productivity growth, pressure on state department of agriculture budgets, increasing private investment in research, development and extension (RD&E), and the potential impacts of biotechnology.

These changes mean that the GRDC must:

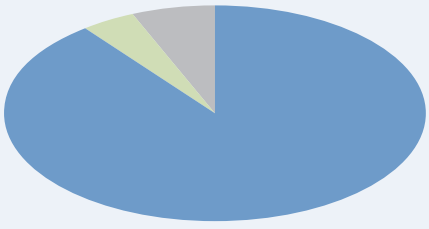
- work closely with its stakeholders (grain growers, the Australian Government and RD&E partners) to develop strategies and programs that will positively contribute to productivity growth in a sustainable way
- clearly demonstrate and communicate the financial, environmental and social impacts that RD&E contributes to the growth of the Australian grains industry and the nation as a whole.

Figure 3: GRDC income in 2008–09



Grain grower levy	**$89.1m**	(59.3%)
Australian Government	**$43.9m**	(29.2%)
Interest, royalties and other	**$17.3m**	(11.5%)

Figure 4: GRDC expenditure in 2008–09



Research and development	**$106.3m**	(87.6%)
Employee benefits	**$6.1m**	(5.0%)
Suppliers & other	**$8.9m**	(7.4%)

Highlights of 2008–09

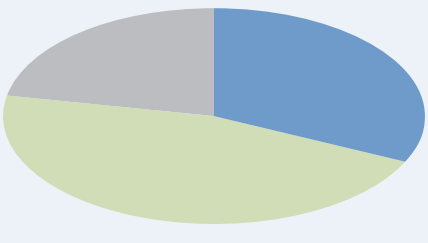
Table 1: Five years at a glance

	2008–09		2007–08	2006–07	2005–06	2004–05
GRDC						
Revenue	$150.4m	▲	$127.2m	$98.6m	$116.9m	$111.2m
Expenditure	$121.3m	▲	$102.5m	$118.2m	$127.5m	$120.2m
Operating surplus/(deficit)	$28.5m	▲	$24.1m	($19.8m)	($10.6m)	($9.0m)
Total assets	$159.1m	▲	$117.5m	$106.0m	$127.7m	$135.7m
Total equity	$118.7m	▲	$89.7m	$65.6m	$84.1m	$94.7m
Industry contributions	$89.1m	▲	$76.6m	$50.9m	$60.9m	$64.2m
Commonwealth contributions	$43.9m	▲	$37.6m	$35.8m	$43.1m	$35.7m
R&D expenses	$106.3m	▲	$89.1m	$105.6m	$116.1m	$107.1m
Employee benefits	$6.1m	▲	$5.8m	$5.6m	$5.2m	$4.9m
Suppliers	$5.2m	▲	$5.1m	$5.1m	$5.6m	$5.8m
Number of full-time GRDC staff[a]	49	▲	47	44	50	46
Grains industry						
Estimated number of grain farms[b]	28,455	▲	28,081	29,000	30,900	27,600
Number of grain crops covered by R&D levies	25	—	25	25	25	25
Estimated gross value of production[c]	$11,154m	▲	$10,160m	$5,024m	$8,540m	$7,263m
Total grain production—summer and winter crops ('000 tonnes)[d]	36,046	▲	29,042	19,204	43,396	37,288

a Number of full-time GRDC staff as at 30 June each year.
b Australian Bureau of Agricultural and Resource Economics (ABARE) estimates for the number of broadacre farms planting at least 100 hectares for grain production—From the *Australian Grains* report series, 2005 to 2009. Figures for 2004–05 to 2007–08 restate the estimated numbers of grain farms shown in previous GRDC Annual Reports in accordance with this new definition of a grain farm. Previous reports defined a grain farm as a broadacre farm planting more than 30 hectares per year for grain production.
c Latest ABARE estimates for the gross value of production (GVP) of grains and oilseeds, excluding rice—From the June 2009 *Australian Commodities* report. Figures for 2004–05 to 2007–08 restate the GVP estimates shown in previous GRDC Annual Reports in accordance with this change to using ABARE data.
d Latest ABARE estimates for total summer and winter crop production, excluding cottonseed and rice, from the June 2009 *Australian Crop Report*.

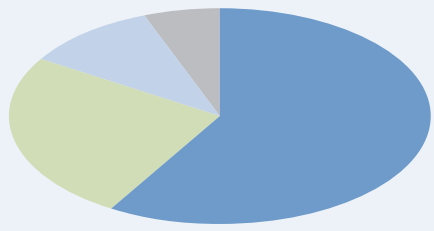
Note: Figures for the 2004–05 to 2006–07 reporting periods have been restated in accordance with a new accounting policy regarding grant income.

Figure 5: R&D investment across the GRDC's three regions in 2008–09



Western Region	**$34.2m**	(32.2%)
Southern Region	**$48.8m**	(45.9%)
Northern Region	**$23.3m**	(21.9%)

Figure 6: Grain grower levy by crop type in 2008–09



Wheat	**$52.3m**	(58.7%)
Coarse grains	**$22.6m**	(25.4%)
Oilseeds	**$9.2m**	(10.3%)
Pulses	**$5.0m**	(5.6%)

Letter of Transmittal

Australian Government
Grains Research and Development Corporation

GRDC
Grains Research & Development Corporation

30 September 2009

The Hon. Tony Burke, MP
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 2009, 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 2008–09 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 and portfolio budget statements for 2008–09.

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 is made in accordance with a resolution of the corporation's directors on 23 September 2009 and presents fairly the information required by the Finance Minister's Orders.

Yours sincerely

Keith Perrett
Chair

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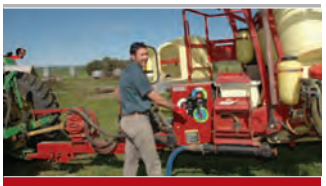

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PART 1

Overview

Photo:
Lupins play a very important role in Clancy Michael's farming operation located at Mingenew, WA.
Photo: Evan Collis

About the GRDC

The Grains Research and Development Corporation (GRDC) was founded in 1990 under the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act).

The corporation has two key customer groups: Australian grain growers and the Australian Government. Its role is to invest in R&D and related activities to benefit grain growers, other grains industry participants and the wider community. In doing so, the GRDC invests in research where obstacles to industry progress exist and where R&D may be effective in overcoming such obstacles.

The corporation's role includes:

- investigating and evaluating the requirements for R&D in the grains industry
- coordinating or funding R&D activities
- facilitating the dissemination, adoption and commercialisation of the results of R&D.

The GRDC determines its priorities in consultation with industry, government and research partners, and acts in partnership with public and private researchers, other R&D funding organisations, agribusinesses and grower groups.

The GRDC is funded jointly by a levy collected from grain growers based on the value of grain they produce, and contributions from the Australian Government. The industry levy is collected on 25 crops, spanning temperate and tropical cereals, oilseeds and pulses.[1]

The GRDC's organisational structure and objectives recognise the complexities of the grains industry and its investment needs. Planning, delivering and communicating R&D outputs occur in an environment that embraces governments, industry groups, research partners, other R&D investors and those operating in the industry itself—particularly Australian grain growers.

Organisational outcome

In a dynamic environment, the GRDC addresses R&D priorities to meet national, regional, commodity and multicommodity challenges, in order to achieve the following overall outcome:

> Through its commitment to innovation, an Australian grains industry that is profitable and environmentally sustainable for the benefit of the industry and wider community.

The outcome reflects the corporate vision in *Prosperity through Innovation*, the corporation's five-year Strategic Research and Development Plan 2007–12, and is consistent with the Department of Agriculture, Fisheries and Forestry's portfolio goal of achieving more sustainable, competitive and profitable Australian agricultural, fisheries, food and forestry industries.

Following a review of agency outcome statements by the Department of Finance and Deregulation, on 10 March 2009 the Minister for Finance approved a revised outcome statement for the GRDC:

> 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 new outcome statement is reflected in the Portfolio Budget Statements 2009–10.

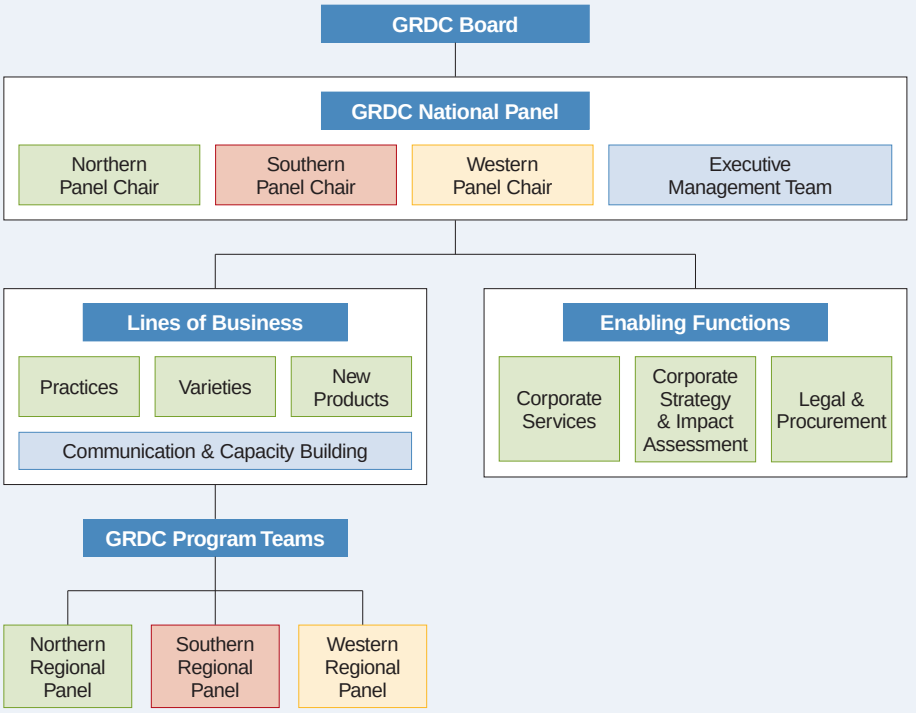
Kulin grower Derek Young discusses trials with DAFWA research scientist Dr Catherine Borger at the GRDC-supported 2008 WANTFA Spring Field Day. Photo: GRDC

1 Leviable crops are: 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. The levy for all crops is 0.99 percent of the net farm gate value of grain produced, except for maize, which is levied at 0.693 percent of net farm gate value.

Structure

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

Figure 7: GRDC structure, 2008–09



Note: For the purposes of performance reporting against the GRDC Annual Operational Plan 2008–09 and the Australian Government Department of Agriculture, Fisheries and Forestry Portfolio Budget Statements 2008–09, 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.

Due to drought and increasing climate variability, the GRDC is playing a key role in assisting growers to improve their whole-farm management skills. 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.

The Board currently comprises eight Directors: Keith Perrett (Chair), Peter Reading (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: Peter Reading (Managing Director) and the executive managers from each of the six management groups. Gavin Whiteley (Corporate Services), Leecia Angus (Corporate Strategy & Impact Assessment), Geoff Budd (Legal & Procurement), Stephen Thomas (Practices and Communication & Capacity Building), John Harvey (Varieties and Communication & Capacity Building) and Vince Logan (New Products).

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 (effective from February 2009).

National Panel

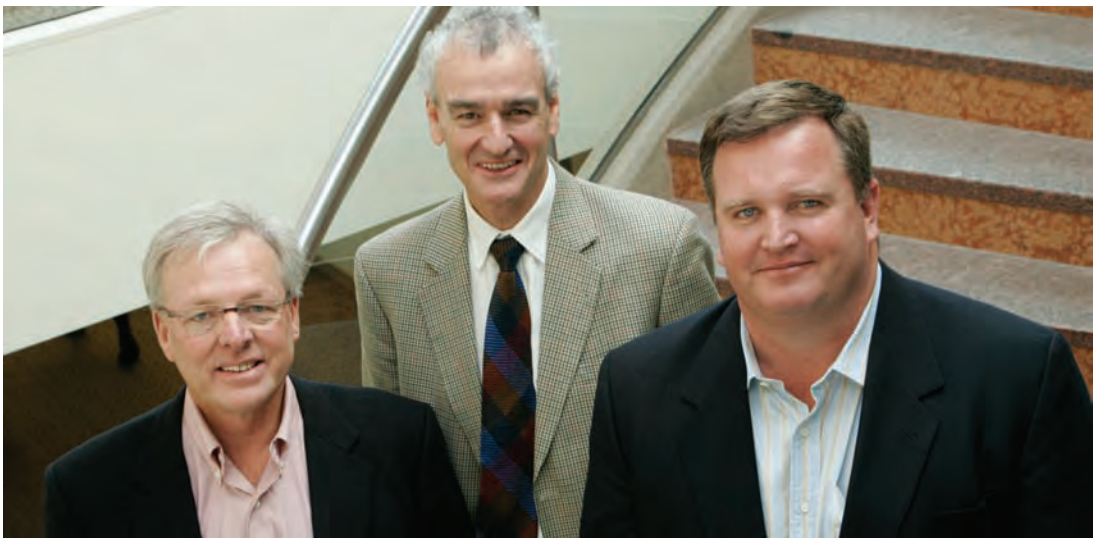
The National Panel includes the chairs of the GRDC's three regional panels, the Managing Director and the executive managers. The National Panel recommends research investment strategies to the GRDC Board, and assists the Board in maintaining links with Australian grain growers, the Australian Government and research partners. On advice from program teams, the National Panel also recommends proposals for the national elements of the GRDC's research investments.

Regional panels

Recognising variations in local conditions, the GRDC has three separate advisory panels to cover the northern, southern and western grain-growing regions of Australia. Figure 8 illustrates the geographical spread and characteristics of each region. Part 3 provides details on the membership of the regional panels.

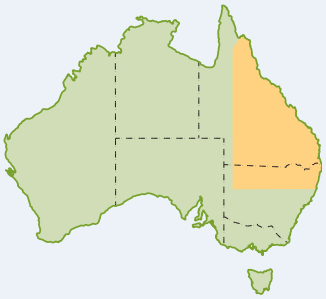
The three regional panels develop regional investment priorities and make recommendations on the allocation of investment budgets to meet regional needs. They are also represented on program teams that advance recommendations on investments to the Board through the National Panel. Regional panels also identify investments that may respond to national priorities.

The regional panels provide an interface with grain growers and researchers and promote awareness of GRDC investments and research outcomes and the corporation's strategic direction.



The three regional chairs (from left) Neil Young (western panel), David Shannon (southern panel) and James Clark (northern panel) are members of the GRDC National Panel which recommends research investment strategies to the GRDC Board. Photo: GRDC

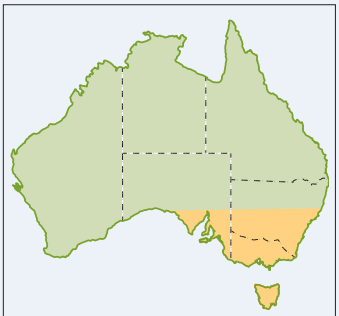
Figure 8: Characteristics of the GRDC regions



Northern Region

- 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

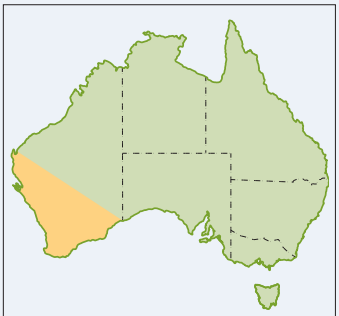
Cotton and grain grower Ian Gourley easily pushes a soil moisture probe into the soil at his farm, 'Blue Hills' near Narrabri, northern NSW.
Photo: Rebecca Thyer



Southern Region

- 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 grains

Angus Maurice shows the soil structure in a stubble paddock on his property, 'Gillinghall', near Wellington, NSW.
Photo: Kellie Penfold



Western Region

- 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

David Hall, senior research officer from DAFWA Esperance, and Ross Whittall examine the topsoil that used to be just sand.
Photo: Evan Collis

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.

GRDC Manager Pulse/Oilseed Breeding Brondwen MacLean inspects desi chickpeas with green seedcoats on offer in wholesale pulse markets in Mumbai, India.
Photo: Rohan Kimber—SARDI

Table 2: Elements of the planning and reporting approach

Element	Purpose
Strategic R&D plan	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	Specifies the annual budget, resources and research priorities that give effect to the strategic R&D plan during a given financial year
Annual report	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, the Grains Council of Australia
Growers' report	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	As part of the Australian Government budget process, summarises the planned outputs, outcomes, performance information and financial statements for a given financial year

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 2008–09, 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 2008–09 and its planned outcomes identified in the 2008–09 Portfolio Budget Statements. The output groups used for reporting purposes correspond to the three lines of business and 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 2008–09 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 the performance framework shown in Figure 9.

Climate variability is here to stay so growers need to have in place key farm management strategies to minimise its impact.
Photo: Maria Taylor

Figure 9: Overview of the GRDC performance framework, 2008–09

Role of the GRDC described in the objects of the *Primary Industries and Energy Research and Development Act 1989* **Refer page 104**	Australian Government's National Research Priorities **Refer pages 29–32**	Rural R&D Priorities Ministerial directions **Refer pages 29–32**	Industry priorities **Refer pages 26–28**

Prosperity through Innovation: **Strategic Research and Development Plan 2007–12**	**Portfolio Budget Statements 2008–09**	**Annual Operational Plan 2008–09**

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 page 21**	**Refer page 22**	**Refer page 22**	**Refer page 22**
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 that 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 48–50**	**Refer pages 61–63**	**Refer pages 70–71**	**Refer pages 80–82**

Outcome	Through its commitment to innovation, an Australian grains industry that is profitable and environmentally sustainable for the benefit of the industry and wider community
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 Australian grains industry continued to undergo significant change in 2008–09. Major developments included the deregulation of bulk wheat export marketing arrangements and the lifting of the moratoria on genetically modified canola in New South Wales and Victoria. The global financial crisis resulted in increased volatility in commodity prices and farm input costs.

This report covers the second year of implementation of the GRDC's Strategic R&D Plan 2007–12, *Prosperity through Innovation*. The Strategic R&D Plan 2007–12 emphasises increased collaboration, and clearly defines performance measures and outcomes to provide growers with the technologies and practices they require to remain competitive in global grain markets.

At this stage most of the planned outputs and key performance indicators are tracking according to the five-year plan.

The successes of 2008–09 and major challenges for 2009–10 are covered in detail in the other sections of this annual report. However, it is worth noting a number of the achievements of 2008–09 and challenges for the year ahead.

Grains industry production in 2008–09

The production of winter grains and oilseeds in 2008–09 was 33.1 million tonnes, an increase of 7.7 million tonnes or 30 percent from the 25.4 million tonnes produced in 2007–08.[2] Winter crop production in Western Australia was 13.6 million tonnes—2.8 million tonnes more than last season—while in New South Wales the winter crop more than doubled from 4 million tonnes in 2007–08 to around 9.7 million tonnes in 2008–09. Together, Western Australia and New South Wales accounted for 70 percent of winter crop production in Australia.

Summer crop production in 2008–09 was 2.9 million tonnes, showing a decrease of 19 percent compared with the 3.6 million tonnes produced in the previous 'bumper' year.

Keith Perrett
Chair

Peter Reading
Managing Director

Overall, during the 2008–09 season more than 36 million tonnes of grain was produced. Although grain prices retreated in the second half of 2008–09, the total crop had a gross value of production of more than $11 billion—the highest value ever recorded.

The GRDC's achievements in 2008–09

Following a request from the Minister, the GRDC assumed responsibility for the Wheat Variety Classification system which was previously managed by AWB International. By 30 June 2009, more than 40 varieties had been classified under the new arrangements and a wheat quality council had been established to oversee classification guidelines.

The GRDC and its partners, in close cooperation with the other rural R&D corporations (RDCs), increased their focus on assessing the impact of R&D investments. The GRDC conducted a number of internal and external assessments of projects; they showed benefit to cost ratios ranging from 1.5:1 to as high as 36:1. The Australian Cereal Rust Control Program's benefit to cost ratio of 23:1 was highest among a group of 'Hero Projects' reviewed across the RDCs.

Each of the output groups made good progress in achieving its targeted outputs and key performance indicators. GRDC-supported breeding programs continued to show significant improvements in performance, as measured by yield increases over industry standard varieties and other performance measures such as disease tolerance.

2 The figures reported in this section update the figures shown in last year's annual report, which were based on the latest estimate available at the time of publication.

The long standing strategic alliance between GRDC, CIMMYT (the International Maize and Wheat Improvement Center, based in Mexico) and ICARDA (the International Center for Agricultural Research in the Dry Areas, based in Syria) enabled Australian breeding programs to access more than 1,300 elite drought-tolerant and disease-resistant wheat and pulse breeding lines.

Fourteen new farming systems investments were established, bringing together grain growers, researchers and agribusiness, to enhance the validation and integration of new technologies in local farming systems.

In collaboration with the Cotton Research and Development Corporation, the GRDC developed a number of cooperative programs addressing productivity and climate change in irrigated cotton and grain farming systems.

The GRDC is leading the nitrous oxide component of the Department of Agriculture, Fisheries and Forestry Climate Change Research Program, and is a key participant in the soil carbon and crop adaptation components of the program.

Following the announcement of the closure of Land and Water Australia, the GRDC has assumed the lead role for the Managing Climate Variability (MCV) program and the Healthy Soils for Sustainable Farms program website.

The GRDC was a finalist in the Governance category of the NAB Agribusiness Awards.

An independent survey of growers showed that 83 percent of those surveyed believed that the GRDC was delivering value in terms of research dollars invested.

One of the principal challenges facing the Australian grains industry is a declining rate of growth in total factor productivity. There are a number of reasons why the decline is occurring, including the impact of the recent severe droughts and reduced levels of farm inputs. To better understand the factors contributing to the decline and to develop strategies to increase the rate of productivity growth, the GRDC has entered into a major study with the Australian Bureau of Agricultural and Resource Economics. Results from this work will be available next year.

During the year a new GRDC Board was appointed. We welcomed new directors—Colin Butcher, Jenny Goddard, Jeanette Long and Graeme Robertson—and were pleased that Nicole Birrell, Steve Marshall and Timothy Reeves remained from the previous Board. We would like to thank retiring Board members—Ross Johns, Don Plowman and PhilipYoung—for their strong contributions to the corporation during their periods on the GRDC Board, and also thank Jeanette Long for her contributions until her early retirement from the new Board on 15th May 2009.

Challenges going forward

The GRDC operates in an ever changing grains industry. The business environment this year will continue to be influenced by the uncertainty of the global financial situation, volatility in grain prices and the impacts of climate change.

The GRDC will continue to drive the implementation of the 2007–12 Strategic R&D Plan *Prosperity through Innovation*, ensuring that the planned outputs are delivered to industry.

A major emphasis for 2009–10 will be to work with our R&D partners, federal, state and territory governments and growers to develop a national grains research, development and extension framework to help ensure that our collective efforts optimise the development and delivery of R&D outcomes to our growers.

The GRDC's achievements depend on the cooperation of the Board, panel members and staff, and strong relationships with our growers and research partners. The GRDC will continue to collaborate with other RDCs, federal, state and territory governments, and research partners. We thank them for their contributions to grains industry R&D in 2008–09.

As at 23 September 2009, there have not been any other developments since the end of the financial year that have affected, or are likely to significantly affect, the GRDC's operations.

We are pleased to note that our Annual Report 2007–08 was recognised for high quality, and commend this year's report to the reader.

Keith Perrett
Chair

Peter Reading
Managing Director

Key achievements

The GRDC, in collaboration with its research partners, successfully implemented its annual operational plan and responded to the priorities of the Australian Government and Australian grain growers.

Also in 2008–09:

- In November 2008, the Primary Industries Ministerial Council endorsed the National Primary Industries Research, Development and Extension Framework (National RD&E Framework). Contributing to this framework are 14 sectoral and seven cross-sectoral industry strategies. As a member of the committee developing the framework, the GRDC has contributed significantly to developing the grain sector plan. The strategies will drive productivity and innovation within the grains industry.
- Since bulk wheat export deregulation, the GRDC has become responsible for Wheat Variety Classification, a system providing bulk export market signals to Australian wheat breeders. More than 40 new wheat lines have been graded since January 2009. The Wheat Classification Council, which has oversight of the grading operations, held its first meeting in June 2009. The council will access market data and distil it into parameters for setting wheat grades.
- The National Integrated Weed Management Initiative (NIWMI), which builds on projects completed in the CRC for Australian Weed Management, focuses on integrated weed management (IWM) approaches incorporating chemical and non-chemical control methods. The GRDC has invested in a series of NIWMI projects, to ensure that there is national coordination of research to reduce the impacts of herbicide resistance, and effective communication of IWM solutions to the grains industry.
- The GRDC funds Australian wheat and pulse breeders to travel to CIMMYT and ICARDA to select promising germplasm for further evaluation in Australia. In 2008, these activities culminated in the importation of more than 1,300 elite wheat and pulse breeding lines containing traits of interest to Australian breeders and pre-breeding researchers, including improved drought tolerance and disease resistance.
- Wheat-breeding programs with GRDC support performed strongly in 2008–09, releasing several new varieties with superior traits designed to meet the particular needs of growers in Australia's wheat-growing regions. The reach and resources of the wheat-breeding effort were expanded during the year, through a new business relationship between Australian Grain Technologies and one of the world's leading seed producers.
- Partnerships with targeted natural resource management bodies, farming systems practitioners and mixed farmers were developed to carry out a range of planning activities to assist the GRDC and Meat and Livestock Australia to develop a collaborative mixed farming system RD&E project across multiple catchments.
- The GRDC follows the Climate Change Research Strategy for Primary Industries as the basis for directing investment in both the mitigation of greenhouse gas emissions and efforts to assist the grains industry to adapt to climate change. The GRDC is leading the nitrous oxide component of the Department of Agriculture, Fisheries and Forestry Climate Change Research Program, and is a key participant in the soil carbon and crop adaptation components.
- The GRDC continued to improve the alignment between its activities and the objectives of its key customer groups—Australian grain growers and the Australian Government—and other stakeholders.
- The GRDC's Annual Report 2007–08 received a silver award at the Australasian Reporting Awards.
- The Australian Cereal Rust Control Program (ACRCP) has formally become a partner in the Borlaug Global Rust Initiative. ACRCP partners are also involved in several new projects funded by the Bill and Melinda Gates Foundation.
- The National Grains Industry Biosecurity Plan, developed by the GRDC in partnership with Plant Health Australia and the Grains Council of Australia, was launched. The plan provides a blueprint for protecting the industry from exotic pests and diseases.

- The GRDC Chair launched *A Responsible Lead: an Environmental Plan for the Australian Grains Industry.* Developed by the GRDC and the Grains Council of Australia in consultation with the industry, the plan deals with risks and opportunities arising across 18 agroecological zones, covering water, soil and climate issues.
- The GRDC continued to support the Australian Grains Free Air Carbon Dioxide Enrichment (AGFACE) project, which is a partnership between the GRDC, the University of Melbourne and the Department of Climate Change for the collection of information on the impacts of elevated carbon dioxide on wheat-based cropping systems.
- The communication activities of the CIMMYT – Australian Germplasm Evaluation (CAGE) project were expanded to incorporate information relating to GRDC-funded research activities at ICARDA.
- The GRDC has implemented a new customer relationship management (CRM) system. This system will improve the timely and targeted dissemination of information to the grains industry.
- Training packages were developed and delivered to strengthen capability in priority areas such as managing climate variability, precision agriculture and integrated pest management.
- The GRDC supported 32 travel awards, 10 industry development awards, 27 conferences and 52 training scholarships, including 19 PhD scholarships and 12 undergraduate honours scholarships.

GRDC's *Ground Cover* newspaper popularity spreads:

(Top) Scott Roberts, a grower from Alford, SA states Ground Cover is a 'must read' for all grain growers—in a recent edition an article helped him decide to invest in a disc seeder.
Photo: Emma Leonard

(Bottom) Iowa farmer Clay Mitchell is regarded in the US as a pioneer of controlled traffic and is a subscriber to *Ground Cover*. He says that it is one of the best sources of general farming knowledge in the world.
Photo: Richard Heath

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 2008–09, as well as the dates on which the Minister made announcements or decisions of particular significance to the GRDC.

Table 3: Significant events, 2008–09

Date	Event
1 July 2008	The Hon. Tony Burke, MP, Minister for Agriculture, Fisheries and Forestry wrote to the GRDC requesting it take over the management of the Wheat Variety Classification function from AWB (International) Ltd.
14 July 2008	The GRDC Chair wrote to the Minister confirming agreement to take over the management of the Wheat Variety Classification function.
17 July 2008	The Minister wrote to the GRDC advising of the establishment of a new Australian Weeds Research Centre and seeking GRDC input.
12 August 2008	The GRDC Chair wrote to the Minister to advise that the GRDC had acquired the Value Added Wheat CRC's shares in Triticarte Pty Ltd, as part of the windup of the CRC, then divested the shares to DArT Pty Ltd.
23 September 2008	The Minister wrote to the GRDC detailing the new Australian Government Bargaining Framework and the expectation that the GRDC would adopt and implement it.
28 October 2008	The Minister approved the GRDC's Annual Report 2007–08 for tabling. The report was tabled out of session on 10 November 2008.
11 November 2008	The Minister advised the appointment of directors to the GRDC Board.
8 January 2009	The GRDC Chair wrote to the Minister to recommend the appointment of Steve Marshall as GRDC Deputy Chair.
23 January 2009	The Minister wrote to the GRDC Chair to confirm his support for increased collaboration between the GRDC and the Cotton RDC.
24 February 2009	The Minister wrote to the GRDC Chair to confirm the appointment of Steve Marshall as Deputy Chair.
10 March 2009	The Hon. Lindsay Tanner, MP, Minister for Finance and Deregulation approved the revised outcome statement for the GRDC.
23 April 2009	The GRDC submitted the GRDC 2009–10 Annual Operational Plan to the Minister for Agriculture, Fisheries and Forestry for approval.
29 April 2009	The GRDC Chair wrote to the Minister to advise that the GRDC had purchased part of the University of Sydney's shareholding in Australian Grain Technologies Pty Ltd (AGT).
23 June 2009	The Minister approved the GRDC's 2009–10 Annual Operational Plan.
26 June 2009	The GRDC Chair wrote to the Minister to advise that the GRDC had purchased part of GrainCorp Services Limited's shareholding in AGT.

PART 2

Our Performance

Photo:
CSIRO Plant Industry technician Damber Shrestha using temperature controlled cabinets to investigate how photoperiod and vernalizing temperatures affect flowering and growth processes in lupins.
Photo: Evan Collis

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 2008–09; and the 2008–09 Portfolio Budget Statements for the Department of Agriculture, Fisheries and Forestry.

This section describes the GRDC's corporate performance in 2008–09 in terms of:

- evidence of effective implementation of the corporate strategies set out in the Strategic R&D Plan 2007–12
- grain grower feedback, collected by the Kondinin Group, on the perceived value created from growers' research dollars invested through GRDC
- results of the impact assessments of five R&D project clusters
- Australian Bureau of Agricultural and Resource Economics findings on farm financial performance and total factor productivity in the grains industry.

The details of the performance of each output group against the performance indicators in the Annual Operational Plan 2008–09 are shown in the respective output group sections.

Corporate strategies

Table 4 provides examples of how the GRDC progressed against its performance measures for 2008–09 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	In November 2008, the Primary Industries Ministerial Council endorsed the National Primary Industries Research, Development and Extension (RD&E) Framework, to facilitate a more coordinated and collaborative approach to rural RD&E. The framework is built on RD&E strategies for 14 primary industry sectors and seven cross-industry sectors. The GRDC is a leading member of the committee developing the framework, and has contributed significantly to formulating the strategy for the grains sector. The GRDC is an active participant in the Climate Change Research Strategy for Primary Industries (CCRSPI). The strategy provides a framework for coordination of climate change R&D across the agricultural sector. The CCRSPI work plan aims to: • complete the audit of climate change projects and include them in the Australian Agriculture and Natural Resources Online (AANRO) database • coordinate activity and investment • support immediate cross-sector and cross-jurisdiction research priorities.
Key GRDC investments demonstrate national coordination with research partners	The GRDC has been working with breeding companies, seed companies, bulk handlers and marketers to simplify End Point Royalty (EPR) collection systems and build a whole-of-industry 'culture of compliance'. During 2008–09, agreement was reached to have a voluntary national system where traders either directly deduct EPRs from grower payments or provide data to the royalty managers of varieties. The GRDC facilitated the work of the Australian Winter Cereals Pre-Breeding Alliance (AWCPA) to endorse guidelines for the transfer of typical pre-breeding project outputs, such as markers and germplasm, to breeding programs. This aims to speed up technology transfer between pre-breeding and applied breeding organisations. Following on from last year's drought workshop, the AWCPA conducted a nationwide audit of phenotyping facilities and ran national workshops on salinity and crown rot.

Table 4: Corporate overview *(continued)*

Indicator	Performance
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 2008–09 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.[a] The GRDC's Annual Operational Plan 2009–10 was approved by the Minister on 23 June 2009.
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 barley-breeding program, it leveraged $1.7 from research partners • in the salinity management program, it leveraged $1.7 from research partners • in crop disease management, it leveraged $1.6 from research partners. Other examples of the GRDC's leveraging include investments in wheat breeding, pulse and oilseeds breeding and Novozymes Biologicals (Australia) Pty Ltd.
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 three regional GRDC panels and growers, advisers and researchers. In addition, the GRDC sought direction from the grains industry's formal representative organisation, the Grains Council of Australia. These processes ensure that investments are made in order to meet the needs of growers and the wider Australian grains industry. Since bulk wheat export deregulation, the GRDC has become responsible for Wheat Variety Classification, a system providing bulk export market signals to Australian wheat breeders. Since January 2009, 40 new wheat lines have been graded. The Wheat Classification Council, which has oversight of the grading operations and sets the parameters around the grades, held its first meeting in June 2009. The council will access market data and distil it into parameters for setting wheat grades. The GRDC's investment in the National Variety Trials (NVT) program provides growers and agricultural advisers with independent information on the agronomic performance of new variety releases of winter cereals, canola and selected pulse crops. The list of priority traits endorsed by the AWCPA for research in biotic and abiotic stress tolerance in wheat will guide future investments by the GRDC and its research partners in wheat pre-breeding. Barley Breeding Australia has an ongoing strong relationship with Barley Australia to provide guidance on R&D that the malting barley industry requires. Similarly, Pulse Breeding Australia liaises with the industry body Pulse Australia Limited to ensure market signals are fed into R&D priority setting.

a Table 9 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

The formal survey seeking grain grower feedback on GRDC performance is conducted on a biennial basis and is due to be conducted again in 2009–10. This will be a major assessment tool for corporate performance.

As a completely independent event from GRDC-funded surveys, the Kondinin Group conducted a survey of 800 to 1,000 of its members in 2008–09. That survey gained responses to the question: 'Do you think you get value for money for your research dollar from GRDC?'

The results were that 83 percent of the surveyed Kondinin Group members (noting the small sample size) answered 'yes' to the question. The survey, which has been conducted each year for the past four years, shows that between 2005 and 2007 the positive response moved from 73 percent to 83 percent, then stabilised at 83 percent in 2008.

Impact assessments

The GRDC undertook five impact assessment studies in 2008–09 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 using both an independent consultant and in-house resources. Table 5 summarises the key results.

Barley breeding

The GRDC investment in barley breeding totalled approximately $46 million in present value terms between 2002 and 2008. New barley varieties were bred to incorporate a wide range of improved agronomic and quality attributes.

The two key factors accounted for in determining benefits were the increased profits from new varieties, and the extent to which the new varieties displaced other varieties in barley production areas or made them more competitive with other crops, such as wheat. Yield increases could also be manifest in subsequent crops in a rotation.

The value of benefits from the GRDC investment was estimated at $380 million in present value terms over 25 years, resulting in a benefit to cost ratio of 8:1. The net present value (total benefits less total costs) to industry was estimated at $334 million.

Barley is a significant and traditional part of the local economy in many Australian communities. By improving yields and maintaining industry competitiveness, the investment has led to higher incomes, regional stability and improvements in social welfare.

Western Australian No-Tillage Farmers Association

The Western Australian No-Tillage Farmers Association (WANTFA) was formed in 1992 as the first no-till farmer group in Australia. Its purpose has been to drive adoption of sustainable and profitable broadacre cropping systems by sharing farmer experiences and innovations from research and field trials across its network. GRDC investment between 1997 and 2010 will total approximately $4 million in present value terms.

The principal benefits derived from the investment include both short-term and long-term benefits to adopters of no-till.

- In the short term, improved soil moisture retention from reduced soil disturbance and a higher degree of ground cover have led to higher yields, especially in low-rainfall years. There has been increased profitability of crop production from higher average yields, with decreases or minimal increases in operational costs.

Table 5: Summary of results of impact assessments

	Present value of benefits (1) $m	Present value of costs (2) $m	Benefit to cost ratio (1/2)	Net present value (1–2) $m
Barley Breeding	380.0	46.4	8:1	333.6
Western Australian No-Tillage Farmers Association	145.4	4.0	36:1	141.4
Crop Disease Management in Western Australia	12.7	4.6	2.7:1	8.1
Reducing Salinity and Recharge	7.7	5.2	1.5:1	2.5
Growing Noodle Wheat Exports to Taiwan	3.2	1.2	2.7:1	2.0

WANTFA post-seeding field walk. Photo: GRDC

- In the longer term, further yield increases may be captured from improved control of pests and diseases, improved soil structure and higher organic soil carbon content, reduced reliance on chemical control of weeds and greater employment of leguminous and other cover crops.

The value of benefits from the GRDC investment has been estimated at $145 million in present value terms, resulting in a benefit to cost ratio of 36:1. The net present value (total benefits less total costs) to industry is estimated at $141 million.

The investment also provides environmental and social benefits. These include enhancing the sustainability of the land, improving the water quality of waterways, reducing pollution from stubble burning, reducing chemical usage on farms and increasing research capacity.

Crop Disease Management in Western Australia

This impact assessment evaluated seven GRDC projects in Western Australia contributing to improved crop protection from plant diseases. GRDC investment in the projects amounted to $4.6 million in present value terms between 2001 and 2007.

The primary outcome of these investments was reduced use of fungicide leading to lower costs of production.

The value of benefits from the GRDC investment was estimated at $12.7 million in present value terms over 25 years, resulting in a benefit to cost ratio of 2.7:1. The net present value (total benefits less total costs) to industry is estimated at $8.1 million.

There is also a general community benefit from the perception that a more targeted approach to disease control demonstrates a more responsible approach to environmental management. Farmers and the community benefit from greater security from plant disease threats resulting from the increased scientific capacity. Farmers also benefit from reduced stress in the knowledge that they have increased skills and capacity to manage disease threats.

Although there is no significant environmental outcome identified from these projects, there is a general environmental management benefit from recognition that more responsible and targeted approaches are being used for fungicide management.

Reducing Salinity and Recharge

The overall objective of the investment in this series of projects was to increase growers' knowledge of methods for responding to the growing threat of salinity and water logging, through decision aids. GRDC investment in this cluster of projects totalled $5.2 million in present value terms between 2000 and 2005.

The value of benefits from the GRDC investment was estimated at $7.7 million in present value terms over 25 years, resulting in a benefit to cost ratio of 1.5:1. The net present value (total benefits less total costs) to industry was estimated at $2.5 million.

Social benefits from the investment include the 'oasis' factor of having green in the landscape, and hence reduced farmer stress during the summer–autumn period.

Growing Noodle Wheat Exports to Taiwan

The primary objective of this project was to increase the level of wheat exports to the lucrative Taiwan noodle market. The GRDC investment in the project amounted to $1.2 million in present value terms between 2002 and 2007.

The value of benefits in present value terms was estimated at $3.2 million over 20 years, resulting in a benefit to cost ratio of 2.7:1. The net present value to industry (total benefits less total costs) was estimated at $2 million.

The project outputs were not intended to achieve any specific social outcomes. However, the project may have improved business confidence and enabled the establishment of relationships between Australia and Taiwan which may lead to spillover benefits in other areas of food manufacturing and processing.

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 rural R&D corporations and the Department of Agriculture, Fisheries and Forestry, funds a range of surveys and analytical research conducted by the Australian Bureau of Agricultural and Resource Economics (ABARE), 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 from the AAGIS results.

Financial performance

The financial performance of grain-producing farms, which include cropping specialists and mixed crop–livestock farms, is projected to have further improved in 2008–09, as a result of increased grain production. Cash receipts from the sale of crops are projected to have risen by 22 percent on average, despite a fall in grain prices resulting from expected higher grains production.

With the projected increase in cash receipts more than offsetting the increase in cash costs, farm cash incomes are projected to have risen by 20 percent to average $145,900 per farm in 2008–09. This, in combination with an increase in the value of farm trading stocks, is projected to have resulted in an increase in farm business profit to $21,300 per farm in 2008–09 after realising a small profit of $8,200 in 2007–08 and a sizable loss of $105,420 per farm in 2006–07, the largest average farm business loss recorded by cropping farms since ABARE commenced its survey of broadacre farms in 1977–78.

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.

TFP growth in Australia's broadacre industries is highly variable on a year-to-year basis. It has generally trended upward over the past three decades, but since the turn of the century broadacre productivity growth appears to be slowing, particularly in the cropping and mixed crop–livestock industries.

The latest TFP results available from ABARE are for the period between 1977–78 and 2006–07. Results to 2008–09 will become available in two years time. Between 1977–78 and 2006–07, cropping specialists realised the highest average annual growth in productivity, at 2.1 percent per annum, compared with an annual rate of 1.5 percent for the mixed crop–livestock industry, the beef industry, and all broadacre industries combined (including sheep and dairy).

However, between 1997–98 and 2006–07, overall broadacre productivity growth appears to have been falling at an average rate of 1.4 percent a year. Cropping industries have been the hardest hit, with cropping specialists and the mixed crop–livestock industry recording declines in productivity growth rate of 2.1 percent per annum and 1.9 percent per annum respectively. The beef industry has been the standout performer over the period, realising an average productivity growth rate of around 2.8 percent a year.

Productivity growth within the Australian cropping industry is fairly similar among regions, but the factors driving it differ markedly. Producers in the southern and western agroecological regions realised strong growth in farm outputs and some input growth. In the northern agroecological region, productivity growth was the result of more modest growth in output, accompanied by a reduction in overall input use, as Table 6 shows.

Table 6: Total factor productivity growth by GRDC production region, 1977–78 to 2006–07 (percent)

Region	Input growth	Output growth	Total factor productivity growth
Northern	–0.8	1.3	2.0
Southern	2.0	4.7	2.7
Western	1.7	3.8	2.1

Source: ABARE, *Financial performance of grains producing farms, 2006–07 to 2008–09*, Australian grains industry report 09.1, May 2009.

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*, through the GRDC's consultations with the GCA, local research advisory committees, grower groups and grower organisations and individual grain growers.

Key priorities identified were:

- environmental
  - responses to climate change
  - improved water use efficiency
  - sustainability and resource management
  - soil health and biology
- farm management
  - integrated farming practices and technologies
  - integrated management of weeds, diseases and pests
  - herbicide resistance management

Healthy soils are fundamental to food production and carbon balance. Photo: Emma Leonard.

- variety development
  - biotechnology for improving genetic gain
  - superior new varieties
- new and innovative product development
- capacity building
  - improving skills, training and education in agriculture
  - farm business management.

Table 7 shows how investments in 2008–09 directly addressed these priorities.

Table 7: Investments to meet grain grower priorities in 2008–09

Priorities	Examples of relevant GRDC investments
Environmental	
Responses to climate change *Improved water use efficiency*	The GRDC actively participated in the development of the Climate Change Research Strategy for Primary Industries, a framework for effective and collaborative R&D on climate change across the agricultural sector. The GRDC, in partnership with the University of Melbourne and the Department of Climate Change, continued its support for the Australian Grains Free Air Carbon Dioxide Enrichment (AGFACE) project, established to collect information on the impacts of elevated carbon dioxide on wheat-based cropping systems. Other GRDC-supported climate change research projects included: • measurement of paddock-based greenhouse gas emissions from wheat production to improve life cycle assessment of wheat products • assessment of greenhouse gas emissions in cereal–legume cropping systems in southern Australia • development of fertiliser management strategies for decreasing on-farm greenhouse gas emissions • projects to mitigate nitrous oxide emissions from soils, using pulses and improved nitrogen management, and to mitigate nitrous oxide emissions in high-rainfall cropping systems • research on soil carbon and biochar • a project to optimise wheat root architecture for increased yield and yield stability • research to develop wheat cultivars with improved drought tolerance and agronomic traits.

Table 7: Investments to meet grain grower priorities in 2008–09 *(continued)*

Priorities	Examples of relevant GRDC investments
Environmental *(continued)*	
Sustainability and resource management *Soil health and biology*	The GRDC provided support for: • a scoping study to identify ways to assist growers to make better fertiliser decisions in Australian cropping systems • the National Rhizobium Program, which focuses on managing *Rhizobia* to maximise nitrogen fixation by legumes in agriculture • a project to identify ways to harness soil microbial processes to get maximum value from stubble retention in different cropping regions • research into advanced techniques for managing subsoil constraints • a project to identify and use novel sources of resistance against soil-borne pathogens in wheat.
Farm management	
Integrated farming practices and technologies	Fourteen new farming systems investments were established, bringing together grain growers, researchers and agribusiness, to enhance the validation and integration of new technologies in local farming systems.
Integrated management of weeds, diseases and pests	The National Integrated Weed Management Initiative was established, to coordinate investment in research and communications to reduce the use of herbicide and the impact of herbicide resistance.
Herbicide resistance management	Following early success in a feasibility study, a research program was contracted with Charles Sturt University to develop a commercial product using native parasitic nematodes to control snails. The GRDC also supported: • a farming systems project to increase the profitability of cropping systems in Western Australia, using lupins, oats, oilseeds and pulses • work to develop integrated disease control methods for broad leaf crops, using varietal selection and crop management • research to better predict and manage *Rhizoctonia* disease risk in cereals • research to identify cultivars for rotational management of root lesion and burrowing nematodes in Western Australia • field testing of the Harrington Weed Seed Destructor, a non-chemical weed management tool being developed by the Western Australian Herbicide Resistance Initiative • ongoing work on risk assessment and preventative strategies for herbicide resistance in the Northern Region • a project to identify new compounds from plant produced metabolites with the potential to be used as natural herbicides. The GRDC, in collaboration with CropLife Australia, distributed more than 40,000 copies of the *Herbicide Resistance Mode of Action Groups* booklet.
Variety development	
Biotechnology for improving genetic gain	More than 50 blackleg-resistant lines with higher resistance than existing cultivars, including both polygenic and major gene resistance sources, were accessed by private canola breeders. The GRDC supported: • a collaborative project to improve wheat and barley germplasm for saline and sodic soils • the development and implementation of molecular markers for narrow-leafed lupin breeding • research to develop genetic approaches to enhance resistance to *Fusarium* and *Bipolaris* in wheat and barley • projects to eliminate grain defects and improve grain quality using biochemical and genetic solutions.

Table 7: Investments to meet grain grower priorities in 2008–09 *(continued)*

Priorities	Examples of relevant GRDC investments
Variety development *(continued)*	
Superior new varieties	GRDC-supported breeding programs released many new, improved crop varieties: • 14 wheat varieties (including two durum varieties), some of which yield up to 11 percent higher than current varieties of comparable quality • two barley varieties that are higher yielding than comparable popular varieties—one variety, Commander(Ф), consistently record yields 2 percent to 17 percent higher than the dominant malting varieties currently grown • two mungbean varieties—one variety, Crystal(Ф), yields 20 percent higher than the benchmark variety • one desi chickpea variety • one faba bean variety. The GRDC also supported breeding programs to develop higher yielding elite lines of pearl lupin and new vetch varieties for grain and hay production.
New and innovative product development	
	TagTeam, a new soil inoculant product containing *Rhizobium* bacteria and phosphorous-solubilising microbes, was launched in Australia in early 2009. The GRDC undertook a collaborative project with the CSIRO Food Futures Flagship to develop canola plants that produce docosahexaenoic acid (DHA), a healthy omega-3 oil component normally found in fish that has human health benefits. The GRDC also supported: • research to identify important quality and processing attributes needed to make low-gluten and ultra-low gluten malting barleys, suitable for making coeliac-friendly beer • a feasibility study by the University of Sydney to determine whether crops can be used to produce precious-metal nanoparticles that are highly valued for biomedicine, optics and electronic applications. The GRDC has engaged CSIRO to explore opportunities to use crop stubble as feedstock for biofuel and bioenergy production.
Capacity building	
Improving skills, training and education in agriculture *Farm business management*	The GRDC supported 32 travel awards, 10 industry development awards, 27 conferences and 52 training scholarships including 19 PhD scholarships and 12 undergraduate honours scholarships. Training packages were developed and delivered to strengthen capability in priority areas such as managing climate variability, precision agriculture and integrated pest management. The GRDC also continued to support the development of skills and leadership among people working in the grains industry, through: • sponsorship of Australia's premier farming scholarship awards, the Nuffield Australia Farming Scholarships • support for a farm business management initiative • a grains industry research scholarship examining the role of decision support tools in farm business decision making.

Australian Government priorities

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

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

Table 8 shows the relationship between the government's research priorities and the associated goals that relate to them, while Table 9 shows how GRDC investments addressed the national research priorities and rural R&D priorities in 2008–09. The total expenditure allocated to each of the Australian Government's priorities is shown in detail in Table 23 and Table 24.

Table 8: Australian Government priorities and associated goals

National Research Priorities			
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				
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 9: Investments to meet the Australian Government National Research Priorities and Rural R&D Priorities in 2008–09

Priorities	Examples of relevant GRDC investments
RRDP: Productivity and adding value	GRDC-supported breeding programs released many new, higher yielding crop varieties that will help lift industry productivity, including: • 14 wheat varieties (including two durum varieties), some of which yielded up to 11 percent higher than current varieties of comparable quality • two barley varieties that are higher yielding than comparable popular varieties—one variety, Commander(Þ), consistently recorded yields 2 percent to 17 percent higher than the dominant malting varieties currently grown • two mungbean varieties—one variety, Crystal(Þ), yielded 20 percent higher than the benchmark variety The GRDC also supported: • an oilseed industry support program designed to increase the productivity and value of the Australian oilseeds industry • a germplasm enhancement and productivity improvement program for maize in tropical Australia • a project seeking to improve productivity in wheat-on-wheat systems by rotating different varieties • a farming systems project to increase the profitability of cropping systems in Western Australia, using lupins, oats, oilseeds and pulses.
RRDP: Supply chain and markets *NRP: Promoting and maintaining good health*	The GRDC undertook a collaborative project with the CSIRO Food Futures Flagship to develop canola plants that produce docosahexaenoic acid (DHA), a healthy omega-3 oil component normally found in fish that has human health benefits. The GRDC also supported: • a range of projects to facilitate the use of Australian wheat for bread and noodle production in Asian markets • market intelligence gathering and market visits for wheat and barley breeders, growers, and marketers • a national screening program for grain defects in barley, including black point, kernel staining and pre-harvest sprouting • work to evaluate the brewing qualities of new malting barley lines destined for export markets • research to identify important quality and processing attributes needed to make low-gluten and ultra-low gluten malting barleys suitable for making coeliac-friendly beer. The GRDC produced *Grain Market Lingo*, a free publication which provides factual, objective information on price risk management. The GRDC continued to support Go Grains Health & Nutrition Ltd to promote the nutritional and health benefits of grains and pulses.

Table 9: Investments to meet the Australian Government National Research Priorities and Rural R&D Priorities in 2008–09 *(continued)*

Priorities	Examples of relevant GRDC investments
NRP: An environmentally sustainable Australia *RRDP: Natural resource management*	The GRDC supported: • a scoping study to identify ways to assist growers to make better fertiliser decisions in Australian cropping systems • the National Rhizobium Program, which focuses on managing *rhizobia* to maximise nitrogen fixation by legumes in agriculture • a project to identify ways to harness soil microbial processes to get maximum value from stubble retention in different cropping regions • research into advanced techniques for managing subsoil constraints • a workshop on exploiting the biological potential of cropping soils • a project to identify and use novel sources of resistance against soil-borne pathogens in wheat.
NRP: An environmentally sustainable Australia *RRDP: Climate variability and climate change*	The GRDC actively participated in the development of the Climate Change Research Strategy for Primary Industries, a framework for effective and collaborative R&D on climate change across the agricultural sector. The GRDC, in partnership with the University of Melbourne and the Department of Climate Change, continued its support for the Australian Grains Free Air Carbon Dioxide Enrichment (AGFACE) project, established to collect information on the impacts of elevated carbon dioxide on wheat-based cropping systems. Other GRDC-supported climate change research projects include: • measurement of paddock-based greenhouse gas emissions from wheat production to improve life cycle assessment of wheat products • assessment of greenhouse gas emissions in cereal–legume cropping systems in southern Australia • development of fertiliser management strategies for decreasing on-farm greenhouse gas emissions • projects to mitigate nitrous oxide emissions from soils, using pulses and improved nitrogen management, and to mitigate nitrous oxide emissions in high-rainfall cropping systems • research on soil carbon and biochar • a project to optimise wheat root architecture for increased yield and yield stability.
NRP: Safeguarding Australia *RRDP: Biosecurity*	The GRDC provided major funding support for a grain hygiene program through the Cooperative Research Centre for National Plant Biosecurity. A National Grains Industry Biosecurity Plan, developed by Plant Health Australia in partnership with GRDC, the Grains Council of Australia, the state and territory governments and the Australian Government, was launched in Adelaide in February 2009. The plan incorporates the latest scientific research and pest intelligence to identify the pests that present the highest risk to the grains industry, and provides a blueprint for protecting the industry from exotic pests and diseases. The GRDC also continued to support work on the registration and extension of the use of new ethyl formate formulations on stored grain.

Table 9: Investments to meet the Australian Government National Research Priorities and Rural R&D Priorities in 2008–09 *(continued)*

Priorities	Examples of relevant GRDC investments
RRDP: Innovation Skills *NRP: Frontier technologies for building and transforming Australian industries; (includes the associated priority goal of 'Promoting an innovation culture and economy')*	The GRDC supported 32 travel awards, 10 industry development awards, 27 conferences and 52 training scholarships including 19 PhD scholarships and 12 undergraduate honours scholarships. Training packages were developed and delivered to strengthen capability in priority areas such as managing climate variability, precision agriculture and integrated pest management. The GRDC also continued to support the development of skills and leadership among people working in the grains industry, through: • sponsorship of Australia's premier farming scholarship awards, the Nuffield Australia Farming Scholarships • support for a farm business management initiative • a grains industry research scholarship examining the role of decision support tools in farm business decision making.
NRP: Frontier technologies for building and transforming Australian Industries *RRDP: Technology*	The GRDC supported the commercialisation of results from a collaborative project to enhance near-infrared (NIR) calibrations for predicting the energy value of whole cereal grains for different types of livestock. The aim is to ensure that rapid measurement through NIR technology becomes the industry accepted standard for valuing and using grains for livestock feed. TagTeam, a new soil inoculant product containing *rhizobium* bacteria and phosphorous-solubilising microbes, was launched in early 2009. The GRDC also supported work to: • examine the market potential of a new MEMS IR (micro electrical mechanical infrared) technology for measuring soil and grain characteristics, and to determine the most viable path to market • integrate new technologies to improve yield stability and enhance genetic gain in barley and sorghum breeding programs.

Notes: 'NRP' priorities are the Australian Government's four national research priorities.
'RRDP' priorities are the ministerial priorities for rural R&D corporations and companies.

Climate change focus

In 2008, the Department of Agriculture, Fisheries and Forestry (DAFF) announced the Climate Change Research Program, an initiative to improve productivity and help farmers manage climate change. This program, part of the Australia's Farming Future initiative, provides funding for R&D in the areas of greenhouse gas emissions, soil management and adaptation to climate change.

The GRDC was successful in obtaining funds to develop collaborative projects in the areas of climate change adaption, mitigation, and better soil management in the grains industry. This success was a result of direction provided from the Climate Change Research Strategy for Primary Industries (CCRSPI) and the GRDC's commitment to delivering high-quality outcomes to assist the grains industry adapt to climate change.

Through the CCRSPI, the GRDC was appointed to lead R&D in the nitrous oxide component of the Australian Government's Climate Change Research Program and to be a key participant in the soil carbon and crop adaptation components.

Nitrous oxide emissions

Nitrous oxide represents 18 percent of Australian agriculture's greenhouse gas emissions. Work commenced in 2008–09 to develop a research framework to ensure research is well targeted and delivers high-quality outcomes to reduce nitrous oxide emissions. The research framework consists of eight new projects, in which the GRDC is in partnership with the Victorian Department of Primary Industries, Queensland University of Technology, University of Melbourne, University of Western Australia, Queensland Department of Natural Resources, University of New England, and New South Wales Department of Industry and Innovation.

The key outcomes from this group of projects are:

- an accurate quantification of nitrous oxide emissions under different management practices over the main agricultural regions, soil types and climates
- provision of methods and data for verification of the nitrous oxide component of the Department of Climate Change's FullCAM carbon accounting model, using datasets of nitrous oxide emissions under a range of management practices
- provision of methods and data for development of national defaults, and their respective variance and uncertainty, for nitrous oxide emissions from a matrix of current management practices, soil types and climates
- an investigation of the potential of inhibitors to reduce nitrous oxide losses from agricultural systems.

Soil carbon sequestration

GRDC-funded collaborative projects in soil carbon managed by CSIRO were developed in 2008–09. The key outcomes from these projects are similar to those for nitrous oxide research:

- quantification of changes under different management practices and environments
- provision of methods and data for verification of the soil carbon component of the FullCAM model
- provision of methods and data for the development of national defaults.

Farm and crop adaptation to climate change

The GRDC is partnering with CSIRO in a set of projects to improve understanding of how farmers can modify their farming systems to adapt to climate change. Other work is focusing on the selection of crop genotypes better adapted to heat, drought and frost in a changed climate.

The key outcomes from this group of projects are:

- downscaling of climate change models to the agroecological zone scale, to assist in industry planning
- testing of the effects of elevated carbon dioxide and soil water availability in selected genotypes of wheat, canola and pulses
- screening of plant traits in cereal germplasm that improve plant adaptation to elevated carbon dioxide and increased temperature.

Dr Mark Howden, Senior Principal Research Scientist, CSIRO Sustainable Ecosystems and a theme leader in CSIRO's Climate Adaptation Flagship and BCG member John Ferrier addressing growers at a climate and risk management field day at Birchip, Victoria. Photo: BCG

InterGrain Pty Ltd's wheat breeding trials at DAFWA's glasshouse facility located at South Perth.
Photo: GRDC

Adaptation to elevated levels of carbon dioxide

The Australian Grains Free Air Carbon Dioxide Enrichment (AGFACE) facility in Victoria—the result of a partnership between the GRDC, the University of Melbourne and the Department of Climate Change—continued to deliver information on the impacts of elevated levels of carbon dioxide on wheat-based cropping systems in 2008–09. This work will continue in 2009–10 with additional support from the Climate Change Research Program.

At the Horsham site, the second phase of operation of the facility resulted in data suggesting that elevated carbon dioxide increases grain yield. Elevated carbon dioxide increased grain yield from 3.01 tonnes per hectare to 3.72 tonnes per hectare (an increase of 24 percent) under rain-fed conditions. When irrigated, grain yields increased from 3.20 tonnes per hectare to 4.56 tonnes per hectare (an increase of 43 percent). An interaction with the time of sowing of the sites and the magnitude of the response indicates that temperature during growth could impact on the response to carbon dioxide.

Results from the first year of operation of the Walpeup site reported the effect of elevated carbon dioxide on grain yield as an increase from 1.02 tonnes per hectare to 1.64 tonnes per hectare when sown early season (April/May). Carbon dioxide also increased the number of fertile heads per plant, but had only a small effect on kernel weight.

A general observation from both sites was of a greater positive effect of elevated carbon dioxide on grain yields when crops experience more favourable field conditions.

Managing Climate Variability

In 2008–09, through the GRDC's involvement in the Managing Climate Variability (MCV) program, a series of national workshops were held to raise grain growers' awareness and knowledge of the impact of climate change on cropping regions and individual farm businesses. Other projects in the MCV program are developing improved forecasts based on climate drivers as well as historical climate data, evaluating the impacts of heat stress on crops, and examining how best to prepare for extreme climatic events. Through MCV and other investments, the Bureau of Meteorology's POAMA (Predictive Ocean Atmosphere Model of Australia) forecast continues to improve in predictive skill.

With the announcement of the closure of Land and Water Australia, the GRDC has agreed to be the managing agent for the MCV program. Managing the risks associated with season-to-season climate variability is a key tool to assist growers adapt to longer-term changes in climate.

Collaboration

The GRDC's primary objective is 'to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and sustainability'. Collaboration is essential to achieve the GRDC's four key strategies that underpin and drive this objective.

Deliver against Australian Government priorities

The GRDC collaborates with a vast range of research, development and extension partners—including other rural R&D corporations (RDCs); universities; CSIRO; agencies of state and territory governments and the Australian Government; growers; and all sectors of the Australian grains industry—to identify and respond to major rural issues.

On issues that span the Australian rural sector, such as climate change, the GRDC is involved in a number of collaborations with other RDCs. In 2008–09, these included:

- the implementation of the national CCRSPI
- the Managing Climate Variability program
- the Grain and Graze program
- the Collaborative Partnership for Farming and Fishing Health and Safety
- the Premium Grains for Livestock Program
- the Drift Management Extension Strategy for the Northern Region
- cross-RDC collaboration on measuring the impact of R&D
- a project for 'Improving the utilisation of red wheat by lactating dairy cows'
- a project for 'Reducing nitrous oxide emissions from sugarcane lands'
- a project for 'Improving the integration of legumes in grain and sugarcane farming systems in southern Queensland'.

Further details of these and other collaborative projects, including the research partners involved, are provided in Appendix C.

The RDCs also worked together or shared information on a range of common issues including project management, legal agreements, records management, archiving and intellectual property management.

Coordinate a national grains R&D agenda and portfolio

The GRDC's ongoing coordination of a national grains R&D portfolio involves collaboration both within the grains industry and across the rural sector.

In November 2008, the Primary Industries Ministerial Council endorsed the National Primary Industries Research, Development and Extension (RD&E) Framework, to facilitate a more coordinated and collaborative approach to rural RD&E. Under the framework, separate RD&E strategies will be developed for 14 primary industries and seven cross-industry sectors. The Department of Agriculture and Food, Western Australia and the GRDC are the lead agencies coordinating the development of a national RD&E strategy for the grains industry.

The GRDC and its research partners are involved in a number of nationally coordinated R&D programs that tackle key grains industry issues, including:

- plant genetic resources and pre-breeding, such as strategic alliances within breeding programs, including for pre-emptive breeding and virus screening
- crop breeding and variety trials
- farming practices, such as conservation farming and precision agriculture
- integrated weed management, disease management and pest management
- environmental issues, such as climate change, salinity and water use efficiency
- cooperation throughout the grains value chain
- extension of R&D outcomes
- capacity building.

Ensure R&D is market-driven

Ensuring that R&D is market driven means that sound and reliable market intelligence is communicated to breeding programs, inspires new product development and drives practice change. The GRDC continues to participate in a wide range of industry meetings and supports researchers and industry to develop and progress important and strategic relationships both nationally and internationally.

The GRDC is increasingly involved in collaboration along the grains industry value chain, by supporting the promotion of the nutritional and health values of grains (through Go Grains), the development of high-amylose wheat, the commercial release of NIR calibrations for feed grain quality and industry cooperation to establish standard measures for barley quality.

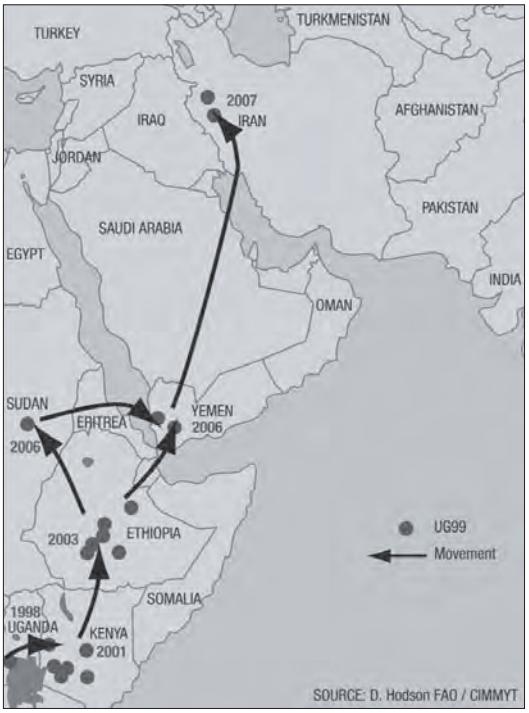
Grow and leverage total grains R&D investment

On a global scale Australia is a small investor in grains and agricultural R&D. Growing and leveraging the total investment in grains R&D is therefore increasingly important. The GRDC continues to expand its strong and productive relationships with international R&D providers.

For example, in order for Australian grain growers to have access to superior varieties and compete in global markets, Australian plant breeders and researchers need access to both international germplasm and knowledge from overseas. The GRDC plays an important role in forging long-term strategic collaborations with key international research partners.

The GRDC maintained its direct strategic alliances with CIMMYT and ICARDA in 2008–09. As part of the alliances, the GRDC funded Australian wheat and pulse breeders to travel to CIMMYT and ICARDA to select promising germplasm for further evaluation in Australia. These activities have contributed to the importation of elite wheat and pulse breeding lines containing traits of interest to Australian breeders and pre-breeding researchers, including improved drought tolerance and disease resistance.

The GRDC also continued to support a collaborative project with the Australian Centre for International Agricultural Research (ACIAR) with the overall aim of using germplasm from China, India and Australia to enhance productivity of canola-quality *Brassica napus* and *B. juncea* in all three countries. The project was in line with both the ACIAR's objective of assisting developing countries to improve skills and resources, and the GRDC's objective of enhancing oilseed brassica production in Australia. The project involved 13 institutes across the three countries.



Ug99 migration pathways: The presence of the stem rust race Ug99 has been confirmed at a number of sites in Uganda, Kenya, Ethiopia, Sudan, Yemen and Iran with Afghanistan, Pakistan and India under immediate threat. Total wheat production in these countries is estimated at 117 million tonnes which is 19 percent of world production with a total population of 1 billion people.

Other ways in which the GRDC leveraged grains R&D investment in 2008–09 included:

- expanding its network of international collaborations with both private and public sector organisations—for example, as a partner in the international effort to combat the spread of the Ug99 stem rust pathogen, the GRDC now co-invests in several projects funded by the Bill & Melinda Gates Foundation
- supporting complementary work on pulse molecular markers with international collaborators, including the University of Saskatchewan, Canada, and a Chinese consortium
- participating in a program with Grasslanz Technology Ltd, a commercial venture of a New Zealand Crown Research Institute, AgResearch, to identify and develop cereal endophytes
- funding research visits to key international markets, student exchanges and opportunities for the R&D community to understand and respond to changing market requirements.

Case Study

Collaboration promotes health and safety for farmers and families

The Collaborative Partnership for Farming and Fishing Health and Safety is a cooperative effort between the Australian Government Department of Health and Ageing and the R&D corporations for rural industries, grains, fisheries, sugar and cotton. The partnership invests in R&D with the aim of improving physical and mental health, and the safety of the work environment and work practices, for farming and fishing workers and their families.

As a member of the partnership, the GRDC attended the tenth National Rural Health Conference, 'Rural Health: The Place to Be', in May 2009. Held in Cairns (Queensland), the conference brought together approximately 900 delegates from a range of disciplines and locations across Australia.

Presentations at the conference included case studies, poster presentations, workshops and interactive demonstrations, and raised key issues such as:

- capacity building for agricultural professional networks
- evaluation frameworks and access to health-related analytical information
- use of novel technologies to improve health services
- integration of infrastructure and programs to improve efficiency and collaboration
- development and enhancement of health policies for rural Australia
- the future of health in the context of climate change and the global financial crisis.

The presence of partnership members at the conference was a first step in promoting the activities and outcomes of the partnership's investments. It potentially expanded the stream of applicants for R&D opportunities with the partnership.

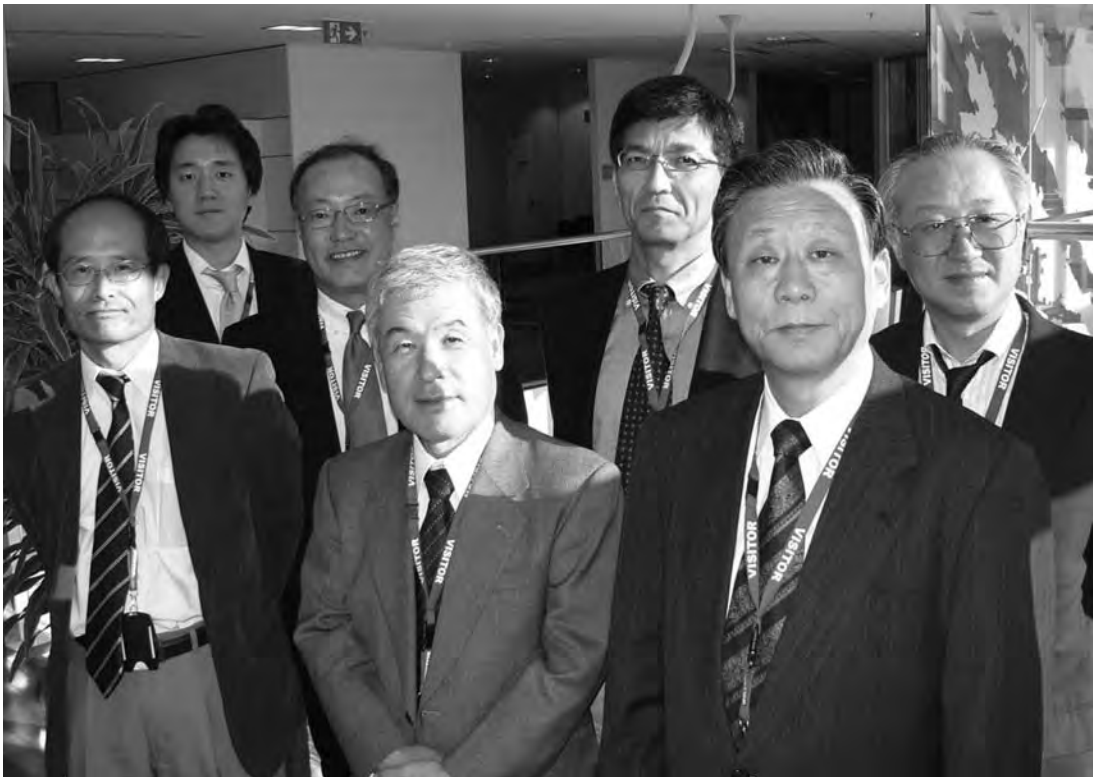
Allison and Jamie Cummins, with nine-month old daughter Eva at their family farm near Yarrawonga in northern Victoria. Photo: Kellie Penfold

International delegations

In 2008–09, the GRDC hosted a number of international delegations, mainly from countries with well-established grains industries. Through such visits, the delegations learn about Australia's industry – government collaborative approach to R&D, while the GRDC gathers first-hand information about the industry drivers in other countries.

High-level visits of particular note included those of:

- Dr Katherine Kahn, Program Officer of the Agricultural Development Initiative from the Bill and Melinda Gates Foundation, in August 2008
- Dr Cary Fowler, Executive Director of the Global Crop Diversity Trust, in September 2008
- Dr Thomas Lumpkin, Director General, and Peter Ninnes, Executive Officer—Research Management, of the CIMMYT, in September 2008
- a four-person delegation from Kazakhstani Trade and Agriculture, in September 2008
- a five-person delegation from the Japan Flour Millers' Association, in September 2008
- a 25-member delegation from the Association of Argentine Cooperatives, in November 2008
- a five-person delegation from Groupe Limagrain of France, in November 2008
- an 18-member delegation from China's State Administration of Grain, in December 2008
- Dr Dyno Keatinge, Director General of the World Vegetable Centre, in December 2008
- Professor Philip Pardey, Professor of Science and Technology Policy in the Department of Applied Economics at the University of Minnesota, in February 2009
- Dr Prem Warrior, Senior Program Officer—Agricultural Development from the Bill and Melinda Gates Foundation, in April 2009.



A delegation of Japanese flour millers visited Australia seeking reassurance that wheat quality will remain a top priority in a deregulated market. Dr. Kazui Kondo, President of Nitto Fuji Flour Milling (centre front) led the delegation. Photo: DAFF

Output Group 1—Practices

The Practices output group develops and promotes innovative and integrated practices and technologies to increase capacity for on-farm change, particularly in addressing the issues of soil constraints, water and nutrient use, crop threats, environmental variability, agronomic improvements, natural resource management and biosecurity.

Alliances between growers and advisers are becoming increasingly important in integrating new and improved varieties, practices and technologies into farming systems. Recognising that information needs and preferred delivery mechanisms differ according to production region, enterprise mix and individual circumstances, the output group packages and tailors information to be delivered 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. Through the Practices output group, the GRDC aligns sustainable production systems research at a farm level with broader, community-based land use initiatives.

Agronomic benefits continue to accrue from research on water use efficiency, improved farming systems and precision agriculture and engineering. Further research, development and extension on soil biota, subsoil constraints and nutrient uptake provides additional scope for improvements to farm profitability, while challenges for environmentally sustainable farming practices under increasing salinity, climate variability and greenhouse emission concerns continue to evolve.

The complexity of farming systems, and the need to reduce reliance on traditional chemicals to minimise the development of pest resistance, demand integrated crop protection solutions that are innovative, diverse and cost effective. Ongoing developments in our understanding of both crop pests and hosts are improving our ability to manage pest–host interactions, providing farmers with vital alternatives to traditional mechanical and chemical crop protection solutions in an integrated pest management format.

CONTENTS:

Investments also support education training and other capacity-building activities that facilitate on-farm practice change and allow the grains industry to make the best use of new technology.

Table 10 summarises the achievements of the Practices output group against its performance indicators in the Annual Operational Plan 2008–09 and its objectives and strategies in the GRDC Strategic R&D Plan 2007–12, *Prosperity through Innovation*. The following sections describe some of the results of the output group's investments during the year.

Precision agriculture

The economic benefits of the use of precision agriculture (PA) have been well demonstrated in recent years by a collaborative project involving the GRDC, DAFF, the National Landcare Program, CSIRO, the South Australian Grain Industry Trust and the Southern Precision Agriculture Association. Fourteen case studies specifically undertaken to evaluate the economic benefits of PA on grain farms in South Australia, Victoria, New South Wales and Western Australia demonstrated increased profits of $10 to $37 per hectare (average $19 per hectare) through the use of PA methods.

Although the uptake of some PA technologies such as yield mapping and variable rate application has been very slow in Australia, interest in other PA techniques is increasing as growers embrace the use of Global Positioning Systems (GPS) guidance and autosteer systems, the cost of PA equipment declines, and the rising costs of inputs make variable rate application technologies more attractive.

In 2008–09, the GRDC continued to support work to expand the range and relevance of PA techniques and tools, and promote them to growers. The research focus included ways to:

- more accurately zone paddocks to maximise profit and minimise environmental impacts—research in this area includes on-farm trials, augmented by detailed economic analyses, in the Western Australian wheat belt, and studies of the potential for novel tools such as electromagnetic induction and geophysics to characterise soil quickly and efficiently
- optimise information gathering and synthesis—work at the University of Sydney is investigating methods for combining data layers measured at different spatial scales; improving the design and analysis of paddock-scale experimentation; and analysing and applying in-season crop sensing tools in combination with yield and soil maps
- drastically reduce herbicide use—a project with the South Australian Research and Development Institute (SARDI) aims to determine whether weed distribution is related to PA zones and whether weed patches are stable from season to season, and to develop ways to efficiently and accurately construct maps of weed distribution so that GPS and variable rate technology can be used to apply herbicides efficiently
- reduce the labour and cost involved in soil sampling—a project with the University of Sydney is developing a multi-ion measuring system (MIMS) that will directly measure soil nitrate, sodium and potassium levels using electrochemical sensors and ion-exchange kinetic models. The aim is for the MIMS to be automated and built into a portable field unit that can be integrated into a multi-sensor platform with the potential to provide on-the-go integrated information for variable seeding, fertiliser and chemical applications.

Responding to a survey commissioned by the GRDC in 2004, growers reported that one of the main obstacles to PA adoption was the lack of skilled and experienced people able to assist them in overcoming equipment problems and analysing and interpreting PA data so that it could be used to improve cropping decisions.

In concert with the PA research program in 2008–09, the GRDC invested in the delivery of education and training to maximise the impact of the research, development and extension (RD&E) effort and improve technical knowledge of PA across the three GRDC regions. The courses target growers and consultants, to help ensure enough industry experts exist to take PA from the scientist's desktop to the paddock, by demonstrating and evaluating PA technologies in context in their local areas.

Conservation farming

In various guises, conservation farming has been practised in Australia for many years, and has demonstrated benefits associated with profitability, soil erosion, water management and farming efficiencies. However, no-till systems have not been embraced in some areas, and potential problems (such as herbicide resistance and stratification of nutrients in surface soil) are becoming apparent in some established systems. Conservation farming must constantly evolve to meet the changing needs of sustainable cropping.

The GRDC supports R&D to take conservation farming forward, through developments such as improved stubble management; increased maintenance of ground cover, especially through the use of cover crops; new nutrient tests and fertiliser placement systems; and the integration of spatial technologies.

Two trials to explore the benefits and risks associated with different conservation farming systems have been established by the Western Australian No-Tillage Farming Association (WANTFA). One trial site is on a relatively heavy soil at Cunderdin and the other is on a sandplain soil at Mingenew. The trials are examining a range of no-till approaches:

- maximum carbon retention—the aim is maximum residue retention, with a rotation of winter cereal–winter cereal–winter cereal
- maximum diversity—the aim is maximum residue retention, with a rotation of winter cereal–winter legume–winter brassica
- maximum flexibility—each year the crop rotation is determined by a management team within treatment guidelines
- maximum profit—the aim is to maximise profit following local no-till practice where possible, with a rotation of winter cereal–winter cereal–winter legume.

Importantly, soil carbon is being monitored under the various treatments. In addition, controls based on current practice allow comparisons of soil properties, water balance, yield, grain quality and profitability.

In other GRDC-supported work, in Western Australia, South Australia and central-west New South Wales, the use of cover crops is being examined for impacts on ground cover, soil water and soil carbon.

Nutrient management

Although an abundance of fertiliser trials have been carried out across the Australian grain-growing regions, many of the results have not been widely analysed or published, and much of the knowledge resides with individual scientists, fertiliser companies or grower groups. The GRDC has supported the establishment of a project to compile and interpret these results (with statistical re-analysis where necessary) in both regional and national contexts. A national nutrient database has been developed to fit within the national soil database (ASRIS), to be the repository of information collated and processed under the project.

The aim is to provide comprehensive information to improve growers' fertiliser decisions in cropping systems for all Australian grain-growing regions. A key element of the project has been the development of a nutrient loss index. This index will allow advisers and growers to assess losses to maximise the efficient use of fertilisers in cropping systems.

A project advisory committee and a national network of specialists will ensure that the database and index tool can be fully operational in 2010–11. The project will enhance the framework through which new science developed under the GRDC's Nutrient Management Initiative is delivered to growers in future.

Salinity management

Salinity is a problem in many grain-growing regions, and there is no crop tolerant enough to be recognised as productive on even moderately affected salt land and areas prone to waterlogging. In addressing this issue for the sustainability of grain farming, the GRDC is contributing to several projects through the Future Farm Industries Cooperative Research Centre (CRC).

The first project aims to develop a wheat variety through hybridisation with wild relatives that displays tolerance to salt and waterlogging and is suitable for cropping on mildly and moderately salt-affected lands. Two crosses were tested in the field for the first time in 2008; breeding work is currently underway to restore fertility and other basic agronomic characters in these crosses. Twenty other crosses are ready to be evaluated for salt and waterlogging tolerance.

The second project, Evercrop™, will evaluate and develop the use of perennial crops in increasing profitability, resilience and natural resource management outcomes in grain-producing regions. This project has trial sites in cropping-based systems in three major cropping areas: the low-rainfall mallee region of Victoria; the medium-rainfall region of the northern wheat belt of Western Australia; and the uniform-rainfall region of southern New South Wales. Methods to overcome constraints inhibiting the adoption of perennials in the different cropping systems will be assessed by measuring the costs and benefits of particular uses of perennials in mixed farming systems relative to other options. Cropping systems analysis tools and approaches will also be evaluated to allow growers and agribusiness people to evaluate the placement, duration and management of perennials in farming landscapes.

Weed management

The National Integrated Weed Management Initiative (NIWMI), which builds on projects completed in the CRC for Australian Weed Management, focuses on integrated weed management (IWM) approaches incorporating chemical and non-chemical control methods. The GRDC has invested in a series of NIWMI projects, to ensure that there is national coordination of research to reduce the impacts of herbicide resistance, and effective communication of IWM solutions to the grains industry.

In 2008–09, the GRDC supported activities to:

- monitor the impact of genetically modified glyphosate-resistant canola in cropping systems, through a project conducted by the University of Melbourne in collaboration with universities in other states
- further develop the Weed Seed Wizard, a management decision support tool being refined by the University of Western Australia
- field test the Harrington Weed Seed Destructor, a non-chemical weed management tool being developed by the Western Australian Herbicide Resistance Initiative—field testing in commercial harvest conditions indicated weed control efficacy of greater than 85 percent
- nationally promote IWM in Australian cropping systems, through training courses for growers and agronomists.

Disease management

In 2008–09, the GRDC continued to actively promote a strategy to manage the significant impacts of cereal rust, based on three tactics: sowing varieties with cereal rust resistance; adopting cultural practices, such as controlling volunteer hosts during summer; and using fungicides effectively.

The GRDC's ongoing investments in the Australian Cereal Rust Control Program (ACRCP) continue to be important in mitigating the impact of the number of new virulent stripe rust pathotypes and managing the potential risk of incursions of exotic pathotypes. In 2008–09, ACRCP partner CSIRO continued work to develop genetic markers for Ug99 stem rust resistance genes that will permit more efficient deployment of the genes in new Australian wheat varieties as a pre-emptive measure against any possible incursion.

The efficiency of breeding and the durability of stem rust resistance in new varieties are being enhanced, through accurately 'stacking' multiple resistance genes in a single variety. ACRCP research is also increasing the understanding of rust resistance mechanisms, the cloning of resistance genes, the possibility of building synthetic resistance genes and the development of DNA markers. In particular, the cloning of the leaf rust resistance gene Lr34 and publication of that research in the prestigious international journal *Science* was a major breakthrough by CSIRO and its international collaborators. Research is continuing to investigate the transgenic expression of this gene and the mode of action.

The University of Melbourne is examining the genome sequences of the fungal diseases sclerotinia and blackleg in canola, to identify candidate genes with roles in infection as potential targets for disease control. This research has identified genes in these fungi that are crucial for infection and represent potential fungicide targets. Other genes encoding proteins that elicit a defence response in plants may possibly confer disease resistance when expressed as transgenes in canola.

A recent national study on the economic impacts of wheat and barley diseases, commissioned by the GRDC, indicates that the fungal pathogen *Stagonospora nodorum* causes $108 million in annual losses in the Western Australian wheat crop. The Australian Centre for Necrotophic Fungal Pathogens, based at Murdoch University, has made significant progress in identifying genetic resistance to *S. nodorum*, including genetic tools, signalling, metabolism and discovery of the gene and protein of a host-specific toxin (ToxA) associated with infection. The success of the research highlights the potential benefits of using molecular approaches to improve disease management.

The Department of Agriculture and Food, Western Australia (DAFWA) continued work on the validation and web-based delivery of forecasting tools for crop disease risks, focusing on cereal rusts, viral diseases and fungal diseases of field peas and canola. Tests were conducted on blackspot in field peas to validate the current Blackspot Manager model for Western Australia and calibrate the model for use in South Australia. Studies are also being undertaken by SARDI and DAFWA to model and predict spore movement of ascochyta in chickpeas.

Studies by the Queensland Department of Primary Industries and Fisheries (QDPIF) investigated a range of aircraft and satellite imagery processes that may be used in the detection of foliar and root diseases in pulses. The studies demonstrated that high-resolution satellite imagery can accurately identify small areas of ascochyta-infected chickpeas, and that infrared imagery can depict areas within a paddock with low vigour. The ongoing QDPIF project also provides:

- extension of pulse disease management learning to growers and advisers, with a particular focus on ascochyta in chickpeas in 2008
- the development of screening protocols for a wide range of pathogens, which have been employed by breeding programs to identify peanut, mungbean, chickpea and sunflower germplasm and/or breeding lines with superior disease resistance.

Pest management

Integrated pest management (IPM) in cropping systems aims to reduce the overall input cost to growers, reduce the risk of insecticide resistance and reduce the use of prophylactic sprays, providing a range of commercial and environmental benefits. The GRDC continues to improve access to pest management information for growers and advisers via the Pestlinks website, www.grdc.com.au/pestlinks.

In 2008–09, the National Invertebrate Pest Initiative (NIPI) continued to develop and disseminate information to growers and advisers on the role of IPM on farm. A series of training workshops were held and the initiative contributed to the establishment of a specialist website on IPM in grains for the Northern Region, the Beat Sheet. NIPI also published a special edition of the *Australian Journal of Experimental Agriculture* entitled 'Invertebrate pests of grains and integrated management: current practice and prospects for the future', providing valuable updates on IPM projects and processes.

Russian Wheat Aphid (RWA) is a significant pest of all wheat growing areas in the world, except Australia—Murdoch University's Dr Mehmet Cakir (pictured) is leading the GRDC supported $1.4 million collaborative international research project focusing on pre-breeding strategies in wheat and barley to offset the threat of RWA. Photo: USDA and Rose Yeoman

DAFWA researchers have demonstrated the importance to IPM of weed and volunteer crop control measures, especially where summer and autumn rains allow for 'green bridge' carryover of mites. Their research shows that, while monitoring crops for pests and targeting sprays is time consuming, it will decrease the risk of insecticide resistance in mites. This informs the management of pests which can cause considerable yield loss, such as red-legged earth mite and wheat curl mite, the vector for wheat streak mosaic virus (WSMV).

The University of Melbourne, through the Centre for Environmental Stress and Adaptation Research (CESAR), has been investigating the distribution of wheat curl mite and the prevalence of WSMV throughout Australia. CESAR has identified two lineages of the mite which may be discrete species, only one of which transmits WSMV. This research may help in determining the spread of the virus, and is linked with work being undertaken by DAFWA to increase understanding of the epidemiology of wheat curl mite and its distribution.

QDPIF continued its program of IPM training workshops, expanding the areas of delivery to include central Queensland, in line with the increased need for IPM as pulse and oilseed crops are adopted in that area. The QDPIF project also investigated pest management thresholds, disseminating updated information through the workshops and via the Beat Sheet and IPM website.

Biosecurity

The National Grains Industry Biosecurity Plan, developed by Plant Health Australia in partnership with the GRDC, the GCA, the state and territory governments and the Australian Government, was launched in 2008–09. This important document provides the framework and summarises the responsibilities for managing biosecurity in the grains industry. The GRDC had a significant co-investment in the development of this plan as well as providing technical input. The GRDC also contributed to Australian grains industry biosecurity preparedness through the CRC for National Plant Biosecurity.

In addition to ACRCP research to mitigate biosecurity risks from exotic cereal rust strains, the GRDC has invested in an international pre-breeding program to provide Russian wheat aphid resistance in wheat and barley. This research is intended to pre-empt a possible incursion of the Russian wheat aphid, which has the potential to cause 70 percent yield loss in cereal crops and is present on every continent except Australia. The program has discovered the mechanism that allows Russian wheat aphid to quickly develop virulence to resistant plants without associated declines in overall fitness, despite the aphid's asexual mode of reproduction. This information provides cereal breeders with essential knowledge for pyramiding genes for durable resistance.

In another area of research to pre-empt possible pest incursion, the CRC for National Plant Biosecurity has developed an enhanced protocol for the extraction of DNA from grain dust spores of *Tillietia indica*, the cause of Karnal bunt in wheat. This protocol has been used in an international test for validation and to enhance detection methods.

Systems water use efficiency

The GRDC's Water Use Efficiency Initiative, established in 2008, put in place investments focused on achieving measurable improvements in whole-farm water use efficiency.

Work completed by the Bureau of Rural Sciences and DAFWA provided a baseline and a framework for evaluating the likely impacts of increasing water use efficiency for cereals, in each statistical local area and agroecological zone of the Australian grain-growing regions. The work showed that enormous yield gains could become available to the grains industry if constraints to achieving maximum water use efficiency were removed, and highlighted the practices required to achieve healthy crop growth and remove soil constraints. Building on the baseline established in 2005–06, work is underway to identify zones that can achieve major gains in water use efficiency and yield.

Projects have been established in targeted locations from central Queensland to the northern agricultural region of Western Australia, to bring together the necessary skills, resources and assets from various networks and sectors to increase water use efficiency of their local farming systems by 10 percent.

Accurate information about soil water can improve the effectiveness of many aspects of cropping, including the choice of crop and variety, fertiliser rates, sowing time, seeding rate and row configuration. Knowing how to assess available stored water, and relate that knowledge to individual areas and particular crops, can improve management of soils and raise productivity.

During 2008–09 the GRDC, in partnership with CSIRO, trained and assisted 254 growers from across Australia to improve their knowledge of soil water. The project provided ready access to data about soil profiles representative of all growing areas, through the APSoil database. APSoil includes details such as water storage capacity at various depths and the incidence of root constraints (such as high pH or salinity) for each soil listed. Data on more than 480 soil profiles is available for public use through the APSoil website, www.apsim.info/apsim/Products/Apsoil.asp.

Extension

In 2008–09, the GRDC focused on building networks in the grains industry to foster two-way information flow with extension providers, and commenced several projects addressing specific segmentation of research capacity among extension providers.

Extension networks

As part of the continued rollout of the GRDC Extension Strategy and Implementation Plan, work commenced on an extension audit to coincide with the implementation of the new GRDC customer relationship management (CRM) system. This project will improve the capture of extension professionals' details, both public and private, to ensure that the GRDC can rapidly disseminate new information to industry.

Key organisations have been prioritised to ensure that a diverse range of partners can be captured in the CRM system, and segmentation categories specific to extension providers are also being established.

The GRDC also commenced the first phase of a project to integrate weed, pest and disease expertise into the CRM database, to assist in managing customer relations and provide a tool for analysing the grains industry's resource capacity in those areas of expertise. In 2008–09, the project concentrated on contacting and collecting information from professionals in relevant academic disciplines, organisations and communities within the grains industry.

The GRDC continued its strategic partnership with the State Extension Leaders Network (SELN). SELN is a gathering of government extension leaders and influencers from each state and territory of Australia, and strives to provide leadership and strategic direction in the development of extension service delivery. In 2008–09, the GRDC made presentations at SELN meetings in Melbourne and Adelaide, and discussed the GRDC Extension Strategy and Implementation Plan, the status of current GRDC investments and initiatives being scoped. SELN members expressed interest in the GRDC's evaluation techniques and discussed methods to collaborate on the use of the GRDC CRM system and further work in adoption research.

The GRDC also conducted a number of face-to-face workshops with growers and extension providers across Australia in 2008–09, to discuss improved opportunities for the delivery of information from the GRDC and its research partners. The results of such consultation are used as part of an overall analysis to improve and validate the GRDC's information and extension mechanisms.

Customer relationship management system

The GRDC's customer database has been managed internally within the GRDC for several years, with the primary purpose of distributing information products and services, including the *Ground Cover* newspaper. In 2008–09, the GRDC converted the existing database into a dedicated CRM system.

A key component of this project was to ensure that the GRDC uses CRM technology to foster targeted information exchange and manage relationships. The GRDC will use the CRM system to:

- improve the profiling of grains industry customers
- enhance the flexibility, timeliness and relevance of the delivery of products and services from the GRDC to customers
- improve the capture of information from customers to tailor information more effectively
- improve the ability to cater for and respond to changing demographics in the Australian grains industry
- take advantage of existing, new and emerging information technologies as they arise.

Migration of data to the CRM system was completed, and further demographic variables were scoped, in 2008–09.

Collaboration with agribusiness

The GRDC hosted regular meetings of the National Agribusiness Reference Group in 2008–09, focusing on issues such as:

- providing and receiving RD&E information and priorities from agribusiness to tailor programs that maximise uptake by grower clients
- delivering information in a form that is relevant and easy to use by agribusiness and the GRDC
- providing mechanisms to collect desirable feedback on the relevance of the RD&E priorities to changing agribusiness, client and industry needs
- capturing the need for continued commercial relevance within RD&E investments
- ensuring that strong formal linkages exist between agribusiness and the GRDC's regional advisory panels.

The GRDC supplemented the National Agribusiness Reference Group with a series of regionally based meetings for agribusiness representatives, at Moree (New South Wales), Horsham (Victoria), Perth and Northam (Western Australia).

The meetings concentrated on current issues of regional concern, including the data needed to support agribusiness clients, and the best methods to deliver RD&E outputs to agribusiness advisers, in each region. The meetings were positive, and agribusiness participants clearly requested that the GRDC continue this engagement process.

In addition, as part of the GRDC Western Panel Spring Tour, representatives from the Western Region Regional Agribusiness Reference Group and other invited guests held discussions with members of the Western Panel and staff of the GRDC. Participants were asked to name key issues and/or activities underway in their respective organisations, and potential opportunities for collaboration. The meeting was also used to promote initiatives in the GRDC investment plan.

GRDC representatives attended the Australian Association of Agricultural Consultants (AAAC) Western Australia's AAAC Outlook conference in November 2008. The conference brought together agricultural consultants from across the region to discuss and debate aspects of the chemical, fertiliser and fuel outlook for grower clients in Western Australia. The GRDC has actively engaged with AAAC Western Australia as part of the rollout of the regional agribusiness reference groups across Australia.

Following discussions with agribusiness professionals, the GRDC added online versions of the *Grains Research Update* newsletters for the northern and southern regions from 2006 onward to the GRDC website.

Access to final reports

The first phase of a GRDC project to convert the final reports of research projects to online formats is now complete. In 2008–09, 702 final reports were converted to a consistent web format. The GRDC rigorously tested the prototype to ensure a smooth transition of content to the GRDC website.

The emphasis of the project has now moved to consulting with GRDC program managers and investment partners to assess the quality, accuracy and relevance of the information prior to making information available live to the public. The first stream of reports was released on the GRDC website in late 2008–09.

Case Study

Water use efficiency project pinpoints returns on rainfall

Opportunities to increase production and profit per land unit and annual rainfall unit greatly affect the economic viability of Australian farms.

Over the past 80 years, improvements in crop yield and yield stability have been achieved against a background of unchanged rainfall in South Australia or slightly declining rainfall in Western Australia. Growers' success in improving yield per rainfall unit has been the result of a combination of four elements: improved cropping practices, better varieties, synergies between varieties and agronomy, and adoption of new technologies. All these elements, and in particular the synergies from improved varieties and cropping practices, are essential to increase productivity.

Working with farming groups and scientists across South Australia, New South Wales, Queensland and Western Australia, a new GRDC-funded project aims to improve water use efficiency both in-crop and on the farm generally.

This project focuses on three of the above four elements—improved cropping practices, synergies between agronomy and varieties, and grower adoption of new technologies—on two scales: the crop and the whole farm.

At the crop level, there is frequently a large gap between actual and attainable yield per unit of water used. There are many complex interacting reasons for this inefficiency, including management practices and environmental drivers (such as the time of rainfall). This project aims to guide growers in better matching management, variety, soil and climate, to improve the water use efficiency in Australia's grain crop, and increase the kilograms of grain produced per hectare per millimetre of rain (kg/ha/mm).

Since the mid-1800s, varietal improvements have increased yield per unit of water used. In wheat in particular, there has been a steady rate of improvement of about 0.078 kg/ha/mm per year, from about 9 kg/ha/mm to the estimated 22 kg/ha/mm yielded by today's varieties. Although this is a major achievement, matching varieties with soil, climate and management remains a challenge, and is being addressed in this project.

Another goal of this project is to improve land and water productivity and profit of the whole farm by better managing the entire cropping system. This involves better allocation of all farm resources—such as land, water, machinery and labour—and identification of strategies that optimise trade-offs between profit and risk, informed by likely water availability and water use efficiency. This part of the project aims to improve productivity not via an increase in yield as such but through the recognition of greater profit per hectare, per year, per millimetre of rain ($/ha/year/mm).

Case Study

Farmers and industry cooperate to contain spray drift

The GRDC joined representatives of chemical companies, spray applicators, the New South Wales Farmers Association, the Australian Pesticides and Veterinary Medicines Authority, the Australian Government and Cotton Australia to take part in an industry forum on spray drift, convened by the National Farmers' Federation (NFF), in Canberra in 2008.

The aim of the forum was to discuss opportunities that might exist for formulating a whole-of-industry guide for the spray application of chemicals. Key issues debated at the meeting included:

- contributions to a whole-of-industry guide for spray application, and how to communicate and implement a guide
- methods to raise training standards and obligations on farmers, applicators and agronomists to promote the responsible and safe use of agricultural chemicals
- stewardship measures undertaken by manufacturers and distributors that go beyond existing regulatory requirements
- the use of Farm Minder® management tools for chemical use
- the possibility of holding a spray drift summit with whole-of-supply chain participation and potential to launch a code of practice.

Information on recent GRDC-supported work, including a spray drift demonstration project (managed collaboratively between the GRDC and the Cotton Research and Development Corporation) and the publication of a fact sheet and a *Ground Cover* supplement on spray drift, was well received by participants.

Following the meeting, the GRDC, NFF and GCA discussed collaborative efforts to combat spray drift, with a focus on promoting spray drift awareness.

GRDC projects are tackling different aspects of spray drift management and are working closely with growers in all cropping regions. Photo: Emma Leonard

Table 10: 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 2008–09		
$43.85 million		
Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Increased use of spectral imaging and other precision agriculture technologies to improve production efficiency	An information package for growers on how to use spectral imaging and precision guidance technologies in crop protection and nutrition decisions Targeted training activities and information packages in precision agriculture directed at advisers, growers and undergraduate students	A project commenced in 2008–09 to deliver the package in 2010–11. A manual on precision agriculture was drafted in 2008–09 for delivery in 2009–10.
Coordinated national investments for weed management research and communication	Successful establishment of a coordinated national integrated weed management initiative New investment into preventative strategies for herbicide resistance management in collaboration with government, manufacturers and resellers	The National Integrated Weed Management Initiative was established in 2008–09 to coordinate investment in research and communications. The Harrington Weed Seed Destructor was tested as a non-chemical tool for weed seed management in the harvest process. More than 40,000 copies of the revised *Herbicide Resistance Mode of Action Groups* booklet were distributed in collaboration with CropLife Australia.
Effective management of weed, disease and insect biosecurity risks	New strategic investment in surveillance, improved identification of exotic pests to Australia and development of new sources of plant resistance	An international traveller surveillance risk analysis survey was initiated in 2008–09 for implementation in 2009–10. Research to pre-empt possible pest incursions included pre-breeding research for Russian wheat aphid resistance in cereal crops, and molecular identification of potential sources of *Stagonospora nodorum* resistance in wheat.

Table 10: Practices overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Improved effectiveness of partnerships between growers, advisers and researchers	New focused investments in farming systems research, development and extension	Fourteen new farming systems investments were established, bringing together grain growers, researchers and agribusiness to enhance the validation and integration of new technologies in local farming systems.
	New framework for improved pathways to registration and prioritisation of pesticide research outcomes in the grains industry	
	A series of regional workshops to engage growers, industry organisations and farming systems groups in planning on an agroecological zone basis	Eight regional workshops were conducted in targeted agroecological zones to shape and plan a collaborative mixed-farming system RD&E project across multiple catchments—the results formed the basis for scoping a new mixed farming systems investment.
Successful development of an industry-agreed framework for measuring and monitoring improvements in water use efficiency	Measurement of water balance in all current conservation farming projects	Through CSIRO, soil water monitoring, including measurement of evaporation and water use and estimation of drainage below the root zone, was established in all current conservation farming projects.
	Integration of water use efficiency as a key measure in farming systems related research, development and extension	The target of a 10 percent increase in water use efficiency was built into the planning, management and evaluation of the 20 component projects within the GRDC's Water Use Efficiency Initiative.
	Establish a systems-based national methodology to measure water use efficiency	A framework was developed to schematically represent the relationship between rainfall and gross income, using biomass flows in the farming system as 'currency'.
Engagement of key grain-growing regional natural resource management bodies in the development of sustainable cropping systems for a variable climate	Launch of a comprehensive Australian grains industry environmental plan	*A Responsible Lead: an Environmental Plan for the Australian Grains Industry* was launched by the GRDC Chair at the Australian Grain Industry Conference in Melbourne on 29 July 2008.
	A series of meetings in key grain-growing catchments to identify and prioritise key management practices relating to managing impacts of climate change	Eight workshops, involving 26 regional catchment groups, were conducted; they identified the need for wider industry partnerships in developing more competitive and sustainable farming systems in a more variable environment.
	Develop new partnerships with targeted natural resource management bodies in major grain-growing areas to deliver products, tools and skills from GRDC research, development and extension	Partnerships with targeted natural resource management bodies, farming systems practitioners and mixed farmers were developed to carry out a range of planning activities to assist the GRDC and Meat and Livestock Australia to develop a collaborative mixed farming system RD&E project across multiple catchments.
	New investments on improved crop agronomy and management practices effective in meeting catchment, production and environmental targets	A project on the agronomy of canola-quality *Brassica juncea* was established.

Table 10: Practices overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Engagement of key grain-growing regional natural resource management bodies in the development of sustainable cropping systems for a variable climate *(continued)*	Commencement of the integration of current crop nutrition knowledge into the national Australian Soil Resource Information System (ASRIS) database to allow growers and their advisers to make better fertiliser decisions	A national nutrient database has been developed to fit within the national soil database; the database will be populated in 2009–10.
	Further quantification of the economic benefit of ameliorating subsoil constraint	Guidelines were developed and delivered in partnership with Queensland Department of Natural Resources and Mines.
	Training packages to provide growers with skills to better manage the impacts of climate variability and climate change	Training packages were developed and delivered through the Managing Climate Variability program.
Improved effectiveness of research advisory committees	Review of research advisory committee operations and proposed feedback mechanisms	A review of research advisory committee (RAC) operations was completed in December 2008; new contracts for funding of RAC activities were implemented and the process of providing priority feedback to the GRDC was formalised.
	Expansion of the zones in which the GRDC conducts industry liaison	A new Tasmanian research advisory committee was contracted.
Improved delivery of information to customers to aid adoption of R&D	Analysis of extension networks across Australia to improve the efficiency of delivery from the GRDC	An extension audit process commenced in 2008 and will be integrated into the GRDC customer relationship management (CRM) system.
	A completed audit of current decision support tools and products, identifying gaps and overlaps	An audit of decision support tools was completed and recommendations on the future use of such tools in the grains industry were made to the GRDC and its partners.
Demonstrated engagement with agribusiness channels to improve information flow	Establish national and regional meetings with a range of agribusinesses	Meetings of the national and regional agribusiness reference groups were held in Horsham (Victoria), Moree (New South Wales), Perth and Northam (Western Australia). A National Agribusiness Reference Group meeting was conducted in Canberra.
Enhanced targeted delivery of GRDC extension programs	Successful implementation of a customer relationship management system	Successful installation of the CRM system was completed in November 2008; specific information requirements were tested in a scoping workshop.
Improved ability to deliver information in GRDC final reports to stakeholders	Final reports converted and made available on the GRDC's web site	A total of 702 final reports were converted into HTML format; editing and checking commenced, and the first stream of reports was made available.

Output Group 2—Varieties

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

The output group supports crop improvement for growing domestic markets, as well as for exports, with the aim of raising the overall value of the Australian grains industry. This means 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.

DAFWA pre-breeder Irene Waters, along with other team members is responsible for germplasm phenotyping of wheat and barley to determine tolerance to abiotic stresses relating to climate and soil constraints. Photo: Rose Yeoman

CONTENTS:

Varieties 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 11 summarises the achievements of the Varieties output group against its performance indicators in the Annual Operational Plan 2008–09 and its objectives and strategies in the GRDC Strategic Plan 2007–12, *Prosperity through Innovation*. The following sections describe some of the results of the output group's investments during the year.

Wheat breeding

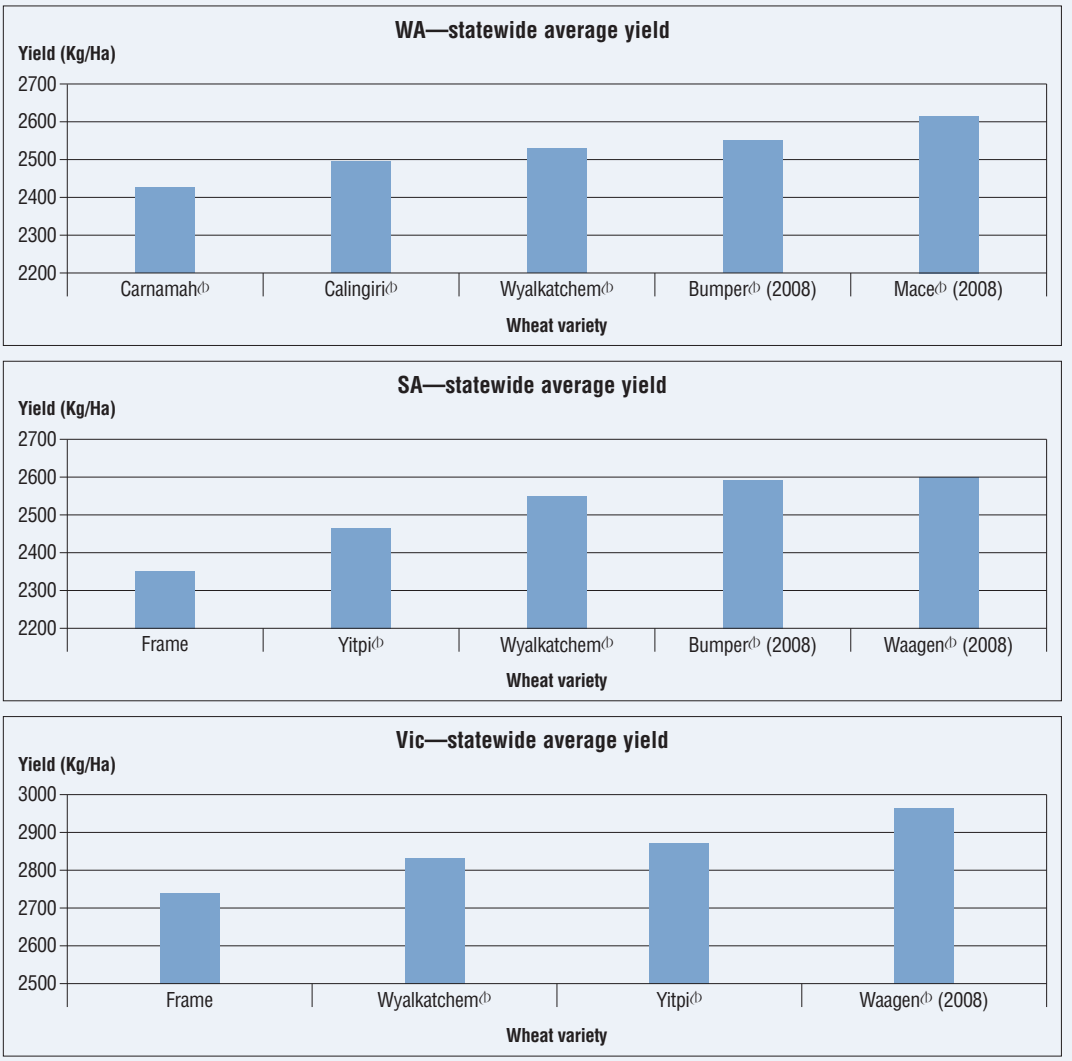
Wheat-breeding programs with GRDC support performed strongly in 2008–09, releasing several new varieties with superior traits designed to meet the particular needs of growers in Australia's wheat-growing regions. The reach and resources of the wheat-breeding effort were expanded during the year, through a new business relationship between Australian Grain Technologies and one of the world's leading seed producers.

New releases

Fourteen new wheat varieties, including two durum wheat varieties, were released in 2008–09.

Data from long-term and multi-site trials in National Variety Trials (NVT) indicate that many of these varieties have yields significantly higher than those of the currently preferred varieties in their target regions. For example, in Western Australia the recently released milling varieties Bumper$^{\Phi}$ and Mace$^{\Phi}$ were between 2 percent and 9 percent higher yielding than the most dominant varieties, while in South Australia and Victoria the new milling variety Waagen$^{\Phi}$ recorded yields 3 percent to 11 percent higher than the dominant varieties, as shown in Figure 10.

Figure 10: Yield results for 2008–09 wheat varieties relative to the three most dominant varieties in Western Australia, South Australia and Victoria



Note: Yield results are based on statewide NVT. The most dominant varieties are determined by silo delivery volume.

Dual-purpose wheat

In 2008–09, the GRDC continued to support the CSIRO breeding program for dual-purpose wheat. This is a small, specialised breeding program developing grazing wheat varieties for the high-rainfall zone of south-eastern Australia. A major hindrance since the beginning of this project has been the continued dry conditions in south-eastern Australia, which have limited the ability to select for yield and disease resistance. To counter this effect, yield trials and disease nurseries have been established in comparable climates in New Zealand. Two lines developed through the program are currently being commercialised.

Durum wheat

The newly formed National Durum Wheat Improvement Program released two new durum varieties, Caparoi(Þ) and Hyperno(Þ), in 2008–09. Caparoi(Þ) was developed to meet increasing demand for a durum wheat variety with superior quality traits adapted to the hostile South Australian durum-growing regions. Caparoi(Þ) is high-yielding durum with improved resistance to fungal pathogens; strong seedling vigour; excellent lodging and shedding resistance; and excellent colour and quality traits.

The GRDC has supported durum pre-breeding research at ICARDA for more than ten years. The research has been focused on pre-emptively breeding resistance for potential disease threats, and improving water use efficiency. Several sources of resistance to diseases and pests—such as the highly virulent durum leaf rust (*Puccinia recondite*), *Septoria tritici* blotch and hessian fly—have been identified through this alliance. These will be crossed into varieties suitable for production in Australia.

Australian Grain Technologies

The GRDC is the largest shareholder in Australian Grain Technologies (AGT), one of Australia's leading wheat-breeding companies. During 2008–09, AGT welcomed a new shareholder, Vilmorin & Cie, a subsidiary of the French grower-owned cooperative Groupe Limagrain. Limagrain is a global leader in plant breeding and seed production and commercialisation, operating in more than 30 countries.

Integrating international expertise into the company has been an important part of AGT's long-term strategic plan. The partnership with Vilmorin & Cie will help to ensure AGT remains at the cutting edge of breeding technology and can capture new market opportunities for Australian growers. AGT will also benefit from Limagrain's direct connection to the food supply chain, from seed to supermarket, through its investments in the production and commercialisation of cereal ingredients and bakery products.

In 2008–09, AGT continued its strong commitment to improving the productivity of the Australian grains industry, making available a number of new, improved crop varieties, including six bread wheat varieties and two durum wheat varieties.

InterGrain

As described in the GRDC's 2007–08 Annual Report, the Government of Western Australia and the GRDC launched the wheat-breeding company InterGrain in October 2007.

In 2008–09, InterGrain released four wheat varieties: Fortune(Þ), Bumper(Þ), Zippy(Þ) and Endure(Þ). The varieties' diverse characteristics enable growers to have better choice in matching variety selection to growing conditions and different end markets.

InterGrain developed a strategic relationship with Grain Pool to ensure that the three premium udon varieties, Binnu(Þ), Yandanooka(Þ) and Fortune(Þ), are rapidly adopted by the Japanese market and deliver premium prices back to Western Australian growers.

In 2008, InterGrain expanded its breeding beyond Western Australia, commencing breeding programs especially for New South Wales, Victoria and South Australia. InterGrain also appointed a new Chief Executive Officer and began transferring breeding and technical staff from DAFWA across to InterGrain.

HRZ Wheats

HRZ Wheats is a joint venture between CSIRO, the New Zealand Institute for Plant and Food Research and the GRDC. The partnership is developing high-yielding, disease-resistant, milling-quality wheat varieties for Australia's high rainfall zones.

In 2008–09, HRZ Wheats released one new wheat variety for the high-rainfall zone: Gascoigne(Þ).

Barley breeding

After three years of operation, Barley Breeding Australia (BBA) is looking to the future through the recommendations of an independent review conducted in late 2008. The review, delivered to the BBA advisory board in February 2009, examined the performance of BBA since its inception in June 2006, reviewed the rapidly changing barley industry environment, and made recommendations as to the future structure of Australian barley breeding. Industry consultation, begun as part of the review process, is continuing with the public release of the review's summary and recommendations and the advisory board's invitation to growers and industry to participate in further discussion on the future of barley breeding.

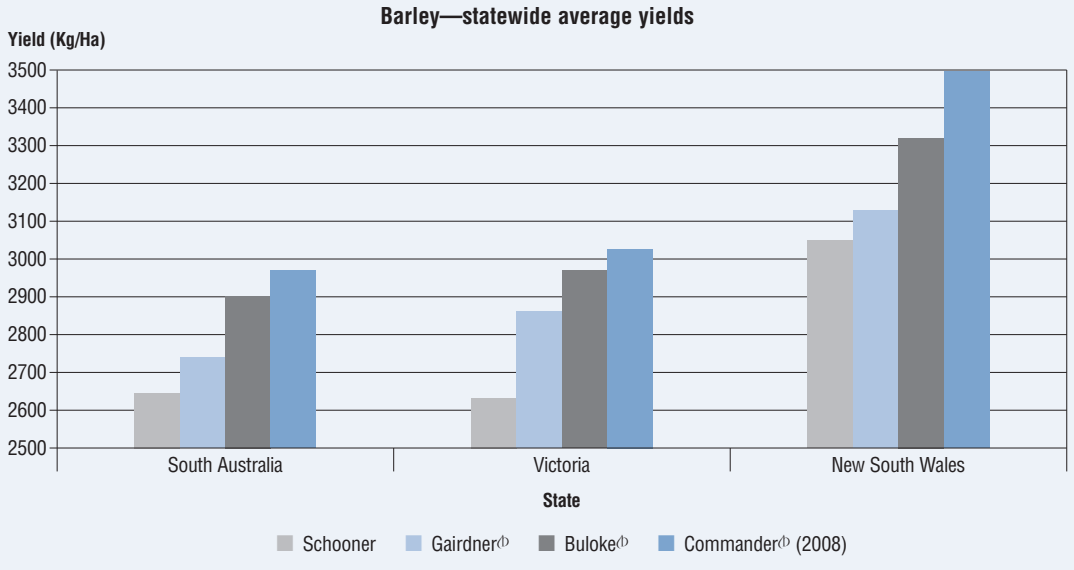
Two new barley varieties were released in 2008–09. Commander(Φ), released by the southern node of BBA, is a mid to late maturity malting barley, while Shepherd(Φ), released by the northern node, is an early to mid maturity feed barley. Data from NVT main season trials indicates that both varieties are higher yielding than comparable popular varieties in their target regions. For example, from 2005 to 2007 Commander(Φ) consistently recorded yields 2 percent to 17 percent higher than the dominant malting varieties in South Australia, Victoria and New South Wales, as shown in Figure 11.

Crystal(Φ) is a newly released mungbean variety. It is high yielding and has increased resistance to powdery mildew, tan spot and halo blight. Photo: Rebecca Thyer

Mungbean breeding

In July 2008, a new collaborative mungbean breeding program commenced, involving QDPIF, the Australian Mungbean Association (AMA) and the GRDC. The program is focused on improving yield, grain quality and disease resistance, and accesses genetic material from international sources. The involvement of the AMA ensures that there is a path to market for new varieties developed by the program.

Figure 11: Yield results for the 2008–09 release malting barley variety Commander(Φ), relative to three dominant malting varieties in South Australia, Victoria and New South Wales



Note: Yield results are based on statewide NVT. The dominant varieties are determined by silo delivery volume.

Two new mungbean varieties were released to growers for the 2008–09 season, under licence to the AMA:

- Crystal(Φ) is a large-seeded bright green mungbean with up to 20 percent higher yield than the industry benchmark of Emerald(Φ) and 4 percent higher yield than White Gold. Crystal(Φ) offers significant advantages in grain quality, under both dry land and irrigated production, including evenness of colour, brightness and shape. The low levels of hard seed further increase its attractiveness for both cooking and processing end uses.
- Satin II(Φ) is a dull-seeded green mungbean released to replace Satin. Released in 1988, Satin was the only dull-seeded variety available in Australia. In recent years the production of Satin has decreased significantly, as the quality of the variety has deteriorated through genetic drift, making it difficult to sell overseas. Satin II(Φ) has a 20 percent yield increase over Satin, as well as superior seed quality with increased seed size and improved evenness of colour, shape and size. Satin II(Φ) is expected to fully replace Satin and continue the Australian industry's export of dull-seeded mungbeans.

Pulse breeding

Pulse Breeding Australia (PBA) is a world-class breeding program that delivers improved pulse varieties to Australian grain growers. The first PBA varieties for chickpeas and lentils will be released in 2009–10.

In 2008–09, PBA used yield data, crop price and a range of specific crop information to provide regional gross margin comparisons between selected PBA varieties and current industry varieties for all four PBA pulse crops. This information will address specific performance indicators within the PBA National Plan and provide growers with information on new varieties.

ICARDA is an important research partner for the PBA breeding and germplasm enhancement programs. Assistance from ICARDA in developing diagnostic tests and reliable techniques for screening Australian breeding material against exotic diseases and pathogens has been essential to the improvement of virus resistance. In 2008–09, ICARDA tested pulse varieties, breeding lines and germplasm accessions from Australia for resistance against three major viruses.

Canola breeding

The blackleg fungus is the major pathogen of canola worldwide, and the Australian canola industry relies on blackleg resistance for its survival. In 2008–09, the GRDC supported a new project to assemble a differential set of Australian blackleg isolates that can be used to identify all known major resistance genes in brassica lines.

Previous and current GRDC-funded projects have shown that rotation of blackleg resistance sources can increase durability in canola cultivars. However, implementation of this management strategy requires varieties to be categorised into groups according to their resistance type. Presently, the resistance genes in most Australian cultivars are not known.

Researchers based at the French National Institute for Agricultural Research (INRA) have a differential set of blackleg isolates that can identify ten major resistance genes expressed in seedlings. Because quarantine restrictions prevent Australian researchers from importing the isolates, 33 Australian brassica lines were provided to the French researchers, who used their set of isolates to identify the major resistance genes in those lines.

The aim of this international collaboration is to be able to identify blackleg isolates that can discriminate various different resistance genes. This will enable breeders to produce cultivars based on specific resistance genes, leading to a robust canola industry where the threat of blackleg is minimised.

Soybean breeding

In 2008–09, seed increase commenced for the new soybean variety Moonbi(Φ). The variety was developed by the Australian Soybean Breeding Program, a partnership between CSIRO, the New South Wales Department of Primary Industries (NSWDPI) and the GRDC. Moonbi(Φ) will be available to growers in 2010.

Moonbi(Φ) has a number of significant advantages over other soybean varieties, including improved seed characteristics for soybean processing, good genetic potential for high protein levels, improved weathering tolerance and yield, and a 10–12 day earlier finish.

Oat breeding

In 2009, the GRDC-funded National Oat Breeding Program, based at SARDI, formed a partnership with ABB Grain to develop and promote new milling oat varieties. The five-year partnership will see ABB Grain commercialise milling oat varieties, while the National Oat Breeding Program researches and breeds new varieties. The program is focused on improving agronomic, yield and milling traits to support growers, the domestic milling market, and food manufacturers.

In a related project to develop sources of rust resistance in oats, six new sources of oat stem rust resistance and two new sources of oat leaf rust resistance have been identified. The process of crossing these new sources of rust resistance into current variety backgrounds commenced during 2008–09 and will be accelerated with the implementation of molecular marker technology in 2009–10.

Pre-breeding in winter cereals

With GRDC support, Australian pre-breeding researchers achieved excellence in 2008–09, including a groundbreaking discovery in the genetics of rust resistance, the launch of a revolutionary software tool to improve the efficiency of breeding programs, and significant progress in the pursuit of key traits such as higher yield, disease resistance and drought tolerance.

Australian Centre for Plant Functional Genomics

With GRDC support, the Australian Centre for Plant Functional Genomics (ACPFG) expanded its collaborative network both in Australia and overseas, including new private sector research partnerships, and continued to perform strongly in its work on drought- and salinity-related traits in 2008–09. ACPFG researchers:

- studied the performance of selected wheat lines grown in various locations over several seasons, to improve the knowledge of why some Australian wheat cultivars out-perform others in dry environments—this knowledge will enable breeders to identify and stack validated drought-related traits and accelerate the development of varieties with improved yield stability in water-limited environments
- identified a specific genome region which plays a key role in tolerance to heat stress
- generated transgenic rice and barley lines able to maintain biomass production under salt stress, using genetic material derived from moss and *Arabidopsis*—ACPFG has applied for a national patent for this technology.

Molecular Plant Breeding Cooperative Research Centre

The GRDC has investments in the Molecular Plant Breeding CRC (MPBCRC), which includes a suite of projects targeted at identifying genes inferring tolerance to biotic and abiotic stress and quality traits in wheat and barley. The MPBCRC has broadened its relationships to include all of the major wheat and barley breeding programs in Australia.

Achievements of the MPBCRC in 2008–09 included:

- receiving the CRC Association's Award for Excellence in Innovation for its CrossPredictor technology, a software package that allows breeders to predict breeding outcomes for wheat quality traits, reducing the costs of breeding programs in terms of time and breeding population sizes
- developing a new genotyping technology, 'temperature switch PCR'—a technical handbook was produced to help new users, and the technology was provided to other researchers and to wheat and barley breeders
- developing a new molecular marker technology, 'dideoxy-terminated SNP (ddSNP) detection'—international patent applications have been filed and manuscripts are being prepared for publication
- continuing to deploy its multiplex-ready PCR (polymerase chain reaction) technology for SSR (simple sequence repeat) genotyping, in collaboration with other Australian research organisations—molecular markers for six new genes conferring plant growth habit and disease resistance in wheat have been identified using this technology.

CSIRO

CSIRO conducted a range of pre-breeding research projects with support from the GRDC in 2008–09. Results included:

- providing germplasm incorporating new salt tolerance genes Nax1 and Nax2 (previously identified by CSIRO) to all Australian wheat and durum wheat breeding programs for evaluation
- identifying a synthetic wheat which may have enhanced tolerance to drought stress at the reproductive stage, a main cause of reduced grain numbers
- progressing work on the recombination of chromosomes from *Thinopyrum intermedium* and *T. ponticum* in wheat to achieve trigenomic chromosomes. These chromosomes are stable and carry genes responsible for rust resistance and resistance to barley yellow dwarf virus.

Molecular marker development

During 2008–09 the GRDC restructured its investments in the development of molecular markers for wheat and barley breeding. The new Australian Wheat and Barley Molecular Marker Program focus on molecular markers for soil and foliar diseases, and has three components:

- technology development
- improved phenotyping methods
- a single genetic analysis project which is charged with developing the new molecular markers and delivering both traits and markers to breeding clients.

The program serves all Australian wheat and barley breeding programs. As technology users, the breeding programs are represented on the technical steering committee that oversees the R&D work of the genetic analysis project. The setup provides for close interaction between researchers and breeders and will ensure that program outputs are relevant to users. Previously, a similar model was implemented for the canola molecular marker program, which reports to a canola breeders' group. The much smaller investment in molecular marker development for lupins is integrated with the single, national lupin breeding program.

A highlight from the wheat and barley molecular marker program was the demonstration that the absence of a single gene in wheat, Tsn1, strongly reduces the severity of symptoms of fungal disease caused by *Septoria nodorum* and yellow spot infection. The Tsn1 protein serves as a receptor for a fungal protein, ToxA, which can be produced outside the fungus and used in a simple diagnostic test to select for less susceptible breeding lines.

Australian Cereal Rust Control Program

The Australian Cereal Rust Control Program (ACRCP) is a partnership between the University of Sydney, CSIRO, CIMMYT and the University of Adelaide. The ACRCP is internationally recognised for its ability to discover and use novel sources of rust resistance from wild relatives of wheat.

During 2008–09 the ACRCP continued to provide diagnostic screening services to Australian breeders of wheat, barley, triticale and oats.

The ACRCP formally became a partner in the Borlaug Global Rust Initiative during 2008–09. This means that the Australian research effort is now fully integrated with the international fight to control the spread of the Ug99 stem rust pathogen.

Dr Jason Able from the Adelaide node of the CRC for Molecular Plant Breeding and his team identified a gene that controls how chromosomes pair and exchange DNA during sexual reproduction. Scientists will now be able to selectively reintroduce beneficial 'wild ancestor' genes into modern varieties. Photo: Brad Collis

In 2009, a highlight of the ACRCP's work was the publication of a paper in *Science* by CSIRO researchers and their collaborators at the University of Zurich (Switzerland), who identified the gene and predicted protein product of Lr34/Yr18. This scientific breakthrough provides valuable insight into the mechanics of durable rust resistance. The identification of this gene also provides perfect molecular markers for use in breeding.

Australian Winter Cereals Pre-breeding Alliance

The prioritisation of national and regional targets for pre-breeding research is an ongoing activity of the Australian Winter Cereals Pre-breeding Alliance (AWCPA), a forum representing Australia's major pre-breeding organisations and the GRDC. In 2008–09 the AWCPA convened a national workshop to map out future research priorities in salinity tolerance.

An earlier AWCPA workshop focused on the adaptation of wheat to water-restricted environments. The workshop identified a need for greater emphasis on phenotyping and validation of promising traits in realistic, water-limited environments. Consequently, the GRDC completed an audit of existing field phenotyping facilities, with the purpose of creating national facilities that are well equipped to analyse and dissect 'drought' traits. It is expected that the facilities will support a range of drought-related research projects across several crops and link strongly to activities at the new Australian Plant Phenomics Facility in Adelaide and Canberra.

The AWCPA has agreed on a set of non-binding recommendations for the commercialisation of traits and selection methods in Australia. These guidelines are designed to accelerate the adoption of technologies from publicly funded pre-breeding research by commercial breeding programs. They provide for equitable, non-exclusive access by all Australian breeding programs, 'realistic' expectations regarding the value of intellectual property, and certainty about licensing costs at the time of technology transfer to breeders. Although these guidelines apply only to wheat they could be extended to other cereal crops in the future.

The AWCPA also holds workshops to improve communication across the plant-breeding value chain and promote collaboration between research partners. During 2008–09 a workshop on *Septoria nodorum* provided an interactive forum for researchers and wheat breeders and ensured that Australian wheat breeders had access to the latest GRDC-funded research findings. Another workshop was held to promote the exchange of ideas and scope collaborative opportunities in nitrogen use efficiency and phosphorous use efficiency research.

National Variety Trials

National Variety Trials (NVT) is a GRDC-funded national program of comparative crop variety testing with standardised trial management, data generation, collection and dissemination. NVT provides grain growers and agricultural advisers with access to robust independent results on the performance of recently released crop varieties from trials conducted across Australia. This information is available from the NVT Online database to help growers make crop variety selection decisions.

All Australian winter cereal, pulse and canola breeders participated in NVT in the 2008 season. Of the 587 trials planted, 65 were abandoned due to unfavourable seasonal conditions; the results of a further 76 did not meet NVT's data quality requirements and were consequently not published. Results of the remaining 446 trials were analysed by the National Statistics Program and delivered to grain growers through the NVT website (www.nvtonline.com.au) and state agriculture department sowing guides.

In response to the lifting of the moratoria on genetically modified (GM) canola in Victoria and New South Wales in early 2008, the 2008 NVT program incorporated five dedicated GM canola trials, located near Forbes and Wagga Wagga in New South Wales and Horsham, Lake Bolac and Shepparton in Victoria. Roundup Ready® (GM) canola cultivars were trialled alongside imidazolinone-tolerant and triazine-tolerant cultivars in an experiment designed to allow comparisons between the different chemistry types. As a result of the dry season and spring frosts, only the Horsham and Forbes trials were successful. Results of these trials revealed that there was no significant difference between the best yielding varieties from each herbicide tolerance group. In 2009, the canola trial component of the NVT program will be expanded to incorporate 15 dedicated GM trials.

The NVT program was formally reviewed in 2008, with the objectives of identifying inherent strengths and weaknesses in the program and developing a roadmap for its future structure and function of the program. The review involved an extensive stakeholder consultation process incorporating targeted surveys and interviews and an open call for submissions. The 354 survey responses that were returned represented the full spectrum of NVT stakeholders from across Australia, including growers, grower representative groups (farmers' federations and cropping groups), agronomists, private consultants, seed industry representatives, plant breeders, trial operators and statisticians. Key recommendations of the review have begun to be implemented. Selection of NVT trial service providers for the next phase of the NVT program will occur by multi-stage tender.

Pathway to market for genetically modified canola

A total of 108 farmers in Victoria and New South Wales were accredited in 2008–09 to grow Australia's first commercial crop of herbicide-resistant GM canola. Grain was delivered to five dedicated sites and sold to domestic processors.

In its summary report to Australian oilseed industry stakeholders, *Market Choice in the Canola Industry 2008*, Grain Trade Australia concluded that the existing market choice protocols summarised in its 2007 report *Delivering Market Choice with GM Canola* had been effective and did not require modification (the report is available online via the Australian Oilseeds Federation website, www.australianoilseeds.com).

In Western Australia the government allowed limited GM canola plantings to commence with the May/June planting season in 2009.

Case Study

CrossPredictor software brings speed and savings to pre-breeding

Developed by Howard Eagles of the Molecular Plant Breeding Cooperative Research Centre (MPBCRC), and collaborators, the award-winning software package CrossPredictor enables wheat breeders to analyse and predict breeding outcomes for quality traits 'in silico', greatly reducing the cost and time required to deliver new, improved varieties to growers.

Using conventional methods, it can take up to 15 years to develop a new variety of wheat, from the initial crossing to the final release. In Australia, the differences between grain-growing environments, and unpredictable constraints posed by erratic rainfall and temperature patterns, prolong the process of selecting and testing cultivars in the field. Today's molecular technologies can identify genes (and allelic variations) that influence traits such as grain yield or grain quality. Using such genetic information, CrossPredictor can predict the breeding outcomes of many generations and combinations of parent lines, within minutes.

The system designers collated decades worth of field trial data on hundreds of Australian wheat varieties to create a uniform dataset in which quality measurements could be analysed relative to genetic fingerprints. Based on that analysis, they assigned to various genetic combinations a 'genetic value' that is predictive of grain-quality traits. Environmental effects were eliminated by averaging the results of quality tests from trials across a range of climates, soil types and farming practices. The predictive power of the 'genetic values' was validated against known breeding outcomes.

Using the genetic values, CrossPredictor allows breeders to view how quality traits from each parent line would recombine and segregate among the progeny. From potential two-way and three-way crosses, a user can calculate the minimum population sizes required for a 95 percent or 99 percent probability of obtaining progeny within desired quality ranges, even resolving genetic linkage issues. This assists breeders to design breeding programs to combine different quality, stress and yield traits without compromising established gains.

The technique has proved capable of handling more than 10,000 combinations of alleles while accounting for as much as 60 to 70 percent of genetic variation that affects grain classification, and has also explained some longstanding difficulties achieving high grain quality in some wheat varieties. Genes influencing other traits can be added to the system: genetic values are now being calculated for development traits, such as sowing dates and heading time, that are important determinants of yield. Eventually, predictions could be made for particular environment types based on soil, rainfall and temperature characteristics.

CrossPredictor is now being used routinely by Australian breeders and seed companies, and has led to a 2.5 percent reduction in the cost of wheat breeding, earlier access to better strains, and higher commercial quality with increased yield and improved disease resistance. New varieties being developed using CrossPredictor are just a few years away from commercial release. In 2008, the success of the system was acknowledged with an Award for Excellence in Innovation at the Cooperative Research Centre Association's national conference.

Case Study

Pulse Breeding Australia delivers chickpeas with fungus resistance

The PBA chickpea breeding program has made significant progress towards securing the Australian chickpea industry against major disease threats, and delivering varieties that meet the needs of the market.

Apart from drought, the major impediment to consistent yield in chickpeas is fungal disease. In particular, ascochyta blight, first recorded in Australia's commercial crops in 1996, has spread to all chickpea-growing regions.

A highlight of the PBA program has been the significant improvement in ascochyta blight resistance that breeders have achieved in the ten years since the disease first became a major problem. Genesis 090, released in 2005 in the southern cropping region, and PBA HatTrick$^{\Phi}$, soon to be released in the north, are two PBA-developed varieties that will significantly increase growers' gross margins by vastly reducing or eliminating the need to use fungicide sprays against ascochyta. These new strains also provide increased resistance to phytophthora root rot, as well as higher yield and better seed quality.

The photos below illustrate the difference in performance between the standard variety Gully and PBA HatTrick$^{\Phi}$ under high pressure from ascochyta blight.

(Left) Trial of Gully$^{\Phi}$ (virus resistant standard variety in 1998) and (Right) the newly released variety PBA HatTrick$^{\Phi}$ illustrates the performance of both varieties under high ascochyta blight disease pressure. Photos: Kevin Moore

The high levels of phytophthora root rot resistance available in some of the chickpea's wild relatives are being incorporated into PBA's advanced breeding lines. Other chickpea breeding advances in 2008–09 centred on the discovery and exploitation of useful traits such as salt tolerance, multiple herbicide resistance, resistance to root-lesion nematode and reduced botrytis grey mould susceptibility.

Through the development of a commercial focus and closer industry linkages, PBA has laid the groundwork for a rapid, coordinated and geographically targeted release of improved varieties that deliver value for growers and meet market requirements. In part, this was achieved by establishing the PBA Release Advisory Group. This group embodies a wide range of expertise and includes representatives from the commercial partner AWB Seeds and the industry body Pulse Australia Limited. In addition, key members of the PBA chickpea program met the buyers and processors in the world's major chickpea markets.

HatTrick$^{\Phi}$ will enter its final bulk-up phase in 2009, prior to large-scale release in northern New South Wales and southern Queensland in 2009–10.

Table 11: 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 2008–09		
$43.82 million		
Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
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	The release of improved varieties of wheat, barley, canola, pulse crops and summer coarse grain crops that benefit the Australian grains industry	Fourteen new wheat varieties were released, which in NVT trials yielded up to 11 percent higher than existing popular varieties of comparable quality. They included two new varieties of durum wheat, Caparoi(Þ) and Hyperno(Þ), adapted to hostile environments in the southern Australia durum-growing region. Two new barley varieties, Commander(Þ) and Shepherd(Þ), were released by the southern and northern nodes of Barley Breeding Australia, respectively. Two new mungbean varieties were released: Crystal(Þ) and Satin II(Þ). Crystal(Þ) has an annual yield 20 percent higher than the yield of the benchmark variety. One new desi chickpea variety was released. One new faba bean variety was released to growers for the northern region. A new variety of Soybean, Moonbi(Þ), will commence seed increase for commercialisation in 2010.
Research organisations that are responsible for pre-breeding research with a focus on an agreed set of key national and regional traits	Industry agreement on key target traits for wheat and barley Research organisations that are responsible for at least 80 percent of the pre-breeding research having agreed to focus 50 percent of their resources on an agreed set of key traits	Priority-setting workshops were held to determine pre-breeding targets for wheat quality and salinity traits. Plant breeders were involved in the direction setting for all molecular marker programs. A survey of key research organisations, conducted in December 2007, indicated that more than 80 percent of their resources were allocated to research on the agreed priority national and regional traits.

Table 11: Varieties overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Evidence of excellent scientific research and effective collaboration both nationally and internationally through independent, expert scientific review in 2008	Enhanced communication and collaboration between industry and research stakeholders Five examples of scientific excellence identified and reported both nationally and internationally through independent, expert scientific review in 2008	Breeders are involved with the direction of all GRDC-funded molecular marker programs. Examples of recognised scientific excellence are the: • identification of the genes which may be used to enhance salinity tolerance in bread wheat and durum wheat, notably Nax1, Nax2, and PpENA • cloning of the adult plant rust resistance gene Lr34 • launch of the wheat quality prediction technology Cross Predictor. The communication activities of the CIMMYT Australia Germplasm Evaluation (CAGE) project were expanded to incorporate information relating to GRDC-funded research activities at ICARDA.
Evidence that genes, germplasm and enabling technologies developed in GRDC-supported pre-breeding research are being used in breeding programs	New traits and associated molecular markers developed for use by Australian breeding programs	The PBA germplasm enhancement program has developed screening methods and scoring systems for targeted traits. Genetic variation has been identified and the frost tolerant selections for field pea, lentil and chickpea are being used in crosses. Genetic variation has been identified for pod drop in lentils, heat stress tolerance in faba bean and field pea and pod shattering resistance in chickpea. Good variation for quality traits in canola, including high 'oil plus protein' content, low glucosinolate content and low saturated fats, has been identified. Molecular markers have been identified for cereal cyst nematode resistance in oats. Six new sources of oat stem rust resistance and two new sources of oat leaf rust resistance have been identified. The absence of a single gene, Tsn1, strongly reduces disease symptoms caused by *Septoria nodorum* and yellow spot infection. Breeders may use a protein which interacts with Tsn1 as a marker for the selection of less susceptible breeding lines.

Table 11: Varieties overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Evidence that genes, germplasm and enabling technologies developed in GRDC-supported pre-breeding research are being used in breeding programs *(continued)*	New genes with potential importance to the Australian grains industry discovery and made available for proof-of-concept testing and further development	More than 50 blackleg resistant lines with higher resistance than existing cultivars, including both polygenic and major gene resistance sources, have been accessed by private breeders from the 2008 nursery. Canola germplasm and marker populations have been made available to the breeding companies. Germplasm with sodium exclusion traits Nax1 and Nax2 has been transferred to wheat and durum breeders for evaluation. Elite drought-tolerant and disease-resistant wheat and pulse breeding lines were imported from CIMMYT and ICARDA under a formal collaboration agreement.
Continued progress towards market entry for GM canola into Australia	Delivery platform for GM crops in Australia Access to enabling technologies Access to novel traits which reduce key limitations to grain production	Australia's first commercial GM canola crops were grown in Victoria and New South Wales. Western Australia has allowed limited plantings of GM canola in 2009. Australian researchers had access to cereal transformation technologies and opportunities to partner with international organisations to access novel traits not available in Australia.
Participation in NVT by relevant breeding programs	Participation in NVT by 90 percent of relevant breeding programs Crop variety yield and performance data made available to Australian grain growers through NVT program	All Australian breeders of wheat, barley, triticale, oats, pulses and canola (including GM canola) are participants in NVT. Yield results from 446 NVT cereal, pulse and canola trials were published on the NVT website (www.nvtonline.com.au) and in state agriculture department sowing guides. GM canola trials, based in New South Wales and Victoria, were conducted in NVT for the first time in 2008.
EPR collection processes	Support to industry to simplify EPR collection processes and increase EPR collection efficiency	The GRDC has been working to simplify End Point Royalty (EPR) collection systems and build a whole-of-industry 'culture of compliance'. During 2008–09, agreement was reached to have a voluntary national system where traders either directly deduct EPRs from grower payments or provide data to the royalty managers of varieties.

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; 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; builds partnerships to develop products and services and to deliver them to growers; and undertakes product development to meet market requirements.

Table 12 summarises the achievements of the New Products output group against its performance indicators in the Annual Operational Plan 2008–09 and its objectives and strategies in the GRDC Strategic R&D Plan 2007–12, *Prosperity through Innovation*. The following sections describe some of the results of the output group's investments during the year.

CONTENTS:

New grain food products

The new grain food products portfolio focuses on identifying output traits that may increase the value or the attractiveness to customers of Australian grain.

High-amylose wheat

High-amylose wheat produces a high level of resistant starch, which is important in bowel health and has a lower glycaemic index than other starches, with benefits for losing weight and stabilising blood sugar levels. The Arista Cereal Technologies Pty Ltd joint venture (Arista) is pursuing both GM and non-GM solutions to market demand for these attributes.

Arista continued to work toward commercialisation of high-amylose wheat in 2008–09. Major achievements included:

- face-to-face discussions with potential commercial partners in Australia, Europe and the North American Free Trade Agreement countries (Canada, Mexico and the United States)
- the assembly of negotiation teams to progress negotiations with preferred partners.

Arista also implemented a research strategy to expedite the characterisation of an optimal transgenic event for commercial release.

Omega-3 canola

The GRDC has partnered with the CSIRO Food Futures Flagship to develop canola plants that produce docosahexaenoic acid (DHA), a healthy omega-3 oil component. DHA is vital for human health and is normally available only from fish sources. CSIRO has previously developed technology that showed that land-based plants could produce DHA if they were given the right genes to do so. In 2008–09, the project began to transfer this technology into canola. The project also entered into an agreement with a potential international partner for joint evaluation of early-stage material to expedite development of the technology.

Coeliac-friendly barley for beer

People with coeliac disease, who comprise 1 percent of the Australian population, experience negative health reactions to as little as 10 milligrams of gluten protein per day. A larger proportion of Australians suffer from gluten intolerance, which has symptoms similar to those of coeliac disease but is not well defined.

The GRDC and CSIRO are working to develop a barley suitable for brewing 'ultra low gluten' beer for gluten-intolerant consumers. In barley, the gluten-like proteins are members of the hordein protein families.

In 2008–09, using traditional breeding techniques, the project produced a low-gluten barley line from which 90 percent of the hordein proteins have been removed. Preliminary trials have shown this line can be malted. Future research activities aim to improve the seed size and micro-malting characteristics of the low-gluten barley lines, by crossing to elite cultivars.

Go Grains

The GRDC continued to support Go Grains Health & Nutrition Ltd (Go Grains) in its delivery of consumer information, educational resources and media campaigns to promote the nutritional and health benefits of grains and pulses.

Go Grains, recognising the lack of grain consumption data in Australia, commissioned market research company Colmar Brunton to gather information on grains consumption in Australian households and to evaluate the awareness of the '4+ serves a day' campaign. Messages on the health benefits of wholegrains appear to be getting through to consumers, with 67 percent of respondents indicating they were 'more likely' to buy a product labelled as 'wholegrain'. Go Grains aims to conduct the survey every two years to track changes in grain food consumption, and will respond to the identified changes. Go Grains continues to attract new members from the grains industry, and in 2008–09 welcomed the CSIRO Food Futures Flagship as a member.

Feed grain

The GRDC works with feed grain user organisations to ensure that grains are developed to meet the demands of the livestock industries. In 2008–09, the GRDC and members of the Australian Feedgrain Partnership contracted a project to transfer exciting new yield potential technology to sorghum to help increase the supply of sorghum for livestock industries. The yield potential technology, developed in a GRDC-funded project with the CSIRO Food Futures Flagship, may also help to increase the digestibility of sorghum starch for livestock.

The GRDC also continued to support the Pork CRC in implementing and using near-infrared (NIR) calibrations developed by the Premium Grains for Livestock Program. The Pork CRC has launched AusScan, a business arm of the Pork CRC, to commercialise the NIR calibrations. The GRDC supported the AusScan forum held in March 2009, which brought together participants from across the feed grain supply chain and was aimed at promoting the use of NIR technology for the evaluation and trading of feed grains.

New industrial uses for grains

The new industrial uses portfolio seeks to identify opportunities for the use of Australian grains in developing bio-based industries, for example to replace petrochemicals.

Biofuels

The GRDC has continued to focus on determining a path forward for technologies that use grain and grain residues as feedstock for ethanol production. A scoping study from the CSIRO Energy Transformed Flagship, commissioned by the GRDC, identified opportunities for improved energy efficiency on farm, regional biodiesel self-sufficiency, and use of crop stubble for bioenergy production. The GRDC has engaged CSIRO to further explore opportunities for the use of crop stubbles as feedstock for biofuel and bioenergy production.

Crop Biofactories Initiative

The Crop Biofactories Initiative (CBI) is a three-stage partnership between the GRDC and CSIRO that aims to:

- engineer oilseeds with fatty acid compositions that match specific industrial applications
- establish the matching materials science technologies
- launch production and processing value chains within Australian agribusiness.

This is a significant strategic step that builds on Australia's increasing acceptance of GM oilseed production. CBI has chosen safflower as its platform crop for industrial oil production in Australia and has acquired the necessary expertise to implement an efficient safflower transformation pipeline.

In 2008–09, the first year of the second stage of the investment, CBI continued to use the market intelligence gained through its engagement with international chemical and lubricant companies to refine the research program toward 'best bets'. This is a strategy where the portfolio of projects is refined and resources moved from projects identified as less likely to deliver to those with high potential. Where projects have been stopped as a result of this strategy, CBI has been working to secure licence arrangements for the technologies that were not carried through to the second stage of the CBI investment cycle.

Nanoparticles

The GRDC is supporting University of Sydney researchers in determining the feasibility of creating crops capable of producing precious-metal nanoparticles that are highly valued for biomedicine, optics and electronics applications. Preliminary results indicate that common crop plants are capable of accumulating elemental gold.

New farm products and services

The new farm products and services portfolio seeks to identify technology and intellectual property that can be developed and brought to market to assist the productivity of Australian grain growers.

Novel pesticides

The GRDC invests in projects focused on developing novel chemicals and/or pesticide products that are effective against key Australian insect pests, weeds and diseases.

Three new areas for investment were identified and scoped in 2008–09 in preparation for investment in July 2009:

- potential new insecticides based on short-chain peptides from spider toxins
- the role biopolymers could have in control of foliar disease in cereals
- a novel rodenticide.

The development of new pesticidal actives is a high-risk activity. For this reason, the projects are specifically tailored to address known risks. Maximum financial leverage is sought in early stages of projects to minimise exposure and increase the opportunities. Alternatively, as projects are progressed, commercial partnerships are sought to ensure the path to market is clearly defined.

Following early success in a study of the feasibility of using native parasitic nematodes to control snails, a full research program was contracted with Charles Sturt University to progress the technology through to a commercial product. A commercial company has begun evaluating the production potential of several of the nematode species. To complement this work, a small project was commissioned with CSIRO Entomology to work on potential improvements to baiting attractants used in existing snail control products.

In addition, *Metarhizium* isolates for the control of insect pests, developed by QDPIF researchers, have been released to a commercial licensee for evaluation as a first step in the development of a new biopesticide product.

Instrumentation

The GRDC invests in the development and commercialisation of innovative instrumentation technologies, to provide faster, cheaper, more accurate and/or more quantitative measurement tools for the grains industry, and in particular for on-farm use.

Informed by the ongoing success of a project demonstrating microspectrometer technology, the GRDC contracted an independent group to examine the market potential of a new MEMS IR (micro electrical mechanical infrared) technology for measuring soil and grain characteristics, and to determine the most viable path to market. The GRDC expects to begin speaking to commercial companies about opportunities to incorporate the technology into their instrumentation in 2009–10.

Cereal endophyte program

The GRDC has invested in a program with Grasslanz Technology Ltd (a commercial venture of a New Zealand Crown Research Institute, AgResearch) to identify and develop cereal endophytes that may have a role in controlling heat and water stress and insect damage in cereals. Grasslanz is a world leader in endophyte technology and has been responsible for bringing insect-resistant pastures containing endophytes to market in Australia and the United States.

The collaboration has enabled the sharing of mycology, botany, biochemistry and plant physiology resources from AgResearch to identify the relevant endophyte populations from the relevant cereal populations that are potentially critical for the control of abiotic and biotic stresses. To assist in this work, AgResearch was also successful in obtaining significant funding from the New Zealand Foundation for Research, Science and Technology.

Soil biology

The Novozymes Biologicals Australia Pty Ltd joint venture completed another season of field evaluations of a range of growth promotion and disease control microbes sourced from both Australian and North American research programs. Promising research data will assist in the applications to register the products with the Australian Pesticides and Veterinary Medicines Authority (APVMA) in 2009–10. APVMA registration is necessary before such a product can be commercialised.

The new product TagTeam, which is a *Rhizobium* inoculant including phosphorous-solubilising microbes sourced from GRDC-supported research, was launched in Australia in early 2009. The response from the industry to this new technology is very encouraging for the future of beneficial microbes in agriculture.

The third generation of the National Rhizobium Program got under way in 2008–09, marking more than ten years of research in the area by the consortium of universities and agricultural departments led by Murdoch University. Goals for the current program include working more closely with the PBA breeding teams in a collaborative approach to increasing the symbiotic relationship between pulse and bacteria and, therefore, the total amount of nitrogen fixed.

Export opportunities

The GRDC's export opportunities strategy has focused on developing technologies or knowledge that provide or define a unique selling advantage for Australian grain in key export markets and, in particular, new projects that have the potential to increase Australia's market share in the Asian markets.

In 2008–09, a visit to millers and noodle makers in China revealed an excellent opportunity to work with Asian researchers and millers to assess Australian wheat for blending into premium noodle flours. An assessment of the cost and impact of such work was commissioned in late 2008; as a result, a new project will be contracted in July 2009 to take advantage of this opportunity.

The completion of the first year of the GRDC-supported hybrid baking project in 2008–09 resulted in several strong and advantageous relationships being established with Asian millers and bakers. Research in a number of countries in Asia is currently underway and is being carefully guided by a joint management group consisting of GRDC staff and panel members together with professionals from BRI Research.

Variety identification

The issue of varietal purity and identification has been discussed in the malting barley industry for many years, with an increasing level of concern. Malting barley is not unique in terms of the difficulty in maintaining purity of varieties through the supply chain (and across years). However, due to the sensitivity of end-users to the functionality of the grain and the guarantees of purity offered by exporters, the issue has greater relevance in relation to malting barley than to other cereals.

Technologies are emerging that have the potential to identify varieties from grain or tissue samples. Preliminary testing with such technologies has highlighted some opportunities to improve the quality of Australian malting barley and to maintain and improve the reputation of Australian grain.

In 2008, the GRDC investigated aspects of the issue, including an assessment of the accuracy and discriminatory abilities of new technologies. A strategic plan for barley variety identification has been written in collaboration with representatives of the malting barley industry and is now being implemented.

The first goal is to establish an industry-agreed set of reference seed samples that defines each variety, as a precursor to the development of a national database of variety profiles for use by commercial genotyping services or the development of other discriminatory technologies. For new varieties, the discriminating profiles will need to be established in conjunction with the release of the variety, early enough to allow appropriate monitoring of the development of pure seed stocks.

A future program will apply the technologies to specific barley samples, and define the application of testing at the various stages of the supply chain. A second phase will benchmark the supply chain within a defined growing region with an aim to define the level and scope of quality problems in each region.

The eventual result will be a whole-of-industry set of ground rules and an implementation plan to enable all sectors to determine variety identity and purity, and to correct shortcomings. This may be a world first for this type of total quality assurance approach, and should lead to a higher level of confidence in Australian malting barley. It will also have implications for the wider cereal industry, as a similar approach could be extended to wheat and other open-pollinated species.

Case Study

NIR calibrations add value for feed grains

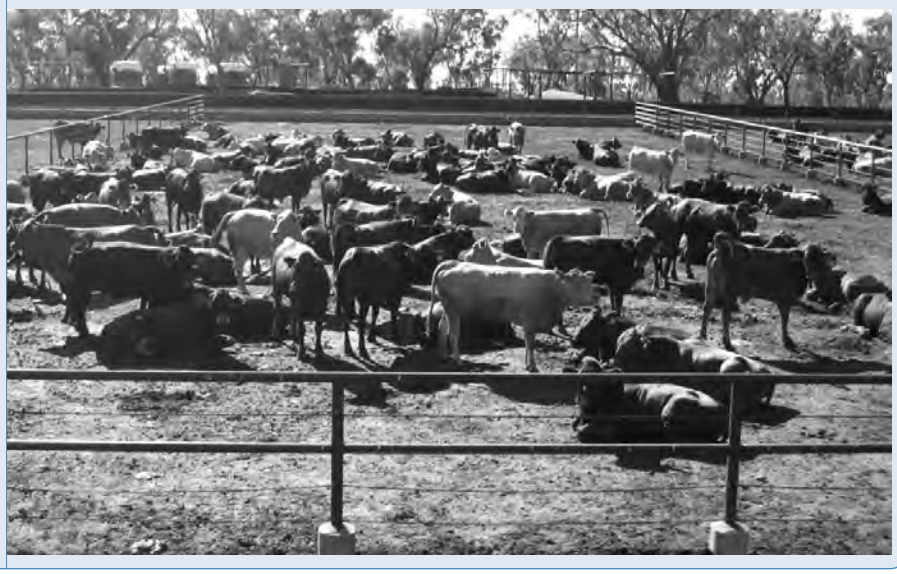
AusScan was established by the Pork Cooperative Research Centre to commercialise near-infrared (NIR) calibrations, in particular those developed by the Premium Grains for Livestock Program with support from the GRDC. The goal of AusScan is to ensure that rapid measurement through NIR technology becomes the industry accepted standard for valuing and using grains for livestock.

AusScan's major products are NIR calibrations that predict the energy value of whole cereal grains for different types of livestock, including ruminants, pigs and broilers, and predict specific chemical and physical characteristics of grains.

AusScan's services include issuing sublicences for the calibrations, maintaining and upgrading the calibrations, and performing 'ring-test' comparisons to ensure the calibrations remain accurate across licensees. The existing calibrations will be upgraded through continuing research and new calibrations will be developed in related areas.

AusScan provides licences to allow users to apply the NIR calibrations on their own NIR instruments. Three types of annual licence are available, to meet the needs of different partners in the feed grain supply chain:

- laboratory service providers—a licence for entities that conduct large volumes of NIR analyses and provide the results to clients
- industry supply chain participant—a licence for grain growers, bulk handling accumulators, traders, operators of feed mills or feedlots and other feed grain users
- grain breeding research company—a licence for companies that undertake grains research and breeding programs.



The development of NIR calibrations could help growers match grain with specific feed markets.
Photo: GRDC

Case Study

Harrington Weed Seed Destructor sorts the weeds from the chaff

Ray Harrington, a grain grower from Kojonup, Western Australia, firmly believes in destroying the seed contained in harvester chaff as a viable way of reducing weed populations. However, close to a decade ago, Ray decided there was no future in collecting the chaff and carrying it off the field or burning it.

As a result, Ray began designing and building the first prototype of the 'Harrington Weed Seed Destructor'. This harvester trail-behind unit completely destroys any seeds contained in the chaff and re-spreads it over the field, eliminating the need to stop and empty chaff carts.

Over the years Ray's first design was modified may times. By 2008, it was effective but still needed refinement to become a commercial piece of equipment. Significant trial work was also needed to prove the importance of chaff in the weed cycle.

In February 2008, the GRDC became involved, entering into a joint project with Ray to take the technology to market.

In 2008–09, an engineer was contracted to design and build a new prototype using the latest modelling and fabrication technologies. The Western Australian Herbicide Resistance Initiative began field testing the efficacy of the prototype, both by directly capturing the processed chaff and by measuring weed recruitment after use of the technology.

The field trial results so far have been very encouraging, demonstrating little residual viable weed seed after treatment by the destructor, and modifications to create what is expected in the commercial model are underway in preparation for a second year of trials. Success in these trials would be the perfect platform for the launch of the Harrington Weed Seed Destructor in 2011.

The GRDC's role in the project has focused on providing project management, resources and scientific rigour, to ensure that a promising technology is brought to market quickly and with scientific backing.

Table 12: 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 2008–09		
$10.28 million		
Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Identification of national and international work being undertaken in the area of nitrogen fixation	Identify and evaluate potential investment opportunities in the area of nitrogen fixation	Review of current knowledge in the area of non-legume nitrogen fixation suggested that this was not an area ready for further investment in terms of products; it was referred to the GRDC's Practices line of business for further pure research.
Assessment of a fungal biopesticide product pipeline for activity against several new pest targets, including silverleaf whitefly and etiella moth	Identification of product pipeline from different sources Assessment against key pest targets undertaken	A transfer of *Metarhizium* isolates to a commercial licensee is the first step in the development of a new biopesticide product. A new project focused on new pest targets commenced at Charles Sturt University.
Development of commercial strategies and engagement with commercial partners	Develop commercial strategies and, where appropriate, engage with commercial parties for: • Crop Biofactories Initiative • coeliac-friendly beer • high-amylose wheat (Arista joint venture) • fungal biopesticide.	 Representatives of the Crop Biofactories Initiative continued to engage with international chemical and lubricant companies in relation to the emerging technology. Potential commercial partners are performing larger scale brews of the coeliac-friendly malting barley product. Arista Cereal Technologies has conducted a survey of potential partners in North America and is preparing to enter negotiations. A commercial partner is assessing the viability of the fungal biopesticides strains in production.
Licence agreements negotiated for grain fumigant GLO2	Engagement of key commercial partners for the final phase (registration and market delivery) of the GLO2 grain fumigant project.	Negotiations are underway to license a commercial partner to take GLO2 to market.

Table 12: New Products overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Product development and commercial assessment to deliver a snail biopesticide product	Successful recruitment of a commercial partner to undertake phase two (product development and commercial assessment) of the snail biopesticide project. Investment in phase two of the snail biopesticide project, to take the technology from a proof-of-concept stage to a commercial product.	A commercial partner is assessing the current isolates for suitability in production systems—this is expected to take between six and 12 months and will run in parallel with the research at Charles Sturt University. The second phase of the snail biopesticide project has been contracted and will begin field trials in the spring of 2009.
Identify, scope and negotiate joint projects in partnership with feed grain user organisations	Identify collaborative projects. Develop solutions to increase whole-of-chain profitability and sustainability.	Members of the Australian Feedgrain Partnership are funding a project to develop high-yielding sorghum with improved digestibility. The AusScan business arm of the Pork CRC commenced licensing NIR calibrations developed by the Premium Grains for Livestock Program. The AusScan Forum was held, bringing feed grain industry participants together.
Successful negotiation of the consortium to take forward the export grain market research and development partnership	Assessment and selection of potential partners for involvement in export wheat market research and development partnership projects.	Assessments were completed for potential partners in export wheat market R&D partnership projects. An east coast pilot-scale crop quality report was contracted.

Dr Greg Tanner who heads up the CSIRO Plant Industry Coeliac Friendly Cereals project is developing an authentic-tasting, gluten-free barley-based beer.
Photo: Brad Collis

Output Group 4—Communication & Capacity Building

The GRDC provides strength and security to the grains industry through investment with research partners to undertake R&D to ensure Australian grain growers are profitable and innovative. It is important that the GRDC demonstrates that it is a leader in delivering rural R&D, that it achieves good value for money and that it is meeting its primary objective of increasing grower profitability through its strategic investments. The benefits from GRDC investment flow through to Australian grain growers and the general community.

Through a range of communication activities, the Communication & Capacity Building output group positions the GRDC and its research partners as a credible source of technical and industry-specific information. It invests in a range of programs to enhance awareness, motivation and ultimately adoption of the outcomes of GRDC and partner investments.

In consultation with the other output groups, Communication & Capacity Building also identifies opportunities for high-quality and reliable new publications and products that meet grains industry needs. Australian grain growers are a diverse audience, and their information needs and preferred delivery mechanisms vary. Accordingly, the output group packages and delivers timely and targeted information to satisfy the different demands.

Recognising the roles that research partners, government agencies and industry bodies play in influencing on-farm decision making, the output group also collaborates with these entities in a range of joint communication and delivery activities. Such collaboration ensures that the GRDC can leverage and maximise 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.

Table 13 summarises the achievements of the Communication & Capacity Building output group against its performance indicators in the Annual Operational Plan 2008–09 and its objectives and strategies in the GRDC Strategic R&D Plan 2007–12, *Prosperity through Innovation*. The following sections describe some of the results of the output group's work during the year.

CONTENTS:

Communications

Communication plays a crucial part in the adoption cycle of new technologies and practices. Editorial coverage is a cost-effective and credible method of communicating key messages to target audiences.

The crop production cycle provides a framework for media activities to ensure information is delivered when it can be of most benefit to growers.

The GRDC has contracts with professional communicators in each of the three GRDC regions—Northern, Southern and Western.

Each of the regional communicators writes and distributes weekly media press releases, *Crop Doctor* columns (timely agronomic information to growers) and *Grain Flashes* (news briefs or snippets), as well as providing articles to a plethora of agricultural magazines and newspapers.

Outlined below is a snapshot of additional regional communication carried out in each of the GRDC's three regions:

Northern Region

The bi-monthly, three-part Australian grains Consultants' Corner series showcases GRDC research, with in-depth analysis from researchers

and testing of information by regional agronomists. In 2008–09, this detailed series of regular articles covered key issues such as:

- *Cereal rust*—Adopting strategies to combat cereal rust including controlling the green bridge, selecting rust-resistant varieties and using fungicide control where necessary.
- *Inter-row planting*—Northern Grower Alliance and New South Wales Department of Primary Industries recommendations on practicing inter-row planting to reduce the risk of cereal rust.
- *Herbicide resistance and fleabane control*—Queensland Department of Primary Industries and Fisheries (QDPIF) research results on herbicide resistance and fleabane control.

Southern Region

- *Stripe rust*—Due to a number of stripe rust outbreaks in August 2008, a concerted communication effort by GRDC advised growers to prepare for a potential explosion of the disease. Key messages to growers included the need to regularly monitor their crops for signs of stripe rust and to be prepared to make decisions regarding fungicide applications.
- *Summer weeds*—Key messages communicated to growers were to maintain summer weed control in order to conserve soil moisture and to manage the weed seed bank to ensure that summer weeds are not more of a problem in the future.
- *Pests*—Several pest issues emerged in the spring of 2008 and beyond, which required the development and distribution of a series of communications materials to remind growers of the need to closely monitor crops and to consider their control options. In particular, aphids, armyworm, mites and weevils were a cause for concern.

Western Region

- *Glyphosate and trifluralin use*—With glyphosate and trifluralin resistance in ryegrass and wild radish in Western Australia increasing, a key message communicated to growers recommended the adoption of integrated weed management strategies to retain the effectiveness of non-selective herbicides.
- *Summer weed control*—One of a number of key messages to growers was that through controlling summer weeds soil moisture is retained in the paddock for future crops and offers growers the benefit of higher crop yields.
- *Use of phosphine in grain storage*—Western Australian growers, unlike some of their eastern-state counterparts, are still able to use phosphine to fumigate their grain. Where phosphine resistance has been detected it is only minor. The key message to growers was to ensure that they use the correct dose rate in fully sealed and tested silos.

Publications

Fact sheets

During 2008–09 the GRDC published 11 fact sheets; most were distributed nationally through the *Ground Cover* newspaper. Additional copies were printed to meet bulk requests for copies from grower groups, agribusiness, agricultural colleges and agronomists.

Two fact sheets in particular were very timely and addressed specific issues which were of concern to growers in the GRDC Northern Region:

- *Chickpea Disease*—In September 2008, the first disease incursion of ascochyta blight was detected in chickpeas in central Queensland. Within one week of the notification of the disease, the GRDC, in partnership with the QDPIF, distributed this fact sheet with information on how to control and manage the disease to growers in that region.
- *Northern Weeds*—This fact sheet provided information, including agronomy and IWM strategies, for summer grass and for four weeds that have become resistant to herbicides: wild oat, annual ryegrass, barnyard grass and liverseed grass. Its timely distribution in January 2009 gave growers time to put IWM options into practice before the winter sowing season.

In September 2008 approximately 10 percent of Western Australia's grain-growing area was hit by a severe frost event resulting in estimated losses of up to $105 million in potential net farm income. Frost is estimated to cost more than $33 million a year in South Australia and Victoria while nationally the cost to the grains industry averages more than $100 million a year.

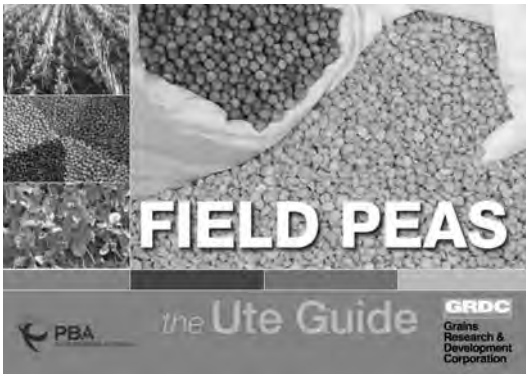
GRDC Communications Manager Kylie Paulsen on Southern Panel spring tour near Horsham, Victoria. Photo: Porter Novelli

To assist growers in managing future frost risk, in March 2009 GRDC published the *Managing the Risk of Frost* fact sheet which highlighted a number of key messages. Growers in frost-prone areas should have in place a frost risk management strategy that encompasses choice of crop and variety, manipulating the soil and canopy temperature, matching inputs to yield potential in frost risk areas, and sowing time. In particular, the fact sheet was very timely as it provided details on the frost susceptibility of some crops and what impact sowing time has on flowering time. Frost during the flowering period can be most damaging to cereal crops.

Other fact sheets published in this reporting period related to spray drift, NVT, herbicide resistance, frost, crown rot and nematodes.

Ute Guides

The popularity of ute guides continued with two new titles being added to the ute guide series—*Lentils: The Ute Guide* and *Field Peas: The Ute Guide*. Both these pulse guides are more than just diagnostic tools. Lentils and field peas are important in the crop rotation, providing a cereal disease break and nitrogen fixation in the soil. The guides are designed to assist growers in the identification of disease symptoms, insect attack and poor nutrition as well as to highlight critical issues of best practice in growing and marketing these two pulse crops.



Research reports

In cases of particular interest to a wide range of grains industry participants, the GRDC takes information from project final reports and presents it in an easy-to-read research report format. These reports are available free to anyone in the grains industry.

The release of the *Estimating plant available water capacity* research report was in response to growers' increased interest in water use efficiency. This report has become a resource that is used widely in training activities associated with the management of soil water and the characterisation of soils for plant available water (PAW). It is hoped that the information will assist growers, advisers and consultants in obtaining a better understanding of the size of the soil 'bucket' in which the water resources required to grow a particular crop are stored. It adds to growers' knowledge of how to develop better rules of thumb for managing resources in a more informed way.

Of the seven reports published to date, three titles have required reprinting due to the high level of interest: *GM Canola—performance and experiences in 2008*, *High profit farming in northern Australia* and *Cereal Growth Stages*.

Disease Management and Crop Canopies—What are the interactions?

The new publication *Disease Management and Crop Canopies—What are the interactions?* is a follow-up to the previously popular *Cereal Growth Stages: the link to crop management* booklet, which, after two print runs, is now out of print. It reports on three years of GRDC-supported field trial work and looks at the interactions between cultivar susceptibility and disease management, canopy management and how the use of nitrogen influences the need for disease control. In addition, it presents the results of newer active ingredients in fungicide used on disease in wheat and barley.

Success in planning for succession

A Guide to Succession—Sustaining families and farms was published by the GRDC in 2007 and high demand for this resource continues. Consultants working in the counselling, accountancy, rural health and banking areas have found the succession guide a useful tool in approaching a difficult subject.

Over ten thousand copies were initially printed and all stock is now exhausted. In 2008-09 the GRDC received requests for bulk copies from organisations such as the Bendigo Bank, Centrelink and state rural health organisations. As a result the GRDC facilitated the printing of further copies. It is expected that this demand will continue as the information in the guide, particularly the case studies, will not date over time.

Building industry capacity

Through awards, scholarships, training and development and outreach programs, the GRDC supports efforts to build capacity across the grains industry. In 2008–09, these efforts included awareness-raising programs for high school students, research grants for scientists and growers, and professional development opportunities for future industry leaders.

GRDC awards

The GRDC offered six categories of training awards, as well as travel and conference support, in 2008–09.

This included support for:

- 27 conferences, 32 travel awards and ten industry development awards
- 52 training scholarships, including 11 Agricultural Training Awards, 12 Undergraduate Honours Scholarships and 19 Grains Industry Research Scholarships.

Grains Industry Research Scholarships and Undergraduate Honours Scholarships are available to students of excellence in a field relevant to the future of the Australian grains industry. The scholarships are for three years and comprise a tax-free stipend of $25,000 per year plus $5,000 per year for project operating expenses.

Secondary schools programs

The secondary schools program is part of a long-term effort to address the current and predicted skills shortages in many primary industries, particularly the grains industry. The program is an industry–university–school partnership designed to stimulate student interest in studying science at university, with a pathway into primary industries.

In 2007–08, the Primary Industry Centre for Science Education (PICSE) program was successfully piloted in five states by six universities, each supported by their local industry partners. In December 2008, the Australian Government provided funding for this program to be developed nationally over three years, with the understanding that matching funds would be allocated by a consortium of national agribusinesses and R&D corporations.

The PICSE program had a number of successes in 2008–09, including:

- ongoing cooperation from local primary industries, which become involved in different aspects of the program
- high levels of participation among undergraduate students, post-graduate students, agricultural science lecturing staff and researchers, who take on responsibilities in different aspects of the program
- an increasing level of awareness among students and teachers of the importance of tertiary studies and careers in agricultural science
- significant attitudinal change among teachers and high-achieving students with respect to career pathways in science fields that underpin primary industries
- development of exemplar material to produce a CD teaching resource.

Through GRDC support during the year, 5,673 upper high school science students were presented with an illustrated talk about science in local industries; 135 students were selected for the PICSE Industry Placement Scholarship Program; and 132 science teachers were engaged in a range of professional development sessions with local scientists, researchers and industry staff.

National Youth Science Forum

The GRDC encouraged students to consider careers in agricultural science through the National Youth Science Forum, a two-week intensive program held at the Australian National University. Participants are selected following a rigorous selection process and must demonstrate an interest in pursuing a career in a science- or engineering-related field.

In January 2009, the forum introduced 288 students from all over Australia to researchers, encouraged them to achieve excellence in all their undertakings, and helped them to develop their communication and interpersonal skills. Three GRDC staff members gave presentations about their own journeys through agricultural science, and held informal discussions with each of the student groups during the program.

BHP Billiton Science Awards

The BHP Billiton Science Awards, Australia's most prestigious science awards, are supported by a partnership between BHP Billiton, the Australian Science Teachers' Association, CSIRO and the GRDC. The awards recognise students who have undertaken practical research projects which demonstrate innovative approaches and thorough scientific procedures. The awards also recognise teachers for their support of open-ended student investigations in science education.

The GRDC Prize for Sustainable Agriculture in 2008–09 was presented to Hannah Younger and Luke Fletcher, Year 10 students from Marist Regional College in Burnie, Tasmania, for their project entitled 'Bloomin' Algae'.

GRDC award winners at the 2009 BHP Billiton Science Awards Luke Fletcher (left) and Hannah Younger with the GRDC's managing director Peter Reading. Photo: CSIRO

Dr Therese McBeath, receiving her GRDC-sponsored *Science and Innovation Award for Young People in Agriculture* from Minister Tony Burke. Photo: Bureau of Rural Sciences, DAFF

Hannah and Luke's aim was to investigate the effect of fertilisers on eutrophication of waterways. *Chlorella protothecoides*, a single-celled alga, was grown in water containing a range of concentrations of different types of fertiliser, and the dry mass was measured to calculate the growth rate. The investigation sought to determine which fertiliser most accelerates algal growth and to show that increasing nitrogen concentrations can increase oxygen levels in daylight and reduce oxygen concentrations at night. While the hypotheses were unsupported by the results, many questions that warrant further investigation were raised about the effects of fertilisers on algal growth.

CSIRO undergraduate summer school

The GRDC, in collaboration with the Australian Pastoral Research Trust, again sponsored the annual CSIRO Plant Industry Summer Student program. The programs run for ten weeks and are especially tailored for second- and third-year university undergraduates.

Each successful student works alongside a CSIRO research scientist who undertakes to guide the student during their project. Projects are designed to ensure they provide students the opportunity to learn new techniques and approaches, and to experience the excitement of research science. At the completion of the program, the students present their results in a public forum and prepare a final report on their findings.

Science and Innovation Awards for Young People in Agriculture

The GRDC continued its sponsorship of the Department of Agriculture, Fisheries and Forestry Awards for Young People in Agriculture.

To qualify, applicants had to be aged between 18 and 35 years and working or studying in an agricultural, fisheries, food, forestry or natural resource industry. Applicants were required to submit an innovative project proposal that addressed a significant issue in Australia's rural industries and could be completed within 12 months.

The winners were selected from a competitive field throughout Australia, based on their potential to benefit Australia's rural industries.

In 2008–09, the GRDC-sponsored award was presented to Therese McBeath, a research associate at the University of Adelaide, who wants to identify fertilisers that deliver phosphorous more efficiently. Her research included a visit to the United States in February 2009 to see the latest research into foliar phosphorous fertilisers.

Nuffield scholars

The GRDC continues to support the skill and leadership development of people working in the grains industry through its sponsorship of Australia's premier farming scholarship awards, the Nuffield Australia Farming scholarships.

These scholarships give Australians the opportunity to travel overseas to study a research topic of their own choice, related to farming practices, in New Zealand, Europe, Asia and the Americas. As well as promoting a closer understanding between farmers in Australia and overseas, the scholarships provide participants with the opportunity to better understand the forces shaping international trade policy in key markets, the issues behind consumer sentiment, and the technological advances being made by producers in other countries.

It is expected that scholars will be able to actively spread the knowledge and understanding they have gained to significantly boost their farming sector's understanding of the international forces affecting the Australian industry and the need to adopt new technology and management practices to continue to maintain productivity growth and competitiveness.

The 2008–09 GRDC scholars are:

- Stuart Barden, from Gilgandra, New South Wales, who is studying grain growing in marginal- and low-rainfall areas, with the aim of producing better, more consistent yields, as well as improving water use efficiency through micro water harvesting.
- James Hassall, also from Gilgandra, New South Wales, who is examining the role of PA in the future of farming and the new technologies being developed to enhance PA.
- Leon Ryan, from York, Western Australia, who is studying factors driving demand for grains and potential product substitutions.

Stuart Barden
Photo: Nuffield Australia

James Hassall
Photo: Nuffield Australia

Leon Ryan
Photo: Nuffield Australia

Australian Rural Leadership Program

The GRDC sponsored two participants in the Australian Rural Leadership Foundation's Australian Rural Leadership Program in 2008–09. The program is an opportunity for selected rural and regional leaders to undertake a program of personal growth and develop the skills, knowledge and networks needed to be effective in regional, state, national and international arenas.

The program comprises professional and personal leadership skills development, examination of key national and international issues, and interaction with leaders in government, industry and the community. The program prepares participants to:

- develop sustainable, competitive and profitable industries, in an international context
- develop economically, socially and environmentally sustainable communities in rural and regional Australia
- establish strategic alliances and build strong links within and across industry sectors
- identify the competing demands for industry, government and community support
- identify and analyse the strategic issues affecting the future of rural and regional Australia
- understand the values, tactics and arguments of interest groups
- deal confidently with industry, government and community leaders in Australia and overseas
- participate in shaping national policies.

The GRDC-sponsored participants in 2008–09 were:

- Donna Lynch, a primary producer with farm production mainly consisting of wheat, wool and prime lambs in south-central Western Australia. Donna is a member of the Cooperative Bulk Handling group, Growers Advisory Council and Western Australian Meat Marketing Co-operative Limited (WAMMCO) and vice-chair of the Rural Policy Committee.
- Caroline Rhodes, the senior manager at Wheat Exports Australia responsible for the administration of the Wheat Export Accreditation Scheme. Caroline has worked in the Australian grains industry since 1999 and has extensive experience in international trade, marketing, R&D and quarantine policy. She holds a Bachelor of Agricultural Science from the University of Adelaide, a Master of Agribusiness from the University of Melbourne and a Diploma from the Australian Institute of Company Directors.

Case Study

Growers master risk management with *Grain Market Lingo*

Since the deregulation of bulk wheat export marketing, growers have needed to take a more active role in managing their own price risk. The GRDC received feedback from grain growers stating that, in their view, a lot of available information on price risk was not objective but was directed at promoting a company's own price risk products.

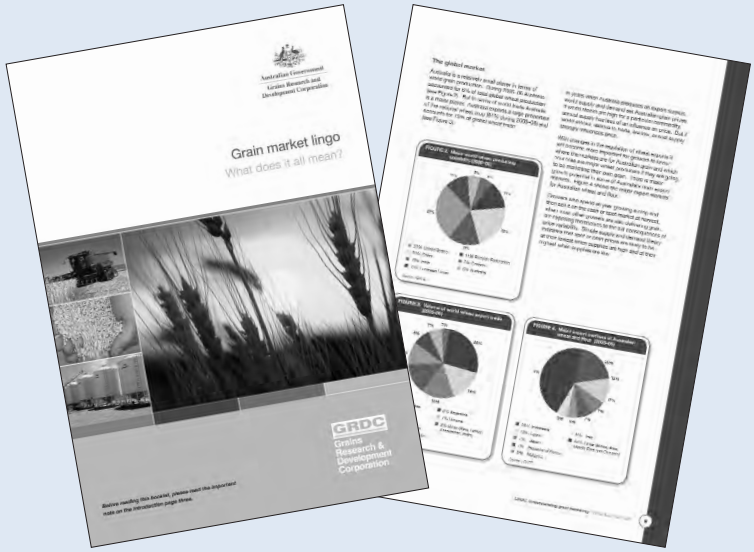
To address growers' concerns, given the fact that effective management of both risk and profitability is the key to short-term success and long-term viability, the GRDC published *Grain Market Lingo*.

Grain Market Lingo provides factual, objective information on price risk management as well as case studies on how growers have used various marketing options. It provides background on the terminology and marketing options as well as outlining the advantages and disadvantages of the various options.

The booklet covers:

- risks—production, price, delivery, quality and counterparty risks
- market trends in grain marketing
- grain pricing—futures, basis price and foreign exchange
- grain marketing tools—forward contacts, futures markets, options, commodity swaps and others
- converting prices back to the farm gate.

The GRDC offered *Grain Market Lingo* as a free publication with very widespread distribution. Within one month of its release, growers had snapped up the initial 5,000 copies printed, and it was necessary to reprint an additional 2,000 copies to meet demand. *Grain Market Lingo* has become a 'must have' resource in many of the grain marketing workshops held around Australia.



Case Study

Research scholar takes a close look at lucerne flea

Better ways to control the damaging lucerne flea, which attacks pasture, cereal and legume crops, are one expected outcome of John Roberts's PhD project at the University of Melbourne. With support from a GRDC Grains Industry Research Scholarship, John is investigating the biology of the lucerne flea and the possibility of using a predatory mite to control it.

After completing a science degree with majors in genetics and zoology, John sought a PhD project that combined the two disciplines. This led him to the Centre for Environmental Stress and Adaptation Research at the University of Melbourne, and the project on lucerne fleas.

John's work has revealed some important differences between the effects of chemical control in red-legged earth mite (RLEM) and lucerne flea. 'Lucerne fleas have a much greater tolerance to pesticides than RLEM, so where both pests are present, pesticide control of RLEM is unlikely to control lucerne flea and could in fact result in a secondary pest flare,' he says.

A comparison of organophosphates and synthetic pyrethroids showed that only organophosphate pesticides were effective against lucerne flea. Also, laboratory pesticide trials have shown that synthetic pyrethroids are harmful to an important beneficial predator, the snout mite, while organophosphates appear less toxic.

John hopes to investigate the snout mite's predatory ability, noting that in the past the mite has controlled lucerne flea in some areas. He also hopes to investigate the use of more selective chemicals which might control lucerne fleas without harming the snout mite and other beneficial species.

Using field trials and laboratory work, John has also studied the genetics of lucerne fleas in different populations to determine movement patterns between regions, which relates to how pesticide resistance might spread.

John receives a stipend for living expenses and a contribution to use for project expenses through the Grains Research Scholarship, and some additional support from the GRDC's National Invertebrate Pest Initiative.

Grains Industry Research Scholar John Roberts. Photo: Robin Taylor

Table 13: 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 2008–09		
$6.72 million		
Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Implementation of the GRDC communication strategy	A revised GRDC communication strategy developed, that identifies the needs of stakeholders, key messages and processes for evaluation.	The GRDC Communication Strategy was approved by the GRDC Board in April 2009.
	Successful implementation of the communication strategy, to facilitate the delivery of research outputs to a wide audience, building on existing regional delivery channels. Monitor grains industry and corporate issues to develop targeted communication strategies (e.g. pests and diseases).	The GRDC conducted three national issues-based communication campaigns, focusing on: • productivity and profitability • climate change • the GRDC's role in wheat breeding.
	Identification of opportunities for the GRDC to work collaboratively with RDCs, research partners, industry partners and governments to deliver information in ways that reduce duplication, better target stakeholders and are more cost effective.	The GRDC continued to engage with the communication managers from other rural R&D corporations (RDCs) to ensure effective partnerships. There was joint RDC participation at the National Farmers' Federation Congress and the Australian Bureau of Agricultural and Resource Economics Outlook conference. The GRDC collaborated on the joint RDC evaluation framework launch and media activities.
Increased awareness of the GRDC and its research outcomes	Unaided awareness of the GRDC increases through targeted communication activities (from 68 percent in 2006 to 80 percent in 2009)	Independent media analysis showed that the volume of media coverage increased from 55 percent in 2006–07 to 57 percent in 2008–09.
	Increased understanding of the GRDC and its role as measured through independent research surveys	The next grower awareness survey will be conducted in 2010.

Table 13: Communication & Capacity Building overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Increased awareness of the GRDC and its research outcomes	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	Six *Ground Cover* supplement titles were published and distributed in *Ground Cover* newspaper. Seven research reports were produced.
Increased favourable mentions of the GRDC's research activities and outputs and those of its research partners	Increase in positive media coverage (over established benchmarks) for print and electronic media	Positive media coverage increased by approximately 2 percent from 55 percent to 57 percent.
Increased awareness of GRDC investment outcomes through promotion at targeted conferences and workshops	Increased profile of the GRDC and its research outcomes at grains conferences	The GRDC supported 27 conferences, and attended and participated in 24 conferences.
Increased profile of the GRDC's regional panels	The proportion of growers who are aware of the GRDC's regional panels increase to 50 percent by 2009	Panel members participate as assigned members at RAC group meetings. The next awareness survey will be conducted in 2010.
Number of alternative electronic delivery mechanisms identified	Exploration of alternative electronic delivery mechanisms for rapid dissemination of information to customers Introduction of mobile phone based extension Delivery of audio based extension tools	The GRDC commenced the development of video podcasts of the GRDC Crop Updates for the GRDC website. The new CRM system is being populated with mobile numbers in compliance with privacy and anti-spam legislation. The GRDC pilot tested mobile phone–based extension of R&D outcomes through the National Agribusiness Reference Group. The GRDC rolled out 42 agronomy segments to rural radio stations.
Improved ability to deliver new information packages and tools via the GRDC website	Creation and dissemination of web pages addressing specific industry issues Effectively packaged information on integrated research, development and extension issues and technologies, delivered to customers	Additions to the GRDC website included information on: • Pulse Breeding Australia • plant breeder's rights • wheat variety classification • biosecurity • grower groups • integrated pest management • GRDC regional panels • integrated weed management • the Australian Feedgrain Partnership • Pastures Australia.

Table 13: Communication & Capacity Building overview *(continued)*

Performance for 2008–09		
Performance indicators	**Targets**	**Achievements**
Improved delivery of technical information through workshops held across Australia	Implementation of technical workshops on strategic and tactical research, development and extension issues	The GRDC: • continued to conduct integrated weed management workshops • delivered spray drift management workshops • held a canopy management workshop for senior advisers.
Increased grower and industry satisfaction that publications, products and services are timely, targeted and specific to customer needs	Production of fact sheets that present information on particular issues, both regional and national, and are timely, targeted and relevant to growers Increase in grower and industry satisfaction of *Ground Cover* newspaper as measured through independent market research surveys	Eleven fact sheets were printed and distributed at both national and regional levels. The *2008–09 Industry Extension and Publication Needs Survey* found that the level of technical information in *Ground Cover* met the needs of 85 percent of grain growers, while 88 percent of advisers identified *Ground Cover* as a highly regarded information source.
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	Continue to support training awards, travel awards, conferences, Nuffield Foundation and Australian Rural Leadership Foundation scholarships	The GRDC supported 32 travel awards, 10 industry development awards, 27 conferences and 52 training scholarships, including 19 Grains Industry Research Scholarships and 12 Undergraduate Honours Scholarships. The GRDC sponsored three Nuffield Australia Farming scholarships and two Australian Rural Leadership Foundation scholarships.

The GRDC provides funding support annually to the Australian Grains Industry Conference which is a key event in the grains industry calendar.
Photo: Brad Collis

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 strategy
- information management systems
- corporate communication
- risk management
- quality management
- human resource management
- finance and administration
- corporate governance and legal services.

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 below and throughout this annual report are key activities undertaken by the Corporate Services, Corporate Strategy & Impact Assessment and Legal & Procurement groups during 2008–09.

Portfolio analysis

In 2008–09, the GRDC continued to undertake R&D portfolio analysis. 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 (pure basic, strategic basic, applied, experimental development, deliver outcomes of R&D in products and services to stakeholders, capacity building)
- delivery time to growers of R&D outcomes (long-term projects versus short-term)
- probability of overall success (high-risk long shots versus lower-risk sure bets)
- benefit to cost ratio
- induced spillover benefits to the broader community.

The GRDC's portfolio is grouped under 24 clusters based on common themes and/or outcomes:

- Practices: Biosecurity, Conservation Agriculture, Crop Protection, Environment, Extension, Farming Systems, Soils, and Tactical Crop Management
- Varieties: Gene Discovery, Germplasm Enhancement, Enabling Technologies, Barley Breeding, Wheat Breeding, Oilseed Breeding, Pulse Breeding, Other Cereal Breeding, Summer Crops Breeding, and National Variety Trials
- New Products: Biopesticides, Grain Storage Farm/off farm, Instrument Products, New Grain Products—Food, New Grain Products—Industrial, and Soil Biology.

Although not listed separately, productivity and climate change are also common themes; because they are ubiquitous and overarching in nature they are considered in the context of almost every part of the GRDC portfolio.

Several matrices are used to analyse the GRDC's portfolio, including risk versus reward and risk versus time to delivery to grain growers. GRDC portfolio analysis results in a more effective and efficient selection and management of projects.

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

WA Cunderdin grower Norm Jenzen has planted 45 hectares of GM canola this year. Photo: Evan Collis

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 2008–09 included around 770 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 time frames for a limited number of formal reviews of targeted investment areas. Four formal reviews were conducted in 2008–09:
  - National Variety Trials
  - Australian Winter Cereals Pre-Breeding Alliance
  - National Oat Breeding Program
  - Go Grains Health & Nutrition Ltd

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 2008–09 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.

Four generations of the Sinclair family during the 2008 harvest. (From left) Michael Sinclair's father Graham (who drives the header) with grand-daughter Catie, Michael (who drives the trucks) with son Angus, and Michael's grandfather Peter (although retired, drives the chaser bin). Photo: Kellie Penfold

Information technology

The GRDC's information technology (IT) environment received a number of improvements that increased the level of online security for staff and visitors at the GRDC's office.

The upgrade of the GRDC firewall has given IT staff better control over unwanted internet traffic to and from the GRDC, including the blocking of viruses, denial-of-service attacks and other hacking attempts. Monitoring of servers using Security Centre Operations Manager software has given the GRDC's IT staff the ability to identify small issues before they have the chance to become major outages.

The GRDC servers were continually upgraded and, as part of the upgrade process, virtualised. This means that the GRDC is able to optimise hardware investments by reducing the number of hardware servers in use, and the associated consumption of electricity, at the GRDC's office. The virtualisation project also means that the GRDC now has a more robust internal recovery system that was developed in line with the GRDC's Disaster Recovery Plan.

The GRDC has successfully completed the implementation of the TRIM Context Records Management System. The addition of the Diem interface has enabled the GRDC to integrate TRIM with the GRDC Project Management System, Clarity. The addition of TRIM and integration with Clarity have improved the productivity of staff by successfully linking project records with project details.

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 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 research 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 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 2008–09 is described below.

In addition to participating directly in the commercialisation of new wheat varieties where it has co-ownership of the cultivars, the GRDC monitors the total number of new wheat varieties released, including private breeding company releases. The GRDC reports on the total releases so that breeding activity, regardless of whether it is publicly funded or a private enterprise, can be monitored over time.

New crop varieties

In 2007–08, the GRDC was actively involved in the release and commercialisation of several new crop varieties. The GRDC's primary objective was to encourage rapid adoption of the new, superior varieties by growers, while protecting the interests of the intellectual property owners.

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

The new varieties commercialised in 2008–09 included:[3]

- 12 new wheat varieties—Bumper(Þ), Endure(Þ) Fang(Þ), Fortune(Þ), Gascoigne(Þ), Gruner(Þ), Mace(Þ), McCubbin(Þ), Saintly(Þ), Sunvex(Þ), Waagen(Þ) and Zippy(Þ)
- two new durum wheat varieties—Caparoi(Þ) and Hyperno(Þ)
- two new barley varieties—Commander(Þ) and Shepherd(Þ)
- two new mungbean varieties—Crystal(Þ) and Satin II(Þ)
- one new desi chickpea variety—CICA0512(Þ)
- one new faba bean variety—Doza(Þ)
- one new soybean variety—Moonbi(Þ).

High-amylose wheat

Since signing a joint venture agreement with CSIRO and Groupe Limagrain Cereales Ingredients, establishing Arista Cereal Technologies Pty Ltd, the GRDC has been assisting the company to successfully commercialise the high-amylose wheat product.

Major achievements in 2008–09 included:

- face-to-face discussions with potential commercial partners in Australia, Europe and the North American Free Trade Agreement countries (Canada, Mexico and the United States)
- the assembly of negotiation teams to progress negotiations with preferred partners.

Arista also implemented a research strategy to expedite the characterisation of an optimal transgenic event for commercial release.

Coeliac-friendly barley for beer

The GRDC is working with the CSIRO Food Futures Flagship to develop a malting barley that is suitable for gluten-intolerant people. In 2008–09, the project produced a low-gluten barley line in which 90 percent of the hordein proteins have been removed. Preliminary trials have shown this line can be malted. Future research activities aim to improve the seed size and micro-malting characteristics of low-gluten barley lines.

Soil biology

The Novozymes Biologicals Australia Pty Ltd joint venture completed another season of field evaluations of a range of growth promotion and disease control microbes sourced from both Australian and North American research programs.

The new product TagTeam, which is a *Rhizobium* inoculant including phosphorous-solubilising microbes sourced from GRDC-supported research, was launched in Australia in early 2009. The response from the industry to this new technology is very encouraging for the future of beneficial microbes in agriculture.

Cereal endophyte program

The GRDC has invested in a program with Grasslanz Technology Ltd (a commercial venture of a New Zealand Crown Research Institute, AgResearch) to identify and develop cereal endophytes that may have a role in controlling heat and water stress and insect damage in cereals. Grasslanz is a world leader in endophyte technology and has been responsible for bringing insect-resistant pastures containing endophytes to market in Australia and the United States.

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 CRCs, government policy.

Table 14 describes the companies which the GRDC had shares or membership in 2008–09. In most cases the GRDC also nominated one or more directors to the company's board.

3 The term 'new varieties commercialised' is defined by the GRDC as meaning 'varieties for which there is a significant amount of seed available commercially to growers'.

Table 14: Companies in which the GRDC has shares or membership as at 30 June 2009

Companies limited by guarantee		
Name	**Activity**	**GRDC role**
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	A GRDC employee is a member of the company, for GRDC
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 Ltd	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
Single Vision Grains Australia Limited	Inactive	Is the only member Appoints the directors
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		
Name	**Activity**	**GRDC role**
Arista Cereal Technologies Pty Ltd	Undertakes development of high-amylose wheat	Is a 17 percent shareholder. Nominates one director
Australian Centre for Plant Functional Genomics Pty Ltd	Conducts functional genomics research into abiotic stress	Is a 19.7 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 36.7 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 31.4 percent shareholder. Nominates one director

Table 14: Companies in which the GRDC has shares or membership as at 30 June 2009 *(continued)*

Companies limited by shares *(continued)*		
Name	**Activity**	**GRDC role**
HRZ Wheats Pty Ltd	Develops high-yielding milling wheat varieties for Australia's high-rainfall zone	Is a 43.4 percent shareholder Nominates one director
InterGrain Pty Ltd	Undertakes commercial wheat breeding	Is a 33 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.

Patents

During 2008–09, 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—10 patents/patent applications in three families

2 Varieties
- Gene Discovery—105 patents/patent applications in 19 families
- Germplasm Enhancement—33 patents/patent applications in nine families
- Pulse and Oilseed Breeding—eight patent/patent applications in one family

3 New Products
- New Farm Products and Services—49 patents/patent applications in nine families (incorporating the seed destructor patent applications, which are the only family of applications solely owned by GRDC)
- New Grain Products—28 patents/patent applications in seven families.

Plant breeder's rights

In 2008–09, the GRDC and its research partners:

- lodged seven new plant breeder's rights (PBR) applications
- withdrew two new PBR applications
- surrendered four certificates of PBR.

At 30 June 2009, the GRDC co-owned 139 plant varieties covered by PBR, and 33 PBR applications.

Trademarks

The corporation surrendered two trademarks in 2008–09. At 30 June 2009, the GRDC held seven trademarks, either in its own right or jointly.

Subsidiaries

During 2008–09 the GRDC had one subsidiary company, Single Vision Grains Australia Limited, which was inactive.

PART 3

Our Organisation

Photo:
Greg Giblett, a founding member of AMPS Research, and the group's research coordinator Jules Dixon.
Photo: Rebecca Thyer

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 12, 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 12: Members of the GRDC Board in 2008–09

Directors as at 30 June 2009

Keith Perrett

Chair (Non-Executive)

Appointed:
1 October 2007 until
30 September 2010

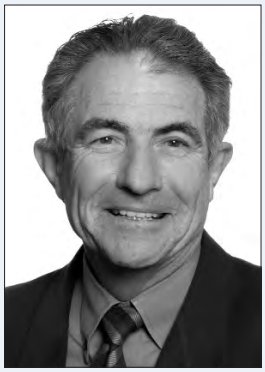
Member:
Remuneration Committee

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 Farmer's 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 October 2007. He was also a member of the Governing Council of the Plant Breeding Institute of the University of Sydney between 1997 and 2003.



Peter Reading

BScAg (Hons), FAICD

Managing Director
(Executive)

Appointed:
February 2004

Peter has been Managing Director of the GRDC since February 2004. He is the inaugural Chair of Pulse Breeding Australia and a Director of Single Vision Grains Australia Limited.

Peter was previously the Managing Director of the Grain Pool Pty Ltd and a director of Enterprise Grains Australia and GrainGene III.

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. In Australia he subsequently worked for Incitec, British Oxygen Group and the Grain Pool.

Figure 12: Members of the GRDC Board in 2008–09 *(continued)*

Directors as at 30 June 2009

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.

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 the 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.

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 consultant. She has 23 years of experience as an economic policy adviser to the Australian Government, initially in 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 responsibility for the economic, industry, infrastructure and environment, and Cabinet divisions; and the Council of Australian Governments Secretariat. Jenny acted as the Secretary of the department on several occasions, including in early 2008.

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, with high-level policy experience across a wide range of macroeconomic, Commonwealth–state, industry, infrastructure and environment policy issues and detailed knowledge of Australian Government Cabinet and Budget processes.

Figure 12: Members of the GRDC Board in 2008–09 *(continued)*

Directors as at 30 June 2009

Steve Marshall

BSc(Hons1), M.AppSc, FAIFST

Director (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.

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

Professor Timothy Reeves

B.Sc(Hons), M.Agr.Sc 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 RD&E, 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 (1992–95); and Director General of the International Maize and Wheat Improvement Center (CIMMYT) based in Mexico (1995–2002).

His other roles have included: Member, United Nations Millennium Project Task Force on Hunger; Senior Expert, FAO, 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

BSc (Ag) (Hons); PhD in plant physiology (Oxford), FAIM

Director (Non-executive)

Appointed:
11 November 2008 until 30 September 2011

Graeme has been the Director of Curtin University's School of Agriculture and Environment (the Muresk Institute) since March 2004, responsible for agribusiness, horticulture, viticulture, environmental biology, rangeland science and aquaculture. He also chairs the Pastoral Lands Board of Western Australia.

Previously Graeme spent ten years as Director General of the Western Australian Department of Agriculture and was the inaugural Chair of the Land and Water Resources Research and Development Corporation.

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.

Figure 12: Members of the GRDC Board in 2008–09 *(continued)*

Directors retiring in 2008–09

Ross Johns

AdDipBusMgt, FAICD

Deputy Chair
(Non-executive)

Retired:
30 September 2008

Member:
Finance, Risk and Audit Committee
Remuneration Committee

Ross lives and works in rural Victoria, and has been a grain grower for many years. He is an active member of the Victorian Farmers Federation and a Director of ABB Grain Ltd.

He takes a keen interest in regional affairs, and has participated in many overseas marketing missions.

He brought to the GRDC experience in grain production and marketing, business management, sociology, technology transfer and natural resource management.

Don Plowman

BScAg, MScAg, PhD

Director (Non-executive)

Retired:
30 September 2008

Don is the Deputy Chief Executive, Primary Industries and Biosecurity, and the Executive Director Agriculture Food and Wine at the South Australian Department of Primary Industries and Resources.

He has more than 30 years experience in managing research, including as a director with the Horticultural R&D Corporation and the Dried Fruits R&D Council, and as a Board member for numerous Cooperative Research Centres (CRCs).

His particular areas of expertise are in administration, R&D, the environment and ecology, natural resource management and technology transfer.

Philip Young

BAgS, MEcon

Director (Non-executive)

Retired:
30 September 2008

Member:
Finance, Risk and Audit Committee

Philip has been an international agricultural and agribusiness consultant for the past 27 years, with a focus on China.

He owns a share-farmed intensive grain production property at Munglinup on the south coast of Western Australia.

He was the inaugural Chair of Australian Grain Technologies Pty Ltd from 2003 to 2005, and was a member of the Interim Board of Single Vision Grains Australia Limited from 2005 to 2007.

Jeanette Long

BAppSc (Ag), GDEd, MBA (Agribusiness), GAICD

Director (Non-executive)

Appointed:
11 November 2008

Resigned:
14 May 2009

Jeanette is a partner in a family farming business at Ardrossan in South Australia and in an agricultural consulting business specialising in farm consulting, R&D and training and facilitation. She is a board member of Australian Women in Agriculture Ltd, and has chaired the national program Partners in Grain since 2005.

Jeanette is a committee member of the Ag Excellence Alliance (linking South Australian grower groups), and was the inaugural chair from 2005 to 2007. She was awarded a Centenary Medal for service to the community in 2002 and the RIRDC Rural Women's Award in 2004. She has a range of skills and experience relevant to the GRDC, including commodity production and marketing and sociology.

Board as at 30 June 2009. (Left to right—Back row) Colin Butcher, Nicole Birrell, Jenny Goddard, Steve Marshall (Left to right—Front row) Graeme Robertson, Peter Reading, Keith Perrett, Timothy Reeves. Photo: Geoff Comfort

Board selection

The Minister 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 Selection Committee, a committee chosen by the Minister for Agriculture, Fisheries and Forestry on advice from the Grains Council of Australia, nominates between five and seven GRDC directors. Appointment of directors nominated through this mechanism is subject to ministerial approval.

Change of Board membership

The terms of Nicole Birrell, Ross Johns, Steve Marshall, Don Plowman, Timothy Reeves and PhilipYoung finished on 30 September 2008. The terms of Keith Perrett and Peter Reading continued.

On 11 November 2008 a new GRDC Board was appointed, until 20 September 2011. The Board's nine directors included four new members: Colin Butcher, Jenny Goddard, Jeanette Long and Graeme Robertson. They joined the continuing Chair, Keith Perrett, and re-appointed members Nicole Birrell, Steve Marshall and Timothy Reeves.

Jeanette Long resigned from the Board on 14 May 2009.

On 30 July 2009 the Selection Committee's Presiding Member, Bill Ryan, delivered a copy of his annual report to the Minister. A copy of this report is at Appendix E.

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 time frames
- 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 15.

Table 15: Board committees as at 30 June 2009

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, and tours to GRDC regions. During 2008–09 the Board held five meetings in Canberra; one meeting in Melbourne; and a visit to the Eyre Peninsula (Southern Region) in August 2008.

Each director's attendance at Board and Board committee meetings during the year is set out in Table 16.

Table 16: Attendance at Board and committee meetings, 2008–09

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 2008–09						
Nicole Birrell	7	7	3	3		
Colin Butcher	4	4	2	2		
Jenny Goddard	4	4	2	2		
Steve Marshall	7	7	2	2	1	1
Keith Perrett	7	7			1	1
Peter Reading	7	7				
Timothy Reeves	6	7			1	1
Graeme Robertson	4	4				
Directors ceased during 2008–09						
Ross Johns	2	2	1	1		
Jeanette Long	3	3				
Don Plowman	2	2				
Philip Young	2	2				

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. 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. A formal induction of new directors was conducted on 17 December 2008 and 5 February 2009.

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 (EMT) has seven members: the Managing Director, and the executive managers from each of the six management groups. The management structure is shown in Figure 7 in Part 1.

The EMT 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 detailed management objectives for the corporation. The Board reviews the corporation's performance against the objectives at least three times 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 three times per 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 conducted in 2006–07 and was described in the 2006–07Annual Report.

GRDC Board and staff meet the Queensland Department of Employment, Economic Development and Innovation's Hermitage Research Station staff, to discuss GRDC's significant investments in the sorghum, barley and maize breeding programs. Photo: Rachel Bowman

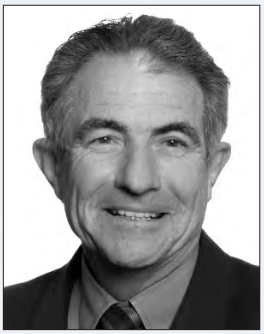
Executive Management Team

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 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 13.

Figure 13: Members of the GRDC Executive Management Team as at 30 June 2009



Peter Reading

Managing Director

Peter has been Managing Director of the GRDC since February 2004.

He is the inaugural Chair of Pulse Breeding Australia and a Director of Single Vision Grains Australia Limited.

Peter was previously the Managing Director of the Grain Pool Pty Ltd and a director of Enterprise Grains Australia and GrainGene III.

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. In Australia he subsequently worked for Incitec, British Oxygen Group and the Grain Pool.

Stephen Thomas

Executive Manager, Practices

Executive Manager, Communication & Capacity Building*

Stephen joined the GRDC in March 2009 and 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 previously a director of the Value Added Wheat Cooperative Research Centre (VAWCRC) and has held board positions with Enterprise Grains Australia and the Australian Sheep Industry CRC.

Stephen was Director of Rural Innovation at 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.

John Harvey

Executive Manager, Varieties

Executive Manager, Communication & Capacity Building*

John manages all aspects, including performance, of the GRDC's R&D investments in the 'better varieties, faster' pathway. He is also responsible for the GRDC's strategies for, and investments in, capacity building.

John is a graduate member of the Australian Institute of Company Directors. He is a director of Australian Crop Accreditation System Limited and a Director of the VAWCRC. He is on the management Boards of Pulse Breeding Australia, Barley Breeding Australia and the National Soybean Breeding Program. He is 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. His background is in agricultural extension, and RD&E management. He previously worked with the Queensland Department of Primary Industries.

Figure 13: Members of the GRDC Executive Management Team as at 30 June 2009 *(continued)*

Vince Logan

Executive Manager, New Products

Vince manages all aspects, including performance, of the GRDC's R&D investment in the 'new products' pathway.

Vince is a Certified Public Accountant and a graduate member of the Australian Institute of Company Directors.

He is a director of Novozymes 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.

Vince joined the GRDC in 1996 as Business Manager after 17 years in finance and marketing roles in the petroleum industry. He was appointed Executive Manager, Business Development in 2001 and Executive Manager, New Products, in 2004.

Leecia Angus

Executive Manager, Corporate Strategy & Impact Assessment

Leecia manages the development of the corporate strategy, regional panel and program support and impact assessment of RD&E investments.

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 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 is currently participating in the Australian Rural Leadership Program.

Geoff Budd

Executive Manager, Legal & Procurement

Geoff manages the GRDC's legal, procurement, risk management and compliance areas. He is also the GRDC Board Secretary, providing administrative support to the GRDC Board.

Geoff represents the GRDC as a Director of Pulse Australia Limited and a director of Single Vision Grains Australia Limited.

Geoff joined the GRDC in January 2001 as Corporate Lawyer, from private law 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. He holds a current legal practising certificate and membership of the Australian Capital Territory Law Society, and is a graduate member of the Australian Institute of Company Directors. Geoff has a Master of Laws specialising in intellectual property and is a graduate of Course 13 of the Australian Rural Leadership Program.

Gavin Whiteley

Executive Manager, Corporate Services

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.

Gavin is a Director of Single Vision Grains Australia Limited and Agrifood Awareness Australia Limited.

Gavin joined the GRDC in January 2005. He has a strong background in agribusiness, having previously held executive level roles in the beef, cotton and chicken-meat industries. 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.

Note: Responsibility for the role of Communication & Capacity Building is shared by John Harvey, Stephen Thomas and the Manager Communications, Kylie Paulsen.

Staff

Staff are employed under section 87 of the 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 2009, there were 49 full-time employees, including the Managing Director. The gender mix consisted of 24 females and 25 males. A staff list is provided in Table 17.

Table 17: Staff as at 30 June 2009

	Position	Occupant
Managing Director's area	Managing Director Manager Communications Executive Assistant	Peter Reading Kylie Paulsen Wynette Neil
Corporate Services	Executive Manager Manager Finance Accountant—Reporting Contract Payments Officer Accounts Payable Officer Manager Human Resources Records Management Coordinator Travel Coordinator Receptionist Administrative Assistant Manager IT Facilities Network Administrator Webmaster Network Support Officer	Gavin Whiteley Danielle White Nino Divito Carmen Jiang Kylie McLay Wendy Neil Ross Thompson Sarah Smith Ros Walton Helen Moffat Tavis Hamer Bhargav Prajapati Sam Livingstone Brendan Lawler
Legal & Procurement	Executive Manager Corporate Lawyer Compliance Officer Manager Procurement and Contracting Contracts Coordinator	Geoff Budd James Macintyre Catherine Wells Cathy Stewart Klaudia Skazlic
Corporate Strategy & Impact Assessment	Executive Manager Impact and Business Analyst Corporate Strategist Evaluation and Reporting Administrative Coordinator Panel Coordinator (National and North) Panel Support Officer (West) Panel Support Officer (South)	Leecia Angus Vincent Fernandes Zoltan Lukacs Ben Maroney Noelia Freitas Amy Fay Carolyn Pearson
Practices	Executive Manager Administrative Coordinator Project Manager Practices Manager Agronomy Soils and Environment Project Manager Practices Manager Crop Protection Manager Validation and Adoption Manager Extension and Grower Programs Manager Publications	Stephen Thomas Angela Ditton Ian McMaster Martin Blumenthal Tanya Robinson Rohan Rainbow Stuart Kearns Tom McCue Maureen Cribb

Table 17: Staff as at 30 June 2009 *(continued)*

	Position	Occupant
Varieties	Executive Manager Coordinator Varieties and Capacity Building Administrative Coordinator Administrative Coordinator Manager Gene Discovery Manager Germplasm Enhancement Project Manager Breeding Project Manager Pre-Breeding Manager Wheat and Barley Breeding Manager Pulse/Oilseed Breeding	John Harvey Merrilyn Baulman Zoe Wake Wendy Bosci Andreas Betzner Jorge Mayer Sara Hely Juan Juttner Vacant Brondwen MacLean
New Products	Executive Manager Administrative Coordinator Manager New Farm Products and Services Manager New Grain Products	Vince Logan Bettina Garrett Paul Meibusch Jody Higgins

Staff location

Six 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.

GRDC staff during team building exercise in November 2008 which included visits to research organisations. Photo: GRDC

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 GRDC's three regional panels are composed of grain growers, agribusiness representatives, researchers and the GRDC executive managers, with provision for other industry experts to participate as appropriate. Regional panel members also participate as members of GRDC 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 roles, responsibilities, codes of conduct, remuneration and selection guidelines for panel members. Panel members as at 30 June 2009 are listed in Table 18.

Table 18: Regional panel membership as at 30 June 2009

	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 John Crosbie Merna Curnow	Richard Konzag Allan Mayfield Andrew Rice Peter Schwarz Stephen Thomas
Western Regional Panel	Neil Young Richard Oliver	Leecia Angus Ralph Burnett Anna Butcher Merrie Carlshausen David Fienberg	Tracey Gianatti John Harvey Frances Hoyle Peter Roberts

Southern panel members visit to Marcus Oldham College, Geelong. Photo: GRDC

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 19).

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 19: Program teams as at 30 June 2009

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

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 *Primary Industries and Energy Research and Development Act 1989* (PIERD Act), the GRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry, who is responsible for all rural R&D corporations, including the GRDC.

During 2008–09 the Hon. Tony Burke, MP, 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 2008–09 are discussed in more 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 Industry 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 2002
- Finance Circular No 2006/06 Foreign Exchange (FOREX) Risk Management (replacing Finance Circular 2002/01)
- Finance Circular 2005/09 Cost recovery policy (replacing Finance Circular 2002/02)
- National Code of Practice for the Construction Industry and the associated Implementation Guidelines
- Australian Government Property Ownership Framework 2005
- Protective Security Manual 2005.

The GRDC is complying with the notified policies.

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 2009, 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, the Grains Council of Australia (GCA).

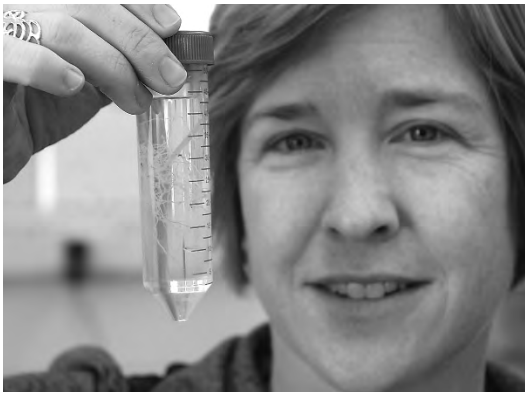
Grains industry priorities

In setting directions for 2008–09 (the second year of *Prosperity through Innovation*, the Strategic R&D Plan 2007–12), the GRDC identified industry priorities through direct consultations with the GCA, 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 2008–09. The priorities and the GRDC's achievements in meeting them during 2008–09 are discussed in more detail in Part 2.

Stakeholder report

Each year the GRDC prepares a stakeholder report to assist the GCA to formulate advice to the Minister on setting the research levy rates which provide the basis for the corporation's income each year. The draft Stakeholder Report 2009–10 was provided to the GCA on 23 December 2008 for input. The final Stakeholder Report 2009–10 was provided to the GCA in March 2009.

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 2007–08 report was circulated to growers and other *Ground Cover* subscribers in November 2008.



CSIRO researcher, Dr Michelle Watt with a Brachypodium seedling in a test tube which may be a solution to the US-driven search for suitable biofuel crops. Photo: Kellie Penfold

Industry levy rates

In 2008–09, 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 2008–09 are recorded in Note 3C of the Notes to the Financial Statements.

The GRDC paid the Australian Government Department of Agriculture, Fisheries and Forestry $548,028 for the collection and management of levies in 2008–09.

Consultation arrangements

The GRDC paid the GCA $38,546.04 for its participation in consultations with the corporation during 2008–09. The GCA 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.

Table 20 lists the project funds and conference support that the GRDC provided to the GCA in 2008–09.

Table 20: GRDC funding for Grains Council of Australia participation in projects and events, 2008–09

Grains Council of Australia activity		GRDC contribution ($)
GCA00020	Market Access Biosecurity Grains Industry Consultative Committee	18,160
GCA00021	Sponsorship of attendance at International Grains Council Conference 2009	5,109
GCA00022	Trade information facilitation activities	15,840
GCA00023	Sponsorship of R&D session at 1 April 2009 Grains Industry Forum	5,000
GCA00024	Seed Industry consultation and Seed Industry Reference Group	10,000

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 to 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)
- 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 2008–09 is presented on pages 117–118.

Judicial decisions and reviews by outside bodies

In 2008–09, the GRDC was not affected by judicial decisions, nor was its conduct the subject of any reviews by outside bodies.

Corporate governance

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

Key activities during 2008–09 included:

- detailed review of policies and procedures on corporate governance, finance, travel and information technology
- the design and implementation of new business and fraud risk reports
- monthly reviews of business and fraud risks
- completion of the Business Continuity Plan and Information Technology Disaster Recovery Plan.

The GRDC was a finalist in the Oppeus Governance Award category at the 2008 NAB Agribusiness Awards for Excellence, which built on the GRDC winning the Ernst & Young Risk Management Award category at the 2007 NAB Agribusiness Awards for Excellence.

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 Business 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 a fraud risk assessment every two years. During 2008–09 the GRDC engaged external provider 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 will provide the final fraud risk assessment and fraud control plan in early 2009–10.

The GRDC also conducts an external business risk assessment every three years. Oakton conducted the most recent external business risk assessment in May 2006, and is scheduled to conduct the next external business risk assessment in 2009–10.

To ensure 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 and 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 fraud control action plan every six months.

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 the Comcover Benchmarking Program of Comcover members. The March 2009 Benchmarking Survey rated the GRDC in the top 3 percent of small Comcover members and the top 31 percent of the 126 participating Comcover members. The GRDC rated:

- high on risk monitoring and review (top 8 percent of all Comcover members)
- high on risk management governance (top 3 percent of small Comcover members)
- relatively low on communication and training (but still above the average of all Comcover members).

The GRDC will strive to continue improving its risk management framework in 2009–10. In particular, the GRDC is participating in the Comcover Risk Management Assessment Service. In addition, in June 2009 Echelon Australia Pty Ltd commenced an independent external review of the GRDC's risk management framework, capability and culture. Echelon will complete its review in 2009–10 and provide its recommendations to the GRDC.

Quality assurance

The GRDC's Quality Management System has ISO9001:2000 quality assurance accreditation from SGS Systems & Services Certification Pty Ltd.

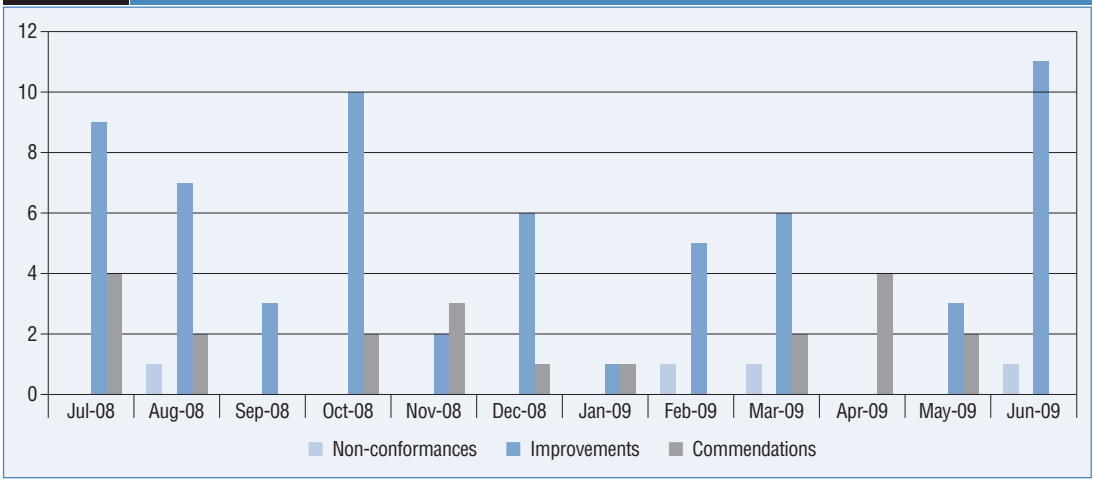
In 2008–09, regular internal audits were conducted by a contracted certified auditor over two days every two months. In March 2009, a successful external surveillance audit was conducted by SGS Systems & Services Certification Pty Ltd. The GRDC's certification was continued to 2010.

From left: Alan Stevens from Tan Lodden Hay Exports, David Shannon and Dr Mark Peoples from the GRDC southern panel discuss the potential of the export hay market. Australia's 'clean-and-green' image is an important selling point for hay exporters, especially to Australia's major customer, Japan.
Photo: Porter Novelli.

In addition, the EMT formally reviewed the quality system once every six months. All aspects of the quality system were considered at the quality management review meetings, including recommendations for improvements, complaints, non-conformance and commendations.

Figure 14 shows the results of the quality audits. The audits demonstrate that the Quality Management System based on ISO9001:2000 is robust, is being used correctly and continues to be a useful tool for business improvement. During 2009, the GRDC will update the Quality Management System to meet the ISO9001:2008 quality assurance standard.

Figure 14: Results of quality audits, 2008–09



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 the Grains Council of Australia's environmental policy.

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 9).

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 research, development and extension (RD&E) investments in:

- new tolerance traits for saline and sodic soils
- improved nitrogen use efficiency in wheat and barley
- national phenotyping facilities for water productivity traits
- adaptation to climate change and mitigation of greenhouse gas emissions in the Australian grains industry
- water use efficient farming systems
- low-methane producing feed grains.

Other investments also address issues that have environmental outcomes, such as weed management, pesticide use, integrated pest management, tillage practices and crop rotations.

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.

Part 2 of this annual report includes more discussion on how GRDC investments helped to achieve environmental objectives.

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 2009 has been lodged with the Privacy Commissioner. The online digest may be viewed at the commissioner's website, www.privacy.gov.au.

Photo: Evan Collis

Freedom of information

As an Australian Government statutory authority the GRDC is required to report on the following matters under sections 8 and 9 of the *Freedom of Information Act 1982* (FOI Act):

- 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).

Details of the organisation

Details 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 advisors 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 'Accountability' section 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 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 www.grdc.com.au.

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 document(s) 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 2008–09.

People management

As a relatively small, specialist organisation operating in a market where competition for skilled staff is intense, the GRDC places high priority on looking after its people as well as managing its human resources effectively. This includes monitoring and rewarding individual performance; planning to secure the right suite of skills to meet the current and future needs of the GRDC; and providing a healthy work environment.

Performance management

Excellent performance is encouraged through the GRDC performance management process. Twice each year, all staff undergo performance review according to agreed key result areas and goals. The dialogue between managers and their staff, which is continued between formal reviews, ensures that performance is aligned with the strategic direction of the organisation, allows support and realignment if necessary, and reaffirms strong performance. At the end of the year, the annual bonus scheme rewards excellent individual performance while also taking into account the overall performance of the organisation.

Recruitment, retention and succession management

During the year, 12 staff members were recruited to fill vacancies. The job market for quality staff continued to be tight despite the impact of the global financial crisis during the latter part of the year. The strong reputation of the GRDC in the agricultural and research sectors has paid dividends by attracting key people.

The GRDC values its people and aims to retain their services. Identifying why people choose to remain in the GRDC is important. The GRDC understands that people may choose to stay for financial and non-financial reasons. It recognises that people need to be well remunerated but that they also value training and development, a good organisational culture, extra staff benefits such as health initiatives and work–life balance, and the knowledge that the GRDC cares for all its staff members.

A formal succession management process takes place yearly, when all staff are rated according to their potential to succeed in certain roles. Staff with good potential are identified and encouraged to develop their skills and trained to be able to take on new roles, should the need arise. The succession plan is reviewed by the Board and is a successful retention tool, as staff are recognised for their skills and performance.

During 2008–09 four people moved roles within the GRDC.

Workforce development

In 2008–09, four executive managers attended formal strategic leadership training, several staff members continued formal study and other members of staff attended short courses and conferences. Leecia Angus is currently participating in the Australian Rural Leadership Program, which aims to develop leaders in rural Australia while forging networks and relationships between the participants.

The GRDC is proud to have supported:

- five employees who undertook academic studies in such units as accounting and accrual accounting, project management, statistics, marketing management, organisational behaviour, Bachelor of Commerce units, leadership and motivation
- 22 employees who attended self-development and leadership training programs
- Board and panel members and 18 members of staff who attended a media skills training program after being identified as those most likely to be key corporate spokespeople involved with high-profile issues.

Southern Farming Systems Gippsland branch project coordinator Greg Foster and facilitator Rose Maher examine sorghum which is part of a variety trial near Bairnsdale to identify summer cropping options for growers.
Photo: Catherine Norwood

Australian Government Bargaining Framework

The GRDC is working towards complying with the Australian Government Bargaining Framework when engaging employees, as directed under section 143 of the PEIRD Act. This framework aims to:

- ensure fairness and flexibility
- promote productivity
- provide for collective agreement, negotiated at the individual authority level
- enshrine accountability for compliance with the framework.

Equal employment opportunity

Staff are employed under terms and conditions consistent with the *Equal Employment Opportunity (Commonwealth Authorities) Act 1987* and the equal employment policy set out in the GRDC Operating Manual. Recent important changes to discrimination laws include a change in definition of marital status to include same sex couples, highlight the importance of family responsibilities, include breastfeeding as a ground on which discrimination can occur, and impose a positive duty on employers to reasonably accommodate requests for flexible working arrangements.

The GRDC is proud to have a workplace population which is diverse in terms of ethnicity and cultural background yet harmonious and cohesive.

Analysis of the GRDC workforce for 2008–09 shows that, compared to last year, both the gender profile and the age profile remained steady. Table 21 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.

During 2008–09 progress in implementing the Commonwealth Disability Strategy included the following:

- All GRDC employment policies, procedures and practices complied with the requirements of the *Disability Discrimination Act 1992*, as amended by the *Disability Discrimination and Other Human Rights Legislation Amendment Act 2009*.
- All recruitment documentation provided by the GRDC was available in alternative forms, including in hard copy (provided on request) and on the GRDC website.
- Information and advice on 'reasonable adjustment' principles were provided to managers and recruiters on request.

Table 21: Breakdown of staff by age and gender, 2007–08 and 2008–09

	2007–08		2008–09	
	Number	Percentage	Number	Percentage
20–30 years	9	19	11	22
30–40 years	15	32	14	29
40–50 years	11	24	10	20
50–60 years	10	21	13	27
>60 years	2	4	1	2
Female	22	47	24	49
Male	25	53	25	51
Total	**47**	**100**	**49**	**100**

Occupational health and safety

The GRDC cares for the health, safety and wellbeing of its employees, Board members, panel members, contractors and visitors to its workplace. It complies with the *Occupational Health and Safety Act 1991* and takes all reasonably practicable steps to ensure a safe working environment.

During 2008–09 the GRDC conducted a review of its occupational health and safety (OH&S) policies and procedures and worked to implement changes resulting from the *Occupational Health and Safety (Commonwealth Employment) Amendment Act 2006*. The GRDC (in consultation with its employees) worked on the implementation of its Health and Safety Management Arrangements (HSMAs) as required under section 16(2)(d) of the *Occupational Health and Safety Act 1991*. The GRDC will use the HSMAs as one of the main mechanisms to demonstrate its commitment in meeting its duty of care.

The Health and Safety Representative will continue to review the health and safety procedures in place and expand them where necessary.

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

The GRDC provided free flu vaccines to all staff, which was important in the pandemic environment experienced in the latter part of 2008–09. Other initiatives introduced for the benefit of employees included the provision of:

- continually updated information in the areas of: reducing stress and keeping active
- information from the Heart Foundation and CSIRO Family Healthy Living
- counselling for staff and families in the form of an Employee Assistance Program, provided by IPS Worldwide.

Table 22 provides a summary of other activities undertaken during 2008–09 in relation to OH&S.

Table 22: GRDC occupational health and safety performance

Indicators	Performance
Training and awareness of occupational health and safety (OH&S) requirements	Important activities conducted during the year included: • workstation assessments carried out for all staff and adjustments where recommended carried out • training on emergency procedures for new staff • senior first aid officer training for two staff members • Comcare-accredited OH&S training for the Health and Safety Representative • the annual emergency building evacuation and fire drill • the annual check and restock of the first aid kit • the establishment of more extensive OH&S policies.
Improved internal security arrangements	Compliance with the Protective Security Manual was implemented in stages. The internal alarm system was upgraded.
Workplace facilities maintained to a high standard	Activities to ensure that facilities were well-maintained during the year included: • twice-yearly inspection of fire extinguishers • annual radiation check of microwave ovens • regular inspection of smoke detectors • painting, and cleaning of carpets.

Financial Statements

Photo:
Keith Perrett senior and Keith Perrett junior in their 2008 wheat crop of Ventura$^{\phi}$ in the 2008 north-west NSW Gunnedah wheat crop competition. The five-tonnes-a-hectare yield was achieved despite a difficult season and was attributed to high soil fertility, a full soil moisture profile at sowing, sound rotations to beat diseases, and early sowing.
Photo: Bob Freebairn

Independent auditor's report

INDEPENDENT AUDITOR'S REPORT

To the Minister for Agriculture, Fisheries and Forestry

Scope

I have audited the accompanying financial statements of Grains Research and Development Corporation (the Corporation) for the year ended 30 June 2009, which comprise: a Statement by Directors; Income Statement; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments 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 are responsible for the preparation and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards (which include the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

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 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

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT 2600
Phone (02) 6203 7300 Fax (02) 6203 7777

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 and fair presentation of the financial statements 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 accounting policies used and the reasonableness of accounting estimates made by the Directors, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting the audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Auditor's 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 the Corporation's financial position as at 30 June 2009 and its financial performance and cash flows for the year then ended.

Australian National Audit Office

Mark A Moloney
Senior Director
Delegate of the Auditor-General
Canberra

12 August 2009

Statement by directors

In our opinion, the attached financial statements for the year ended 30 June 2009 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.*

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
11 August 2009

Signed .....

Mr P F Reading
MANAGING DIRECTOR
11 August 2009

Income statement

FOR THE PERIOD ENDED 30 JUNE 2009

	Notes	2009 $'000	2008 $'000
INCOME			
Revenue			
Revenue from Government	3A	**43,896**	37,621
Interest	3B	**10,010**	5,577
Industry contributions	3C	**89,207**	76,647
Project refunds	3D	**2,207**	4,696
Royalties	3E	**2,003**	1,859
Grants income	3F	**2,632**	406
Other revenue	3G	**430**	363
Total revenue		**150,385**	127,169
Gains			
Sale of assets	3H	**31**	—
Total gains		**31**	—
TOTAL INCOME		**150,416**	127,169
EXPENSES			
Research and development	4A	**106,252**	89,088
Employee benefits	4B	**6,104**	5,782
Suppliers	4C	**5,194**	5,120
Depreciation and amortisation	4D	**411**	610
Write-down and impairment of assets	4E	**3,311**	1,896
Loss from asset sales	4F	**—**	6
TOTAL EXPENSES		**121,272**	102,502
Share of operating results of associates and joint ventures accounted for using the equity method	5D	**(672)**	(613)
Surplus/(Deficit) before income tax		**28,472**	24,054
Income tax expense		**—**	—
SURPLUS/(DEFICIT) ATTRIBUTABLE TO THE AUSTRALIAN GOVERNMENT		**28,472**	24,054

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

Balance sheet

AS AT 30 JUNE 2009

	Notes	2009 $'000	2008 $'000
ASSETS			
Financial assets			
Cash and cash equivalents	5A	**33,104**	12,126
Trade and other receivables	5B	**22,008**	12,656
Investments	5C	**89,806**	81,333
Investments accounted for using the equity method	5D	**288**	134
Investments-other	5E	**7,326**	5,185
Total financial assets		**152,532**	111,434
Non-financial assets			
Land and buildings	6A, D	**5,890**	5,558
Infrastructure, plant and equipment	6B, D	**324**	241
Intangibles	6C, D	**325**	257
Other non financial assets	6E	**24**	1
Total non-financial assets		**6,563**	6,057
TOTAL ASSETS		**159,095**	117,491
LIABILITIES			
Provisions			
Employee provisions	7A	**1,036**	954
Total provisions		**1,036**	954
Payables			
Suppliers	8A	**741**	798
Research and development	8B	**38,628**	26,045
Total payables		**39,369**	26,843
TOTAL LIABILITIES		**40,405**	27,797
NET ASSETS		**118,690**	89,694
EQUITY			
Retained surplus/(accumulated deficit)		**50,439**	22,105
Asset revaluation reserve		**3,361**	2,837
Capital commitment reserve		**2,621**	4,857
Contracted research reserve		**62,269**	59,895
TOTAL EQUITY		**118,690**	89,694
Current Liabilities		**38,764**	25,910
Non-current Liabilities		**1,641**	1,887
Current Assets		**144,942**	106,116
Non-current Assets		**14,153**	11,375

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

Statement of changes in equity

AS AT 30 JUNE 2009

	Accumulated Results		Asset Revaluation Reserve		Contracted Research Reserve		Capital Commitment Reserve		TOTAL EQUITY	
	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000
Opening balance Balance carried forward from previous period	22,105	7,865	2,837	2,832	59,895	53,917	4,857	1,021	89,694	65,635
Adjustment for errors	—	—	—	—	—	—	—	—	—	—
Adjustment for changes in accounting policies	—	—	—	—	—	—	—	—	—	—
Adjusted opening balance	22,105	7,865	2,837	2,832	59,895	53,917	4,857	1,021	89,694	65,635
Income and expenses recognised directly in equity Net revaluation increment/(decrement) (note 6B)	—	—	524	5	—	—	—	—	524	5
Subtotal income and expenses recognised directly in equity	—	—	524	5	—	—	—	—	524	5
Surplus/(deficit) for the period	28,472	24,054	—	—	—	—	—	—	28,472	24,054
Total income and expenses	28,472	24,054	524	5	—	—	—	—	28,996	24,059
Transfer between equity components	(138)	(9,814)	—	—	2,374	5,978	(2,236)	3,836	—	—
Closing balance as at 30 June	50,439	22,105	3,361	2,837	62,269	59,895	2,621	4,857	118,690	89,694

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

Cash flow statement

FOR THE PERIOD ENDED 30 JUNE 2009

	Notes	2009 $'000	2008 $'000
OPERATING ACTIVITIES			
Cash received			
Industry contributions		89,074	76,648
Commonwealth contributions		36,928	28,909
Interest		7,414	5,280
Net GST received		(1,735)	257
Grants income		2,895	406
Other cash received		5,074	7,383
Total cash received		139,650	118,883
Cash used			
Research and development		94,864	101,126
Employees		6,023	5,632
Suppliers		5,273	6,435
Total cash used		106,160	113,193
Net cash from/(used by) operating activities	9(b)	33,490	5,690
INVESTING ACTIVITIES			
Cash received			
Investments		15,006	26,506
Total cash received		15,006	26,506
Cash used			
Purchase of property, plant and equipment		370	286
Investments		20,870	21,488
Shares		6,278	2,896
Total cash used		27,518	24,670
Net cash from/(used by) investing activities		(12,512)	1,836
Net increase/(decrease) in cash held		20,978	7,526
Cash and cash equivalents at the beginning of the reporting period		12,126	4,600
Cash and cash equivalents at the end of the reporting period	5A, 9(a)	33,104	12,126

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

Schedule of commitments

AS AT 30 JUNE 2009

	2009 $'000	2008 $'000
BY TYPE		
Commitments payable		
Capital commitments		
Investments[1]	**2,621**	4,857
Total capital commitments	**2,621**	4,857
Other commitments		
Operating leases[2]	**195**	141
Research projects forward program[3]	**164,509**	142,155
Total other commitments	**164,704**	142,296
Commitments receivable		
GST recoverable on commitments	**(14,973)**	(12,936)
Total commitments receivable	**(14,973)**	(12,936)
Net commitments by type	**152,352**	134,217
BY MATURITY		
Commitments payable		
Capital commitments		
One year or less	**2,439**	2,630
From one year to five years	**182**	2,227
Total capital commitments	**2,621**	4,857
Research project commitments		
One year or less	**70,710**	63,000
From one to five years	**93,799**	77,505
Over five years	**—**	1,650
Research projects commitments	**164,509**	142,155
Operating lease commitments		
One year or less	**104**	102
From one year to five years	**91**	39
Over five years	**—**	—
Total operating lease commitments	**195**	141
Commitments receivable		
One year or less	**(6,438)**	(5,737)
From one year to five years	**(8,535)**	(7,049)
Over five years	**—**	(150)
Total commitments receivable	**(14,973)**	(12,936)
Net Commitments by maturity	**152,352**	134,217

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 2009

1 Capital commitments are GRDC's commitment to purchase shares in Arista Cereal Technologies Pty Ltd, Australian Grain Technologies Pty Ltd, HRZ Wheats Pty Ltd and Canola Breeders Western 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
Photocopiers and fax machines	Photocopiers and fax machines have rental agreements for a period of 5 years, 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 2009.

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

Notes to and forming part of the financial statements

FOR THE YEAR ENDED 30 JUNE 2009

Note 1: Summary of Significant Accounting Policies

1.1 Basis of Preparation of the Financial Report

The financial statements and notes are required by clause 1(b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997* and are a general purpose financial report.

The continued existence of the Corporation in its present form and with its present programs is dependent on Government policy.

The financial statements and notes have been prepared in accordance with:

- Finance Minister's Orders (FMO) for reporting periods ending on or after 1 July 2008; and
- Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial report has been prepared on an accrual basis and is in accordance with historical cost convention, except for certain assets 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 report is 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 FMO, 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 and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under agreements equally proportionately unperformed are not recognised unless required by an accounting standard.

Unless alternative treatment is specifically required by an accounting standard, income and expenses are recognised in the Income Statement when, and only when, the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies 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 1.12) 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.

1.3 New 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 for the current financial year have no material impact on the Corporation:

- AASB 1 *First-time Adoption of Australian Equivalents to International Financial Reporting Standards (June 2007)*
- AASB 3 *Business Combinations (December 2007)*
- AASB 5 *Non-current Assets Held for Sale and Discontinued Operations*
- AASB 7 *Financial Instruments: Disclosures*
- AASB 101 *Presentation of Financial Statements (Dec 2007)*
- AASB 114 *Segment Reporting*

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

1.3 New Accounting Standards *(continued)*

Adoption of New Australian Accounting Standard Requirements (continued)

- AASB 116 *Property, Plant and Equipment*
- AASB 127 *Consolidated and Separate Financial Statements (Dec 2007)*
- AASB 137 *Provisions, Contingent Liabilities and Contingent Assets*
- AASB 139 *Financial Instruments: Recognition and Measurement*
- AASB 1004 *Contributions*
- AASB 1048 *Interpretation and Application of Standards*
- AASB 1049 *Whole of Government and General Government Sector Financial Reporting*
- AASB 1050 *Administered Items*
- AASB 1051 *Land Under Roads*
- AASB 1052 *Disaggregated Disclosures*
- AASB 2007-2 *Amendments to Australian Accounting Standards arising from AASB Interpretation 12 [AASB 1, AASB 117, AASB 118, AASB 120, AASB 121, AASB 127, AASB 131 & AASB 139]*
- AASB 2007-9 *Amendments to Australian Accounting Standards arising from the Review of AASs 27,29 and 31 [AASB 3, AASB 5, AASB 8, AASB 101, AASB 114, AASB 116, AASB 127 & AASB 137]*
- AASB 2008-10 *Amendments to Australian Accounting Standards—Reclassification of Financial Assets*
- AASB 2008-12 *Amendments to Australian Accounting Standards—Reclassification of Financial Assets —Effective Date and Transition [AASB 7, AASB 139 & AASB 2008-10]*
- AASB 2009-3 *Amendments to Australian Accounting Standards—Embedded Derivatives [AASB 139 & Interpretation 9]*
- Interpretation 4 *Determining whether an Arrangement contains a Lease*
- Interpretation 12 *Service Concession Arrangements (Feb 2007)*
- Interpretation 13 *Customer Loyalty Programmes*
- Interpretation 14 *AASB 119—The Limit on a Defined Benefit Asset, Minimum Funding Requirements and their Interaction*
- Interpretation 129 *Service Concession Arrangements: Disclosures*
- Interpretation 1038 *Contributions by Owners Made to Wholly-Owned Public Sector Entities*

Future Australian Accounting Standard requirements

The following new standards, amendments to standards or interpretations have been issued by the Australian Accounting Standards Board but are effective for future reporting periods. It is estimated that the impact of adopting these pronouncements when effective will have no material financial impact on future reporting periods.

- AASB 1 *First-time Adoption of Australian Equivalents to International Financial Reporting Standards (May 2009)*
- AASB 3 *Business Combinations (Mar 2008)*
- AASB 8 *Operating Segments*
- AASB 101 *Presentation of Financial Statements (Sep 2007)*
- AASB 123 *Borrowing Costs*
- AASB 127 *Consolidated and Separate Financial Statements (Mar 2008)*
- AASB 1039 *Concise Financial Reports*
- AASB 2007-3 *Amendments to Australian Accounting Standards arising from AASB 8 [AASB 5, AASB 6, AASB 102, AASB 107, AASB 119, AASB 127, AASB 134, AASB 136, AASB 1023 & AASB 1038]*
- AASB 2007-6 *Amendments to Australian Accounting Standards arising from AASB 123 [AASB 1, AASB 101, AASB 107, AASB 111, AASB 116 & AASB 138 and Interpretations 1 & 12]*
- AASB 2007-8 *Amendments to Australian Accounting Standards arising from AASB 101*

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

1.3 New Accounting Standards *(continued)*

Future Australian Accounting Standard requirements (continued)

- AASB 2007-10 *Further Amendments to Australian Accounting Standards arising from AASB 101*
- AASB 2008-1 *Amendments to Australian Accounting Standard—Share-based Payments: Vesting Conditions and Cancellations [AASB 2]*
- AASB 2008-2 *Amendments to Australian Accounting Standards—Puttable Financial Instruments and Obligations arising on Liquidation [AASB 7, AASB 101, AASB 132, AASB 139 & Interpretation 2]*
- AASB 2008-3 *Amendments to Australian Accounting Standards arising from AASB 3 and AASB 127[AASBs 1, 2, 4, 5, 7, 101, 107, 112, 114, 116, 121, 128, 131, 132, 133, 134, 136, 137, 138 & 139 and Interpretations 9 & 107]*
- AASB 2008-5 *Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 5, 7, 101, 102, 107, 108, 110, 116, 118, 119, 120, 123, 127, 128, 129, 131, 132, 134, 136, 138, 139, 140, 141, 1023 & 1038]*
- AASB 2008-6 *Further Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 1 & AASB 5]*
- AASB 2008-7 *Amendments to Australian Accounting Standards—Cost of an Investment in a Subsidiary, Jointly Controlled Entity or Associate [AASB 1, AASB 118, AASB 121, AASB 127 & AASB 136]*
- AASB 2008-8 *Amendments to Australian Accounting Standards—Eligible Hedged Items [AASB 139]*
- AASB 2008-9 *Amendments to AASB 1049 for Consistency with AASB 101*
- AASB 2008-11 *Amendments to Australian Accounting Standard—Business Combinations Among Not-for-Profit Entities [AASB 3]*
- AASB 2008-13 *Amendments to Australian Accounting Standards arising from AASB Interpretation 17—Distributions of Non-cash Assets to Owners [AASB 5 & AASB 110]*
- AASB 2009-1 *Amendments to Australian Accounting Standards—Borrowing Costs of Not-for-Profit Public Sector Entities [AASB 1, AASB 111 & AASB 123]*
- AASB 2009-2 *Amendments to Australian Accounting Standards—Improving Disclosures about Financial Instruments [AASB 4, AASB 7, AASB 1023 & AASB 1038]*
- AASB 2009-4 *Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 2 and AASB 138 and AASB Interpretations 9 & 16]*
- AASB 2009-5 *Further Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 5, 8, 101, 107, 117, 118, 136 & 139]*
- AASB 2009-6 *Amendments to Australian Accounting Standards*
- AASB 2009-7 *Amendments to Australian Accounting Standards [AASB 5, 7, 107, 112, 136 & 139 and Interpretation 17]*
- Interpretation 1 *Changes in Existing Decommissioning, Restoration and Similar Liabilities*
- Interpretation 12 *Service Concession Arrangements (June 2007)*
- Interpretation 15 *Agreements for the Construction of Real Estate*
- Interpretation 16 *Hedges of a Net Investment in a Foreign Operation*
- Interpretation 17 *Distributions of Non-cash Assets to Owners*
- Interpretation 18 *Transfers of Assets from Customers*

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

1.4 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.

1.5 Gains

Sale of assets

Gains from the disposal of non-current assets are recognised when control of the asset has passed to the buyer.

1.6 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 associates and 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.

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

1.7 Property (Land and Buildings and 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
Plant & equipment	Market selling price

Following initial recognition at cost, property, plant and equipment are carried at fair value less accumulated depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure that the carrying amounts of assets do not materially differ 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 through operating result. Revaluation decrements for a class of assets are recognised directly through operating result except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset restated to the revalued amount.

Depreciation

Depreciable property, plant and equipment assets are written-off to their estimated residual values over their estimated useful lives to the Corporation using, in all cases, the straight-line method of depreciation.

Depreciation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

	2009	2008
Buildings on leasehold land	**25 years**	25 years
Other Infrastructure, plant & equipment	**3 to 12 years**	3 to 5 years

Assets purchased with research payments

Assets purchased with research payments may revert to the Corporation at the end of the research project period and will be accounted for appropriately at that date. During the financial year no research assets reverted to the Corporation.

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

1.7 Property (Land and Buildings and Infrastructure), Plant and Equipment *(continued)*

Impairment

All assets were assessed for impairment at 30 June 2009. Where indications of impairment exist, an impairment adjustment is 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.

No indicators of impairment were found for assets at fair value.

1.8 Intangibles

Software

These intangible assets comprise internally developed 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:

	2009	2008
Information management system	**2.5 years**	2.5 years
Other software	**4 years**	2.5 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 Income Statement 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 2009.

1.9 Employee Benefits

Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

Liabilities for short-term employee benefits (as defined in AASB 119) and termination benefits due within twelve months 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.

All other employee benefit liabilities are measured as the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

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.

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

1.9 Employee Benefits *(continued)*

Leave (continued)

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. The 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 rate determined by an actuary to be sufficient to meet the current costs to the Government of the superannuation entitlements of the Corporation's employees. 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. Employer contributions amounting to $824,816 (2008: $942,551) in relation to these schemes has been expensed in the financial statements.

1.10 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 non-current assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains substantially all such risks and benefits.

The Corporation has no finance leases. Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

1.11 Cash

Cash and cash equivalents includes notes and coins held and any 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. Cash is recognised at its nominal amount.

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

1.12 Financial Assets

The Corporation classifies its financial assets in the following categories:

- 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:

- has been acquired principally for the purpose of selling in the near future;
- are part of an identified portfolio of financial instruments that the Corporation manages together and has a recent actual pattern of short-term profit-taking; or
- have been designated as such upon initial recognition.

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. They are included in non-current assets unless management intends to dispose of the asset within 12 months of the balance sheet date.

Available-for-sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised directly in equity in the reserves with the exception of impairment losses. Interest is calculated using the effective interest method. 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 profit for the period.

Where a reliable fair value cannot be established for unlisted investments in equity instruments, cost is used. The Corporation has acquired shares in the following unlisted companies:

- Australian Grain Technologies Pty Ltd (holding: 36.67%);
- Australian Centre for Plant Functional Genomics Pty Ltd (holding: 19.69%);
- Arista Cereal Technologies Pty Ltd (holding: 17.00%);
- InterGrain Pty Ltd (holding: 33.07%); and
- Canola Breeders Western Australia Pty Ltd (holding: 31.38%)

respectively.

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

1.12 Financial Assets *(continued)*

Available-for-sale financial assets (continued)

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 assets

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. They are included in current assets, except for maturities greater than 12 months after the balance sheet date. These are classified as non-current assets. 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 each balance date.

- *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 Income Statement.
- *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 Income Statement.
- *Available-for-sale 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.

1.13 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.

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

1.13 Financial Liabilities *(continued)*

Other financial liabilities

Other financial liabilities are initially measured at fair value, net of transaction costs.

Other financial 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).

1.14 Investments in Associates

Investments in associates are accounted for under the equity method of accounting, and are initially recognised at cost. The Corporation's share of its associates' post-acquisition profits or losses is recognised in the Income Statement and its share of post-acquisition movements in reserves is recognised in reserves.

Impairment

If there is objective evidence that an impairment loss has been incurred on an investment in an associate, the amount of the impairment loss is the difference between the carrying amount of the investment and its recoverable amount (being the Corporation's share of the present value of the estimated future cash flows expected to be generated by the associate, including the cash flows from the operations of the associate and the proceeds on the ultimate disposal of the investment).

1.15 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* (PIERD Act).

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.

1.16 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 a liability or asset 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 2009 the Corporation held no contingent liabilities or contingent assets.

Note 2: Events After the Balance Sheet Date

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

Note 3: Income

Revenue

	2009 $'000	2008 $'000
Note 3A: Revenue from Government		
Commonwealth contributions	**43,896**	37,621
Note 3B: Interest		
Deposits	**7,576**	5,525
Negotiable certificates of deposit	**82**	32
Sub-total interest income	**7,658**	5,557
Management fee	**(258)**	(185)
Revaluation of investments	**2,610**	205
Total interest	**10,010**	5,577
Note 3C: Industry contributions		
Coarse grains	**22,658**	25,511
Grain legumes	**5,033**	4,614
Oilseeds	**9,176**	6,214
Wheat	**52,340**	40,308
Total industry contributions	**89,207**	76,647
Note 3D: Project refunds		
Cross commodity	**829**	3,674
Coarse grains	**183**	154
Grain legumes	**63**	36
Oilseeds	**110**	64
Wheat	**1,022**	768
Total project refunds	**2,207**	4,696
Note 3E: Royalties		
Cross commodity	**330**	658
Coarse grains	**736**	27
Grain legumes	**308**	307
Oilseeds	**227**	385
Wheat	**402**	482
Total royalties	**2,003**	1,859
Note 3F: Grants income		
Commonwealth	**2,473**	325
State and Territory Governments	**—**	25
Industry	**159**	56
Total grants income	**2,632**	406
Note 3G: Other revenue		
Levy penalties	**94**	130
Groundcover advertising income	**227**	178
Publications revenue	**99**	43
Other income	**10**	12
Total other revenue	**430**	363

Note 3: Income *(continued)*

Gains

	2009 $'000	2008 $'000
Note 3H: Sale of assets		
Gain on sale of non-current asset held for sale		
Proceeds from sale	31	—
Carrying value of assets sold	—	—
Selling expense	—	—
Net gain from sale of assets	31	—

Note 4: Operating Expenses

Note 4A: Research and development

2009	Cross-Commodity $'000	Coarse Grains $'000	Grain Legumes $'000	Oilseeds $'000	Wheat $'000	Total $'000
National	50,333	4,909	3,969	1,524	4,154	64,889
Northern Region	5,195	1,000	310	860	1,649	9,014
Southern Region	11,547	2,913	1,513	1,675	1,228	18,876
Western Region	10,179	470	1,619	750	455	13,473
TOTAL	77,254	9,292	7,411	4,809	7,486	106,252
2008	56,287	9,839	7,412	3,594	11,956	89,088

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.

	2009 $'000	2008 $'000
Note 4B: Employee benefits		
Salaries and wages	5,232	4,678
Superannuation		
Defined contribution plans	690	814
Defined benefits plans	134	129
Leave and other entitlements	48	161
Separation and redundancies	—	—
Total employee benefits	6,104	5,782
Note 4C: Suppliers		
Supply of goods from external entities	156	214
Supply of services from external entities	5,024	4,896
Operating lease rentals*	14	10
Total supplier expenses	5,194	5,120

* These comprise minimum lease payments only.

Note 4: Operating Expenses *(continued)*

	2009 $'000	2008 $'000
Note 4D: Depreciation and amortisation		
Depreciation:		
Infrastructure, plant and equipment	**71**	199
Buildings	**192**	192
Total depreciation	**263**	391
Amortisation:		
Intangibles:		
Information Management System	**100**	199
Software	**48**	20
Total amortisation	**148**	219
Total depreciation and amortisation	**411**	610
Note 4E: Write-down and impairment of assets		
Investments (shares)—revaluation decrement	**3,311**	1,896
Note 4F: Losses from asset sales		
Plant and equipment		
Proceeds from sale	**—**	—
Carrying value of assets sold	**—**	6
Selling expense	**—**	—
Total losses from asset sales	**—**	6

Note 5: Financial Assets

	2009 $'000	2008 $'000
Note 5A: Cash and cash equivalents		
Interest bearing cheque account	**205**	127
Money market call account	**22,899**	11,999
Business online saver account	**10,000**	—
Total cash and cash equivalents	**33,104**	12,126
Note 5B: Trade and other receivables		
Goods and services—related entities	**15,950**	8,849
Goods and services—external parties	**1,375**	1,106
Accrued interest	**95**	108
Accrued income	**960**	—
GST receivable from the Australian Taxation Office	**3,628**	2,593
Total trade and other receivables (gross)	**22,008**	12,656

Note 5: Financial Assets *(continued)*

	2009 $'000	2008 $'000
Note 5B: Trade and other receivables *(continued)*		
Receivables are aged as follows:		
Not overdue	**22,008**	12,591
Overdue by:		
Less than 30 days	**—**	58
30 to 60 days	**—**	—
61 to 90 days	**—**	—
more than 90 days	**—**	7
	—	65
Total receivables (gross)	**22,008**	12,656

All receivables are current.

Receivables for goods & services

Credit terms are net 7 days (2008: 7 days).

Accrued interest

The interest rates range from 2.25% to 3.00% (2008: 3.29% to 7.15%) and the frequency of payments is monthly.

	2009 $'000	2008 $'000
Note 5C: Investments		
BT Individually Managed Fund — At market value	**44,682**	40,642
UBS Individually Managed Fund At market value	**45,124**	40,691
Total investments	**89,806**	81,333

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)*

	2009 $'000	2008 $'000
Note 5D: Investments accounted for using the equity method		
Investments in associates:		
Novozymes Biologicals Australia Pty Ltd	—	101
HRZ Wheats Pty Ltd	288	33
Total equity accounted investments	288	134
All such investments are non-current.		
Equity accounted share of results		
Net profit/(loss) before income tax	(672)	(613)
Income tax expense attributable to net profit/(loss)	—	—
Net profit/(loss) after income tax	(672)	(613)
Carrying amount of equity accounted investments		
Balance at the beginning of year	134	83
Additions	826	664
Share of net profit/(loss) for the year	(672)	(613)
Carrying amount at end of year	288	134
Share of assets and liabilities		
Current assets	295	209
Non-current assets	—	2
Total assets	295	211
Current liabilities	7	77
Non-current liabilities	—	—
Total liabilities	7	77
Net assets	288	134

Name of entity	Principal activities	Reporting date	Ownership interest 2009 %	Ownership interest 2008 %
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	43.4	62.0†

* Incorporated in Australia

† Limited to 49.5% voting rights

Note 5: Financial Assets *(continued)*

	2009 $'000	2008 $'000
Note 5E: Investments—other		
Shares in unlisted companies		
Australian Grain Technologies Pty Ltd	**10,293**	9,285
Provision for diminution in share value	**(5,650)**	(5,152)
	4,643	4,133
Australian Centre for Plant Functional Genomics Pty Ltd	**21**	1
Arista Cereal Technologies Pty Ltd	**2,600**	1,576
Provision for diminution in share value	**(1,207)**	(532)
	1,393	1,044
InterGrain Pty Ltd	**4,500**	1,500
Provision for diminution in share value	**(3,534)**	(1,493)
	966	7
Canola Breeders Western Australia Pty Ltd	**400**	—
Provision for diminution in share value	**(97)**	—
	303	—
Total investments—other	**7,326**	5,185

The shares held are ordinary shares.

Note 5F: Investments in controlled entities

Name of entity	Country of incorporation	Amount of investment		% equity held	
		2009 $'000	2008 $'000	**2009 %**	2008 %
Single Vision Grains Australia Limited	Australia	**—**	—	**100.0**	100.0

Note 6: Non-Financial Assets

	2009 $'000	2008 $'000
Note 6A: Land and buildings		
Leasehold land—fair value	**1,000**	950
Total land	**1,000**	950
Buildings on leasehold land—fair value	**4,890**	4,800
Accumulated depreciation	**—**	(192)
Total buildings	**4,890**	4,608
Total land and buildings (non-current)	**5,890**	5,558
Note 6B: Infrastructure, plant and equipment		
Plant and equipment—fair value	**395**	241
Accumulated depreciation	**(71)**	—
Total infrastructure, plant and equipment	**324**	241
Movement in asset revaluation reserve		
Increment for land	**50**	—
Increment for buildings	**474**	—
Increment for plant and equipment	**—**	5
Total movement in asset revaluation reserve	**524**	5

All revaluations are conducted in accordance with the relevant 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.

A formal revaluation of plant and equipment was conducted by the Australian Valuation Office as at 30 June 2008. It has been assessed that the carrying amount of plant and equipment does not materially differ from fair value at 30 June 2009.

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

	2009 $'000	2008 $'000
Note 6C: Intangibles		
Information Management System—at cost	**696**	691
Accumulated amortisation	**(670)**	(570)
Total Information Management System	**26**	121
Software—at cost	**381**	233
Accumulated amortisation	**(145)**	(97)
Total software	**236**	136
Intellectual Property—at cost	**63**	—
Accumulated amortisation	**—**	—
Total intellectual property	**63**	—
Total intangibles (non-current)	**325**	257

No indicators of impairment were found for intangible assets.

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

Note 6D: Analysis of property, plant, equipment and intangibles

Table A—Reconciliation of the opening and closing balances of property, plant and equipment (2008–09)

	Leasehold Land $'000	Buildings on leasehold land $'000	Other Infrastructure, Plant & Equipment $'000	Total $'000
As at 1 July 2008				
Gross book value	950	4,800	241	5,991
Accumulated depreciation/amortisation and impairment	—	(192)	—	(192)
Net book value 1 July 2008	950	4,608	241	5,799
Additions:				
by purchase	—	—	154	154
Revaluations and impairment through equity	50	474	—	524
Depreciation/amortisation expense	—	(192)	(71)	(263)
Disposals:				
other disposals	—	—	—	—
Net book value 30 June 2009	1,000	4,890	324	6,214
Net book value as at 30 June 2009 represented by:				
Gross book value	1,000	4,890	395	6,285
Accumulated depreciation/amortisation and impairment	—	—	(71)	(71)

Table B—Reconciliation of the opening and closing balances of property, plant and equipment (2007–08)

	Leasehold Land $'000	Buildings on leasehold land $'000	Other Infrastructure, Plant & Equipment $'000	Total $'000
As at 1 July 2007				
Gross book value	950	4,800	669	6,419
Accumulated depreciation/amortisation and impairment	—	—	(343)	(343)
Net book value 1 July 2007	950	4,800	326	6,076
Additions:				
by purchase	—	—	115	115
Revaluations and impairment through equity	—	—	5	5
Depreciation/amortisation expense	—	(192)	(199)	(391)
Disposals:				
other disposals	—	—	(6)	(6)
Net book value 30 June 2008	950	4,608	241	5,799
Net book value as at 30 June 2008 represented by:				
Gross book value	950	4,800	241	5,991
Accumulated depreciation/amortisation and impairment	—	(192)	—	(192)

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

Note 6D: Analysis of property, plant, equipment and intangibles *(continued)*

Table C—Reconciliation of the opening and closing balances of intangibles (2008–09)

	Information Management System $'000	Software $'000	Intellectual Property $'000	Total $'000
As at 1 July 2008				
Gross book value	691	233	—	924
Accumulated depreciation/amortisation and impairment	(570)	(97)	—	(667)
Net book value 1 July 2008	121	136	—	257
Additions:				
by purchase	5	148	63	216
Depreciation/amortisation expense	(100)	(48)	—	(148)
Net book value 30 June 2009	26	236	63	325
Net book value as at 30 June 2009 represented by:				
Gross book value	696	381	63	1,140
Accumulated depreciation/amortisation and impairment	(670)	(145)	—	(815)

Table D—Reconciliation of the opening and closing balances of intangibles (2007–08)

	Information Management System $'000	Software $'000	Intellectual Property $'000	Total $'000
As at 1 July 2007				
Gross book value	1,293	124	—	1,417
Accumulated depreciation/amortisation and impairment	(1,014)	(98)	—	(1,112)
Net book value 1 July 2007	279	26	—	305
Additions:				
by purchase	41	130	—	171
Depreciation/amortisation expense	(199)	(20)	—	(219)
Net book value 30 June 2008	121	136	—	257
Net book value as at 30 June 2008 represented by:				
Gross book value	691	233	—	924
Accumulated depreciation/amortisation and impairment	(570)	(97)	—	(667)

	2009 $'000	2008 $'000
Note 6E: Other non-financial assets		
Prepayments	24	1

All other non-financial assets are current

Note 7: Provisions

	2009 $'000	2008 $'000
Note 7A: Employee provisions		
Leave	**1,036**	954
Total employee provisions	**1,036**	954
Employee provisions are represented by:		
Current	**834**	808
Non-current	**202**	146
Total employee provisions	**1,036**	954

The classification of current includes amounts for which there is not an unconditional right to defer settlement by one year, hence in the case of employee provisions the above classification does not represent the amount expected to be settled within one year of reporting date. Employee provisions expected to be settled in twelve months from the reporting date are $747,000 (2008: $721,000), and in excess of one year are $289,000 (2008: $233,000).

Note 8: Payables

	2009 $'000	2008 $'000
Note 8A: Suppliers		
Trade creditors	**224**	174
Accrued expenses	**517**	624
Total supplier payables	**741**	798
All supplier payables are current.		
Settlement is usually made net 30 days.		
Note 8B: Research and development		
Research and development	**38,628**	26,045
Research and development payables represented by:		
Current	**37,189**	24,304
Non-current	**1,439**	1,741
Total research and development payables	**38,628**	26,045

Note 9: Cash Flow Reconciliation

		2009 $'000	2008 $'000
9(a) Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement			
Report cash and cash equivalents as per:			
Cash Flow Statement		**33,104**	12,126
Balance Sheet	5A	**33,104**	12,126
Difference		**—**	—
9(b) Reconciliation of operating result to net cash from operating activities:			
Operating result		**28,472**	24,054
Depreciation/amortisation		**411**	610
Net write down of financial assets		**3,311**	1,896
Loss on disposal of assets		**—**	6
Share of net profit/loss of associates		**672**	613
Revaluation of investments		**(2,610)**	(205)
(Increase)/decrease in receivables		**(9,351)**	(8,689)
(Increase)/decrease in prepayments		**(23)**	(1)
Increase/(decrease) in employee entitlements		**82**	150
Increase/(decrease) in payables		**12,526**	(12,744)
Net cash from/(used by) operating activities		**33,490**	5,690

Note 10: Director Remuneration

	2009	2008
The number of directors of the Corporation included in these figures are shown below in the relevant remuneration bands:		
$ Nil—$14,999	**3**	1
$15,000—$29,999	**5**	3
$30,000—$44,999	**2**	4
$60,000—$74,999	**1**	—
$570,000—$584,999	**1**	—
$585,000—$599,999	**—**	1
Total number of directors of the Corporation	**12**	9
Total remuneration received or due and receivable by directors of the Corporation	**842,107**	853,784

The directors of the Corporation, with the exception of the Managing Director, are appointed by the Minister—Agriculture, Fisheries and Forestry, Australia.

Note 11: Related Party Disclosures

The following persons were Directors of the Grains Research and Development Corporation during the year:

Mr Keith Perrett (Chair)
Mr Ross Johns (Deputy Chair—term finished 30 September 2008)
Ms Nicole Birrell (reappointed 11 November 2008)
Mr Steve Marshall (reappointed 11 November 2008; Deputy Chair—appointed 19 December 2008)
Dr Don Plowman (term finished 30 September 2008)
Prof. Timothy Reeves (reappointed 11 November 2008)
Mr Philip Young (term finished 30 September 2008)
Ms Jennifer Goddard (appointed 11 November 2008)
Ms Jeannette Long (appointed 11 November 2008; resigned 14 May 2009)
Mr Colin Butcher (appointed 11 November 2008)
Prof. Graeme Robertson (appointed 11 November 2008)
Mr Peter Reading (Executive Director)

Several directors of the Corporation hold directorships with other companies. All transactions between the Corporation and companies with a Director common to the Corporation are conducted using commercial and arms-length principles.

The aggregate remuneration of Directors is disclosed in Note 10.

Note 12: Executive Remuneration

The number of senior executives who received or were due to receive total remuneration of $130,000 or more:

	2009	2008
Between $130,000—$144,999	4	1
Between $145,000—$159,999	1	2
Between $160,000—$174,999	4	2
Between $190,000—$204,999	—	1
Between $205,000—$219,999	—	2
Between $220,000—$234,999	1	2
Between $235,000—$249,999	2	—
Total	12	10
The aggregate amount of total remuneration of senior executives shown above	2,091,235	1,873,541
The aggregate amount of separation and redundancy/termination benefit payments during the year to executives shown above	—	—

The officer remuneration includes all officers concerned with or taking part in the management of the Corporation during 2008-09 except the Managing Director. Details in relation to the Managing Director have been incorporated in Note 10—Director Remuneration.

Note 13: Remuneration of Auditors

	2009 $	2008 $
The cost of financial statement audit services provided to the Corporation was:		
Australian National Audit Office	**22,700**	22,100

Note 14: Financial Instruments

Note 14A: Categories of financial instruments

	2009 $'000	2008 $'000
Financial assets		
Loans and receivables:		
Cash and cash equivalents	**33,104**	12,126
Trade and other receivables	**18,380**	10,063
	51,484	22,189
Available-for-sale:		
Shares in unlisted companies	**7,326**	5,185
Fair value through profit or loss (designated):		
Managed funds	**89,806**	81,333
Carrying amount of financial assets	**148,616**	108,707
Financial liabilities		
At amortised cost		
Payables	**39,369**	26,843
Carrying amount of financial liabilities	**39,369**	26,843

Note 14B: Net income and expense from financial assets

Loans and receivables		
Interest revenue (note 3B)	**1,456**	784
Net gain/(loss) from loans and receivables	**1,456**	784
Available-for-sale		
Impairment (note 4E)	**(3,311)**	(1,896)
Net gain/(loss) from available-for-sale	**(3,311)**	(1,896)
Fair value through profit or loss (designated)		
Interest revenue (note 3B)	**8,554**	4,793
Net gain/(loss) from fair value through profit and loss	**8,554**	4,793
Net gain/(loss) from financial assets	**6,699**	3,681

Note 14: Financial Instruments *(continued)*

Note 14C: Fair values of financial instruments

Valuation method used for determining the fair value of financial instruments

For those assets carried at fair value, the fair value was obtained by using the quoted market value at reporting date, adjusted for the transaction costs necessary for realisation.

The carrying amount of all assets and liabilities approximate their fair value.

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 risk 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
	2009	2008	**2009**	2008
	$'000	$'000	**$'000**	$'000
Cash and cash equivalents	**33,104**	12,126	**—**	—
Receivables	**18,380**	9,998	**—**	65
Managed funds	**89,806**	81,333	**—**	—
Shares in unlisted companies	**21**	1	**7,305**	5,184
	141,311	103,458	**7,305**	5,249

Ageing of financial assets that are past due but not impaired for 2009:

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
Receivables	**—**	**—**	**—**	**—**	**—**
	—	**—**	**—**	**—**	**—**

Note 14: Financial Instruments *(continued)*

Note 14D: Credit risk *(continued)*

Ageing of financial assets that are past due but not impaired for 2008:

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	$'000	$'000	$'000	$'000
Receivables	58	—	—	7	65
	58	—	—	7	65

The following assets have been individually assessed as impaired:

	2009 $'000	2008 $'000
Shares in unlisted companies	7,305	5,184

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 following tables illustrate the maturities for financial liabilities:

	On demand	Within 1 year	1 to 2 years	2 to 5 years	> 5 years	Total
	2009 $'000	2009 $'000	2009 $'000	2009 $'000	2009 $'000	2009 $'000
Payables	—	37,930	1,250	189	—	39,369
	—	37,930	1,250	189	—	39,369

	On demand	Within 1 year	1 to 2 years	2 to 5 years	> 5 years	Total
	2008 $'000	2008 $'000	2008 $'000	2008 $'000	2008 $'000	2008 $'000
Payables	—	25,102	1,472	269	—	26,843
	—	25,102	1,472	269	—	26,843

The Corporation receives funding from industry through levies and contributions from the Australian Government. In addition, the Corporation manages its budgeted funds to ensure it has adequate funds to meet payments as they fall due and the Corporation has policies in place to ensure payments are made when due and has no experience of default.

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 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
			2009 $'000	**2009 $'000**	2008 $'000	2008 $'000
Interest rate risk	Interest	+0.75%	**1,259**	**1,259**	1,363	1,363
		–0.75%	**(1,259)**	**(1,259)**	(1,363)	(1,363)

The method used to arrive at the possible change of 75 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.

75 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, however, not to the extent of the extraordinary volatility experienced in 2008-09.

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 and Euros.

The following table details the effect on the profit and equity as at 30 June from a 12 per cent favourable/ unfavourable change in AUS dollars against US dollars and Euros with all other variables held constant.

	Risk variable	Change in risk variable	Effect on		Effect on	
			Profit or loss	Equity	Profit or loss	Equity
			2009 $'000	**2009 $'000**	2008 $'000	2008 $'000
Currency risk	USD	+12%	**231**	**231**	267	267
		–12%	**(294)**	**(294)**	(340)	(340)
Currency risk	EUR	+12%	**—**	**—**	12	12
		–12%	**—**	**—**	(15)	(15)

The method used to arrive at the possible risk of 12 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.

Note 14: Financial Instruments *(continued)*

Note 14F: Market risk *(continued)*

Currency risk (continued)

A standard rate of 12 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 2008-09.

Other price risk

The Corporation is not exposed to other price risk.

Note 15: Reporting of Outcomes

Note 15A: Outcomes of the Corporation

Corporation activity involves the identification, co-ordination, funding and evaluation of research and development for Australia's grain industries. These financial statements provide a detailed overview of the Corporation's total financial operations for the year ended 30 June 2009. The Corporation operates predominantly in one industry, the grains industry and in one geographical area being Australia.

Outcome 1—Through its commitment to innovation, an Australian grains industry that is profitable and environmentally sustainable for the benefit of the industry and wider community.

Four outputs are identified for the above outcome. These are:
Output 1—Practices
Output 2—Varieties
Output 3—New Products
Output 4—Communications and Capacity Building

Note 15B: Net cost of outcome delivery

	Outcome 1		Total	
	2009 $'000	2008 $'000	**2009 $'000**	2008 $'000
Expenses				
Departmental	**121,944**	103,115	**121,944**	103,115
Total expenses	**121,944**	103,115	**121,944**	103,115
Other external income				
Departmental				
Interest	**10,010**	5,577	**10,010**	5,577
Industry contributions	**89,207**	76,647	**89,207**	76,647
Project refunds	**2,207**	4,696	**2,207**	4,696
Royalties	**2,003**	1,859	**2,003**	1,859
Grants	**2,632**	406	**2,632**	406
Other revenue	**430**	363	**430**	363
Gain on sale of assets	**31**	—	**31**	—
Total other external income	**106,520**	89,548	**106,520**	89,548
Net cost/(contribution) of outcome	**15,424**	13,567	**15,424**	13,567

Note 15C: Major classes of departmental income and expenses by output groups

Outcome 1	Output 1		Output 2		Output 3		Output 4		Total	
	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000	2009 $'000	2008 $'000
Departmental expenses										
Research and development	**41,518**	35,012	**46,807**	39,885	**10,851**	8,467	**7,076**	5,724	**106,252**	89,088
Employees	**1,526**	1,446	**1,526**	1,446	**1,526**	1,445	**1,526**	1,445	**6,104**	5,782
Suppliers	**1,609**	1,641	**1,380**	1,348	**1,229**	1,175	**976**	956	**5,194**	5,120
Depreciation and amortisation	**103**	152	**103**	152	**103**	153	**102**	153	**411**	610
Write-down of assets	**—**	—	**451**	1,493	**221**	403	**—**	**—**	**672**	1,896
Loss on disposal of fixed assets	**—**	1	**—**	1	**—**	2	**—**	2	**—**	6
Share of operating results (equity method)	**—**	77	**2,637**	77	**674**	383	**—**	76	**3,311**	613
Total departmental expenses	**44,756**	38,329	**52,904**	44,402	**14,604**	12,028	**9,680**	8,356	**121,944**	103,115
Funded by										
Departmental income										
Revenues from Government	**17,152**	14,785	**19,338**	16,843	**4,483**	3,576	**2,923**	2,417	**43,896**	37,621
Interest	**3,911**	2,192	**4,410**	2,497	**1,022**	530	**667**	358	**10,010**	5,577
Industry contributions	**34,858**	30,122	**39,298**	34,315	**9,110**	7,285	**5,941**	4,925	**89,207**	76,647
Project Refunds	**318**	2,289	**1,526**	1,178	**169**	560	**194**	669	**2,207**	4,696
Royalties	**501**	465	**501**	465	**501**	465	**500**	464	**2,003**	1,859
Grants	**2,493**	330	**30**	10	**109**	66	**—**	**—**	**2,632**	406
Other revenue	**108**	91	**108**	91	**108**	90	**106**	91	**430**	363
Gain on sale of assets	**—**	—	**31**	—	**—**	—	**—**	**—**	**31**	**—**
Total departmental income	**59,341**	50,274	**65,242**	55,399	**15,502**	12,572	**10,331**	8,924	**150,416**	127,169

Note 15: Reporting of Outcomes *(continued)*

Note 15C: Major classes of departmental income and expenses by output groups *(continued)*

The Corporation's outcomes and outputs are described at Note 15A.

The Corporation uses actual expenses for the allocation of Research and Development expenses and some supplier expenses. All other expenses are apportioned across outputs evenly. Revenues reflect actual income for allocation of project refunds, reversals of previous asset write-down and some other income. All other revenue is apportioned across outputs based on Research and Development expenditure.

Appendices

Photo:
Viewing trials at the GRDC-supported WANTFA 2008 Spring Field Day at Meckering: (from left) Western Panel chairman Neil Young, newly appointed panel member Dr Fran Hoyle, WANTFA's Neil Cordingley and GRDC Board member Ross Johns.
Photo: Brendan Cant

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 2008–09 financial year (see Table 9 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 23a: 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	3.72	12.45	3.53				4.16			0.06			0.44			5.04			14.32		0.13	43.85
Varieties	0.53		0.50				2.17						28.66			7.07			3.46		1.43	43.82
New Products			0.02				0.12			1.50			2.24	2.07		–0.02			3.10		1.25	10.28
CCB																6.72						6.72
CSIA																0.84			0.48		0.26	1.58
Total	**4.25**	**12.45**	**4.05**	**0.00**	**0.00**	**0.00**	**6.45**	**0.00**	**0.00**	**1.56**	**0.00**	**0.00**	**31.34**	**2.07**	**0.00**	**19.65**	**0.00**	**0.00**	**21.36**	**0.00**	**3.07**	**106.25**

CCB = Communication & Capacity Building, CSIA = Corporate Strategy & Impact Assessment

Table 23b: 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	3.50	11.72	3.32				3.92			0.06			0.41			4.74			13.48		0.12	41.27
Varieties	0.50		0.47				2.04						26.97			6.65			3.26		1.35	41.24
New Products			0.02				0.11			1.41			2.11	1.95		–0.02			2.92		1.18	9.68
CCB																6.32						6.32
CSIA																0.79			0.45		0.24	1.49
Total	**4.00**	**11.72**	**3.81**	**0.00**	**0.00**	**0.00**	**6.07**	**0.00**	**0.00**	**1.47**	**0.00**	**0.00**	**29.50**	**1.95**	**0.00**	**18.49**	**0.00**	**0.00**	**20.10**	**0.00**	**2.89**	**100.00**

CCB = Communication & Capacity Building, CSIA = Corporate Strategy & Impact Assessment

Table 24: 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	11.17	10.51	0.13	0.12	9.09	8.56	3.85	3.62	13.90	13.08	5.38	5.06	0.33	0.31			43.85	41.27
Varieties	18.32	17.24	0.92	0.87	0.72	0.68	2.49	2.34	3.46	3.26	7.07	6.65	10.33	9.72	0.51	0.48	43.82	41.24
New Products	1.25	1.18	1.43	1.35			0.12	0.11	3.10	2.92	–0.02	–0.02	4.21	3.96	0.19	0.18	10.28	9.68
CCB											6.72	6.32					6.72	6.32
CSIA			0.05	0.05					0.48	0.45	0.84	0.79			0.21	0.20	1.58	1.49
Total	**30.74**	**28.93**	**2.53**	**2.39**	**9.81**	**9.23**	**6.46**	**6.08**	**20.94**	**19.71**	**19.99**	**18.81**	**14.87**	**14.00**	**0.91**	**0.85**	**106.25**	**100.00**

CCB = Communication & Capacity Building, CSIA = Corporate Strategy & Impact Assessment

Appendix B: GRDC project list

Number	Title	Expenditure $
	PRACTICES	
	Agronomy, Soils and Environment	
AWR00002	Contribution to Pastures Australia	500,000
CCC00004	High Yielding Irrigated Grains in Cotton Farming Systems, Phase 3	250,000
CSA00016	Putting precision agriculture on the ground in WA	250,000
CSA00017	Achievable yields for irrigated grains in the northern region	101,225
CSA00019	Soil Carbon Research Program	1,084,500
CSA00020	Economic assessment of nutrient use efficiency of the Australian grains industry	100,307
CSA00021	Enhancing the capability of the Australian grains industry to improve nutrient use efficiency—a nationally coordinated systems approach	150,821
CSA00022	Developing climate change resilient cropping and mixed cropping/grazing businesses in Australia	50,000
CSE00043	Harnessing soil microbial processes to get maximum value from stubble retention in different cropping regions	146,068
CSE00051	Pest suppressive landscapes: linking integrated pest management and natural resource management	499,480
CSO00040	Manipulating soil carbon and nutrient pools	74,672
CSO00041	A fundamental understanding of biochar—implications and opportunities for the grains industry	102,741
CSP00083	New approaches and technologies for management of wheat grain protein content	125,000
CSP00085	Evaluating the potential for dual-purpose (graze/grain) canola in the mixed farming systems of southern Australia	175,000
CSP00087	Water balance of conservation farming systems	74,646
CSP00097	Managing crops, animals and crop disease in mixed farming systems based on dual-purpose wheats	150,000
CSP00110	Water balance of conservation farming systems in South Australia and NSW	81,342
CSP00115	Improving productivity by rotating wheat varieties in wheat-on-wheat systems	94,152
CSP00117	Exploratory practices in the west	25,888
CSP00124	Systems perspectives of the potential for use of green and brown manures—a scoping study	35,000
CSP00125	Adapting wheat to future warm and dry climates—improved simulation of flowering and tillering	302,999
CSPS20	Project Review 2008—WANTFA projects	7,812
CUR00006	Review of livestock impacts on no-till systems	50,000
CWC00003	Cover crop and stubble management systems for central and southern NSW	148,000
DAN00098	Development of agronomy packages for new varieties in southern NSW	129,769
DAN00104	Barley agronomy for southern Australia	273,999
DAN00106	Developing agronomic solutions to improve barley yield and grain quality in the GRDC Northern Region	196,440
DAN00114	Development of a world-class lucerne-breeding program	66,000
DAN00119	*Brassica juncea* agronomy	150,000
DAN00120	Use of animal manures and biological wastes in crop production	49,720
DAN00129	Development of agronomy packages for new varieties in NSW	173,736
DAQ00148	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern NSW and Queensland	246,259

Number	Title	Expenditure $
DAS00075	DNA assay to quantify barley roots	73,456
DAS00081	Development of a world-class lucerne-breeding program	66,000
DAS00088	Advancing site-specific management of weeds and soilborne diseases	189,956
DAV00059	Management of high-rainfall cropping to improve water quality and productivity	244,488
DAV00081	Assessment of greenhouse gas emissions in cereal–legume cropping systems in southern Australia	328,698
DAV00083	Assisting growers achieve yield potential in the high-rainfall zones of south-eastern Australia	250,021
DAV00084	New Varieties, New Agronomy—Pulse agronomic research, south-eastern Australia	250,000
DAV00090	Real-time sensing of crops for management intervention—application of thermal and hyperspectral technologies	149,960
DAV00092	Develop investment priorities in soil biology	20,000
DAV00095	Improving nitrogen and phosphorus management in south-east Australian cropping systems	138,202
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	15,000
DAW00093	Identifying soil constraints to crop production on the south coast sandplain	72,700
DAW00103	Measurement of paddock-based greenhouse gas emissions from wheat production to improve life cycle assessment of wheat products	246,628
DAW00146	Enhancing paddock productivity—A collaborative, diagnostic approach to cropping systems research	526,156
DAW00147	Variety-specific agronomy for wheat yield and quality in the Western Region	283,097
DAW00148	Barley agronomy for the Western Region	391,687
DAW00161	Increasing the profitability of cropping systems in WA using lupins, oats, oilseeds and pulses	750,000
DAW00172	Better quality wheats in WA—Ramen noodles	25,000
DAW00188	GRDC strategic planning for investment based on agroecological zones	190,000
DGQ00002	Soybean harvesting	5,000
DNR00008	Advanced techniques for managing subsoil constraints	199,902
FFI00003	EverCrop™ and EverCrop Decide: developing the role for perennials in mixed farming systems	259,790
FFI00004	Development of a salt- and waterlogging-tolerant wheat	170,210
ILA00001	Facilitation of 'Strategic Thinking for Long Term Planning' workshops	1,194
KIP00001	Making better fertiliser decisions for cropping systems in Australia—Initial scoping phase	118,100
LWR00004	Contribution to primary industries climate change strategy	149,880
LWR00006	Contribution to Managing Climate Variability program, Phase 2	650,000
LWR00007	Contribution to National Program for Sustainable Irrigation	190,000
PR104-1	Assist the industry to improve and demonstrate its environmental credentials	8,971
PR114-1	Agronomy reference group	3,914
PR160-1	Inclusion of soil organic carbon in emission trading	13,895
PR203-1	Workshop on Exploiting the Biological Potential of Cropping Soils	11,190
PR258-1	Woody crops on farms	50,000
QUT00002	Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils	159,277
QUT00003	Reducing nitrous oxide emissions in irrigated grains–cotton farming systems	59,866
RDC00005	Project Review 2008—Pastures Australia Review	60,000
SAN00013	Improvement of no-till farming practices through innovation in sowing, weed control, residue management and precision agriculture systems	202,000

Number	Title	Expenditure $
SRD00003	Reducing nitrous oxide emissions from sugarcane lands	257,175
UA00091	Responses to salinity in barley and pulse crops	29,500
UA00092	Chemistry and crop agronomy in alkaline cropping soils	196,770
UA00103	DGT (diffusive gradients in thin films) as the soil test of choice for predicting phosphorus requirements of grain crops	155,000
UA00111	Developing chemical methods to mobilise fixed nutrients in cropping soils	149,999
UCS00008	The contribution of subsoil constraints to 'canola yield decline'	282,245
UM00023	Synchronising nutrient supply and crop demand in modern cropping systems	51,000
UM00037	Enhanced efficiency fertilisers as mitigation tools for reducing greenhouse gas emissions from intensive agricultural systems in Australia	89,145
UMU00030	Making better fertiliser decisions in the WA cropping systems	103,529
UMU00035	Improving profit from fertiliser through knowledge-based tools that account for temporal and spatial soil nutrient supply	399,161
UNE00012	Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management	75,000
UNS00002	Active implements for precision seed and fertiliser placement	76,500
UQ00041	Development of a world-class lucerne-breeding program	66,000
US00044	Next steps in precision agriculture	179,580
USA00005	Improving sowing system technologies for no-till cropping	60,000
UT00009	Delivering a world-class root model to Australian grains researchers	27,875
UWA00081	Combating subsoil constraints: Unlocking crop potential through innovative subsoil management	162,000
UWA00083	Lectureship (Level B) in Pasture Science at UWA	(18)
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	152,502
UWA00131	Fertiliser management strategies for decreasing on-farm greenhouse gas emissions	166,362
WAN00012	New frontiers no-till farming systems	239,248
WAN00013	Cover crops for no-till farming systems	51,100
	Total Agronomy, Soils and Environment	**15,742,535**
	Crop Protection	
ABE00001	Improved pollination practices with honey bees	149,200
AES00003	Develop the business case for investment in commercialisation of the Harrington Weed Seed Destructor	22,500
AKC00002	Registration of minor use chemistry for the grains industry	123,000
AKC00003	Pathways to registration—Improved pesticide research coordination in the grains industry	50,000
ANU00006	Exploring a model system to develop controls for plant parasitic nematodes	116,000
CIM00013	Australian Cereal Rust Control Program—Adult plant resistance to wheat rusts	361,839
CSE00046	National Invertebrate Pest Initiative	421,341
CSE00048	Better prediction and management of *Rhizoctonia* disease risk in cereals	265,079
CSP00096	Crown rot-resistant bread wheat through new knowledge of epidemiology and genetics	541,204
CSP00116	Molecular control of reproduction in weeds	65,058
CSU00006	Integrated weed management in the Southern Region	194,500
DAN00086	Assessment of integrated pest management strategies to control insects in rotational farming systems of the Southern Region	25,450
DAN00109	Management of *Fusarium* and other winter cereal diseases in the northern cropping zone	200,000

Number	Title	Expenditure $
DAN00110	More profitable chickpeas through disease management and disease screening—Northern Region	90,000
DAN00111	Differential herbicide tolerance of winter crops in south-eastern Australia, Stage 3	154,311
DAN00115	Integrated disease control for broad leaf crops with varietal selection and crop management for southern NSW and northern Victoria	119,999
DAN00116	Integrated disease management in northern no-tillage systems using precision agriculture	113,739
DAN00121	*Helicoverpa* insecticide resistance: monitoring, mechanisms and management 2	103,342
DAQ00086	IPM for pulses in northern Australia—Sustainable production in a changing cropping environment	100,000
DAQ00105	Continued delivery of applied solutions to weed issues in central Queensland	118,714
DAQ00106	Herbicide tolerance of barley and wheat cultivars in the Northern Region, Phase 3	80,000
DAQ00107	Cropping options to limit root lesion nematodes	109,967
DAQ00108	Reducing the impact of pulse diseases in the Northern Region	209,842
DAQ00130	Management of tobacco streak virus in sunflower and pulse crops	100,000
DAQ00136	Risk assessment and preventive strategies for herbicide resistance in the Northern Region, Phase 3	300,000
DAQ00137	Improved options for fleabane control in the Northern Region	175,000
DAQ00151	Manage emergency plant pests threats	10,000
DAS00048	Control of cereal fungal diseases	295,000
DAS00070	Herbicide tolerance screening in the Southern Region with national coordination	90,000
DAS00071	Pathology in pulse crops in the Southern Region—South Australia module	132,560
DAS00073	Crown rot management for durum and bread wheats for the Southern Region	225,000
DAS00094	Diamondback moth (*Plutella xylostella*) control and insecticide resistance management	28,695
DAS00095	Assessment of the biological control potential of *Sarcophaga penicillata*	48,354
DAV00078	Victorian pulse pathology and virology support program	120,050
DAV00087	Victorian cereal pathology support with emphasis on crown rot management	228,674
DAW00123	A systems approach to enhance the adoption of integrated weed management techniques in the northern agricultural region of WA	213,356
DAW00157	Cultivars for rotational management of root lesion and burrowing nematodes in WA	190,000
DAW00158	Applied weed management in WA	160,001
DAW00159	Management to minimise disease constraints in Western Region farming systems	890,000
DAW00174	In-furrow fungicide options	125,000
DAW00177	Developing integrated pest management guidelines for the WA grain belt and strategies to manage the wheat curl mites' spread of wheat streak mosaic virus	230,000
DGQ00001	Waiver of GRDC requirement for professional indemnity insurance in development of a business case for the Harrington Weed Seed Destructor	38,920
DNR00007	Effective and safe rodent management in grain cropping systems	10,000
HFG00005	Improving weed control options in conservation farming systems	169,300
ICN00009	National promotion of integrated weed management in Australian cropping systems	135,500
JDS00005	Manage emergency plant pests threats	10,000
KAL00002	Multiple cereal foliar fungicide treatments at different crop growth times in association with some Western Region National Variety Trials	78,500
NPB00005	National reference laboratory for *Trogoderma* and related Dermestids	87,840
NPB00006	Development of biosecurity contingency plans and assessment of data for declaring freedom from emergency plant pests	113,560
PR124-1	Registration for minor use chemicals for the grains industry	2,126
PR166-1	Continuation of selected projects from Australian Weed Management CRC and implementation of new national coordinating structure	1,219

Number	Title	Expenditure $
PR177-1	Contingency plans for emergency plant pests of the grain industry	706
PR66-1	*Helicoverpa* species insecticide resistance—monitoring mechanisms and management	1,140
SFS00017	Optimising cereal profitability in the high-rainfall zone through integration of disease management and canopy management principles	344,000
UA00098	Managing the risks of trifluralin resistance in no-till cropping systems	124,204
UA00104	Understanding and management of weed resistance to glyphosate	155,373
UA00105	Emerging weeds in changing farming systems	200,000
UM00026	Fungal pathology developments for management of oilseed brassicas in Australia	279,950
UM00029	Wheat curl mite and its role in the transmission of wheat streak mosaic virus	121,643
UM00030	Pilot scale implementation strategy to maximise durability of blackleg resistance in canola	145,070
UM00031	Monitoring virulence in Australian populations of the blackleg fungus	112,674
UM00033	Developing and demonstrating the role of alternative chemistries and integrated management for crop establishment pests	123,154
UM00035	Impact assessment for GM canola in cropping systems	94,544
UM00036	Scoping study into using microwave technologies as part of an integrated weed management strategy in conservation farming systems	49,880
UMU00022	Australian Centre for Necrotrophic Fungal Pathogens—Fungal pathogenicity	947,407
UMU00025	Genetic dissection of fungal disease resistance in legumes using *Medicago truncatula*	443,527
UMU00029	Pre-emptive breeding for Russian wheat aphid resistance	325,000
UMU00031	Fungicide resistance benchmarks	140,000
US00039	Australian Cereal Rust Control Program	1,596,689
UWA00112	Western Australian Herbicide Resistance Initiative, Phase 3	600,000
UWA00121	Improved herbicide tolerance for break crops	200,871
UWA00124	Efficacy of the Harrington Weed Seed Destructor in targeting weed seeds during the harvest of Australian grain crops	99,482
UWA00125	Weed Seed Wizard: Validation and improvement of a weed management decision support tool	223,921
VR58-2	National Crown Rot Initiative Conference	5,204
	Total Crop Protection	**14,278,179**
	Validation and Integration	
AEA00001	Increasing water use efficiency in mixed crop–livestock systems	30,000
AEA00002	Development of the Using Biomass Theme	50,000
ALL00001	Western Region Agribusiness Trial Extension Network	12,500
AMP00002	Leaf spotting project	21,000
AMP00003	Leaf Spotting Trial Plan 2009	63,790
AOF00006	Oilseed Industry Support Program—Increasing the value of the Australian oilseeds industry through enhancing productivity and value	567,500
BAC00001	Southern Region Agribusiness Trial Extension Network	25,000
BBC00003	High Rainfall Zone Coordinator	26,236
BWD00008	Flexible farming systems to meet the challenges of farming the southern Mallee and northern Wimmera	126,600
BWD00012	Yielding benefits through partnerships	319,345
BWD00013	Planning proposal for the development of a mixed farming project in central Victoria	30,000
CCN00001	Coordination of the program logic nationally for the mixed farming program	30,000
CFI00009	Guiding growers to more profitable and sustainable cropping systems in the western districts of the northern grain belt	162,880
CRC00001	Western Region agribusiness extension	25,000
CSA00011	Training growers to manage soil water	251,173

Number	Title	Expenditure $
CSA00013	Southern Queensland Farming Systems	532,534
CSA00015	Irrigated Wheat Data Collection Project	24,901
CSA00018	Pre-experimental modelling for Grain and Graze 2	105,000
CSP00109	Increasing water use efficiency in the northern sandplain region of WA	288,130
CSP00111	Identifying farm-scale opportunities to improve water use efficiency—A nationally coordinated systems approach	253,622
CWF00009	Low Rainfall Collaboration Group	200,000
CWF00012	Southern Region Agribusiness Trial Extension Network	15,000
CWF00013	Increasing farm water use efficiency in central west NSW	265,100
CWF00014	Low Rainfall Collaboration Group—Canola project	150,000
DAN00096	Canola and mustard in northern NSW—Phase 2	110,000
DAN00102	CropMate—climate information for crop production	175,311
DAQ00109	Barley industry development for the Northern Region	124,998
DAQ00116	Central Queensland Sustainable Farming Systems, Phase 3	550,000
DAQ00123	Agronomic Packages for Improved Yield and Quality in the Australian Peanut Industry	205,102
DAQ00129	Improving the integration of legumes in grain and sugarcane farming systems in southern Queensland	305,976
DAQ00135	Planning proposal for the development of a mixed farming project in Queensland	30,000
DAQ00149	Development of the Transaction Theme	100,000
DAQ00150	Development of the Landscape Theme	50,000
DAS00089	Improving crop and farm water use efficiency in Australia	125,000
DAS00093	Increasing water use efficiency in mixed crop–livestock systems	28,980
DAS00098	Improving farm water use efficiency on Kangaroo Island and in the south-east of South Australia	100,000
DAV00077	Barley Agronomy and Industry Development Officer for Southern Australia	94,590
DAW00149	Barley industry development for the Western Region	77,995
DMA00001	Southern Region Agribusiness Trial Extension Network	12,350
FFC00002	Western Region Agribusiness Trial Extension Network	12,444
FFC00003	Western Region Agribusiness Trial Extension Network	12,500
FFI00005	Development of the Growing Biomass Theme	150,000
FGI00006	Western Region Agribusiness Trial Extension Network	12,500
FLR00004	Increasing water use efficiency in mixed crop–livestock systems	30,000
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
HFG00006	Managing moisture for improved water use efficiency in the Southern Region	102,900
ICF00007	High-yielding winter cereal genotypes for irrigation for south-eastern Australia	498,179
IMA00003	Northern Region Agribusiness Trial Extension Network	12,500
IMA00004	Southern Region Agribusiness Trial Extension Network	25,000
IMA00005	Northern Region Agribusiness Trial Extension Network	25,000
IMA00006	Improved fallow management to maximise water infiltration and retention through better ground cover management and summer weed control	251,600
JSA00003	Southern Region Agribusiness Trial Extension Network	12,500
JSA00004	Southern Region Agribusiness Trial Extension Network	25,000
LEA00001	Improving water use efficiency in Lower Eyre Peninsula farming systems	100,000
LIE00005	Growers critically analysing new technologies for improved farming systems	213,412
LWR00003	Healthy Soils for Sustainable Farms programs	400,000
MFS00001	Southern Region Agribusiness Trial Extension Network	16,700

Number	Title	Expenditure $
MIG00010	Grower Group Alliance	306,622
MIG00011	Increasing water use efficiency in mixed crop–livestock systems	29,200
MSF00002	Mallee Sustainable Farming project	104,167
NAG00001	Western Region Agribusiness Trial Extension Network	25,000
NGA00001	Validation and integration of new technology through grower groups in north-west NSW and south-west Queensland grain-growing zones	347,905
NGA00002	Validation and integration of new technologies and production systems in the north-east NSW grain-growing region—North East Farming Systems	300,094
NRS00001	Development of a mixed farming project across the Southern Region	20,000
NRS00002	Rural theme development 2009 for mixed farming systems	30,000
NRS00003	Development of the Adaptive Management Theme	50,000
NRS00004	Development of the Biological Solutions Theme	100,000
OCR00001	Best Practice Benchmarking	84,342
OLG00001	Western Region Agribusiness Trial Extension Network	24,740
PAL00007	Crop support for the Northern and Southern regions	740,000
PHR00002	Northern Region Agribusiness Trial Extension Network	12,500
PR147-1	Farm Business Management Initiative	6,489
PR185-1	Cropping in catchments	39,261
RAI00002	Reducing frost damage in wheat by delving or spreading clay	29,000
RDP00004	Victorian Dryland Mallee Strategic RD&E Plan	50,000
RMS00001	Southern Region Agribusiness Trial Extension Network	25,000
RPI00007	Improved water use efficiency in no-till cropping and stubble retention systems in spatially and temporally variable conditions in the riverine plains	200,865
SEP00005	Path to Purity—The first steps in grower variety purity testing for malt barley	75,857
SFS00018	Increasing water use efficiency in mixed crop–livestock systems	29,400
UA00107	Eyre Peninsula Farming Systems 3—Responsive farming systems	260,561
UNE00010	Planning proposal for the development of a mixed farming project in northern NSW	26,000
UNF00001	Increasing farm water use efficiency in the upper north of South Australia	125,000
URS00001	Measuring industry performance	150,000
US00042	Irrigated cereal trial at the Plant Breeding Institute, Narrabri	56,917
UT00014	Addressing key limitations to the development of high-value grain crops in Tasmania	150,000
UT00016	Improved water use efficiency of rain-fed and irrigated farming systems in Tasmania	105,355
WAN00015	Western Australian No-Tillage Farmers Association Technology Demonstration Site	103,925
WWL00002	Realising yield potential through farming systems RD&E—Western Region	161,186
YPA00001	Robust, profitable and sustainable farming practices on Yorke Peninsula	155,000
	Total Validation and Integration	**11,700,234**
	Extension and Grower Programs	
ABP00002	GRDC extension provider integration into the customer relationship management database	128,500
AFQ00005	Research Advisory Committees—Northern Region	37,500
CCS32-1	Grains Research Updates	5,770
CEC00001	Integration of final reports onto the GRDC website	120,000
COR00019	Fact sheets for the GRDC website and publication	20,000
CRD00002	Drift Management Extension Strategy for the Northern Region	60,657
DAW00150	Further development of the Crop Updates Partnership	100,606
FDG00002	Conversion of historic annual reports for the GRDC website	2,000
FPL00001	GRDC website search engine enhancement services	10,800

Number	Title	Expenditure $
GRF00001	Queensland Research Advisory Committee Coordination	22,000
ICN00006	Grains Research Updates—Newsletter in the Northern Region	179,200
ICN00008	National workshop for senior advisers: Capacity building, training and RD&E gap analysis on canopy management	34,930
ICN00010	Delivery of GRDC Foliar Disease Workshops	112,390
JLC00011	GRDC Southern Region Crop Updates	317,550
JLC00013	Final report editing for the GRDC website for advisers and growers	105,000
KPI00001	Grower engagement tools for the GRDC research updates	17,500
LSP00001	GRDC customer relationship management database	116,592
LWR00005	Annual Contribution to AANRO	42,400
MDE00001	Database-cleansing services for the GRDC customer relationship management database	56,000
NCA00008	Improving market signals for the GRDC and the grains industry to enhance delivery to customers	100,000
NFA00005	NSW Research Advisory Committee	24,000
NFA00007	Northern NSW Research Advisory Committee coordination	22,000
OBR00002	GRDC's Driving Agronomy	74,000
PR135-1	Improving linkages and extension opportunities with advisers	200
PR192-1	Research Advisory Committees—South Australia	211
PR194	Customer relationship management database development	6,623
PR199	Continuation of Harvest Radio and Driving Agronomy CD	260
PR242	Agribusiness and Regional Crop Updates—West	7,617
RDC00004	GRDC contribution to Collaborative Partnership for Farming and Fishing Health and Safety	60,000
RMP00004	GRDC Crop Updates DVD 2009	47,251
RMP00005	Research update podcasts for the GRDC website	12,500
RRA00005	Final reports online module for the GRDC website	1,800
RRA00006	Northern update papers for the GRDC website	850
RRA00007	Integration of geographical information system, report transfer, newsletter enhancement and improved diary dates functionality for the GRDC website	29,150
SAF00004	Research Advisory Committees—South Australia	26,000
TFG00001	Tasmanian Research Advisory Committee	11,000
UNE00007	Graduate Certificate and Certificate in Sustainable Grains Production	150,000
VFF00006	Research Advisory Committees—Victoria	26,000
VFF00009	2009 Victorian Farmers Federation Pre-harvest Grain Marketing Forums	35,575
	Total Extension and Grower Programs	**2,124,432**
	TOTAL PRACTICES	***43,845,380***
	VARIETIES	
	Cross Varieties	
BBE00008	Verification of progress against selected GRDC (Varieties) performance indicators	45,000
NPB00007	Invasive Species Compendium	40,000
VR83-1	Varieties commercialisation	6,093
	Total Cross Varieties	**91,093**
	Gene Discovery	
ACP00002-Q	Australian Centre for Plant Functional Genomics, Phase 2	2,000,000
ACS00001	Consultancy to support delivery of the 'GM Crops Coexistance Conference'	20,000
ANU00008	Genetic controls of root impedance and drought signalling in wheat	132,572

Number	Title	Expenditure $
ANU00009	Wheat ERECTA/ERECTA-like genes: proof of function on water use efficiency and potential for breeding improved germplasms	219,087
BWD00014	Benchmarking study of the economic, agronomic and environmental impacts of genetically modified (GM) herbicide-tolerant canola	42,850
CMB00001-1	Cooperative Research Centre (CRC) for Molecular Plant Breeding	10,000
CMB00018	Molecular tools to support SSR (simple sequence repeat) and SNP (single nucleotide polymorphism) genotyping capabilities in wheat and barley	140,237
CMB00019	Development of diagnostic markers capturing the range of allelic variation for major phenological adaptation genes in barley and wheat	59,763
CSP00094	Fast tracking high-value traits using heavy ion technology	92,132
CSP00099	Triple Rust Initiative	1,200,000
CSP00107	Reverse genetic analysis of novel genes for resistance to necrotrophic fungal pathogens in wheat and barley	190,000
CSP00114	Analysis of plant defence responses to the broad host range fungal pathogen *Rhizoctonia solani*, using wheat and *Arabidopsis*	71,000
CSPS19	Project Review 2008—National Variety Trials	89,265
DAN00117	Development of molecular markers for application in Australian canola breeding	378,021
DAN00117-UQ	Development of molecular markers for application in Australian canola breeding	106,043
DAN00124	Statistics for the Australian Grain Industry	634,190
DAN00125	Australian Winter Cereals Collection	733,022
DAQ00085	Identifying candidate genes for stay-green in sorghum	160,000
DAQ00132	Integrating new technologies to improve yield stability and enhance genetic gain in barley and sorghum breeding programs	300,000
DAR00003	Increasing the utility and efficiency of diversity arrays technology for wheat and barley breeders in Australia	100,000
DAS00087	Map-based cloning of the scald resistance gene Rrs1 'Turk'	99,840
DAW00170	Development and implementation of molecular markers for narrow-leafed lupin breeding	175,000
DSM00001	Stress-tolerant transgenic wheat plant	500
GBA00003-1	Commercialisation of IP from GBA00003 Development of salt-tolerant wheat for commercial production	986
GPG2	Grain Protection Genes	1,400,000
MPC00004	Wheat-breeding liaison	12,000
SV00001	GM biotechnology crop project—Pathway to market	10,771
UA00007	Transformation in functional genomics and cereal improvement programs	200,000
UA00094	Flour and product colour in wheat	199,927
UA00101	Advancement of new genes for stem and leaf rust resistance from uncultivated relatives of wheat	184,381
UA00102	Australian Wheat and Barley Molecular Marker Program—Genetic Analysis Module	1,000,000
UA00106	Simplified phenotypic assay for product colour stability	39,830
UMU00027	Quantification and pathogen race dissection of disease resistance to *Stagonospora* (*Septoria*) *nodorum* blotch and yellow (tan) spot of wheat	153,000
UMU00028	Allele-specific markers for key glutenins	99,034
USQ00008	Durum Industry Development—Molecular marker–assisted selection for crown rot resistance	65,500
VR24	National Variety Trials	6,020,285
VR57-1	Increasing the utility and efficiency of diversity arrays technology for wheat and barley breeders in Australia	(4,651)
VR58-1	Australian Winter Cereals Molecular Marker Program III	26,905
	Total Gene Discovery	**16,361,490**

Number	Title	Expenditure $
	Germplasm Enhancement	
AGS00002	CIMMYT suite of projects—Germplasm Evaluation Project	114,329
ANU00011	The generation of wheat cultivars with improved drought tolerance and agronomic traits	99,910
BRI00037	Seed testing and sorting by single-kernel NIR technology	211,600
CIM00014	Identification and utilisation of novel sources of resistance against soilborne pathogens in wheat	144,580
CIM00015	Enhanced delivery of CIMMYT germplasm to Australia	165,096
CIM00016	Enhancement of CIMMYT wheat-breeding strategy for drought tolerance and genotypes of relevance to rain-fed areas of Australia	316,752
CMB00014	Accelerating breeding progress by predicting the effects of genes influencing yield and quality in wheat and barley	315,309
CMB00015	Fine mapping of rust resistance, yield and maturity loci in wheat	62,801
CMB00016	Molecular Plant Breeding CRC—Education and Training Program	133,127
CMB00020	Molecular Plant Breeding CRC—Disease genetics: pathogen variation and host interactions	49,231
CSP00053	Wheat traits, genes and germplasm for adaptation to water-limited environments in the Northern Region	658,458
CSP00058	Development and delivery of salt tolerance and water use efficiency traits for durum with diversified genetic background	114,560
CSP00059	Improved wheat and barley germplasm for saline and sodic soils—a collaborative proposal	135,630
CSP00071	New resources for breeding for heading date and improved frost tolerance	34,428
CSP00090	New disease protection for wheat—a block of genes for resistance to barley yellow dwarf virus, root lesion nematodes and rusts plus potential yield boost	172,771
CSPS18	Project Review 2008—Pre-breeding winter cereal research in Australia	67,077
CUR00004	Wheat Quality Objectives Group	87,900
CWQ00017	Dual Purpose Triticale Improvement Program—University of Sydney	165,800
DAN00122	Durum Industry Development—Fast tracking genetic solutions to crown rot, Phase 2	169,996
DAN00123	Quarantine CIMMYT bread wheat germplasm	85,002
DAQ00092	Maize germplasm enhancement and productivity improvement for tropical Australia	150,000
DAQ00104	Sponge and dough bread quality of Australian germplasm	75,000
DAQ00119	Genetic approaches to resistance to *Fusarium* and *Bipolaris* in wheat and barley	144,913
DAQ00122	Nationally coordinated frost trials and physiological studies of frost resistance in wheat and barley	180,000
DAQ00131	Australian Tropical Grains Germplasm Centre	320,150
DAQ00133	Barley foliar pathogens	128,000
DAS00074	Incorporating new sources of stem and leaf rust resistance from wild oat species into cultivated oat varieties	99,991
DAS00092	Provision of LMA (late maturity a-amylase) test kits to cereal breeders and researchers	15,996
DAV00093	Plant genetic resources: Australian Temperate Field Crops Collection	227,128
DAW00162	Nationally coordinated frost trials—Western Region	60,000
DAW00173	Market intelligence gathering and market visits for wheat and barley breeders, growers, and marketers	95,000
FVL00001	Technology licence—Herbicide-resistant gene	74,549
FVL00002	Technology licence—Herbicide-resistant gene	502,098
ICA00003	Technologies for the targeted exploitation of cereal and pulse landraces	168,371
ICA00004	Enhancement of yield and yield stability of spring bread wheat in semi-arid Mediterranean areas of central and west Asia and north Africa	175,000
JPA00002	Audit of National Phenotyping Facilities for Water Productivity Traits	19,090

Number	Title	Expenditure $
RWF00015	Consultancy—National Grains Research Development and Extension	14,000
SOL00001	Audit of National Phenotyping Facilities for Water Productivity Traits	8,800
UA00061	Development and evaluation of weed-competitive wheat cultivars	65,000
UA00063	Breeding for frost tolerance in barley	120,000
UA00074	Germplasm development for durum improvement in southern Australia	199,000
UA00076	Improving adaptation of wheat to hostile soils: quantifying the importance of traits and targeted germplasm development	112,551
UA00090	Physiological based screening for identifying novel salt-tolerant germplasm in wheat and barley	103,572
UA00093	Biochemical and genetic solutions to grain defects elimination and grain quality improvement	165,000
UA00099	Grain defect elimination in wheat	650,000
UA00100	Nationally coordinated frost trials—Southern Region	60,000
UQ00043	CIMMYT– ICARDA suite of projects—Database Project	48,796
US00045	CIMMYT– ICARDA suite of projects—Communication Project	91,199
USQ00010	Regional frost—Calibration of frost chamber to encompass all Australian conditions	59,004
UT00012	Market optimisation and targeting of the fermentability of Australian malting barleys	102,775
UT00013	Targeting potassium homeostasis in breeding wheat for salt tolerance	100,578
UWA00129	Generation of GM herbicide-tolerant narrow-leafed lupin	60,440
UWA00132	Interspecific hybrids in lupins—stabilisation and trait transfer to fixed lines for lupin crop improvement	150,041
VR123-1	Audit of National Phenotyping Facilities for Water Productivity Traits	8,470
VR46-1	Wheat Quality Workshop	1,106
VR64	Frost tolerance in wheat and barley	5,123
	Total Germplasm Enhancement	**7,865,098**
	Wheat and Barley Breeding	
AGL00009	Report the terms and conditions for access to ticket-by-variety date at point of delivery	38,577
AGP00005	National Triticale Improvement Program	415,000
AGP1	Australian Grain Technologies Pty Ltd—Wheat breeding Southern Region	2,778
AGP2	Australian Grain Technologies Pty Ltd—Independent directors	62,117
AVI00001	End Point Royalty Collection Systems	80,541
BA00002	Pilot Brewing evaluation for malting barley lines destined for export—Pilot Brewing Australia	59,800
BRI00042	Wheat Classification—variety operations	400,000
CSP00101	Breeding dual-purpose feed wheats for the high-rainfall zones	325,000
DAM00001	Project Review 2008—Durum Pre-breeding	18,000
DAN00101	Barley Breeding Australia—Department of Primary Industries NSW	173,056
DAN00118	Australian Durum Wheat Improvement Program	298,214
DAN00118-UA	Australian Durum Wheat Improvement Program	477,148
DAN00130	Durum industry development—Collaboration with ICARDA to accelerate cultivar improvement for adaptation across all production regions	65,000
DAQ00094	National screening for barley grain defects including black point, staining and pre-harvest sprouting	90,000
DAQ00110	Barley Breeding Australia—Northern Node	1,069,866
DAQ00140	Climate Change Opportunity—Adaptation of winter cereals to northern and coastal Queensland, Stage 1	215,885
DAQ00141	Recurrent selection program in hexaploid wheat	87,506

Number	Title	Expenditure $
DAQ00142	Wheat pathology in the Northern Region—development of rapid screening methodologies for wheat diseases of importance	209,493
DAQ00143	Optimised wheat root architecture for increased yield and yield stability in the face of a changing climate	215,922
DAS00091	National Oat Breeding Program for milling and feed end uses	750,000
DAV00080	Barley cultivar development—Department of Primary Industries, Victoria, Horsham	122,594
DAV00082	Improved selection for grain plumpness and malting quality	396,550
DAW00151	Barley Breeding Australia—Western Node	1,450,619
DAW00179	Department of Agriculture and Food, Western Australia (DAFWA)–Tasmanian Institute of Agricultural Research (TIAR)–China barley collaboration	40,000
DAW00186	Barley quality—Barley grain defects (black point, pre-harvest sprouting, kernel staining)	210,000
DAW00187	DAFWA–TIAR–China barley collaboration	180,000
DCC00001	Consultancy—Director fees	64,600
KEN00001	The South East Barley Advisory Committee Chairman	8,310
LVR00002	Barley Breeding Australia—Review environmental scan	38,450
MPC00002	Coordinator for Barley Breeding Australia	174,000
PAP00001	Barley Breeding Australia—Technical review best practice	15,900
QOG00002	Wheat classification	(30)
UA00032	Barley Breeding Australia—Southern Node	1,800,016
USQ00011	Seedling and field-based phenotyping of crown rot symptoms in wheat and barley	170,428
UT00017	Biochemistry and genetics of protein modification and fermentability of malting barley	223,334
UWA00118	Barley improvement through germplasm—coordination, introduction and evaluation	170,121
VR01	Barley breeding	13,589
VR01-4	Barley breeding	32,406
VR110-1	End Point Royalty National Framework—EPR collection compliance	22,051
VR124-1	Project Review 2008—National Oat Breeding Program	5,000
VR51-1	Wheat breeding	1,350
VR78-1	Wheat breeding excluding durum	504
	Total Wheat and Barley Breeding	**10,193,695**
	Pulse, Oilseed and Summer Coarse Grains	
AOF00008	Canola Quality Objectives Group	30,000
CSP00104	Australian Soybean Breeding Program	450,000
DAN00094	Australian Chickpea Breeding Program	1,030,507
DAN00108	National Brassica Germplasm Improvement Program	279,998
DAN00112	Identification and utilisation of field pea sources for bean leafroll virus resistance	40,000
DAQ00117	Sorghum Core Breeding Project	600,000
DAQ00128	National Mungbean Improvement Program	265,000
DAQ00138	Sorghum Midge Testing Scheme	15,000
DAS00066	Pulse Germplasm Enhancement—Vegetative and reproductive frost tolerance in pulse crops	84,100
DAS00067	Pulse Germplasm Enhancement—Bacterial blight in field pea, pod drop in lentil, and heat stress tolerance in field pea and faba bean	139,839
DAS00080	Lupin evaluation for eastern Australia	99,964
DAS00086	New vetch varieties for grain and hay production for Australian farmers	261,561
DAV00071	Australian Field Pea Breeding Program	829,074
DAV00072	Australian Lentil Breeding Program	483,484

Number	Title	Expenditure $
DAV00073	Pulse Germplasm Enhancement—Boron and salt tolerance in temperate pulses and durable ascochyta blight resistance in chickpeas	52,268
DAV00085	Australian Canola Germplasm Enhancement Program	250,000
DAV00086	Canola Quality *Brassica juncea* Program	150,000
DAW00156	Lupin breeding for southern Australia	1,049,574
DAW00181	National lupin breeding for southern Australia	1,165,000
FWC00001	Coordinator for Pulse Breeding Australia	90,000
ICA00006	Breeding chickpea for drought tolerance and disease resistance	175,001
MGP00002	Australian National Blackleg Resistance Rating System	76,000
PCA00001	Australian Peanut Genetic Improvement Program	300,000
RWF00011	Northern Region capacity building	45,000
RWF00014	GM for summer crops	35,000
UA00097	Australian Faba Bean Breeding Program	700,215
UCS00011	Eastern Australia Lupin Breeding II	289,943
UM00034	Identification of resistance genes in Australian canola cultivars through development of a differential set of blackleg isolates	60,000
UQ00042	Professorial Chair in Crop Science	73,480
UWA00091	An international collaboration to develop interspecific hybrids between chickpea and its wild relatives	58,942
UWA00094	Interspecific hybridisation of lupins	75,724
UWA00119	Higher yielding elite lines of pearl lupin for Australian agriculture	58,800
VR125-1	GM herbicide-tolerant lupins	3,356
	Total Pulse, Oilseed and Summer Coarse Grains	**9,316,830**
	TOTAL VARIETIES	***43,828,206***
	NEW PRODUCTS	
	Cross New Products	
NP45-1	New products commercialisation	96,892
PCL00004	Marketing Forum for AusScan	4,545
	Total Cross New Products	**101,437**
	New Farm Products and Services	
AGL00008	A scoping study into the state of knowledge and opportunities for investment in nitrogen fixation in the cereal and canola crops arena in Australian crop rotation	(25,592)
AGL00010	Due diligence study: Natural peptide toxin for insect control	11,722
AGL00011	Strategic review of pesticide investments	40,000
ANU00010	Consultancy—Crop manipulation of plant architecture	10,000
BRI00039	Engagement of Asian partners for hybrid baking project, Phase 2	7,756
BRI00040	A new baking process for Asia	650,000
BRI00043	Crop Quality Report	100,000
BRI00044	Facilitating the use of Australian wheat in noodles in Southern China	38,880
BRI00045	Australian wheat for China	239,000
CCP00001	Investigation of instrumentation technologies 1	6,627
CCP00002	MEMS IR (micro electrical mechanical systems infrared) instrumentation and the market potential in the agriculture and food industries	29,750
CGS00001	Harrington Weed Seed Destructor	135,000
CSE00040	Registration and extension of the use of new ethyl formate formulations on stored grain and for structural treatment	231,000

Number	Title	Expenditure $
CSE00044	Identifying mechanisms involved in phosphate solubilisation and plant-growth promotion by *Penicillium*-based rhizosphere inoculants	53,387
CSE00045	Microbial tagging for tracking: Root disease biocontrol efficacy and environmental fate of microbial inoculants in crop rotations	142,935
CSE00050	Identification of feeding attractants to assist baiting technologies for Mediterranean snails	99,452
DAN00097	National independent quality assurance and germplasm maintenance for *Rhizobium* inoculants	143,842
GTL00001	Endophyte technologies for modern cereals	300,000
MEC00001	Weevil Wacker	100,000
NP40	Development of novel herbicide actives from plant-produced metabolites	6,527
NP50	Harrington Weed Seed Destructor—Post-harvest chaff treater	(1,960)
NP59-1	New Farm Products and Services—Due diligence and business case development	13,611
PDH00001	Coordination of beneficial microbe collaboration	50,000
PSP00001	Consultancy—Harrington Weed Seed Destructor business case	12,000
RO00003	Variety identification sample verification	44,143
SGA00004	Desktop study—Genetic Traits for Nutrient Efficiency	20,000
UCS00012	Discovery of novel compounds as leads for natural herbicides	175,926
UCS00013	Biological control of pest snails in Australia using native nematodes	134,138
UMU00032	National Rhizobium Program—Managing rhizobia to maximise nitrogen fixation by legumes in agriculture	450,000
UWA00113	Demonstration of UWA microspectrometer technology for assessment of soil and grain parameters in broadacre agriculture	399,911
VC19-1	Innovations in stored grain technology for post-harvest value adding	2,000
	Total New Farm Products and Services	**3,620,055**
	New Grain Products	
ARB00001	Crop Biofactories Initiative—International Reference Panel	7,373
BBE00009	Development of a commercialisation strategy for GRDC–CSIRO yield gene technology	28,500
CGF00001	Grain Foods CRC Limited	500,000
CGF00002	Grain Foods CRC Limited—Director fees	22,484
CSA00012	Energy efficiency, self-sufficiency and production at farm to regional scale	118,595
CSE00049	Crop Biofactories Initiative 2—Joint Innovation Agreement	1,904,977
CSP00102	Omega 3 LC-PUFA (long-chain polyunsaturated fatty acid) canola oil for Australia	350,000
CSP00112	Wheat starch for specialty markets	350,000
CSP00113	Coeliac-friendly cereals, Phase 4	208,932
CSP00118	Australian Feedgrains Partnership sorghum project	259,000
DRD00002	Improving the utilisation of red wheat by lactating dairy cows	40,000
FMA00003	Project Review 2008—Go Grains Review	3,259
GOG00001	Go Grains—Membership subscription	250,000
GOG00003	Go Grains Health and Nutrition Ltd	100,000
GRD4-1	Project Review 2008—Go Grains Review	2,582
JCS00002	Benefit to Australian grain growers in the feed grain market	11,000
JCS00003	Development of a GRDC feed grain strategy	20,750
NP43	Biofuels	5,000
NP60-1	New Grain Products—Due diligence and business case development	13,600
NPB00004	Grain Hygiene Program for the CRC for National Plant Biosecurity	1,800,270
PCL00002	Enhancement of near-infrared calibrations for predicting the energy value of weather-damaged grains for pigs	99,994

Number	Title	Expenditure $
PCL00003	Sorghum lines with enhanced starch availability for pigs and ethanol production	104,488
PCL00005	Enhancing near-infrared spectroscopy calibrations for predicting the nutritional value of grains for livestock	66,000
PES00001	Business case—New rodenticide	(10,000)
SGA00003	Project Review 2008—Go Grains Review	5,684
SMC00001	Consultancy—Go Grains Health and Nutrition Ltd	14,652
UCS00015	Canola meal proteins for optimal food functionality	47,750
US00038	Biological factories for precious metal nanoparticles	160,000
WJM00003	Coordination of registration of grain storage chemicals	4,838
WJM00004	Coordination of registration of grain storage chemicals	69,920
	Total New Grain Products	**6,559,648**
	TOTAL NEW PRODUCTS	***10,281,140***
	COMMUNICATION & CAPACITY BUILDING	
	Building Research Capacity	
AAC00005	Conference Sponsorship (CS)—Australian Grains Industry Conference 2009	10,000
AAR00002	CS—53rd Australian Agricultural and Resource Economics Society Annual Conference	5,000
ABT00004	CS—14th Australian Barley Technical Symposium	20,000
ACC00005	Travel Award (TA)—Attend Australasia Pacific Extension Network International Conference	1,750
ACP00005	CS—Australian Centre for Plant Functional Genomics (ACPFG) Annual Symposium—Functional Genomics of Salinity Tolerance	10,000
ACT00003	CS—Driving Future Cropping Systems with Spatial Technologies	10,000
AFQ00007	TA—Attend 14th Australian Barley Technical Symposium	1,850
AID00001	CS—59th Australian Cereal Chemistry Conference	10,000
AMC00003	TA—Attend the Weed Science Society of America annual conference, attend the 7th New Ag International Conference and Exhibition and discuss weed scanning research and weed management utilising variable rate technology at the key research facilities in North America and Western Europe	6,000
APE00003	CS—Australasia Pacific Extension Network International Conference	15,000
APP00003	CS—17th Australasian Plant Pathology Society Biennial Conference—2009 Plant Health Management: An Integrated Approach	12,100
ARL00006	Australian Rural Leadership Foundation	98,000
ASA00003	CS—14th Australian Society of Agronomy Conference	20,000
ATA54	Agricultural Training Award (ATA)—To study at the Longerenong College, Victoria	3,000
ATA55	ATA—To study at the Longerenong College, Victoria	3,000
ATA56	ATA—To study at the Longerenong College, Victoria	3,000
ATA57	ATA—To study at the Longerenong College, Victoria	3,000
ATA58	ATA—To study at the WA College of Agriculture, Cunderdin	3,000
ATA59	ATA—To study at the Longerenong College, Victoria	3,000
ATA60	ATA—To study at the WA College of Agriculture, Cunderdin	3,000
ATA61	ATA—To study at the WA College of Agriculture, Cunderdin	3,000
ATA62	ATA—To study at the Tocal College, CB Alexander Campus	3,000
ATA63	ATA—To study at the Tocal College, CB Alexander Campus	3,000
ATA64	ATA—To study at the Longerenong College, Victoria	3,000
AVJ00001	TA—Attend the Challenge of Rural Leadership Course for Nuffield participants at Duchy College, United Kingdom	2,000
BAE00016	CS—Outlook 2009	7,273

Number	Title	Expenditure $
BRS00011	Sponsorship of 2008 and 2009 Science and Innovation Awards for Young People in Agriculture	20,000
CAT00001	CS—2009 Conservation Agriculture and No-till Farming Association Annual Conference	5,000
CFM00008	CS—2009 Crawford Fund Parliamentary Conference—"Feeding Ten Billion, Well: A role for creative capitalism"	10,000
CSD00004	Sponsorship—BHP Billiton Science Awards	30,000
CSP00103	CS—CSIRO Plant Industry Summer Student program	8,000
CSP00119	TA—Attend 9th International Plant Molecular Biology Congress	3,000
CSP00120	TA—Attend 9th International Plant Molecular Biology Congress	3,000
CSP00121	TA— Attend 14th International Congress on Plant–Microbe Interactions and visit laboratories in Canada	3,211
CSP00122	TA—Attend 9th International Plant Molecular Biology Congress	2,000
CSP00123	TA—Attend 14th International Congress on Plant–Microbe Interactions	1,188
DAN00127	TA—Attend 10th International Gluten Conference and 2009 AACC International Annual Meeting and visit laboratories in France	2,472
DAN00128	TA—Attend the 2009 AACC International Annual Meeting and form linkages with pulse researchers at the conference and in Canada	7,630
DAQ00144	CS—Queensland Primary Industries and Fisheries Hermitage Research Station Schools' Plant Science Competition	2,000
DAQ00145	TA—Attend Farming Systems Design 2009—an International Symposium on Methodologies for Integrated Analysis of Farm Production Systems	4,990
DAQ00146	TA—Attend 3rd Parthenium Weed Control Congress	4,500
DAQ00147	TA—Attend 14th Australian Barley Technical Symposium as keynote speaker	8,375
DAS00097	TA—Attend 14th Australasian Plant Breeding Conference and 11th Congress of the Society for the Advancement of Breeding Research in Asia and Oceania	2,750
DAT00004	CS—Grain Marketing Workshops	3,000
DAV00091	TA—To meet with scientists working on endophytes and rhizobia in north America and to attend the 16th International Congress on Nitrogen Fixation	6,000
DAV00094	CS—16th Australian Research Assembly on Brassicas	8,000
DAW00175	TA—Presentation at Regional Crop Updates 2009 at Hyden, Corrigin, Narrogin and Katanning	1,709
DAW00176	TA—Attend the 4th International Wheat Quality Conference to present a paper on Western Australian wheat quality for long fermentation and sponge and dough baking. To have discussions with the International Grains Institute and visit the Canadian Grain Commission.	4,837
DAW00178	TA—Attend the International Conference on Grain Legumes: Quality Improvement, Value Addition and Trade, Indian Society of Pulses Research and Development, Kanpur, India	3,588
DAW00180	TA—Presentation at Crop Updates 2009 in Perth	1,700
DAW00182	TA—Interlaboratory visits in Spain and France and attend Horti Fair 2009	3,500
DAW00183	TA—Attend the AACC International Conference and visit laboratories in the United States	5,300
DAW00184	TA—Attend 2nd International Ascochyta Workshop: Global Research Initiatives	3,200
EPA00001	CS— Attend 14th Australasian Plant Breeding Conference and 11th Congress of the Society for the Advancement of Breeding Research in Asia and Oceania	16,000
FSW00001	CS—Time to Act: 2009 National Farm Health and Safety Conference Perth	10,000
GGA00001	CS—Innovation Generation—Sowing the Seeds of Success	8,000
GIT00002	CS—Spray droplet: measurement; delivery; drift; adhesion; and uptake	13,000
GRS101	Grains Industry Research Scholarship (GIRS)—(UWA) Metabolomic profiling in plants to understand the role of mitochondria in environmental stress tolerance	15,000
GRS104	GIRS—(UA) An examination of the role of the thioredoxin h family in the stress response of cereals	4,200

Number	Title	Expenditure $
GRS107	GIRS—(UWA) The influence of the root–soil hydrological feedback on wheat growth in WA	15,000
GRS110	GIRS—(UWA/CSP) Molecular and genetic study of plant resistance to aphid	35,000
GRS114	GIRS—(UQ) Discovery of genes involved in the transmission of the long-distance silencing signal in *Arabidopsis*	31,250
GRS115	GIRS—(ULA) Characterisation of the Xero2 system in *Arabidopsis thaliana*	30,000
GRS116	GIRS—(UMU) The role of secondary metabolites in legume defence against fungal pathogens, investigated using the model legume	23,335
GRS117	GIRS—(RMI) Ingredients, fortification and colour characteristics of instant noodles	16,250
GRS118	GIRS—(USC) Nanotechnology and locked nucleic acid probes for DNA diagnostics and genotyping in grains	30,000
GRS119	GIRS—(SWI) Investigation of wheat genes encoding immunophilins involved in regulation of storage protein folding, chloroplast function and plant development	30,000
GRS120	GIRS—(UM) Population genetics of the lucerne flea with applications for biocontrol	32,500
GRS121	GIRS—(UM) Durable resistance of *Brassica juncea* to blackleg	18,782
GRS123	GIRS—(UQ) RNA (ribonucleic acid) silencing in plants	30,000
GRS124	GIRS—(UQ) Novel genes regulating plant defence	30,000
GRS125	GIRS—(QUT) Characterisation of the NF-Y family of transcription factors in wheat	30,000
GRS126	GIRS—(UWA) The design of biodiversity conservation contracts under uncertainty	19,423
GRS127	GIRS—(CUR) Adaptations for growing wheat in a drying climate	30,000
GRS128	GIRS—(UMU) A bioinformatics approach for identification of pathogenicity factors/ fungicide targets in *Stagonospora nodorum* and closely related necrotrophic fungi	30,000
GRS129	GIRS—(UA/ACPFG) Characterisation of transcription factors important in regulating salinity tolerance	30,000
GRS131	GIRS—(US) Novel plasmodesmatal proteins and their role in transport in plants	30,000
GRS132	GIRS—(UNS) Amelioration of irrigation salinity for wheat cultivation using cyanobacteria and mycorrhizal fungi	30,000
GRS134	GIRS—(UF) Characterising the molecular basis of the beneficial plant–endophytic actinobacteria relationship	30,000
GRS135	GIRS—(US) Physiological tolerance mechanisms of rhizobia in response to desiccation	30,000
GRS136	GIRS—(US) Epidemiology and host resistance of *Fusarium* head blight	30,000
GRS137	GIRS—(UF) Investigation of the differences between R protein activation in wheat and flax plant species	30,000
GRS138	GIRS—(US) Genetic improvement of grain quality for bread making in triticale	30,000
GRS139	GIRS—(US) Genetics of *Hordeum bulbosum*-derived rust resistance in cultivated barley	30,000
GRS140	GIRS—(UCS) The relationship between earliness and vigour in cereals	30,000
GRS141	GIRS—(UQ) Investigation of techniques to rapidly introgress new genes into adapted bread wheat cultivars	9,043
GRS142	GIRS—(DAS) Genetic and physiological characterisation of resistance to root lesion nematode *Pratylenchus* species in wheat	30,000
GRS143	GIRS—(SWI) Molecular analysis of the GSP and puroindoline genes, related to grain hardness and antimicrobial properties	30,000
GRS144	GIRS—(UA) Structural basis of catalysis and substrate specificity of barley xyloglucan endotransglysocylases (HvXETs)	30,000
GRS145	GIRS—(ULA) Regulation of the XERO2 dehydrin 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) Biolgical indicators and potential amendments to improve soil health crop productivity and profitability	30,000

Number	Title	Expenditure $
GRS149	GIRS—(UCS) The role of decision support tools in farm business decision making	30,000
GRS150	GIRS—(US) Metallic nanoparticle phytosynthesis	12,500
GRS151	GIRS—(UMO) The effect of adsorption of the properties and structure of nanostructured emulsions	12,500
GRS152	GIRS—(UQ) Development and validation of molecular disease resistance markers for use in lucerne breeding	12,500
GRS153	GIRS—(UWA) The effect of biochar on soil organic matter and soil biological populations	10,000
GRS154	GIRS—(UM) Integrated and sustainable control of pest mite and aphid species in the context of climate change	12,500
GRS155	GIRS—(UT) The effect of crop rotation and irrigation on water use efficiency and soil health of grain crop production in Tasmania	1,250
GRS157	GIRS—(UCS) Improved drought avoidance for water-limited environments in Australian cereals	7,500
GRS158	GIRS—(UF) Analysis of the structure, biochemical properties and mode of action of flax rust resistance proteins	15,000
GRS159	GIRS—(CSP) Improved knowledge of crown rot pathogen biology and toxigenicity to safeguard market access of Australian wheat	11,250
GRS160	GIRS—(UA) *Phoma koolunga*: biology and role in ascochyta blight of field peas	6,250
GRS161	GIRS—(ULA) The role of intracellular localisation signals in NHX antiporter regulation in *Arabidopsis*	12,500
GRS162	GIRS—(CUR) Defining the wheat quality requirements for Indian whole wheat chapati	10,000
GRS163	GIRS—(UWA) Investigating mitochondrial proteome differences between stress-tolerant and stress-susceptible wheat genotypes	10,000
GRS165	GIRS—(UWA) Improving sustainable agriculture by doubled haploid (DH) technique in legumes—a holistic approach	5,000
GRS166	GIRS—(UCS) Health benefits of phenolic compounds and protease inhibitors of Australian-grown faba bean varieties	15,000
GRS167	GIRS—(UA) Late maturity alpha-amylase in wheat	10,000
GRS168	GIRS—(US) Genetics of crown rot resistance in wheat	15,000
GRS84	GIRS—(CSP/UQ) Isolation and characterisation of transcription factors from wheat involved in drought adaptation	1
IDA00024	Industry Development Award (IDA)—'The Future Fuel or Food or What' study tour	(9,699)
IDA00031	IDA—2009 New Zealand Maize Conference and Pre-conference Tour	12,000
IDA00032	IDA—International study tour of conservation agriculture practices and rice–wheat raised-bed farming systems in the Indo-Gangetic region of northern India, including the 4th International Conservation Agriculture Congress in New Delhi	6,300
IDA00033	IDA—Southern NSW grain grower study tour to the mid-north agricultural region of South Australia	3,000
IDA00034	IDA—Young Grower's Grains Industry Study Tour	15,000
IDA00035	IDA—Intensive cropping in a seasonally extreme environment, residue management and cooperative marketing fact-finding tour	5,500
IDA00036	IDA—Irrigation Systems and Precision Ag in South East Queensland	5,500
IDA00037	IDA—Ravensthorpe and districts study tour to Victoria	12,000
IDA00038	IDA—North Queensland Farm and Business Tour	12,000
IDA00039	IDA—Experience a different patch	5,000
IDA00040	IDA—Australian Future Grain Leaders Program	10,000
IPR00002	Vavilov–Frankel Fellowships	28,534
IST48	In-service Training Award—(CSA) Developing sustainable and robust integrated crop–livestock farming systems	15,000

Number	Title	Expenditure $
IST52	In-service Training Award—(UMU) Determination of the biofliming ability and three-dimensional architecture of boiflims formed by novel, ineffectively nitrogen fixing root nodule bacteria that have evolved following the acquisition of symbiotic genes from an inoculant strain: towards the understanding of effects on rhizosphere colonisation of bacteria, strain competition, and nitrogen fixation efficiency of nodules	17,700
IST53	In-service Training Award—(UM) Developing novel technologies for monitoring fungal pathogens of oilseed brassicas	6,750
IST54	In-service Training Award—(UWA) Identification of alleles for hybrid vigour by association mapping in canola hybrids	4,500
ITT00001	CS—International Symposium on Thysanoptera and Tospoviruses	8,000
NUF00008	Nuffield Farming Scholarships	182,000
NYS00001	CS—National Youth Science Forum (NYSF)	30,000
OIW00002	CS—Grains West Expo 2009	10,000
PAL00015	TA—Attend the ministerial trade delegation to the Middle East	8,367
PPF00001	CS—1st International Plant Phenomics Symposium: From Gene to Form and Function	5,000
RGH00001	Australian Summer Grains Conference	10,000
RGH00002	CS—2010 Australian Summer Grains Conference	50,000
SAN00016	CS—11th Annual South Australian No-Till Farmers Association Conference 2009	5,000
SCN00001	CS—2008 Western Australian Soil Health Forum: Your Soils—Your Future	2,500
SEA00002	CS—Agricultural Technologies in a Changing Environment	5,000
SF27	Senior Fellowship—(DAN) Interplay of protein and starch in the establishment of durum wheat (*Triticum durum* Desf.) pasta quality: a micro-scale pasta making approach	20,000
SF28	Senior Fellowship—(CEG) Responding to cereal export market opportunities and environmental challenges	45,000
SPA00009	CS—Precision Ag Expo	5,000
UA00109	TA—Attend 2009 Plant Reactive Oxygen Species Conference	3,300
UA00110	TA—Attend EMBO Meiosis Conference and visit collaborators in the United Kingdom	9,000
UCS00014	CS—Australasian Soilborne Diseases Symposium	5,000
UHS127	Undergraduate Honours Scholarship (UHS)—(UNE) The effect of cultivation and row spacing on the competitive ability of triticale against weeds	(126)
UHS129	UHS—(CUR) Optimising establishment of *Bituminaria bituminosa*, a new perennial legume for low-rainfall mixed farming systems	6,000
UHS130	UHS—(UWA) Efficacy of herbicides for a low-disturbance disc-seeding system	6,000
UHS131	UHS—(UWA) Heterosis inhybrid canola varieties for emergence, drought tolerance and blackleg resistance	6,000
UHS132	UHS—(UWA) Dynamic crop sequencing trial	6,000
UHS133	UHS—(US) Investigation into the recognition of underproductive within-field areas and the potential for their amelioration or land use change	6,000
UHS134	UHS—(UQ) Studies on leaf spot of peanut	6,000
UHS135	UHS—(UWA) Assessing the whole-farm benefits of controlled traffic technology	6,000
UHS136	UHS—(UWA) Salt tolerance-wheat	6,000
UHS137	UHS—(UWA) The role of WRKY transcription factors in controlling stress-responsive gene expression	6,000
UHS138	UHS—(UA) Improving phosphorus use efficiency in wheat	6,000
UHS139	UHS—(UWA) Improving phosphorus use efficiency in wheat	6,000
UHS140	UHS—(UWA) Alternative energy metabolism in grain crops under environmental stress	6,000
UMU00033	TA—Attend 16th International Congress on Nitrogen Fixation and the Jamboree for Annotation of *Rhizobium leguminosarum*	3,000

Number	Title	Expenditure $
UMU00034	TA—Attend 16th International Congress on Nitrogen Fixation/Joint Genome Initiative Sequence Workshop	2,639
UNE00011	CS—13th Symposium on Precision Agriculture Research and Application in Australasia	10,000
UQ00044	TA—Attend 22nd Asian Pacific Weed Science Conference	2,600
UQ00045	TA—Attend 14th Australasian Plant Breeding Conference and 11th Congress of the Society for the Advancement of Breeding Research in Asia and Oceania	6,940
US00041	TA—Attend 58th Australian Cereal Chemistry Conference	(10)
US00047	CS—2nd Annual Stepping Out with Fresh Ideas Conference	8,000
USA00007	TA—Attend 18th Triennial International Soil Tillage Research Organisation (ISTRO) Conference and the ISTRO Board Meetings	3,050
UT00011	Building Human Capacity—Linking Schools to Universities through to Primary Industries	150,000
UW00002	TA—Visit International research centres and develop cross-institutional research collaboration	3,924
UWA00120	Capacity building in plant-breeding education and research at UWA	142,322
UWA00122	TA—Attend 2009 Weed Science Society of America Annual Meeting	4,630
UWA00123	TA—Attend the Plant & Animal Genome XVII, the international conference on the status of plant and animal genome research	5,000
UWA00126	CS—Exploiting genome-wide association in oilseed brassicas: a model for genetic improvement of major Organisation for Economic Cooperation and Development crops for sustainable future farming	10,000
UWA00127	TA—Attend 14th International Conference on Near Infrared Spectroscopy	3,000
UWA00128	TA—Attend 14th Australasian Plant Breeding Conference	1,790
VAN00004	CS—7th Annual Victorian No-Till Farmers Association Conference	7,500
VF00009	Visiting Fellowship Award—(CSP) Use of computer simulation to develop breeding methodologies for efficiently integrating selection of quantitatively inherited water use efficiency traits (e.g. coleoptile length, vigour, transpiration efficiency) with molecular marker–assisted selection for major, adapted parent background alleles	4,500
VF00012	Visiting Fellowship Award—(CSP) Potential benefits from triticale traits for adapting wheat to future climate change conditions in Mediterranean environments	14,400
VF00013	Visiting Fellowship Award—(DAN) Participation in Australian Pulse Pathology workshop	3,000
VF00014	Visiting Fellowship Award—(UNE) Improving quantification of carbon dioxide, methane and nitrous oxide fluxes using geographic information systems (GIS)	17,500
VF00015	Visiting Fellowship Award—(US) Axenic culture of stem rust and analysis of secreted proteins	15,160
VF00016	Visiting Fellowship Award—(UWA) Identify herbicides and synergists overcoming herbicide resistance in *Lolium rigidum*	4,500
VF00017	Visiting Fellowship Award—(CSP) Determining the genetic basis for ntirogen use efficiency of wheat using multi-environment QTL (quantitative trait loci) mixed models	10,600
VFF00008	CS—Victorian Farmers Federation Grains Group Annual Conference 2009	15,000
VIC00007	CS—GRDC Irrigation Update	4,000
WAN00017	CS—18th Annual Western Australian No-Tillage Farmers Association Conference	5,000
	Total Building Research Capacity	**2,698,628**
	Corporate Communications	
ANV00008	Ground Cover TV—Two segments	200,000
AUG00001	2009 Australian Grain Yearbook	25,000
BCA00003	Western Region communicator services	110,775
CAN00002	Warehousing and distribution of the GRDC's publications, periodicals and promotional material	50,000
CCS27-3	Publications	14,258

Number	Title	Expenditure $
CCS42	Grains industry magazines	5,000
CIC00003	Northern Region communicator services	74,965
CIC00005	Communication plans for Northern and Western regional communicator services	6,960
CIC00006	Western Region communicator services	20,000
CIC00007	Northern Region communicator services	20,000
CIC00008	Issues-based communication campaigns—'Over the Fence' national	70,200
COR00007	*Ground Cover* newspaper	1,082,065
COR00008	*Ground Cover* supplements	207,508
COR00013	GRDC articles to appear in *Farming Ahead*	34,781
COR00014	Canola Best Management Practice Manual	19,074
COR00015	Grains Industry Environmental Plan	(2,552)
COR00016	Ground Cover Direct catalogue 2009	16,713
COR00017	*Ground Cover* supplements	220,000
COR00018	*Ground Cover* newspaper	181,199
CPU00001	Precision Agriculture Special in *Australian Journal of Agricultural Research* (AJAR)	11,364
ECO00002	Issues-based communication campaigns—National Climate Change	17,250
ECO00003	Issues-based communication campaigns—Climate change campaign implementation	395,390
KDI00017	Advertising in *Farming Ahead* magazine	27,000
KDI00018	Reprint of *Grains Market Lingo* booklet	7,555
MMO00002	Undertake and provide a quarterly in-depth quantitative and qualitative media analysis report	27,061
MMO00003	Media monitoring services	30,715
MMO00004	Media monitoring services	49,000
MMO00005	Media monitoring services	100,000
PIG00005	Delivering professional development through Partners in Grain	230,000
PNS00002	Southern Region communicator services	213,050
PNS00003	Communication plan for Southern Region communicator services	8,090
PNS00004	Southern Region communicator services	20,000
PNS00005	Issues-based communication campaigns—Productivity and Profitability strategy development	20,000
PNS00006	Issues-based communication campaigns—Productivity and Profitability campaign implementation	346,248
PNS00007	Issues-based communication campaigns—Productivity and Profitability campaign implementation, levy brochure development and National Grower Register mailout	20,170
PRI00001	*GM canola—performance and experiences in 2008*	10,408
RSS00008	Vetch Ute Guide	52,800
SAN00017	The Essential Guide to Conservation Agriculture	11,726
WDM00007	Paddock Diary 2006–07, 2007–08 and 2008–09	68,750
	Total Corporate Communications	**4,022,523**
	TOTAL COMMUNICATION & CAPACITY BUILDING	***6,721,151***
	ENHANCED MANAGEMENT	
AAA00005	Increasing informed debate and decision making about gene technology	100,000
ATR00004	2008 internal impact assessments	46,200
ATR00005	2009 internal impact assessments	61,875
ATR00006	Impact Assessment 2009—Random Project Clusters	75,000
BAE00013	Expert advice for the economic and strategic development of the Australian grains industry	440,091

Number	Title	Expenditure $
BAE00017	Australian Agricultural and Grazing Industries Survey and Grains Industry Reports: 2009–10, 2010–11 and 2011–12	100,000
BAE00018	GRDC–Australian Bureau of Agricultural and Resource Economics Productivity Initiative	156,000
GCA00020	Market assess biosecurity Grains Industry Consultative Committee	18,160
GCA00021	Sponsorship of attendance at International Grains Council Conference 2009	5,109
GCA00022	Trade information facilitation activities	15,840
GCA00023	Sponsorship of R&D session at Grains Industry Forum	5,000
GCA00024	Seed industry consultation and seed industry reference group	10,000
GRD172	Global Crop Diversity Trust	477,655
RWF00012	Consultancy—GRDC–Cotton R&D Corporation collaboration opportunities	18,266
RWF00013	Consultancy—National Grains Research Development and Extension	33,500
THC00001	Consultancy—GRDC–Cotton R&D Corporation collaboration opportunities	13,185
	TOTAL ENHANCED MANAGEMENT	***1,575,881***
	GRAND TOTAL	**106,251,758**

AANRO = Australian Agriculture and Natural Resources Online, ACPFG = Australian Centre for Plant Functional Genomics, ATA = Agricultural Training Award, CIMMYT = International Maize and Wheat Improvement Center, CRC = cooperative research centre, 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, GIRS = Grains Industry Research Scholarship, GM = genetically modified, ICARDA = International Centre for Agricultural Research in the Dry Areas, IDA = Industry Development Award, NSW = New South Wales, QUT = Queensland University of Technology, RD&E = research, development and extension, RMI = Royal Melbourne Institute of Technology, SWI = Swinburne University of Technology, TA = Travel Award, TIAR = Tasmanian Institute of Agricultural Research, 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, USA = University of South Australia, USC = Southern Cross University, UWA = University of Western Australia, WA = Western Australia

Appendix C: Joint R&D project list

GRDC partners	Number	Title	Start	Finish
ACIAR	ACA4	Pulse project with ICARDA	1 Jul 2001	3 Mar 2009
ACIAR	ACA5	Oilseed brassica improvement in China, India and Australia	30 June 2002	30 Sept 2009
ARC, DPI VIC, SARDI, UA, UM, UQ	ACP00002-Q	Australian Centre for Plant Functional Genomics, Phase 2	1 Jan 2008	31 Dec 2012
AGO	AGO00003	AGO contribution to UM00028 Indirect greenhouse gas emissions from wheat–sheep farming systems	12 Jun 2006	12 Jun 2009
AGO	AGO00004	AGO contribution to UM00027 Effect of elevated carbon dioxide on wheat-based production systems under Australian field conditions	1 Jun 2006	30 Jun 2010
AGO	AGO00005	AGO contribution to DAV00081 Assessment of greenhouse gas emissions in cereal–legume cropping systems in southern Australia	1 Jul 2007	30 Jun 2009
AWI, DA, MLA, RIRDC	AWR00002	Contribution to Pastures Australia	30 Jun 2006	30 Jun 2010
CRDC	CRD00002	Drift Management Extension Strategy for the Northern Region	1 Jul 2006	30 Jun 2009
CSIRO, DAFF, DAFWA, DNRW QLD, DPIF QLD, DPI NSW, DPI VIC, SARDI, UNE, UWA	CSA00019	Soil Carbon Research Program	1 Jun 2009	30 Jun 2012
CSIRO, DAFF, UM	CSA00022	Developing climate change resilient cropping and mixed cropping/grazing businesses in Australia	15 Jun 2009	30 Jun 2012
CSIRO, DAFWA, DPIF QLD, UQ	CSE00051	Pest suppressive landscapes: linking integrated pest management and natural resource management	30 Jun 2009	30 Jun 2012
AEC, APL, DA, MLA, PRC	CSP00118	Australian Feedgrains Partnership sorghum project	1 Oct 2008	30 Sept 2010
CRDC, DPI NSW	DAN00121	*Helicoverpa* insecticide resistance: monitoring, mechanisms and management 2	1 Jul 2008	30 Jun 2011
DPIF QLD, DPI NSW	DAQ00136	Risk assessment and preventive strategies for herbicide resistance in the Northern Region, Phase 3	1 Jul 2008	30 Jun 2011
CRDC, DPIF QLD	DAQ00148	Defining critical soil nutrient concentrations in soils supporting grains and cotton in northern New South Wales and Queensland	30 Jun 2009	30 Jun 2012
Cornell University, HAL, SARDI, UA, UM	DAS00094	Diamondback moth (*Plutella xylostella*) control and insecticide resistance management	1 Mar 2009	30 Jun 2012

GRDC partners	Number	Title	Start	Finish
AGO, DPI VIC	DAV00081	Assessment of greenhouse gas emissions in cereal–legume cropping systems in southern Australia	1 Jul 2006	30 Jun 2009
DAFF, DPI VIC	DAV00096	Decreasing nitrous oxide emissions in high-rainfall cropping systems	30 Jun 2009	30 Dec 2012
DA, DAFF, DPI VIC	DAV00097	The potential of inhibitors for the mitigation of nitrous oxide emissions from animal production systems, in south-eastern Australia	1 May 2009	30 Jun 2012
AGO, DAFWA	DAW00103	Measurement of paddock-based greenhouse gas emissions from wheat production to improve life cycle assessment of wheat products	31 Dec 2003	30 Jun 2009
DRDC	DRD00002	Improving the utilisation of red wheat by lactating dairy cows	1 Jan 2009	1 Jan 2012
LWA	LWR00003	Healthy Soils for Sustainable Farms programs	1 Jul 2006	30 Jun 2009
LWA	LWR00004	Contribution to primary industries climate change strategy	1 July 2007	30 Jun 2009
LWA	LWR00005	Annual Contribution to AANRO	1 Jul 2008	30 Jun 2010
LWA	LWR00006	Contribution to Managing Climate Variability program, Phase 2	1 Jul 2007	30 Jun 2010
LWA	LWR00007	Contribution to National Program for Sustainable Irrigation	1 Jul 2007	30 Jun 2011
ANU, CSIRO, DEST, UNSW, UQ, UWA	NYS00001	Conference Sponsorship—National Youth Science Forum (NYSF)	1 Jun 2007	30 Jun 2010
APL, CSIRO, DPI NSW, DPI VIC, MLA, RIRDC, SARDI, UNE, US	PCL00002	Enhancement of near -infrared calibrations for predicting the energy value of weather-damaged grains for pigs	1 Sept 2006	31 Aug 2009
DPIF QLD, PRC, UQ	PCL00003	Sorghum lines with enhanced starch availability for pigs and ethanol production	1 Jan 2007	30 Oct 2010
PRC	PCL00005	Enhancing near -infrared spectroscopy calibrations for predicting the nutritional value of grains for livestock	1 Jul 2008	30 Jun 2009
DAFF, QUT	QUT00002	Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils	1 Mar 2009	28 Feb 2012
DAFF, QUT	QUT00003	Reducing nitrous oxide emissions in irrigated grains–cotton farming systems	1 Mar 2009	28 Feb 2012
RIRDC	RDC00004	GRDC contribution to Collaborative Partnership for Farming and Fishing Health and Safety	1 Jun 2008	30 Jun 2010
RIRDC	RDC00005	Project Review 2008—Pastures Australia Review	1 Jan 2009	30 Jun 2009
SRDC	SRD00002	Contribution to DAQ00129 Improving the integration of legumes in grain and sugar	1 Jun 2008	30 Jun 2012
SRDC	SRD00003	Reducing nitrous oxide emissions from sugarcane lands	15 Mar 2009	30 Jun 2012

GRDC partners	Number	Title	Start	Finish
AGO, UM	UM00027	Effect of elevated carbon dioxide on wheat-based production systems under Australian field conditions	1 Jun 2006	30 Jun 2010
AGO, UM	UM00028	Indirect greenhouse gas emissions from wheat–sheep farming systems	12 Jun 2006	12 Jun 2009
DAFF, 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, UNE	UNE00012	Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management	1 May 2009	30 Apr 2012
UT, UWA	UT00011	Building Human Capacity—Linking Schools to Universities through to Primary Industries	1 Jul 2006	30 Jun 2009
DAFF, UWA	UWA00131	Fertiliser management strategies for decreasing on-farm greenhouse gas emissions	1 Mar 2009	28 Dec 2012

AANRO = Australian Agriculture and Natural Resources Online, ACIAR = Australian Centre for International Agricultural Research, AEC = Australian Egg Corporation, AGO = Australian Greenhouse Office, ANU = Australian National University, APL = Australian Pork Ltd, ARC = Australian Research Council, AWI = Australian Wool Innovation Ltd, CRDC = Cotton Research and Development Corporation, DA = Dairy Australia, DAFF = Department of Agriculture, Fisheries and Forestry, DAFWA = Department of Agriculture and Food, Western Australia, DEST = Department of Education, Science and Training, DNRW QLD = Department of Natural Resources and Water, Queensland, DPIF QLD = Department of Primary Industries and Fisheries, Queensland, DPI NSW = Department of Primary Industries, New South Wales, DPI Vic = Department of Primary Industries, Victoria, DRDC = Dairy Research and Development Corporation, HAL = Horticulture Australia Ltd, LWA = Land and Water Australia, MLA = Meat and Livestock Australia, PRC = Pork CRC Limited, QUT = Queensland University of Technology, RIRDC = Rural Industries Research and Development Corporation, SARDI = South Australian Research and Development Institute, 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, US = University of Sydney, 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. The GRDC's home page received between 25,700 and 77,070 page views per month in 2008–09. The bookshop received 2,850 page views per month.

Most of the GRDC's 2008–09 reports and publications are publicly available. Key publications released in 2008–09 are listed below.

Publications available to the public free of charge

Booklets	*Grain Market Lingo: What does it all mean?* *Lifting irrigated cropping profitability and water use efficiency*	
Brochures	*Rust diseases of grain crops—what can Australian travellers do?*	
CDs/DVDs	Driving Agronomy 2009 DVD Grains Research Updates 2009 DVD	
Corporate publications	GRDC Annual Report 2007–08 GRDC Growers' Report 2007–08 GRDC Annual Operational Plan 2009–10 GRDC 2009 Ground Cover Direct publications catalogue 2009–10 GRDC Stakeholder Report	
Fact Sheets **Information for grain growers**	National	Managing the risk of frost National Variety Trials Rust management Spray drift Your GRDC levy
	Northern Region	Chickpea disease Crown rot in cereals Northern weeds
	Southern and Western regions	Crown rot in cereals
Ground Cover* and *Ground Cover Supplements **The grains industry research newspaper**	Six issues of *Ground Cover* (issues 75–80) and six supplements: • Issue 75—Spray application technology • Issue 76—Grain hygiene • Issue 77—National Variety Trials • Issue 78—Feedgrains • Issue 79—New farm products and services • Issue 80—Soil health	
Research reports	*Estimating plant available water capacity* *GM canola—performance and experiences in 2008* *Helping grain growers manage dryland salinity—understanding catchment water balance and salinity management options* *Raising the bar with better canola agronomy* *Raising the bar with better sunflower agronomy*	

Publications available to the public free of charge *(continued)*	
Tools for grain growers	Paddock Diary 2009 Information package: www.grdc.com.au/biosecuritylinks
Update Newsletters **Information for advisers**	Issues 44, 45, 46, 47, 48 and 49 for the Northern Region Issues 54, 55, 56, 57, 58 and 59 for the Southern Region

Publications available for sale to the public	
Booklets	*The Essential Guide to Conservation Agriculture* *Disease Management and Crop Canopies* *Managing Herbicide Resistant Ryegrass* *Australian Grain Yearbook 2009*
Ute Guides **Identification tools for grain growers**	*Lentils: The Ute Guide* *Field Peas: The Ute Guide*

Appendix E: Selection Committee report

GRAINS RESEARCH AND DEVELOPMENT CORPORATION
SELECTION COMMITTEE

The Hon. Tony Burke MP
Minister for Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Minister

Grains Research and Development Corporation Selection Committee Report 2008–09

This report summarises the activities of the Grains Research and Development Corporation (GRDC) selection committee from 28 August 2008 to 30 June 2009, pursuant to section 141 of the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act), in relation to the nomination of seven directors for appointment to the GRDC board.

Establishment of selection committee

The GRDC selection committee was established under the PIERD Act for the purpose of nominating to you seven persons for appointment as directors of the GRDC.

In addition to six expiring nominated director positions, a further position was available for filling following legislative amendments to the PIERD Act, made in 2007. The amendments, among other things, remove the government director position from the board, allow for an additional non-executive director position and expand the skills criteria to include skills in public administration.

I was appointed by you as the presiding member on 28 August 2008, for the period ending 30 June 2010. On 23 September 2008, following nominations made by the GRDC's representative industry organisation, the Grains Council of Australia (GCA), the selection committee was appointed as follows:

- Dr Joanne Daly
- Dr Terry Enright
- Mr David Hamilton
- Mr Murray Jones
- Ms Jane Walton

Selection process

The selection committee advertised the 7 board positions widely, in the national press and regional newspapers as follows, with a closing date of 26 September:

- The Australian (13 September 2008)
- The Australian Financial Review (12 September 2008)
- Tasmanian Country (12 September 2008)
- Stock Journal (11 September 2008)
- Farm Weekly (11 September 2008)
- The Land (11 September 2008)

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In accordance with the PIERD Act, the advertisements called for written applications against the following selection criteria:

• Grains production, processing and marketing	• Economics
• Environmental and ecological matters	• Administration of research and development
• Science and Technology	• Finance and business management
• Technology transfer	• Sociology
• Management and conservation of natural resources	• Public administration

All candidates were also required to have:

- An understanding of corporate governance and responsibilities
- Good communications skills and the capacity to represent GRDC to all stakeholders.

To further expand the range of potential candidates, details of the board vacancies were also distributed through a wide range of electronic networks, including state farming organisations, the grower group network, the Rural, Remote and Regional (RRR) Women's Network and the Kondinin Group. The GCA was also invited to nominate candidates for consideration by the selection committee. Existing GRDC directors were also invited to apply.

In addition, details were provided to the Women on Boards Organisation. A search of the Department of Agriculture, Fisheries and Forestry's *Balance* database and the Office of Women's *AppointWomen* database was also undertaken to identify potential candidates.

A total of 173 applications were received, of which 67 were from female applicants and 4 from existing directors.

The GRDC's selection committee formally reviewed the advertising and dissemination process to ensure that the widest possible field of candidates was identified. Each of the members of the selection committee had extensive networks relating to the grains industry in Australia and these networks were used to assess the distribution of the information.

At the outset of the process, the GRDC selection committee consulted widely to obtain an overview of industry challenges and skill requirements of the new board, in addition to the core skills contained in the PIERD Act. The GRDC Chair and its Managing Director were consulted and provided the selection committee with a detailed briefing on the Corporation and its strategic direction immediately prior to the interview process.

The GRDC selection committee met on 8 October 2008 to discuss the process and to review the applications. The selection committee agreed on 20 candidates for interview, including 10 women and 4 existing directors.

Interviews were conducted on 20 and 21 October 2008 at the Hilton Hotel, Melbourne Airport. Three of the short listed applicants were overseas at the time of the interviews and undertook telephone interviews.

Following interviews the selection committee made its final decisions, taking into account the collective balance of expertise and experience in board affairs required by the PIERD Act.

GRAINS RESEARCH AND DEVELOPMENT CORPORATION
SELECTION COMMITTEE

Board appointments

Upon completion of the selection process, the GRDC selection committee reported to you with seven nominations for your consideration. You agreed to the seven nominations made by the GRDC selection committee. The following appointments were completed by you, for a term commencing from 11 November 2008 and ending on 30 September 2011:

- Ms Nicole Birrell reappointment resident of Victoria
- Mr Steve Marshall reappointment resident of New South Wales
- Prof Timothy Reeves reappointment resident of Victoria
- Mr Colin Butcher new appointment resident of Western Australia
- Ms Jenny Goddard new appointment resident of Australian Capital Territory
- Ms Jeanette Long new appointment resident of South Australia
- Prof Graeme Robertson new appointment resident of Western Australia

Expenses

Item	$
Selection committee and applicants' travel accommodation and expenses	41,526.26
Advertising	13,399.68
Selection committee members' fees (excluding the Presiding Member)	5,748.00
Presiding Member's fees	9,801.00
Secretariat costs (supporting the selection committee)	4,709.87
TOTAL (EXCLUDING GST)	75,184.81

Following notification of your appointment of the directors, I formally abolished the GRDC selection committee pursuant to section 129 of the PIERD Act on 21 November 2008.

Yours sincerely

Dr William Ryan
Presiding Member
Grains Research and Development Corporation selection committee

30 July 2009

References

Photo:
Stephen Mattschoss washing out the spray rig after spraying fungicide and late herbicide.
Photo: Emma Leonard

Abbreviations list

AAAC	Australian Association of Agricultural Consultants
AAGIS	*Australian Agricultural and Grazing Industries Survey*
ABARE	Australian Bureau of Agricultural and Resource Economics
ACIAR	Australian Centre for International Agricultural Research
ACPFG	Australian Centre for Plant Functional Genomics
ACRCP	Australian Cereal Rust Control Program
AGFACE	Australian Grains Free Air Carbon Dioxide Enrichment
AGT	Australian Grain Technologies Pty Ltd
AMA	Australian Mungbean Association
APVMA	Australian Pesticides and Veterinary Medicines Authority
AWCPA	Australian Winter Cereals Pre-breeding Alliance
BBA	Barley Breeding Australia
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CBI	Crop Biofactories Initiative
CESAR	Centre for Environmental Stress and Adaptation Research
CIMMYT	International Maize and Wheat Improvement Center
CRC	cooperative research centre
CRM	customer relationship management
DAFWA	Department of Agriculture and Food, Western Australia
EMT	Executive Management Team
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPR	End Point Royalty
FOI Act	*Freedom of Information Act 1982*
GCA	Grains Council of Australia
GM	genetically modified
Go Grains	Go Grains Health & Nutrition Ltd
GRDC	Grains Research and Development Corporation
HSMAs	Health and Safety Management Arrangements
ICARDA	International Center for Agricultural Research in the Dry Areas
IPM	integrated pest management
IT	information technology
IWM	integrated weed management
MIMS	multi-ion measuring system
MPBCRC	Molecular Plant Breeding Cooperative Research Centre
NFF	National Farmers' Federation
NIPI	National Invertebrate Pest Initiative
NIR	near-infrared
NSWDPI	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
PICSE	Primary Industry Centre for Science Education
PIERD Act	*Primary Industries and Energy Research and Development Act 1989*
QDPIF	Queensland Department of Primary Industries and Fisheries
RAC	research advisory committee
R&D	research and development
RD&E	research, development and extension
RDC	rural R&D corporations
RIRDC	Rural Industries Research and Development Corporation
SARDI	South Australian Research and Development Institute
SELN	State Extension Leaders Network
TFP	total factor productivity
WANTFA	Western Australian No-Tillage Farmers Association
WSMV	wheat streak mosaic virus

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Erica Wright, GRDC Grains Research Scholar is investigating a GM strategy to improve frost and drought tolerance in canola.
Photo: Gio Braidotti

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GRDC
Grains Research & Development Corporation

Delivery dates

Submission of financial statements to the GRDC Finance, Risk and Audit Committee	6 August 2009
Submission of final draft to the GRDC Board	23 September 2009
Certification of financial statements by the Australian National Audit Office	12 August 2009
Approval of final annual report by the GRDC Board	23 September 2009
Submission to the Minister for Agriculture, Fisheries and Forestry	30 September 2009
Submission to the Australian Government Department of Agriculture, Fisheries and Forestry	30 September 2009
Tabling in parliament	During the spring session
Presentation to the Grains Council of Australia	On tabling

Production notes

Compliance editor	Catherine Wells
Photo editor	Maureen Cribb
Program editor	Zoltan Lukacs
Financials	Danielle White
Concepts, text and research	GRDC
Editing and indexing	WordsWorth Writing, Canberra
Design and typesetting	Four Design Group, Queensland
Printing	Goanna Print, Canberra

ISSN 1037–4531

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Development
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