



Australian Government

Grains Research and  
Development Corporation

# GRDC Annual Operational Plan 2010–11



**GRDC**  
Grains  
Research &  
Development  
Corporation

# 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

22 April 2010

The Hon. Tony Burke, MP  
Minister for Agriculture, Fisheries and Forestry  
Parliament House  
CANBERRA ACT 2600

Dear Minister,

I am pleased to submit for your approval the Grains Research and Development Corporation (GRDC) annual operational plan for the financial year 2010–11. This is required under sections 25 and 26 of the *Primary Industries and Energy Research and Development Act 1989*.

In developing the plan, the GRDC has been conscious of the need to facilitate performance reporting, as required under the *Commonwealth Authorities and Companies Act 1997*. This is consistent with the corporation's responsibility to plan and report in an 'outcomes and outputs' framework.

The 2010–11 financial year will be the fourth under the GRDC's current five-year Strategic R&D Plan, *Prosperity through Innovation*. The research activities outlined in this annual operational plan will contribute to implementing the strategies and achieving the objectives set out in *Prosperity through Innovation*.

Table 5 indicates how the GRDC's R&D portfolio addresses the Australian Government's National Research Priorities and Rural R&D Priorities, including the government's focus on climate change adaptation and mitigation, water management, biosecurity, food security and productivity. Table 6 shows how the GRDC's R&D portfolio addresses the additional priorities identified in your letter of 9 February 2010.

Part 5 of this annual operational plan explains that the estimates of income and expenditure are indicative. Changes in the operating environment may require the GRDC to vary the total expenditure or specific allocations to secure its objectives.

Yours sincerely



**KEITH PERRETT**  
Chairman



**Postal address**

Grains Research and Development  
Corporation  
PO Box 5367  
KINGSTON ACT 2604

**Location**

Level 1, Tourism House  
40 Blackall Street  
BARTON ACT 2600

Telephone: **02 6166 4500**  
Facsimile: **02 6166 4599**  
Web site: **[www.grdc.com.au](http://www.grdc.com.au)**

**Production notes**

Compliance editor:

**Catherine Wells**

Concepts, text and research:

**GRDC**

Editing:

**WordsWorth Writing, Canberra**

Design and typesetting:

**Four Design Group, Queensland**

Printing:

**Canprint Communications, Canberra**

© Grains Research and Development  
Corporation 2010

ISSN 1038-670X

This publication is copyright. Apart  
from any use as permitted under the  
*Copyright Act 1968*, no part may be  
reproduced by any process without  
permission from the Grains Research  
and Development Corporation.



ISO 9001:2008  
FS 554590

# Contents

Executive summary	2
<b>1 The GRDC</b>	<b>4</b>
Purpose	4
Funding	4
Structure	4
Relationships	5
Planning and reporting	6
<b>2 Investment</b>	<b>7</b>
Strategy	7
Process	8
Evaluation	9
<b>3 R&amp;D priorities</b>	<b>10</b>
Business environment	10
Industry priorities	10
Australian Government priorities	11
<b>4 Planned outputs in 2010–11</b>	<b>15</b>
Output Group 1—Practices	15
Output Group 2—Varieties	20
Output Group 3—New Products	24
Output Group 4—Communication & Capacity Building	27
Enabling functions	31
<b>5 Estimated income and expenditure</b>	<b>34</b>
Income	34
Expenditure	34
Reserves	35
Payments to the Grains Council of Australia	35
Australian Government Research Priorities	35
Abbreviations list	38



# Executive Summary

## The GRDC

The Grains Research and Development Corporation (GRDC) is a statutory authority established to invest in R&D and related activities to benefit the Australian grains industry and the wider Australian community. The GRDC works to achieve one outcome:

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

The GRDC is primarily funded by an industry levy and Australian Government contributions. Its research portfolio covers 25 leviable crops, spanning temperate and tropical cereals, coarse grains, pulses and oilseeds.

A board of directors governs the GRDC, while the corporation's business activities are led by the Executive Management Team. Regional and national advisory panels—comprising grain growers, agribusiness practitioners, scientists and the GRDC's executive managers—advise the GRDC Board on R&D priorities, and provide an effective interface with stakeholders.

The GRDC delivers its outcome through four output groups—Practices, Varieties, New Products, and Communication & Capacity Building—supported by the enabling functions of Corporate Services, Corporate Strategy & Impact Assessment, and Legal & Procurement.

More information on the GRDC's role, funding, structure and way of doing business is provided in Part 1 of this document.

## Investment strategy

The GRDC's Strategic R&D Plan, *Prosperity through Innovation*, sets out objectives, strategies and performance indicators to address the R&D priorities of its two key customer groups—Australian grain growers and the Australian Government—over the five financial years from 2007–08 to 2011–12.

The strategic measures are implemented and assessed through detailed investment priorities and performance targets that are set out each year in an annual operational plan. The annual operational plan is formulated in consultation with stakeholders and approved by the Minister for Agriculture, Fisheries and Forestry.

Part 2 of this document describes the planning and evaluation processes that the GRDC undertakes each year to ensure that its investments remain relevant and effective.

## Priorities in 2010–11

The GRDC refines its investment portfolio each year to respond to changes in the business environment and to optimally address the priorities of the Australian grains industry and the Australian Government.

Factors expected to influence the GRDC's business environment in 2010–11 include:

- low grain prices impacting growers' profitability
- continuing issues in relation to climate change, plant health and food security
- an easing of restrictions on the production of genetically modified (GM) canola
- the finalisation of a national strategy for grains research, development and extension (RD&E)
- national and international developments in agricultural technologies.

Part 3 of this document provides more details of the key customer priorities and shows how new GRDC investments will address them in 2010–11. Table 1 provides an overview of GRDC investments in key priority areas.

## Performance

The GRDC continually assesses the performance of its programs and projects, and their impact on the Australian grains industry and wider community, and regularly reports to stakeholders.

Performance indicators for each output group are specified in Part 4 of this document. The GRDC's performance against those indicators will be discussed in the annual report for 2010–11.

## Estimates of income and expenditure

The GRDC's total income in 2010–11 is forecast to be \$124.8 million, consisting of:

- Australian Government contributions of \$47.1 million
- levy contributions of \$63.0 million
- other income, including grants income, interest and royalties, of \$14.7 million.

The GRDC Board has approved an annual expenditure of \$146.4 million in 2010–11, an increase of approximately 12 percent over the 2009–10 expenditure budget.

Part 5 of this document provides details of the estimates of GRDC income and expenditure for 2010–11. These figures are indicative only. Changes in the GRDC's operating environment may require the corporation to vary the total expenditure or specific allocations to secure its objectives.



TABLE 1—KEY PRIORITIES FOR R&amp;D INVESTMENT

<b>Productivity improvement</b>	<ul style="list-style-type: none"> <li>• New projects focused on achieving quantifiable and measureable on-farm change through crop sequencing to manage water and nutrient cycles and break disease and weed cycles.</li> <li>• Work to increase the yield and improve the reliability of durum grain production.</li> <li>• Pursuit of new technologies to significantly increase wheat yields.</li> </ul>
<b>Climate change</b>	<ul style="list-style-type: none"> <li>• The identification of genes that enable crops to tolerate heat, frost and drought, and breeding to increase the rate of crop adaptation to climate change.</li> <li>• The adoption of a climate change communication strategy to ensure that knowledge, information and technology generated through research is provided to growers in preparation for the likely impacts of climate change.</li> </ul>
<b>Sustainable environmental resource management</b>	<ul style="list-style-type: none"> <li>• Crop breeding for improved water-use efficiency.</li> <li>• Work to improve               <ul style="list-style-type: none"> <li>– soil quality, through greater use of pulses and pastures in the farming system</li> <li>– water infiltration, through better understanding of non-wetting soils</li> <li>– nitrogen use efficiency, through better understanding of ammonia loss from surface-applied nitrogen fertiliser.</li> </ul> </li> </ul>
<b>Maintaining and improving international market access opportunities and value chain effectiveness and efficiency</b>	<ul style="list-style-type: none"> <li>• Work to improve:               <ul style="list-style-type: none"> <li>– the food quality and end-use market acceptance of Australian pulses</li> <li>– the value and marketability of Australian feed grains.</li> </ul> </li> <li>• The development of high-amylose wheat, with human health benefits.</li> </ul>
<b>Biosecurity</b>	<ul style="list-style-type: none"> <li>• Development of a national rating system and improved disease resistance management for blackleg in canola.</li> <li>• Herbicide resistance management.</li> <li>• Disease identification through molecular diagnostics.</li> </ul>
<b>Workforce, skills, education (capacity building) and diversity</b>	<ul style="list-style-type: none"> <li>• Workshops on particular topics such as precision agriculture, irrigation in grains and wide row spacing/stubble management.</li> <li>• Sponsorships of events such as the National Youth Science Forum and grower representative organisation conferences.</li> <li>• Examination of the potential to expand training opportunities to engage a wider selection of Indigenous people in the Australian grains industry.</li> </ul>
<b>Collaboration on the national RD&amp;E framework</b>	<ul style="list-style-type: none"> <li>• Continued active participation in the committee developing the Primary Industries Ministerial Council's National Primary Industries RD&amp;E Framework, including a significant contribution to formulating the national strategy for the grains sector.</li> <li>• Projects to implement the national RD&amp;E framework once it has been endorsed by relevant parties.</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluation of the longer term economic, social and environmental impacts of RD&amp;E investments, as a joint process with the other RDCs. Areas to be analysed include wheat breeding, crop agronomy, near-infrared calibration and a cluster from the GRDC's Communication &amp; Capacity Building output group.</li> <li>• Work to:               <ul style="list-style-type: none"> <li>– undertake impact assessments on project clusters</li> <li>– assess the feasibility of a predictive tool to estimate the impact that investing in certain priorities will have on grains industry productivity</li> <li>– assess GRDC performance through stakeholder surveys.</li> </ul> </li> </ul>

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

# 1 The GRDC

## Purpose

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

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

The GRDC assists the grains industry by investing in R&D and related activities across a portfolio spanning temperate and tropical cereals, coarse grains, pulses and oilseeds. This involves coordinating and funding the activities; monitoring, evaluating and reporting on their impact; and facilitating the dissemination, adoption and commercialisation of their results.

The GRDC also contributes to the development of strategic national approaches to grains industry R&D, to reduce fragmentation and duplication, and to help address industry-wide issues such as biosecurity and climate change.

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

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

## Funding

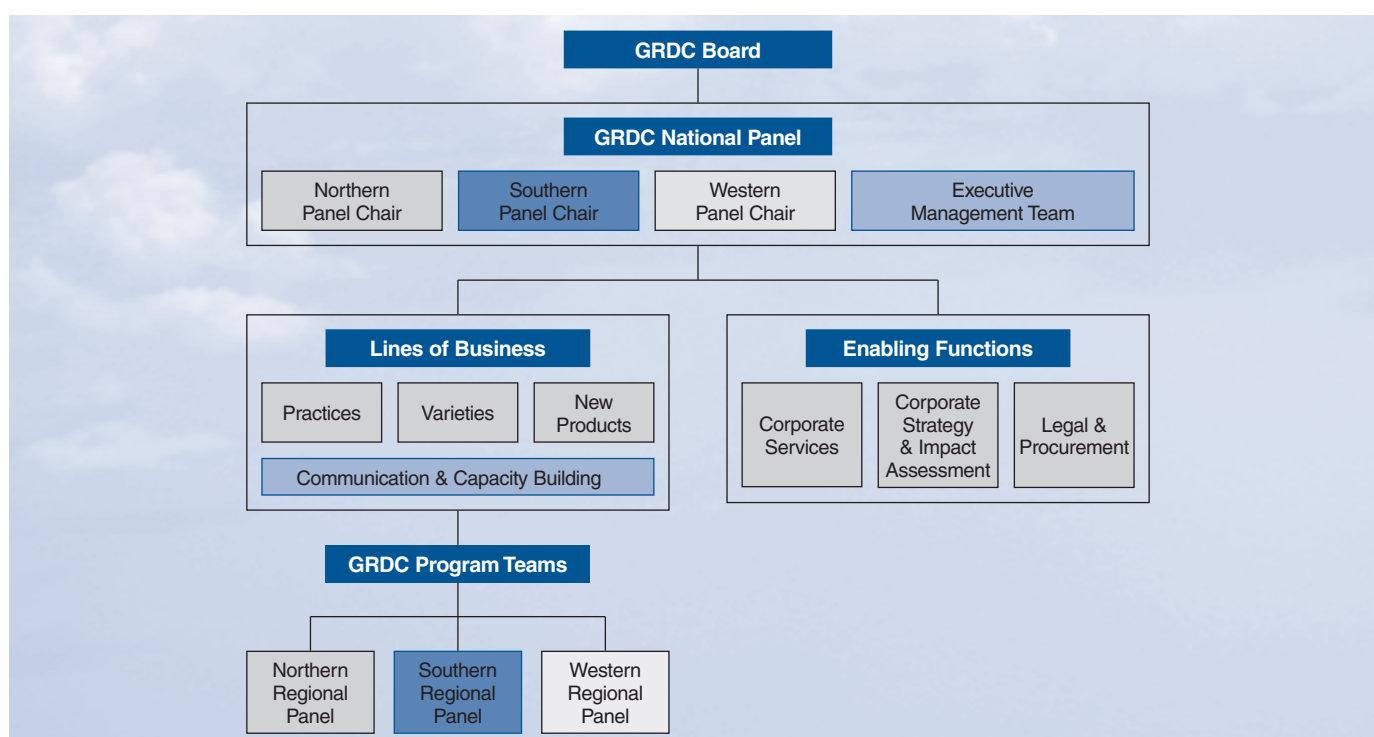
The GRDC is principally funded by a grower levy and Australian Government contributions.

The levy is based on the net farm gate value of the annual production of 25 crops: wheat; coarse grains—barley, oats, sorghum, maize, triticale, millets/panicums, cereal rye and canary seed; pulses—lupins, field peas, chickpeas, faba beans, vetch, peanuts, mung beans, navy beans, pigeon peas, cowpeas and lentils; and oilseeds—canola, sunflower, soybean, safflower and linseed. The Australian Government's contribution is determined annually, based on the three-year rolling average of the gross value of production of the 25 leviable crops.

## Structure

The organisational structure of the GRDC is shown in Figure 1.

FIGURE 1—ORGANISATIONAL STRUCTURE





## Board and Executive Management Team

A board of directors governs the GRDC, while the corporation's business activities are led by an Executive Management Team comprising the Managing Director and the six executive managers (one from each of the three lines of business and three enabling functions).

The GRDC Board oversees corporate governance, sets strategic direction and monitors the ongoing performance of the GRDC and the Managing Director. The Board and the Executive Management Team are jointly responsible for managing and evaluating the GRDC and its investments.

## Lines of business and enabling functions

At the operational level, the GRDC's organisational structure is divided into three lines of business, Practices, Varieties and New Products, which correspond to 'output groups' for performance reporting purposes. The lines of business are supported by three enabling functions: Corporate Services, Corporate Strategy & Impact Assessment, and Legal & Procurement. 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.

## Advisory panels and program teams

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

## REGIONAL PANELS

The three regional advisory panels, covering the northern, southern and western grain-growing regions of Australia, are composed of grain growers, agribusiness representatives, researchers and the GRDC executive managers, with provision for other industry experts to participate as appropriate. Panel members are contracted to carry out their role and are not employees of the GRDC.

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

The GRDC is a leading member of the committee developing the Primary Industries Ministerial Council's RD&E framework, and has contributed significantly to formulating the national strategy for the grains sector. The GRDC regional panels have provided data about regional RD&E capacity and strategic needs to inform the national strategy.

## NATIONAL PANEL

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

The National Panel addresses national R&D priorities across the GRDC's investment portfolio, takes advice from program teams

and advances recommendations to the Board. The National Panel also assists the Board to maintain links with grain growers, the Australian Government, state and territory governments and research partners.

## PROGRAM TEAMS

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

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

## Relationships

The GRDC places high value on not only meeting the needs of its stakeholders but exceeding their expectations, and understands that good communication is an important factor in achieving this. The GRDC also fosters productive relationships with many other organisations that have a common interest in improving knowledge, information and market effectiveness for rural industries.

## Communication with stakeholders

The GRDC works closely with its key customer groups, Australian grain growers and the Australian Government, to ensure their research, development and extension (RD&E) priorities are effectively addressed by GRDC investments. Grain grower interests are represented through:

- the GRDC's national and regional panels
- the consultation and reporting relationships established between the GRDC and the Grains Council of Australia (GCA)
- a range of GRDC-supported channels such as grower and adviser updates and technical workshops on specific issues.

In addition to the direct benefits of the GRDC's activities to the grains industry, the Australian Government's priorities are met through the benefits that flow on to the economy and the wider community. The GRDC works with various Australian Government departments and agencies, in particular the Department of Agriculture, Fisheries and Forestry.

As a statutory authority, the GRDC fulfils planning and reporting obligations that ensure its objectives, outcomes and performance are in line with the government's requirements. Under the *Primary Industries and Energy Research and Development Act 1989*, the GRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry, who is responsible for all RDCs.

The GRDC also maintains strong connections with its other stakeholders: research partners, including state departments, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), universities, cooperative research centres, other rural R&D corporations (RDCs) and companies; grower groups; and co-investors from the private sector.

## Collaboration

The GRDC builds strong relationships with its research and commercialisation partners, and with a wide range of other organisations with an interest in the grains value chain.

Examples of key collaborating organisations include:

- state and territory government departments and agencies
- RDCs, cooperative research centres, CSIRO, universities and other research organisations
- commercial plant breeders, seed companies, agricultural companies and advisers
- grain marketers, exporters and end-users.

The GRDC collaborates with other RDCs and organisations to increase the return on its investment and deliver greater benefits to the Australian grain grower. Partnerships enable investors to share financial resources and research capability, as well as other benefits such as market knowledge and access to complementary technologies and intellectual property. They also reduce the risk faced by each organisation.

The GRDC also collaborates with organisations overseas, both to broaden the resources available to the Australian grains industry and to further international RD&E efforts with potential benefits for the wider Australian community. Notable examples include:

- longstanding strategic alliances with the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Agricultural Research in the Dry Areas (ICARDA)
- participation in international research projects to combat the Ug99 stem rust pathogen, identify molecular markers for pulses and improve the productivity of juncea canola.

Examples of ongoing and potential new collaborative RDC investments in 2010-11 include:

- the second phase of the Grain and Graze program
- work on glyphosate herbicide resistance through the National Integrated Weed Management Initiative
- work on helicoverpa and diamondback moths through the National Invertebrate Pest Management Initiative
- cross-sectoral climate change initiatives
- work on management practices such as the reduction of spray drift and the use of pastures in crop sequences
- the third phase of the Managing Climate Variability Program.

Part 4 of this document provides more details of the planned outputs from these and other collaborative projects for 2010-11.

## Planning and reporting

The GRDC adopts a consultative and strategic approach to planning and reporting, to achieve its objectives effectively and to meet its obligations as a statutory corporation. Table 2 summarises the key elements of the annual planning and reporting framework.

This document is the fourth of five annual operational plans to implement the GRDC's Strategic R&D Plan 2007-12, *Prosperity through Innovation* and is published in response to:

- section 25 of the *Primary Industries and Energy Research and Development Act 1989*, which requires the annual operational plan to describe how the activities planned for the year will satisfy the objectives and strategies outlined in the five-year Strategic R&D Plan

- a ministerial direction which requires the annual operational plan to link planned outputs to the five-year Strategic R&D Plan, set out relevant performance measures, and comply with the reporting requirements outlined in the Commonwealth Authorities and Companies (Report of Operations) Orders 2008 under the *Commonwealth Authorities and Companies Act 1997*
- a departmental direction which requires the annual operational plan to be consistent with the outcomes, outputs and performance measures specified in the minister's portfolio budget statements
- a letter written to the GRDC Chair by the Minister for Agriculture, Fisheries and Forestry in February 2010.

The GRDC's annual report for 2010-11 will report in detail on the GRDC's performance in achieving the objectives of this annual operational plan.

**TABLE 2—ELEMENTS OF THE PLANNING AND REPORTING APPROACH**

Element	Purpose
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 procurement plan	Makes procurement information publicly available through the Australian Government's AusTender web site
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 statement for a given financial year
Growers' report	Provides performance information to growers on R&D activities for a given financial year
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 statement	As part of the Australian Government budget process, summarises the planned outputs, outcomes, performance information and financial 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
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

# 2 Investment

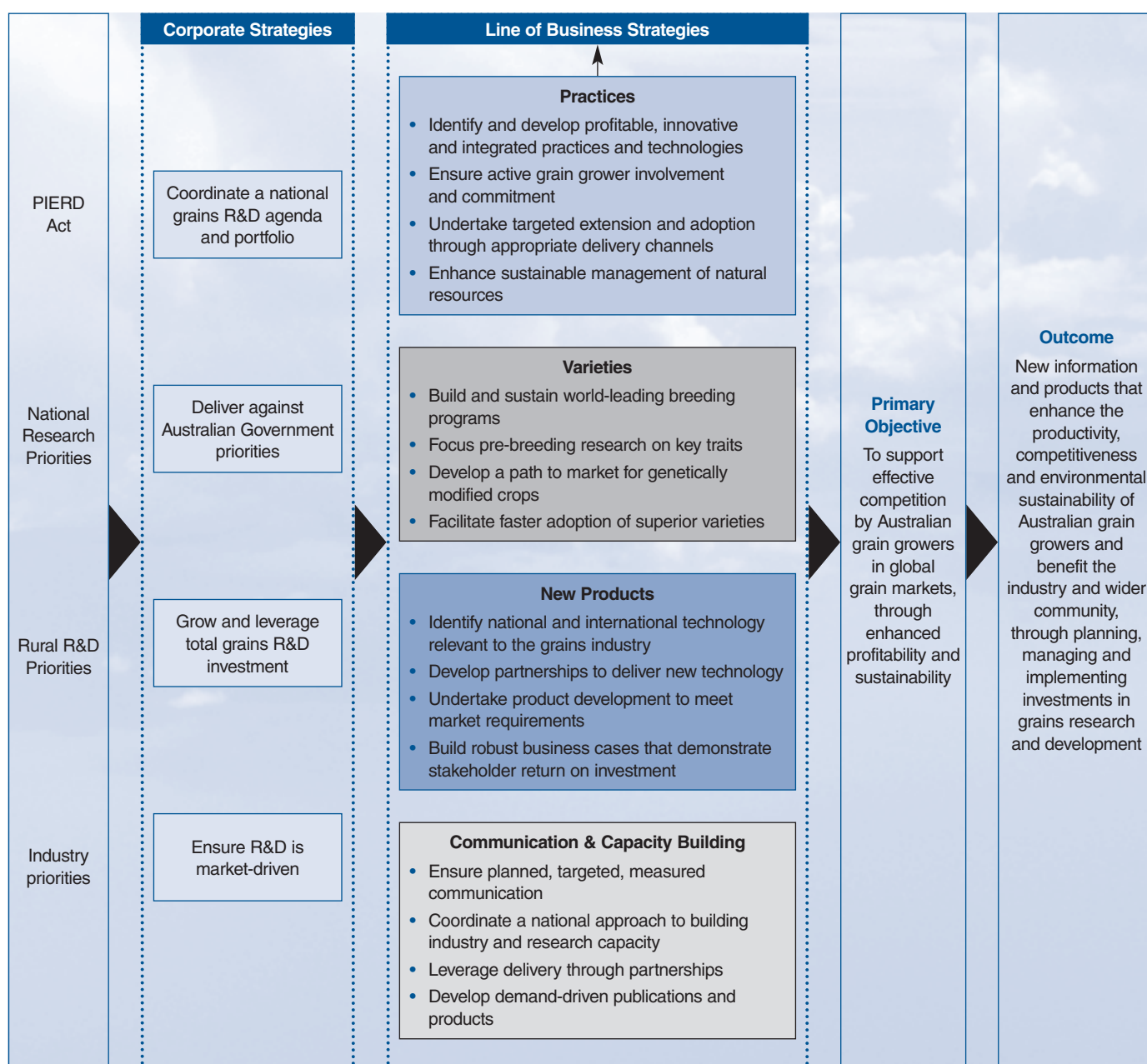
## Strategy

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 five financial years from 2007–08 to 2011–12.

Figure 2 provides an overview of the strategic framework set out in *Prosperity through Innovation*.

The 2010–11 Annual Operational Plan will cover the fourth year in the implementation of *Prosperity through Innovation*. The annual operational plan is based on up-to-date analysis of the business environment, linked to the longer term objectives, to ensure that investments are relevant and targeted to enhance the profitability and sustainability of the Australian grains industry.

FIGURE 2—OVERVIEW OF R&D STRATEGIES



## Process

Figure 3 provides an overview of the stages of the GRDC's investment process.

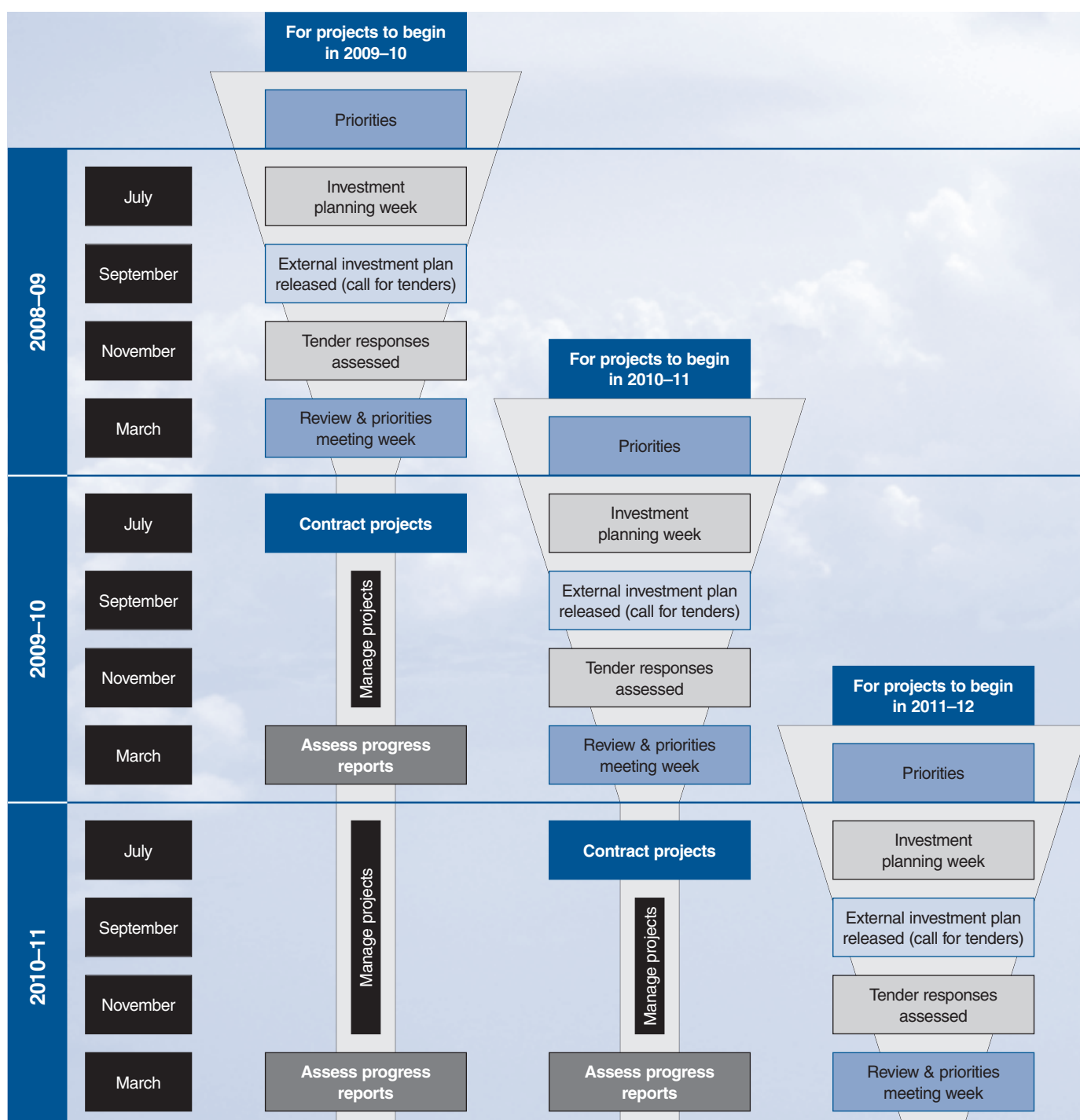
### Information gathering

The GRDC's three regional advisory panels are pivotal in monitoring the corporation's existing investment portfolio and determining grower priorities for RD&E each year.

During 2009–10, the three regional panels gathered information about grower priorities through:

- tours of their regions
- grower and advisor crop updates
- technical workshops on specific issues, such as crown rot and frost
- field days
- industry conferences
- R&D project reviews.

FIGURE 3—INVESTMENT PROCESS





The panels also gathered information on grains industry priorities through communication with other interested parties in their regions. The panels for the Northern and Southern Regions interacted with their local research advisory committees, which are grains industry groups composed of producers, agribusiness representatives and research providers. Western Region panel members interacted extensively with growers, consultants, research providers and agribusiness more broadly. A forum to determine RD&E needs, involving representatives from across the Western Australian grains industry supply chain, was held in March 2010.

### Planning

In autumn of each year the GRDC's advisory panels collate their information on grower priorities for R&D in the next financial year. Based on this information, the GRDC establishes its investment priorities, taking into account:

- the Australian Government's R&D priorities
- the investment that the GRDC has in place, and the existing projects that will terminate in the next year
- the portfolio balance that GRDC wishes to develop to help achieve its five-year strategic objectives.

In July each year, in response to stated government priorities and information on grower priorities, GRDC staff document proposals for RD&E in a process called Investment Planning Week. These proposals are debated by the relevant program teams and regional panels. The regional panels also look at RD&E proposals that are to deliver benefits across multiple regions, from a national perspective. The program teams and panels rank the proposals and provide guidance to the GRDC managers on expected outputs for projects.

### Tenders and negotiations

Usually a significant proportion of proposed new investment (42 percent in dollar terms in 2010–11) is suited to a competitive tendering process. These proposals are published in an external investment plan in August/September each year.

The GRDC's procurement process caters for multi-stage tender, open tender, limited tender or direct negotiation. The tenders are assessed by the program teams, which call upon external expertise as required.

All other new investment is made through direct negotiations. This is particularly the case where there is limited expertise available in the field and/or there are intellectual property reasons why the project is most suited to be delivered by a particular provider.

### Stakeholder and ministerial approval

When tenders and negotiations have been concluded, the stakeholder report and annual operational plan are drafted, setting out the proposed new investment and budget. A draft of the annual operational plan is provided to the Department of Agriculture, Fisheries and Forestry for comment. The draft is updated in response to the department's comments, and the annual operational plan is submitted to the Minister for Agriculture, Fisheries and Forestry with a request that it be approved before the end of the financial year.

A draft of the stakeholder report is provided to the GCA and its affiliates for comment. The draft is updated in response to their comments, and the final stakeholder report is provided to the GCA and other grower representative organisations.

## Evaluation

The GRDC continually assesses the performance of its programs and projects, and their impact on the Australian grains industry and wider community, and regularly reports to stakeholders.

Evaluation of the longer term economic, social and environmental impacts of the GRDC's RD&E investments is undertaken as a joint process with the other RDCs. The areas of investment that will be analysed as part of the joint effort in 2010–11, determined by a random selection process, are:

- wheat breeding in the Western Region
- crop agronomy
- capacity building
- the Premium Grains for Livestock Program's near-infrared calibrations
- the development of instrument products in Output Group 3—New Products.

In addition, the GRDC annually undertakes its own series of impact assessments on project clusters. The joint RDC assessments and the GRDC's own assessments use the same methods, which have been reviewed by the:

- Productivity Commission
- departments of Agriculture, Fisheries and Forestry; Finance and Deregulation; and Treasury
- Australian Bureau of Agricultural and Resource Economics (ABARE).

The GRDC is also assessing jointly with ABARE the feasibility of a predictive tool to estimate the impact that investing in certain priorities will have on grains industry productivity. If such a tool can realistically be developed and used, it will become one of the complementary approaches the GRDC uses in deciding how best to construct its investment portfolio.

The GRDC also assesses performance through stakeholder surveys. The results of the latest two-yearly survey of grain growers, conducted in March and April 2010, will inform priorities for 2011–12.

The GRDC's performance is comprehensively reported on each year through the annual report and growers' report, while the results of impact assessments are published on the GRDC web site.

# 3 R&D Priorities

## Business environment

To ensure that its strategies remain relevant, the GRDC continually monitors and reviews changes in its business environment. Factors that are expected to influence the business environment in 2010-11 include:

- low grain prices impacting growers' profitability
- continuing issues in relation to climate change, plant health and food security
- an easing of restrictions on the production of genetically modified (GM) canola
- the finalisation of a national strategy for grains RD&E
- national and international developments in agricultural technologies.

## Industry priorities

The GRDC regularly reviews the R&D priorities of Australian grain growers through industry-wide consultations with the GCA, regional research advisory committees, agribusiness reference groups, grower groups, grower representative organisations and individual grain growers. Table 3 demonstrates how new investments in 2010-11 will directly address the priorities of Australian grain growers.

In addition, R&D priorities for the grains industry supply chain post-farm gate are determined through the activities of, and GRDC discussions with, grains industry organisations such as the Wheat Classification Council, Barley Australia, Pulse Australia and the Australian Oilseeds Federation, as well as traders and marketers in general.

Scientific opportunities to address grains industry issues post-farm gate are also identified through interaction with researchers.

As described in Part 2, the GRDC identifies specific RD&E priorities across the grains industry each year, largely through the work of the GRDC's regional advisory panels.

**TABLE 3—NEW INVESTMENTS TO MEET GRAIN GROWER PRIORITIES**

Grain grower priorities	Examples of relevant new GRDC investments in 2010-11
<b>Environmental</b>	
Responses to climate change Improved water use efficiency	<ul style="list-style-type: none"> <li>• The identification of genes that enable crops to tolerate heat, frost and drought and breeding to increase the rate of adaptation of crops to climate change.</li> <li>• The extension of the Managing Climate Variability Program, to improve multi-week forecasting, seasonal forecasting and tools for forecasting and to establish the Climate Champion Program.</li> <li>• The adoption of a climate change communication strategy to ensure that knowledge, information and technology generated through research is provided to growers in preparation for the likely impacts of climate change.</li> <li>• Crop breeding for improved water-use efficiency.</li> </ul>
Sustainability and resource management Soil health and biology	<ul style="list-style-type: none"> <li>• Work to improve               <ul style="list-style-type: none"> <li>– soil quality, through greater use of pulses and pastures in the farming system</li> <li>– water infiltration, through better understanding of non-wetting soils</li> <li>– nitrogen use efficiency, through better understanding of ammonia loss from surface-applied nitrogen fertiliser.</li> </ul> </li> <li>• Work to establish a national quality assurance system to improve industry confidence in microbial products, such as soil inoculants, and thereby promote their use in agriculture.</li> </ul>
<b>Farm management</b>	
Integrated farming practices and technologies Integrated management of weeds, diseases and pests Herbicide resistance management	<ul style="list-style-type: none"> <li>• Work to establish an Australian national blackleg resistance rating system for canola breeding material and commercial varieties.</li> <li>• Work to develop a blackleg disease resistance management initiative for canola, with strategies to reduce yield loss based on cultivars with a greater durability of resistance against the blackleg fungus.</li> <li>• Support for a large number of integrated pest management, disease management and weed management (including herbicide resistance management) projects.</li> <li>• Work on identifying diseases through molecular diagnostics.</li> <li>• The registration of minor-use chemistries for the grains industry.</li> <li>• Work to better manage rust by using fungicide strategically and understanding adult plant resistance.</li> <li>• Applied research on necrotrophic fungal pathogens.</li> </ul>

TABLE 3—NEW INVESTMENTS TO MEET GRAIN GROWER PRIORITIES (continued)

Grain grower priorities	Examples of relevant new GRDC investments in 2010–11
<b>Variety development</b>	
Biotechnology for improving genetic gain  Superior new varieties	<ul style="list-style-type: none"> <li>Germplasm enhancement projects to:               <ul style="list-style-type: none"> <li>improve genetic resistance to wheat streak mosaic virus, crown rot and yellow spot in wheat</li> <li>improve frost tolerance in wheat and barley</li> <li>develop high salinity tolerance in winter cereals</li> <li>identify the genetic and phenological basis of head loss in malting barley</li> <li>identify molecular markers for specific maize diseases.</li> </ul> </li> <li>Specific breeding projects to:               <ul style="list-style-type: none"> <li>develop wheat varieties that have substantially higher yields and are better adapted to Australia's harsh environments than existing commercial varieties</li> <li>develop and commercialise high-amylose wheat suitable for growing in Australia and the United States</li> <li>increase the yield and improve the reliability of durum grain production</li> <li>develop pulses with better adaptation to water-limited environments</li> <li>develop herbicide-tolerant pulses.</li> </ul> </li> </ul>
<b>New and innovative product development</b>	
	<ul style="list-style-type: none"> <li>Feasibility studies looking into new ways to produce fertiliser that are cheaper and more energy efficient and environmentally sustainable than current fertiliser products.</li> <li>Work to develop a probe for rapid on-farm soil testing, to enable the cost-effective, real-time collection of moisture and nutrient data.</li> <li>A project exploring a range of new technologies, for on-farm and commercial use, for their potential to control or eradicate insect pests of stored grain.</li> </ul>
<b>Capacity building</b>	
Improving skills, training and education in agriculture  Farm business management	<ul style="list-style-type: none"> <li>Work to facilitate the exchange of knowledge between grower groups.</li> <li>Workshops on particular topics such as precision agriculture, irrigation in grains and wide row spacing/stubble management.</li> <li>Vavilov–Frankel Fellowships to support researchers from developing countries to conserve and use plant genetic resources.</li> <li>Sponsorships of events such as the National Youth Science Forum and grower representative organisation conferences.</li> <li>Examination of the potential to expand training opportunities to engage a wider selection of Indigenous people in the Australian grains industry.</li> <li>Support to assist individuals or small groups to improve their level of understanding of particular issues by attending a conference or travelling to acquire knowledge to benefit the Australian grains industry.</li> <li>National Partners in Grain, which delivers training and mentoring programs to develop leadership and business skills in women and young people in the Australian grains industry.</li> </ul>

## Australian Government priorities

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

- the National Research Priorities announced in December 2002, and their associated priority goals
- the Rural R&D Priorities announced in May 2007
- a letter written to the GRDC Chair by the Minister for Agriculture, Fisheries and Forestry in February 2010.

Table 4 shows the relationships between the government's research priorities and their associated goals, including the Minister's restated and new priorities.

Table 5 shows how new GRDC investments will directly address the government's ongoing objectives, as articulated in the Rural R&D Priorities and the Minister's letter, in 2010–11. Table 6 describes how new investments will address the new priorities identified in the Minister's letter. The expected total expenditure allocated to each of the Australian Government's priorities is shown in detail in Part 5.

TABLE 4—AUSTRALIAN GOVERNMENT RESEARCH PRIORITIES AND ASSOCIATED GOALS

NATIONAL RESEARCH PRIORITIES					
<i>An environmentally sustainable Australia</i>	<i>Promoting and maintaining good health</i>	<i>Frontier technologies for building and transforming Australian Industries</i>	<i>Safeguarding Australia</i>		
A1: Water—a critical resource 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					
<i>Productivity and adding value</i>	<i>Supply chain and markets</i>	<i>Natural resource management</i>	<i>Climate variability and climate change</i>	<i>Biosecurity</i>	
Improve the productivity and profitability of existing industries and support the development of viable new industries	Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the supply chain, including to consumers	Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable	Build resilience to climate variability and adapt to and mitigate the effects of climate change	Protect Australia's community, primary industries and environment from biosecurity threats	
Supporting the Rural R&D Priorities					
<i>Innovation skills</i>		<i>Technology</i>			
Improve the skills to undertake research and apply its findings		Promote the development of new and existing technology			
MINISTER'S R&D PRIORITIES					
<i>Productivity improvement</i>	<i>Maintaining and improving international market access opportunities</i>	<i>Value chain effectiveness and efficiency</i>	<i>Sustainable environmental resource management</i>	<i>Climate change</i>	<i>Biosecurity</i>
To generate new knowledge, which will lead to improved technology that will be adopted by producers to increase productivity	Through work to combat pests and diseases that can potentially be obstructive to trade and to guide production decisions in accordance with the requirements of consumers	Investment in research and development must extend beyond the farm gate to ensure the whole value chain is able to operate at optimum levels	To build and share our knowledge to ensure our soils, water and vegetation are managed properly and invasive pests are controlled	To reduce greenhouse gas emissions and improve soil management, and assist producers to adapt and change farming practices whilst boosting productivity	Maintain our research capability to prevent and deal with disease outbreaks, particularly as such biosecurity threats are expected to become more prevalent with climate change
Supporting the Minister's R&D Priorities					
<i>Workforce, skills, education</i>	<i>Diversity</i>	<i>Collaboration</i>		<i>Evaluation</i>	
RDCs should be taking a stronger role in educating future scientists, improving the knowledge and skills of producers and encouraging people to work in the sector	RDCs should take a greater role in building strong leadership capacity in the sector and encourage a diversity of people in primary industries, including a greater role for indigenous Australians, women and young people	The national Primary Industries Research, Development and Extension Framework has progressed well to date, but it is important to maintain the momentum in 2010, to finalise the sector plans, develop the cross-sectoral plans and work through implementation		RDCs should support the current joint RDC evaluation process, to demonstrate returns on investment and guide future investment decisions	



TABLE 5—NEW INVESTMENTS TO MEET ONGOING AUSTRALIAN GOVERNMENT PRIORITIES

Priorities	Examples of relevant new GRDC investments
<b>Rural R&amp;D Priority</b> <i>Productivity and adding value</i>  <b>Minister's R&amp;D Priority</b> <i>Productivity improvement</i>	<ul style="list-style-type: none"> <li>Projects focused on achieving quantifiable and measureable change through crop sequencing to manage water and nutrient cycles and break disease and weed cycles.</li> <li>Management and breeding to achieve yield levels and stability and grain quality objectives for wheat, canola and barley in the high-rainfall zones, under current climate conditions and future climate scenarios.</li> <li>Projects to: <ul style="list-style-type: none"> <li>increase the yield and improve the reliability of durum grain production</li> <li>increase the profitability of cropping systems in Western Australia, using lupins, oats, oilseeds and pulses</li> <li>develop wheat varieties that have substantially higher yields and are better adapted to Australia's harsh environments than existing commercial varieties.</li> </ul> </li> </ul>
<b>Rural R&amp;D Priority</b> <i>Supply chain and markets</i>  <b>Minister's R&amp;D Priorities</b> <i>Maintaining and improving international market access opportunities</i>  <i>Value chain effectiveness and efficiency</i>	<ul style="list-style-type: none"> <li>Market research to determine consumer attitudes, perceptions and dietary practices in relation to cereals, wholegrain foods and other products that contain wheat.</li> <li>Work to improve food quality and end-use market acceptance of Australian pulses.</li> <li>A project to increase the value and marketability of feed grains by developing an objective testing tool to determine the nutritive value of grain.</li> <li>Collaborative research to develop and commercialise high-amylose wheat suitable for growing in Australia and the United States.</li> </ul>
<b>Rural R&amp;D Priority</b> <i>Natural resource management</i>  <b>Minister's R&amp;D Priority</b> <i>Sustainable environmental resource management</i>	<ul style="list-style-type: none"> <li>Crop breeding for improved water-use efficiency.</li> <li>Work to improve <ul style="list-style-type: none"> <li>soil quality, through greater use of pulses and pastures in the farming system</li> <li>water infiltration, through better understanding of non-wetting soils</li> <li>nitrogen use efficiency, through better understanding of ammonia loss from surface-applied nitrogen fertiliser.</li> </ul> </li> </ul>
<b>Rural R&amp;D Priority</b> <i>Climate variability and climate change</i>  <b>Minister's R&amp;D Priority</b> <i>Climate change</i>	<ul style="list-style-type: none"> <li>The identification of genes that enable crops to tolerate heat, frost and drought, and breeding to increase the rate of adaption of crops to climate change.</li> <li>The extension of the Managing Climate Variability Program, to improve multi-week forecasting, seasonal forecasting and tools for forecasting and to establish the Climate Champion Program.</li> <li>The adoption of a climate change communication strategy to ensure that knowledge, information and technology generated through research is provided to growers in preparation for the likely impacts of climate change.</li> </ul>
<b>Rural R&amp;D Priority</b> <i>Biosecurity</i>  <b>Minister's R&amp;D Priority</b> <i>Biosecurity</i>	<ul style="list-style-type: none"> <li>A pre-breeding project to incorporate better genetic resistance to wheat streak mosaic virus into elite Australian wheat germplasm.</li> <li>Work to establish an Australian national blackleg resistance rating system for canola breeding material and commercial varieties.</li> <li>Work to develop a blackleg disease resistance management initiative for canola, with strategies to reduce yield loss, based on cultivars with a greater durability of resistance against the blackleg fungus.</li> <li>Support for a large number of integrated pest management, disease management and weed management (including herbicide resistance management) projects.</li> <li>Work on identifying diseases through molecular diagnostics.</li> <li>The registration of minor-use chemistries for the grains industry.</li> <li>Work to better manage rust by using fungicide strategically and understanding adult plant resistance.</li> <li>Applied research on necrotrophic fungal pathogens.</li> </ul>
<b>Rural R&amp;D Priority</b> <i>Innovation skills</i>  <b>Minister's R&amp;D Priority</b> <i>Workforce, skills, education</i>  <i>Diversity</i>	<ul style="list-style-type: none"> <li>Work to facilitate the exchange of knowledge between grower groups.</li> <li>Workshops on particular topics such as precision agriculture, irrigation in grains and wide row spacing/stubble management.</li> <li>Vavilov-Frankel Fellowships, to support researchers from developing countries to conserve and use plant genetic resources.</li> <li>Sponsorships of events such as the National Youth Science Forum and grower representative organisation conferences.</li> <li>Examination of the potential to expand training opportunities to engage a wider selection of Indigenous people in the Australian grains industry.</li> <li>Support to assist individuals or small groups to improve their understanding of particular issues by attending a conference or travelling to acquire knowledge to benefit the Australian grains industry.</li> <li>National Partners in Grain, which delivers training and mentoring programs to develop leadership and business skills in women and young people in the Australian grains industry.</li> </ul>

TABLE 5—NEW INVESTMENTS TO MEET ONGOING AUSTRALIAN GOVERNMENT PRIORITIES *(continued)*

Priorities	Examples of relevant new GRDC investments
<b>Rural R&amp;D Priority</b> <i>Technology</i>	<ul style="list-style-type: none"> <li>• Work to develop a probe for rapid on-farm soil testing, to enable the cost-effective, real-time collection of moisture and nutrient data.</li> <li>• Feasibility studies looking into ways to produce fertilisers that are cheaper and more energy efficient and environmentally sustainable than current fertiliser products.</li> <li>• Work to establish a national quality assurance system to improve industry confidence in microbial products, such as soil inoculants, and thereby promote their use in agriculture.</li> <li>• A project exploring a range of new technologies, for on-farm and commercial use, for their potential to control or eradicate insect pests of stored grain.</li> <li>• Pursuit of new technologies to significantly increase the yield of wheat.</li> </ul>

TABLE 6—NEW INVESTMENTS TO MEET NEW AUSTRALIAN GOVERNMENT PRIORITIES

Minister's R&D Priorities	Examples of relevant GRDC investments
<b>Collaboration</b>	<p>The GRDC is a member of the committee developing the Primary Industries Ministerial Council's National Primary Industries RD&amp;E Framework, and has contributed significantly to formulating the national strategy for the grains sector. The GRDC regional panels have provided data about regional RD&amp;E capacity and strategic needs to inform the national strategy.</p> <p>The GRDC expects to commit significant investment to implement the national RD&amp;E framework.</p>
<b>Evaluation</b>	<p>Evaluation of the longer term economic, social and environmental impacts of RD&amp;E investments will continue to be undertaken as a joint process with the other RDCs. Areas that will be analysed include wheat breeding, crop agronomy, near-infrared calibration and a cluster from each of the GRDC's New Products and Communications &amp; Capacity Building output groups.</p> <p>The GRDC will:</p> <ul style="list-style-type: none"> <li>• undertake impact assessments on project clusters</li> <li>• assess the feasibility of a predictive tool to estimate the impact that investing in certain priorities will have on grains industry productivity</li> <li>• assess its performance through stakeholder surveys.</li> </ul>



# 4 Planned Outputs

## Output Group 1—Practices

Table 7 shows the 2010–11 investment budget and planned outputs for Output Group 1—Practices, in the context of its objective and strategies for 2007–12.

**TABLE 7—PRACTICES OVERVIEW**

OUTPUT GROUP 1—PRACTICES		
<b>Objective</b> Better practices developed and adopted faster	<b>Strategies</b> <ul style="list-style-type: none"> <li>Identify and develop profitable, innovative and integrated practices and technologies</li> <li>Ensure active grain grower involvement and commitment</li> <li>Undertake targeted extension and adoption through appropriate delivery channels</li> <li>Enhance sustainable management of natural resources</li> </ul>	<b>Investment budget for 2010–11</b> \$51.42 million
Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Identify and develop profitable, innovative and integrated practices and technologies</b>	Water use efficiency in targeted agroecological zones increases by 10%	<ul style="list-style-type: none"> <li>Crop sequencing initiative established.</li> </ul>
	The area of cropping land with retained stubble increases by 10%	<ul style="list-style-type: none"> <li>Second phase of the Grain and Graze program.</li> <li>Regional strategies developed to increase area sown to broadleaf crops, including pastures and cotton.</li> </ul>
	Effective management of weed, disease and insect biosecurity risks	<ul style="list-style-type: none"> <li>New national integrated weed management plan in place based on program logic and including other RDC collaborators.</li> <li>New national integrated pest management plan in place based on program logic and including other RDC collaborators.</li> <li>Development, with stakeholder organisations, of improvements to the minor use program and generic pesticide labelling.</li> </ul>
<b>Ensure active grain grower involvement and commitment</b>	Improved information flow to and from growers through enhanced with agribusiness	<ul style="list-style-type: none"> <li>Agribusiness and research advisory committee priority issues provided as pages on the GRDC web site.</li> <li>GRDC presences at events previously not attended (for example AgQuip).</li> <li>Regional programs developed in partnership with growers, researchers, agribusiness, and natural resource management bodies.</li> </ul>
	Improved prioritisation of issue-based programs	<ul style="list-style-type: none"> <li>Improved processes that recognise regional differences, to identify and prioritise critical RD&amp;E questions.</li> </ul>
<b>Undertake targeted extension and adoption through appropriate delivery channels</b>	Customer relationship management database upgraded and implemented	<ul style="list-style-type: none"> <li>Customer relationship management database upgraded with accurate demographic profiling.</li> </ul>
	Enhanced use of GRDC website by customers	<ul style="list-style-type: none"> <li>GRDC website enhanced to attract greater use by customers, including through regionally based web content.</li> <li>Implementation of RD&amp;E portfolio with Google maps technology.</li> </ul>



**TABLE 7—PRACTICES OVERVIEW** (continued)

Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Enhance sustainable management of natural resources</b>	Grain growers adapting to climate change and mitigating on-farm greenhouse gas emissions	<ul style="list-style-type: none"> <li>Improvements in climate change management achieved, through better climate forecasts and more efficient use of nitrogenous fertiliser.</li> <li>Cross-sector support for climate change initiatives maintained.</li> <li>Partnership with the Department of Agriculture, Fisheries and Forestry on nitrous oxide and soil carbon research maintained and expanded to include adoption activities with farming systems groups where appropriate.</li> </ul>
	Grain growers improving soil condition and managing nutrient inputs	<ul style="list-style-type: none"> <li>Implementation of the environmental plan, including demonstrated improvements in soil sustainability (especially the management of water-repellent soils).</li> <li>Improved adoption of precision agriculture technologies through understanding key constraints and initiating required extension and training programs.</li> </ul>

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

## Scope

The Practices output group develops and promotes innovative and integrated practices and technologies to increase the grains industry's capacity for on-farm change, particularly in the areas of soil constraints, water and nutrient use, crop threats, environmental variability, agronomic improvements and biosecurity.

Alliances between growers and advisers are becoming increasingly important in ensuring that new and improved varieties, practices and technologies are integrated into farming systems. Recognising that information needs and preferred delivery mechanisms differ according to production region, enterprise mix and individual circumstances, the output group packages and tailors information that is regionally specific, and delivers it to growers and advisers through appropriate networks.

The integration of natural resource management practices into cropping systems is essential for the long-term viability of the grains industry. The GRDC has significant partnerships with a range of bodies established by the Australian Government and state governments to deal with environmental issues. Through the Practices output group, the GRDC aligns sustainable production systems research at a farm level with broader, community-based land use initiatives.

The Extension and Grower Programs area is focused on improving the timeliness, relevance and quality of information packages on offer to customers. The further development of delivery platforms and relationships with extension networks in 2010–11 will accelerate RD&E outcomes.

## Investment priorities for 2010–11

### CLIMATE CHANGE AND VARIABILITY

Climate change represents a continued challenge to grain growers, especially due to the variation in impacts occurring across the Australian landscape. R&D for the grains industry must therefore be well targeted and highly strategic to ensure that the necessary tools and information are delivered to growers to allow them to best prepare for changes.

#### Investment strategy

The GRDC has developed a 'Climate Theme' across all lines of business, to ensure that its approach to mitigating and adapting to climate change is built on investment which is strategic and cost-efficient and delivers direct benefits to growers while addressing government priorities. Existing GRDC investments in relevant research have been aligned with the Climate Theme, which is consistent with the nationally adopted Climate Change Research Strategy for Primary Industries.

#### Communication strategy

The GRDC has adopted a climate change communication strategy to ensure that knowledge, information and technology generated through GRDC research is provided to growers in preparation for the likely impacts of climate change.

As part of the strategy, the GRDC Climate Champion Program began communication activities in early 2010. The initiative is designed to identify leaders in the grains industry from each agroecological zone of Australia, directly linking them to the latest GRDC R&D and using their abilities to:

- communicate information to growers on climate change mitigation and adaptation
- contribute ideas to the development of new climate management tools and technology.



An audit of GRDC research has commenced, to identify material suitable for use in climate change fact sheets. Additionally, in 2010–11 the GRDC will develop briefing documents for government and industry stakeholders, outlining the GRDC's achievements and plans for climate change research. These will consist of two national media stories, a quarterly e-newsletter for distribution to members of parliament (and their advisers) from electorates in grain-producing regions, and a calendar of briefings for Australian Government departments.

### ***Australia's Farming Future***

The GRDC, in partnership with DAFF, is funding projects to improve understanding of nitrous oxide emissions, soil carbon and the adaptation of crops to climate change. The nitrous oxide and soil carbon projects are in place and will continue to produce valuable data in 2010–11.

The adaptation programs will move into the experimental phase and start to generate preliminary findings as part of a second round of funding under the Australia's Farming Future initiative to demonstrate on-farm adaptation and mitigation measures with farming system groups. A series of demonstration sites will be commissioned in the three grain-growing regions to engage farmer groups and research providers in demonstrating best practice to mitigate emissions and adapt to a changing climate.

Partners in the national initiative will be the Birchip Cropping Group in collaboration with grower groups nationally, the Victorian Department of Primary Industries, the Queensland Department of Employment, Economic Development and Innovation, and the Department of Agriculture and Food, Western Australia.

### ***Carbon pollution reduction scheme***

The GRDC has been taking part in Australian Government consultations with industry on policy options for cost-effectively reducing greenhouse gas emissions from agriculture.

This includes discussions on the implementation of emissions trading, instigated by the Department of Climate Change. The discussions—held by representatives from the dairy, meat and livestock, sugar, cotton and grains industries, and research providers—are to assess potential options for emissions trading and canvass possible issues surrounding emissions trading for each sector.

In 2010–11, the GRDC will continue to participate in consultations and implement appropriate research responses to prepare growers for any policy decisions that may ensue.

### ***Managing climate variability***

One way in which agriculture can effectively adapt to an increasingly variable climate is through management decisions made at the levels and timescales of individual farm enterprises. Managing climate variability is about robust risk management, based on reliable climate forecasting, tools to translate the forecasts into applications, and knowledge exchange to foster the adoption of the tools and improve decision making.

In 2010–11, the Managing Climate Variability Program, managed by the GRDC, will enter its third five-year phase of commitment from RDCs. The core partners in the program are

Dairy Australia, Meat and Livestock Australia, the Rural Industries RDC and the Sugar RDC.

The GRDC's key areas of investment in the program will include:

- improved knowledge of the changing climate and opportunities to adapt and respond effectively
- more precise climate forecasting, focusing on within-season or multi-week forecasting and the development of tools to assist the many growers who are adopting more tactical approaches in response to climate variability
- tools that apply climate information to crucial input decisions, such as Yield Prophet, which provides a key to efficient and effective decisions on fertiliser use, and pasture growth projections, which are particularly useful for the many growers who have mixed livestock–grain enterprises
- the online delivery of climate products, through the Bureau of Meteorology's Water and The Land web site and the Climate Kelpie web site.

### **WATER-REPELLENT SOIL**

Water repellence affects more than five million hectares of sandy soils in western and southern Australia. Repellence causes uneven infiltration of water into soils, reduces crop and pasture germination, and leaves soils prone to wind erosion. Although water-repellent soils are a significant constraint to crop production, management options are not well understood.

In 2010–11 the GRDC will support research that will scope the scale of this issue and its impacts, review past work, consider what growers are doing, and identify management options and novel solutions that may be applied in the future. Setting and achieving practice change targets will be a crucial part of the investment. The aim is that consultants, advisers and growers will move together towards the profitable management of water-repellent soils.

### **MIXED FARMING**

In autumn 2010, the second phase of the Grain and Graze program—a successful collaboration between the GRDC and other RDCs, farmer groups, research providers and regional management authorities—will be launched across seven mixed farming regions around Australia.

Grain and Graze aims to increase knowledge, capability, respect and confidence in mixed farming communities, assisting them to manage more viable and environmentally sustainable farming systems that readily adapt to changing climate, market and government policy conditions. The program will be run over four years and include up to 55 partnering organisations involved in mixed farming systems.

By establishing regional teams to propose and lead regional projects, and encouraging local project management, Grain and Graze involves and develops well-skilled, enthusiastic leaders. In 2010–11, this partnership approach will provide the capacity and networks to develop, demonstrate and extend to growers key farming practices that:

- improve whole-farm biomass production and management
- reduce wind and hill slope erosion
- increase soil carbon storage
- improve the management of on-farm biodiversity.

## INTEGRATED WEED MANAGEMENT

Herbicide resistance is an increasing threat to the Australian grains industry. In 2010–11 the GRDC, through the National Integrated Weed Management Initiative, will continue to invest in projects on surveillance as well as chemical, cultural and genetic approaches to weed management.

Through new GRDC investment in the initiative, the Australian Glyphosate Sustainability Working Group will develop strategies to reduce the onset of glyphosate herbicide resistance in the grains industry by deploying alternative chemical and non-chemical management tactics.

Farming systems research will be conducted to demonstrate the value of decreasing weed seed banks in managing glyphosate resistant weeds of fallow systems in the Northern Region. Research will also identify the role of crop competition and the occurrence of a fitness penalty in glyphosate-resistant weeds as a valuable management tool. Information about weed density, exposure and susceptibility to glyphosate, seed production and seed bank dynamics will be used to develop a risk index. Systems to be examined include summer and winter fallows; grain crops, including Roundup Ready® canola; viticulture; horticulture; fence lines; and public use areas.

The working group will also conduct research to determine the factors inhibiting grower uptake of integrated weed management practices in relation to glyphosate use, to more effectively target communication in a national outreach program to deliver key strategies to manage risks associated with glyphosate resistance.

## SPRAY DRIFT MANAGEMENT

To protect public and sensitive areas, the Australian Pesticides and Veterinary Medicines Authority is currently implementing new minimum upwind buffer zone requirements for ground-based and aerial spray application of pesticides. The changes are the result of a review of spray drift risk assessment and mitigation. New restrictions for 2,4-D and other phenoxy herbicides were implemented in March 2010; they will be followed by further restrictions for several thousand other pesticides.

Emerging modern drift reduction technologies (DRTs) for ground-based spray applications promise to provide growers with greater control over spray application. In 2010–11 the GRDC, in collaboration with other RDCs and pesticide registrants, will support work that:

- builds on an existing ground-based DRT model to develop a sophisticated, fully predictive ground-based spray drift model
- utilises the skills of the Centre for Pesticide Application Safety at the University of Queensland and world-class scientists specialising in spray application.

A successful new predictive model will be completed within three to four years. As well as significantly reducing the impacts of the pesticide application buffer zone regulations, the model will enable growers to operate under an improved regulatory framework and take advantage of the significant environmental benefits of modern DRTs such as air induction spray nozzles.

## INTEGRATED DISEASE MANAGEMENT

In 2010–11, the GRDC will invest in a range of projects to improve integrated disease management packages. In particular:

- New research on cereal root diseases, with an increased focus on root lesion nematode management under current cropping practices, will be delivered in the Southern and the Western Regions.
- Research on fungicide and management options for the control of *Rhizoctonia solani* in cereal crops will continue through projects delivered by CSIRO and the Department of Agriculture and Food, Western Australia.
- Adviser and leading grower training in integrated disease management, incorporating traditional and molecular diagnostics, will be delivered through investments in the South Australian Research and Development Institute, and in collaboration with state departments of primary industries.
- New molecular diagnostics for *Pratylenchus teres* in the Western Region and crown rot and *Pratylenchus* species in the Northern Region will be developed and validated in the field.
- National modelling studies to develop useful disease prediction tools for growers will include epidemiology of diseases originating from green bridges—specifically, cereal rusts and wheat streak mosaic virus in wheat, blackspot disease in field peas, and fungal diseases in canola.
- New research linked to the Australian Cereal Rust Control Program will increase knowledge of the impact of climatic effects on the adult plant's resistance to cereal rust in commonly grown genetic backgrounds of wheat. The project will optimise timing for fungicide application for integrated control of stripe rust, *Stagonospora nodorum* blotch and yellow spot, and provide stewardship information on fungicide management on known genetic backgrounds for breeders.



## INTEGRATED PEST MANAGEMENT

The GRDC will continue to support the National Invertebrate Pest Initiative to develop improved systems approaches to manage invertebrate pests. Work in 2010–11 will include:

- research to enhance understanding and management options for diamondback moth, silverleaf whitefly, aphid, helioverpa moth and establishment pests
- a review of the current threshold recommendations for invertebrates
- the development of guidelines to calculate new threshold levels for pest and beneficial insect populations
- effective extension of practical integrated pest management research and new technologies, through on-farm demonstrations and grower group collaboration.

In particular, projects will develop management packages for the registration of currently available and alternative soft chemistries for the control of a variety of mites in broadacre cropping. Management strategies will be developed to prevent the rapid development of insecticide-resistant mites.

## BIOSECURITY MANAGEMENT

Khapra beetle (*Trogoderma granarium*) has been categorised as one of the top five threats in the Plant Health Australia (PHA) Grains Industry Biosecurity Plan. Rapid and accurate identification of this exotic pest species is essential to enable Australia to demonstrate area freedom and monitor grain exports to meet the International Standards for Phytosanitary Measures.

Through the Cooperative Research Centre for National Plant Biosecurity, the GRDC will continue to invest in the establishment of a national reference laboratory for khapra beetle and related pests, to provide diagnostic services (molecular and conventional), training, and a platform for future surveillance and incursion management projects.

Through PHA, the cooperative research centre will develop a further five emergency plant pest contingency plans, and a surveillance plan for hessian fly and sunn pest. PHA will also conduct an audit of all preparedness information—including contingency plans, pest risk reviews, diagnostic protocols and available experts—for all high- and medium-priority pests within the Grains Industry Biosecurity Plan.

GRDC investments will also provide valuable information to the pre-emptive breeding efforts in preparation for post-incursion deployment of cereals resistant to Russian wheat aphid (RWA). A project based at the CSIRO European Laboratory in Montpellier, France, is identifying resistance to RWA, a pest which is endemic in every continent except Australia. Information from this research will determine the importance of establishing RWA quarantine restrictions specific to regions where RWA is endemic, in order to protect against incursions into Australia of hyper-virulent biotypes.

## VALIDATION AND INTEGRATION OF MANAGEMENT PRACTICES

The GRDC's Validation and Integration program supports projects to engage grain growers in local and regional farming systems; monitor the implementation of farm management practices; and engage the private sector on tactical crop production issues.

In 2010–11, new projects within the program will focus on achieving measureable on-farm change through crop sequencing. The benefits of various broadleaf crops growing in rotation with cereals, and crop rotations in general, have been well demonstrated. Because they help to manage the water and nutrient cycles and break the disease and weed cycles, better rotation sequences are more sustainable and more economical.

Over the next five years, work will be conducted on a regional basis to identify the relevant topical farming systems issues associated with managing complex crop sequencing regimes, and to target RD&E to support the decision-making processes that growers undertake with respect to those issues. Through this initiative, the GRDC will also look to capture on farm the benefits from its investments in other topics, such as breeding, pathology, agronomy and soil projects. The initiative will also encourage greater grain grower and agribusiness participation throughout the RD&E process.

In 2010–11 the GRDC will also promote substantial interaction between farming systems groups in similar environments but different geographic locations, allowing capabilities and expertise to reach areas where they are currently not available.

## TARGETED EXTENSION OF RESEARCH OUTCOMES

The GRDC will continue to develop and provide a range of information delivery mechanisms to improve the accessibility of technical information. Key extension activities, such as the hosting of grower and adviser updates, technical workshops and training schemes, will also continue.

In particular, in 2010–11 the GRDC will make new investments in:

- extension of precision agriculture in the Northern Region—This initiative, which was delivered in the Southern and Western Regions in 2009–10, aims to expand the uptake of precision agriculture by delivering advice and training to growers, local advisers and equipment retailers, and includes the provision of training materials as well as the hosting of workshops and demonstrations.
- technology adoption—This project will examine areas of low adoption of key practices, focusing on understanding the factors limiting adoption, including socioeconomic drivers, attitudes, perceptions and beliefs, and comparisons with external factors (such as those derived from Australian Bureau of Statistics data) that may influence uptake.
- selection of key performance indicators for social capacity—This project aims to identify common methods and standards for the measuring social capacity impacts and attribution to current and future investments.
- customer service—Building on the GRDC's significant investment in forming and maintaining its customer relationship database, this project will identify the most effective ways to use the database in extension activities across a range of media and technologies.

In addition, the GRDC will continue to support the popular Seed of Light awards.



## Output Group 2—Varieties

Table 8 shows the 2010–11 investment budget and planned outputs for Output Group 2—Varieties, in the context of its objective and strategies for 2007–12.

**TABLE 8—VARIETIES OVERVIEW**

OUTPUT GROUP 2—VARIETIES		
<b>Objective</b> Growers have access to superior varieties that enable them to effectively compete in global grain markets	<b>Strategies</b> <ul style="list-style-type: none"> <li>• Build and sustain world-leading breeding programs</li> <li>• Focus pre-breeding research on key traits</li> <li>• Develop a path to market for genetically modified crops</li> <li>• Facilitate faster adoption of superior varieties</li> </ul>	<b>Investment budget for 2010–11</b> \$53.71 million
Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Build and sustain world-leading breeding programs</b>	Average annual increase in yield (as measured in NVT trials) for wheat, barley, canola, sorghum and pulses	<ul style="list-style-type: none"> <li>• Average annual increase in yield (as measured in NVT trials) of:               <ul style="list-style-type: none"> <li>– 1.0% for wheat</li> <li>– 1.0% for barley</li> <li>– 1.5% for canola</li> <li>– 1.5% for sorghum</li> <li>– 2.0% for pulses.</li> </ul> </li> <li>• The release of improved varieties of wheat, barley, canola, pulses and summer coarse grains that benefit the Australian grains industry.</li> </ul>
	Commercial breeding programs meeting minimum disease standards	<ul style="list-style-type: none"> <li>• 90% of wheat second-year entries in NVT trials continue to meet minimum disease standards for rust resistance.</li> <li>• 90% of canola entries in NVT trials continue to have blackleg resistance scores of 7 or above.</li> </ul>
	Research partners continue to invest in breeding programs where market failure exists	<ul style="list-style-type: none"> <li>• Where market failure exists, the GRDC's research partners contribute at least 50% of the costs of running the breeding program.</li> </ul>
	Efficient and cost-effective royalty collection systems in place	<ul style="list-style-type: none"> <li>• By 2010, royalty compliance is greater than 80% nationally (measured by consolidating breeding program data).</li> </ul>
	Cost-efficient breeding programs	<ul style="list-style-type: none"> <li>• Breeding population size is expanding or being maintained on reduced resources.</li> </ul>
<b>Focus pre-breeding research on key traits</b>	Nationally coordinated pre-breeding research with a focus on agreed key traits and effective international linkages	<ul style="list-style-type: none"> <li>• New traits and selection methods developed for use by Australian breeding programs.</li> </ul>
	Evidence that genes, germplasm and enabling technologies developed in GRDC-supported pre-breeding research are being used in breeding programs	<ul style="list-style-type: none"> <li>• Effective extension and delivery mechanisms in place for pre-breeding outputs.</li> </ul>
<b>Develop a path to market for genetically modified crops</b>	Delivery platforms developed for genetically modified crops in Australia	<ul style="list-style-type: none"> <li>• Technical milestones achieved towards developing genetically modified herbicide-resistant lupins.</li> </ul>
<b>Facilitate faster adoption of superior varieties</b>	Increased use of NVT results by paid grower advisers	<ul style="list-style-type: none"> <li>• NVT results used by 80% of paid advisers to assist growers with variety selections.</li> </ul>
	Breeder participation in NVT	<ul style="list-style-type: none"> <li>• At least 90% of relevant breeding programs participate in NVT.</li> </ul>

NVT = National Variety Trials



## Scope

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

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

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

## Investment priorities for 2010–11

### WHEAT BREEDING

The GRDC is a shareholder in three commercial wheat-breeding companies: Australian Grain Technologies Pty Ltd, InterGrain Pty Ltd and HRZ Wheats Pty Ltd. These companies rely on income from EPRs and compete, with each other and with other privately funded wheat-breeding programs, for market share. In 2010–11 the GRDC will continue to monitor the performance of these companies, particularly in respect of their ability to develop and commercialise world-leading wheat varieties for Australian grain growers.

The GRDC will also continue to invest in the development of dual-purpose wheat (grazing and grain) for the high-rainfall zones, and in the work of the National Durum Wheat Improvement Program.

### WHEAT CLASSIFICATION

Wheat varietal classification, together with wheat receival standards, aims to deliver grain of consistent physical quality, processing performance and end-product quality to customers and end-users, in differentiated grades. This allows exporters or traders to optimise value capture from markets for the benefit of the industry.

Following the deregulation of wheat marketing in Australia in 2008, the GRDC sponsored the establishment of an independent expert wheat classification panel. In 2008–09, the Wheat Classification Council was established.

The council's primary role is to translate market signals into breeding and classification targets, thereby facilitating the ongoing development and production of wheat varieties that meet the requirements of Australia's key markets. The council has been tasked to consult with industry to determine how industry wants to see wheat classification taken forward, and to recommend future funding options.



In 2010–11 the GRDC will continue to work with the wheat industry to ensure that Australia's grain supply chains meet the expectations of domestic and overseas markets.

### BARLEY BREEDING

Barley Breeding Australia (BBA) is a publicly funded, national breeding program, supported by the GRDC; the Department of Agriculture and Food, Western Australia; the Department of Employment, Economic Development and Innovation, Queensland; the Department of Primary Industries, Victoria; Industry and Investment, New South Wales; and the University of Adelaide. The current funding arrangements for BBA end in mid-2011.

In 2009, a high-level review of BBA recommended a transition from public to commercial barley breeding. As BBA goes into its last year of operation, the GRDC will work with its partners to develop and implement transitional arrangements to ensure the future viability of barley breeding in Australia. The GRDC will also develop a barley pre-breeding strategy to ensure that pre-breeding research remains relevant and available to all barley breeders.

### TRITICALE BREEDING

Triticale is a high-yielding, robust feedgrain crop. In 2010–11, the GRDC and its partners, Australian Grain Technologies and the University of Sydney, will continue to invest in triticale breeding.

Australian Grain Technologies will focus on the development of grain varieties while the university breeds for dual-purpose triticale (grazing and grain). The parties will work together more closely than in previous years, exploiting possible synergies in terms of skills and infrastructure, to deliver high-yielding and rust-resistant varieties to Australian grain producers and mixed-farming businesses.

## DEVELOPMENT OF ENHANCED WINTER CEREALS GERMPLASM

The GRDC supports efforts to strengthen and consolidate the Australian Winter Cereals Pre-breeding Alliance (AWCPA). This includes providing executive support to the AWCPA steering committee, to maximise synergies within the alliance and to streamline the flow of outputs from pre-breeding to breeding programs.

In 2010–11, the AWCPA, together with the GRDC, will focus on:

- drought—The National Managed Environment Facilities sites will be upgraded to host components of projects to conduct fine analyses of water use efficiency traits in realistic environments.
- frost—The GRDC held a national workshop in November 2009 to identify impediments to Australian R&D activities aimed at improving the frost tolerance of Australian grain crops. Key recommendations from this workshop, including investments designed to refine field phenotyping methodologies for frost tolerance, will be implemented in 2010–11.
- crown rot—The Crown Rot Initiative will work to develop novel sources of resistance combined with a toolkit of molecular markers to allow breeders to efficiently assemble the desired traits.
- salinity—Following the recommendations of a national workshop on salinity adaptation held in 2009, new projects will include work to develop high-throughput technologies for the identification and selection of novel sources of salinity tolerance.
- barley—Pre-breeding research investment strategies will be developed in consultation with breeders, and modelled around the working of the AWCPA.
- durum wheat—New investments in pre-breeding research will be developed to address key traits identified by a 2009 review of pre-breeding objectives for durum wheat.
- international germplasm utilisation—The AWCPA framework provides a structure for the coordinated utilisation of international germplasm and knowledge delivered through the GRDC's international collaborations, and will support the communication of pre-breeding research findings associated with this material.



## GENE DISCOVERY AND NEW TECHNOLOGIES

Molecular markers help breeders to track the flow of desired genetic traits and trait combinations through their breeding programs. In response to ongoing demand from breeding programs, in 2010–11 the GRDC will continue to support molecular marker development for wheat, barley, canola and pulses (including lupins).

The GRDC will also continue its gene discovery investments at the Australian National University, CSIRO and the Australian Centre for Plant Functional Genomics—a collaborative investment with the Australian Research Council, the South Australian Government and others. Two new projects at the Australian National University will focus on modifying the sequence and expression of target genes to improve the photosynthetic and water use capacities of wheat.

## NATIONAL VARIETY TRIALS

The GRDC-supported National Variety Trials (NVT) program is an independent variety-trialling program that provides Australian grain growers and their advisers with an accurate source of information on the performance of new winter cereal, pulse and canola varieties. The first phase of NVT ended in February 2010, and a new round of NVT, incorporating recommendations from a review conducted in 2008, has commenced.

In 2010–11, NVT will continue to deliver independent varietal performance data to the grains industry. In addition to existing services:

- In response to the lifting of the moratorium on commercial production of GM canola in Western Australia, NVT will expand the network of GM canola trials conducted in that state.
- The delivery of information to growers will be enhanced through the formation of regional advisory committees, which will also provide advice on operational, policy and extension issues to the NVT manager and the GRDC.

## END POINT ROYALTY ADMINISTRATION PROCESSES

EPRs provide an incentive for private investment in crop breeding, thus securing capital and access to new technologies from overseas. They also provide an effective mechanism for breeders and growers to share production risk. This in turn creates a commercial incentive for breeders to develop the best possible varieties, as the value of the royalty depends on the quantity of grain produced and sold rather than the quantity of seed planted.

EPRs have become an important revenue stream for breeders of winter cereal, pulse and oilseed varieties. For commercial wheat and canola breeders, EPRs are the main source of income.

However, the collection of EPRs can be an onerous task for variety owners and grain producers alike. In 2010–11 the GRDC will continue to support industry efforts to make the EPR collection system more simple and efficient.

## PULSE BREEDING AUSTRALIA

In 2010–11 Pulse Breeding Australia (PBA) will move into the final year of its five-year term. While it continues to focus on breeding better varieties faster, PBA will also look to build on its international relationships, in particular to develop stronger ties with research organisations in Canada and India. An agreement on genomic work will also be progressed with possible partners in those countries.

Through PBA, the GRDC will investigate the potential to establish an alliance agreement with the International Crops Research Institute for the Semi-Arid Tropics. The GRDC, which already supports work being undertaken on pulses by the institute, will increase its focus on pulse product development and sensory evaluation so as to minimise the risk of developing new varieties that fail when released in the market.

To ensure that the ongoing viability of the Australian pulse industry is underpinned by a well-qualified workforce, the GRDC will support PBA in delivering both high-quality research and training for post-graduate students and current researchers. These outcomes will increase capability and contribute to succession planning for the industry.

Research projects commencing in 2010–11 will focus on:

- improving food quality and end-use market acceptance of Australian pulses
- developing pulses with better adaptation to water-limited environments, and pulses with multiple herbicide tolerances.

## PEANUT BREEDING

The GRDC supports a collaborative project, with the Peanut Company of Australia Pty Ltd and the Department of Employment, Economic Development and Innovation, Queensland, that has developed and released new peanut varieties for high-input and dryland production systems. In 2010–11, the program will continue to develop high-oleic varieties which give the industry a competitive edge in the market. In order to maintain this competitive edge, the project will assess other functional food traits of interest.

In addition, a new project with the GRDC, the Peanut Company of Australia, the University of New South Wales and the University of the Sunshine Coast will investigate off-flavour contamination in peanuts. This work, which may have applicability across a range of crops, will train two post-graduate students in off-flavour related analysis, biology and management.

## CANOLA BLACKLEG RATING

Without adequate resistance to blackleg, the most serious disease of canola in Australia, canola cultivars cannot be grown successfully. Growers must have information on the blackleg resistance of each cultivar to determine which cultivars will be suitable for their region.

All canola breeding companies in Australia provide blackleg survival data to a central database. The data is statistically analysed to produce a blackleg rating for each line. This program, supported by the GRDC and industry, provides Australian growers and breeders with a single, national screening and reporting system.



To enhance the data, all Australian canola breeding programs have their advanced lines screened for blackleg resistance on a range of different stubble types. New stubble plots are required each year. In 2010–11, the GRDC will continue to fund the sowing of stubble plots for which the resulting data will be made available to growers through the published ratings.

## JUNCEA CANOLA BREEDING

Juncea canola (*Brassica juncea*) has been developed for low-rainfall areas. Compared to canola (*Brassica napus*), it has faster ground covering ability, better heat and drought tolerance and better shatter tolerance. A major benefit is that juncea canola does not require windrowing.

In 2010–11 the GRDC will investigate the potential to establish a joint program with international agricultural company Viterra to develop and commercialise juncea canola.

## INTERNATIONAL COLLABORATION

The GRDC continues to support valuable interactions with two international centres of the Consultative Group on International Agricultural Research: the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico and the International Centre for Agricultural Research in the Dry Areas (ICARDA) in Syria.

The GRDC has established formal strategic alliances with CIMMYT and ICARDA, under which the GRDC works with both organisations on a suite of research projects that benefit the Australian grains industry. Critically, these alliances ensure that Australian plant breeders have long-term, targeted access to international wheat, barley and pulse germplasm.

The GRDC funds strategic research projects at CIMMYT and ICARDA, and supports Australian wheat and pulse breeders to travel to both organisations to select promising germplasm for further evaluation in Australia. In 2010–11, these activities will continue, and new projects that facilitate the targeted importation of wheat and pulse breeding lines with improved drought and virus resistance will be contracted. Australian research groups will also be involved in new projects such as the Focused Identification of Germplasm Strategy developed at ICARDA.



## Output Group 3—New Products

Table 9 shows the 2010–11 investment budget and planned outputs for Output Group 3—New Products, in the context of its objective and strategies for 2007–12.

**TABLE 9—NEW PRODUCTS OVERVIEW**

OUTPUT GROUP 3—NEW PRODUCTS		
<b>Objective</b> Deliver new products and services (both on farm and off farm) that will assist growers to effectively compete in global grain markets	<b>Strategies</b> <ul style="list-style-type: none"> <li>Identify national and international technology relevant to the grains industry</li> <li>Develop partnerships to deliver new technology</li> <li>Undertake product development to meet market requirements</li> <li>Build robust business cases that demonstrate stakeholder return on investment</li> </ul>	<b>Investment budget for 2010–11</b> \$14.41 million
Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Identify national and international technology relevant to the grains industry</b>	Identify six new technologies and at least one new international supplier, including unsolicited offers	<ul style="list-style-type: none"> <li>Analysis of a survey report from a waste-to-fertiliser project as a basis for a decision on the implementation of case studies.</li> <li>Scoping of opportunities in nutrient use and water use efficiency in preparation for investment in July 2011.</li> <li>Engagement of an international machinery manufacturer to develop the next generation of the Harrington Weed Seed Destructor.</li> <li>Evaluation and contracting of potential new investments in novel compounds and practices for protection of stored grain.</li> <li>Work building on the experiences gained in the barley variety identification project to begin the process for wheat.</li> <li>Scoping of further export development opportunities where targeted R&amp;D investments open up precompetitive positions for Australian grain.</li> <li>A new project to assess novel technology to generate value-added biofuels and chemicals from Australian grain crops.</li> <li>A new project to assess methods for extracting canola meal proteins with improved functionality for incorporation into human food products.</li> </ul>
<b>Develop partnerships to deliver new technology</b>	Existing and new partnerships to deliver technology to growers	<ul style="list-style-type: none"> <li>Commercial strategies and, where appropriate, engagement with commercial parties for:               <ul style="list-style-type: none"> <li>MEMS-IR technology</li> <li>barley identification</li> <li>snail biocontrol</li> <li>outputs of the Crop Biofactories Initiative</li> <li>coeliac-friendly barley</li> <li>high-amylose wheat</li> <li>fungal biopesticide</li> <li>omega-3 canola.</li> </ul> </li> <li>Engagement of key commercial partners for the final phase (registration and market delivery) of the GLO2 grain fumigant project.</li> <li>Development of a path to market and commercial partnerships for the Harrington Weed Seed Destructor.</li> </ul>
<b>Undertake product development to meet market requirements</b>	New products identified and market assessments undertaken and new products tested under market conditions	<ul style="list-style-type: none"> <li>A commercial licence for specific <i>Metarhizium</i> isolates, following successful trials under the current research licence.</li> <li>Commercial-scale field trials of nematode isolates to evaluate efficacy in controlling snail populations.</li> <li>Field trials of snail-baiting actives.</li> <li>Investigation of potential products and concepts for the control of nematodes in cereals.</li> <li>A commercial arrangement for coeliac-friendly barley following successful product trials.</li> </ul>

MEMS-IR = micro electrical mechanical infrared



**TABLE 9—NEW PRODUCTS OVERVIEW** *(continued)*

Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Build robust business cases that demonstrate stakeholder return on investment</b>	Development of robust business cases to justify GRDC investment and to attract co-investment	<ul style="list-style-type: none"> <li>A path to market study for MEMS-IR adapted into a commercial business case for a chosen pathway.</li> <li>Adaption of the Chinese noodle project to align with new opportunities offered by the strategic relationship with a Chinese partner, and presentation of a business case.</li> </ul>

MEMS-IR = micro electrical mechanical infrared

### Scope

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

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



### Investment priorities for 2010–11

#### NEW GRAIN PRODUCTS

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

In 2010–11, the portfolio will:

- investigate methods of
  - extraction, to improve the functionality of canola meal protein fractions for use as ingredients for human food products
  - preconditioning and processing, to improve the ability to incorporate lupin flour into wheat dough to produce superior lupin breads
- develop opportunities for partnering with companies to deliver
  - new grain products, including high-amylose wheat and low-gluten barley, to market
  - wheat varieties with increased yield potential, to Australian grain growers
- continue to invest in
  - the Crop Biofactories Initiative project to produce novel oils for industrial uses, which will reach a critical stage of proof-of-concept for its first product
  - the Post-Harvest Integrity program of the Cooperative Research Centre for National Plant Biosecurity, to improve grain hygiene throughout the supply chain and reduce the spread of phosphine-resistant insects
- ensure grains supply chains are developed to meet the demands of the livestock industries, by partnering with livestock RDCs in projects such as
  - developing sorghum with enhanced yield and digestibility
  - examining the effect (if any) of feeding red wheat to lactating dairy cows
- assess the feasibility of novel technology to generate high-value chemicals from grain stubble.

### NEW FARM PRODUCTS AND SERVICES

New Farm Products and Services identifies investment opportunities in Australia and internationally. The areas with the greatest potential to deliver benefits to the grains industry are subjected to careful market evaluation, and a business case is developed to justify each potential investment.

Key themes for investment in 2010–11 include developing:

- technologies or knowledge that provide or define a unique selling advantage for Australian grain in key export markets, focusing on new projects that have the potential to increase Australia's market share in the Asian wheat market
- innovative instrumentation technologies to provide faster, cheaper, more accurate and/or more quantitative measurement tools for the grains industry, focusing on currently subjective methodologies causing inefficacy in the value chain
- novel pesticides that are effective against Australian insect pests, weeds and diseases, including by evaluating chemicals sourced overseas, focusing on sucking insects and nematodes
- commercial links to assist the development of products from existing projects, such as the GLO2 grain fumigant project.

The GRDC will also collaborate with commercial manufacturers to identify new research targets that build on extensive existing research into the manipulation of plant growth and health through the use of soil biological inoculants.

### COMMERCIALISATION

The GRDC plans to finalise licence agreements with commercial parties to market a new snail biocontrol agent.

Collaborative commercial R&D agreements will also be established in the areas of biopesticides and grain disinfestation. These agreements will ensure that products are developed to suit the market and that intellectual property is transferred efficiently.



## Output Group 4—Communication & Capacity Building

Table 10 shows the 2010–11 investment budget and planned outputs for Output Group 4—Communication & Capacity Building, in the context of its objective and strategies for 2007–12.

**TABLE 10—COMMUNICATION & CAPACITY BUILDING OVERVIEW**

OUTPUT GROUP 4—COMMUNICATION & CAPACITY BUILDING		
<b>Objective</b> Increase the awareness and capacity to optimise adoption of grains research outputs	<b>Strategies</b> <ul style="list-style-type: none"> <li>• Ensure planned, targeted, measured communication</li> <li>• Leverage delivery through partnerships</li> <li>• Develop demand-driven publications and products</li> <li>• Coordinate a national approach to building industry and research capacity</li> </ul>	<b>Investment budget for 2010–11</b> \$6.80 million
Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Ensure planned, targeted, measured communication</b>	Implementation of a revised GRDC communications strategy	<ul style="list-style-type: none"> <li>• Implementation of a GRDC communication strategy that identifies the needs of stakeholders, key messages and processes for evaluation.</li> <li>• Facilitation of delivery of research outputs to a wide audience, building on existing regional delivery channels.</li> </ul>
	Increased awareness of the GRDC and its research outcomes	<ul style="list-style-type: none"> <li>• National issues-based communication campaigns developed and implemented to increase awareness of priority issues, including:               <ul style="list-style-type: none"> <li>– GRDC profitability and productivity objectives</li> <li>– wheat breeding</li> <li>– climate change.</li> </ul> </li> <li>• Regional issues-based communication campaigns developed and implemented to increase awareness of priority issues.</li> <li>• Increase in unaided awareness of the GRDC, through targeted communication activities (from 68% in 2006 to 90% in 2011).</li> <li>• Increased understanding of the GRDC and its role, as measured through independent research surveys.</li> <li>• 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.</li> </ul>
	Delivery of a strategic media program focused on grower activity on-farm to ensure information is delivered when it can be of most benefit	<ul style="list-style-type: none"> <li>• National media program managed to deliver high-quality, timely media products to inform stakeholders of RD&amp;E outcomes and activities.</li> <li>• Increase (over established benchmarks) in national media coverage of research activities and outputs for the GRDC and its research partners.</li> <li>• Increase in favourable GRDC mentions in the media (over established benchmarks).</li> </ul>
	Increased awareness and understanding of the role and function of the GRDC's regional panels	<ul style="list-style-type: none"> <li>• Campaigns implemented focused on regional panel profile and activities in each region.</li> <li>• The proportion of growers who are aware of the GRDC's regional panels increased to 65% by 2010.</li> </ul>
	Regular monitoring of current and emerging issues	<ul style="list-style-type: none"> <li>• Grains industry and corporate issues monitored and targeted communication tools developed to assist in the exchange of information and delivery of consistent messages.</li> </ul>

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

**TABLE 10—COMMUNICATION & CAPACITY BUILDING OVERVIEW** *(continued)*

Planned outputs for 2010–11		
Strategies	Performance indicators	Targets
<b>Leverage delivery through partnerships</b>	Recognition of strong cooperative research partnerships	<ul style="list-style-type: none"> <li>Increased favourable mentions of the GRDC's research activities and outputs and those of its research partners.</li> <li>Increase in positive media coverage (over established benchmarks) for print and electronic media.</li> <li>Establishment of a national grains communication network.</li> </ul>
	Increased collaboration in R&D communication and extension activities between the GRDC and research partners	<ul style="list-style-type: none"> <li>Publication of materials in collaboration with RDCs, research partners, industry partners and government to meet grower and industry needs.</li> <li>Identification of opportunities for the GRDC to work collaboratively with other RDCs, research partners, industry partners and governments to deliver information in ways that reduce duplication, better target stakeholders and are more cost-effective.</li> <li>A pilot communication and extension workshop held in Western Australia.</li> <li>Joint communication efforts with other RDCs.</li> </ul>
<b>Develop demand-driven publications and products</b>	Enhanced information tools to account for industry issues and emerging technologies to enhance adoption by the grains industry and the wider community	<ul style="list-style-type: none"> <li>Production of electronic media including audio, video and other electronically based content.</li> <li>National 'Over the Fence' case studies, including media articles and video content, distributed to rural press and online publishers.</li> <li>Ground Cover TV program developed and delivered to growers, including through Web 2.0 platforms.</li> <li>Pre-recorded content of the national radio program Driving Agronomy delivered to radio stations.</li> </ul>
<b>Coordinate a national approach to building industry and research capacity</b>	A nationally coordinated agricultural research capacity-building strategy	<ul style="list-style-type: none"> <li>Evidence that key stakeholders understand the GRDC's capacity-building strategy.</li> </ul>
	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	<ul style="list-style-type: none"> <li>Continued support of activities that provide growers and others in the grains industry with opportunities to develop leadership skills, including investment in industry-based awards such as the Nuffield Foundation and the Australian Rural Leadership Foundation scholarships.</li> <li>Continued support for training awards, conferences and workshops to maximise targeted awareness of GRDC investment outcomes.</li> </ul>

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





## Scope

The GRDC provides strength and security to the grains industry through continued investment in RD&E to ensure Australian grain growers are profitable and innovative. The benefits from GRDC investment flow through to Australian grain growers, the wider industry and the general community.

It is important that the GRDC demonstrates that it is a leader in rural RD&E, it is good value for money, and it is achieving its primary objective of increasing grower profitability through its strategic investments. Effective communication plays a key role in determining how an organisation is perceived, positioning the organisation with stakeholder groups and increasing stakeholders' understanding and awareness of how the organisation provides benefits.

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 and adoption of the outcomes of GRDC investments.

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

The output group takes part in joint activities with research partners, government agencies and industry bodies, recognising the important role they play in influencing on-farm decision making. Such collaboration ensures that the GRDC can optimise the dissemination of new information.

Communication & Capacity Building also supports initiatives to encourage and develop capacity in education, training and technology transfer for researchers and the wider industry.

## Investment priorities for 2010–11

### COMMUNICATION CAMPAIGNS

It is important that stakeholders understand the GRDC's role in rural R&D, how it provides value for stakeholders, and how it delivers results against its strategic investments. To achieve this understanding, the GRDC will communicate with a range of customer groups, including governments, research partners, grains industry bodies, growers and other industry participants.

During 2010–11 integrated communication activities will be implemented to demonstrate the significance of the GRDC's investments to stakeholders. They will be complemented by national issues-based campaigns targeting growers and other industry segments, as well as a program of regional issues-based campaigns in each of the three grain-growing regions.

### MEDIA TRAINING

To support the delivery of the GRDC's media program, all relevant GRDC staff and panel members will receive media training. This interactive training will ensure that staff are prepared to provide appropriate information about GRDC investments to journalists, and to interact effectively with the media.

## INFORMATION PACKAGING

The GRDC will use a range of communication tools to accurately target information for specific stakeholder segments. Continued emphasis will be placed on packaging and delivering the most recent research results relevant to grower needs, while ensuring that the information is available in readily accessible and user-friendly formats that meet the needs of a diverse range of customers.

The GRDC is developing a suite of communication tools that include traditional and new media. For example, video footage of interviews with growers and researchers will be distributed on DVD directly to growers, and broadcast through internet sites such as YouTube and Farmonline.

### GROUND COVER

In 2010–11 the GRDC's bi-monthly newspaper *Ground Cover* will deliver research information relevant to grower on-farm activity. This will include expanded sections on risk management, climate variability and precision agriculture variable rate technology, as well as pages dedicated to regional issues.

The GRDC will also continue to deliver topic-specific *Ground Cover* supplements, with the choice of topics driven by stakeholder demand. The successful supplement format enables the GRDC to package research information on a specific issue, or group of related issues, to inform growers and assist them to make decisions.

An in-house editorial committee has been established to:

- generate enthusiasm for *Ground Cover* and give GRDC staff more ownership of its content
- provide access to the first-hand knowledge of program managers, so that important outcomes from research projects can be identified in advance of the publication of project reports
- create opportunities for contributors to discuss and exchange ideas for stories and themes for future editions
- ensure that there is a balance in subject matter in each *Ground Cover* edition.

### EXPANSION OF GROWER FACT SHEETS

For several years, the GRDC has been producing 'fact sheets' and distributing them to growers and advisers through the *Ground Cover* newspaper; grains industry forums, such as grains research updates, field days, expos and conferences; and the GRDC web site. Additional copies of some fact sheets have been printed to meet bulk requests from interested parties such as grower groups, agribusinesses, agricultural colleges and agronomists.

Key topics suitable for fact sheets are identified in consultation with growers, researchers, industry representatives and GRDC regional panel members, after which the optimum timing, audience and delivery channel(s) for each fact sheet are determined.

Due to the popularity, timeliness and relevance of the fact sheet format, more than 30 topic- and region-specific fact sheets will be produced in 2010–11, both for the web and in hard copy format.

## RELEASE OF BACK POCKET GUIDES TO CROP GROWTH STAGES

More profitable whole-farm production—as well as more effective integrated pest, disease and nutrition management—is often the result of successfully growing a wide range of crops in the rotation. The application timing of inputs such as pesticide, herbicide, fungicide and fertiliser, based on the growth stages of the crops, is critical to the success of a crop rotation.

In 2010–11 the GRDC, in partnership with Nufarm, will release a series of its popular 'back pocket guides' to assist growers to identify the growth stages of their crops and optimise their use of chemicals and fertilisers. The guides will cover 19 crop types: wheat; coarse grains—barley, oats, sorghum, maize and triticale; pulses—lupins, field peas, chickpeas, lentils, faba beans, vetch, peanuts, mung beans and navy beans; and oilseeds—canola, sunflower, soybean and safflower.

As well as following the respected Zadoks scale to describe ten distinct stages in the development of the plant, the guides will include expert commentary on the use of pesticide and fertiliser and the efficacy and the timing of their application.

## INDUSTRY AND RESEARCH CAPACITY BUILDING

The GRDC will continue to support a range of training opportunities designed to build skills and expertise that will equip the Australian grains industry with the capacity to continuously innovate. The GRDC will maintain support for a range of scientific conferences and workshops that are relevant to the grains industry.

For example, in 2010–11 the GRDC will invest in:

- the National Youth Science Forum, which offers students currently in Year 11 the chance to 'test-drive' a wide range of universities and careers in the sciences. The aim is to expose students to the widest possible range of study and career opportunities in science, technology and engineering, so that they can make informed choices.
- the CSIRO Summer Student Program, which offers hands-on research experience to second- and third-year university students. Each student works alongside a CSIRO research scientist to complete a project designed to give the student the opportunity to learn new techniques and approaches and to experience the excitement of research science.
- the Nuffield Australia Farming Scholarships, which assist Australian grains industry primary producers to pursue their studies overseas, and the Australian Rural Leadership Foundation scholarships, which assist rural leaders to build skills, knowledge and networks.
- National Partners in Grain, which provides professional development opportunities and a support network for women and young people in the grains industry to increase their technical knowledge, business skills and confidence so that they can take a more active and informed role in their farming business enterprise and in the broader grains industry.

The GRDC will also examine the potential to expand these opportunities to engage a wider selection of Indigenous people in the Australian grains industry.



## 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:

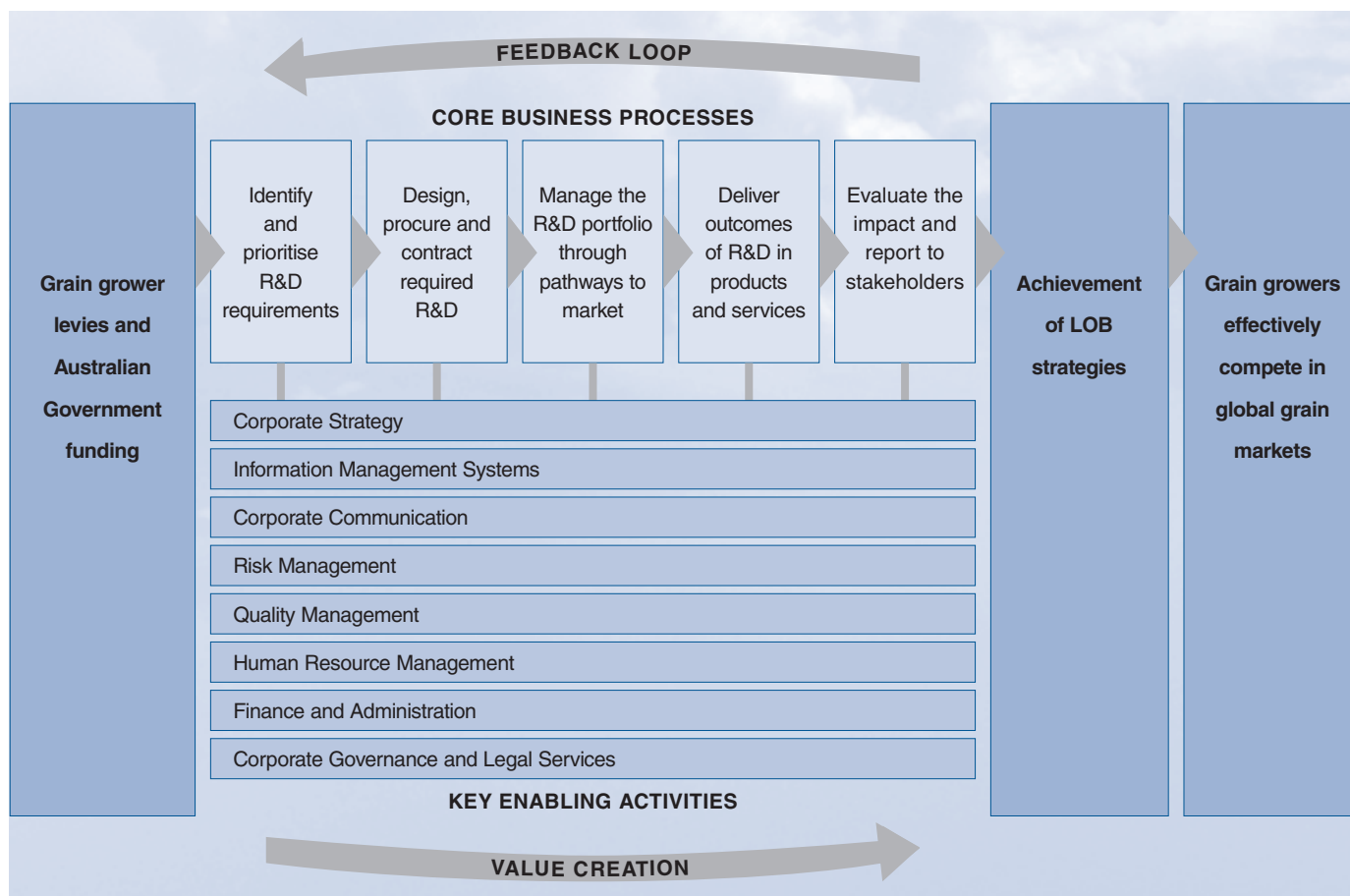
- corporate strategy
- information management systems
- corporate communication
- risk management
- quality management
- human resource management
- finance and administration
- corporate governance and legal services.

These activities provide essential support for all the corporation's responsibilities under the *Primary Industries and Energy Research and Development Act 1989* and the *Commonwealth Authorities and Companies Act 1997*, and equip the four output groups to deliver their targeted outputs.

The GRDC value chain, shown in Figure 4, illustrates how the GRDC implements its strategies through five core business processes and eight key enabling activities. Table 11 sets out the objectives and plans for each activity in 2010–11.



FIGURE 4—VALUE CHAIN



LOB = Lines of business

**TABLE 11—OBJECTIVES AND PLANS FOR KEY OPERATIONAL ACTIVITIES**

Objective	Plans
<b>Corporate strategy</b>	
Ensure implementation of the GRDC's corporate strategies and provide support to panels and output groups.	<ul style="list-style-type: none"> <li>• Ensure existing output group projects and programs achieve targeted outcomes.</li> <li>• Monitor the GRDC's immediate and broader business environments, and present information on key changes.</li> <li>• Implement the Strategic R&amp;D Plan 2007–12 by ensuring ownership of the strategies by members of the Board, Executive Management Team, staff and regional panels.</li> <li>• Continue to monitor the portfolio balance and improve the efficiency and effectiveness of selecting and managing projects.</li> <li>• Institutionalise an impact assessment process and undertake impact assessments.</li> <li>• Ensure efficient and effective functioning of the panels.</li> </ul>
<b>Information management systems</b>	
Support R&D project and record management and the business computing and telecommunication requirements of the organisation.	<ul style="list-style-type: none"> <li>• Ensure information technology is aligned with all GRDC business processes.</li> <li>• Provide business systems that meet the requirements of the organisation.</li> <li>• Maintain a reliable and secure network for GRDC users.</li> <li>• Facilitate the procurement of information technology and telecommunications equipment.</li> <li>• Maintain and continuously improve the project management system.</li> <li>• Develop, implement and continuously improve the records management system.</li> <li>• Ensure that the GRDC's web site and intranet are successfully maintained and developed as effective tools for communication and education of staff and stakeholders.</li> </ul>
<b>Corporate communication</b>	
Inform stakeholders of the corporation's goals, strategies and achievements.	<ul style="list-style-type: none"> <li>• Through the GRDC's regional panels, build greater familiarity with the extent and diversity of the GRDC's R&amp;D role and investment portfolio.</li> <li>• Through mainstream media, identify and target information of interest and relevance to the general public.</li> <li>• Develop integrated communication campaigns (involving all business units) to deliver specific and timely information to external stakeholders.</li> <li>• Through customer feedback, measure the GRDC's effectiveness and performance.</li> </ul>
<b>Risk management</b>	
Ensure that business risks are identified, assessed and appropriately managed	<ul style="list-style-type: none"> <li>• Manage risks at the project, business unit and strategic levels of the corporation.</li> <li>• Maintain an effective risk management system.</li> <li>• Continually monitor and update the risk management plan and the fraud control plan, to reflect changes in the operating environment.</li> <li>• Include risk management in performance measures for staff.</li> <li>• Continue implementing the process to ensure that the level of staff knowledge of risk management is enhanced and risk management is embedded in the corporation's culture.</li> <li>• Maintain a 'comprehensive' rating from Comcover on risk management.</li> <li>• Ensure that internal audit recommendations are included in business risk and fraud control plans and actioned accordingly.</li> <li>• Ensure that strategic risk is reviewed every six months by the Executive Management Team and the Board.</li> </ul>
<b>Quality management</b>	
Be recognised as a quality-driven organisation, through quality leadership, continuous improvement and appropriate accreditation.	<ul style="list-style-type: none"> <li>• Maintain ISO 9001:2008 accreditation with no major non-conformances and with any minor non-conformances closed out within agreed timeframes.</li> <li>• Demonstrate clear leadership on quality and the benefits to be derived from continuous improvement.</li> <li>• Instigate business improvement measures for all areas of quality improvement, including customer complaints and process failures.</li> <li>• Promote quality assurance to ensure that it is effectively used for continuous business improvement.</li> <li>• Evaluate and implement the alignment of policies and procedures with the quality system.</li> <li>• Create an effective feedback loop from staff and customers to the GRDC to measure effectiveness and improve performance.</li> </ul>

RDC = rural R&D corporation



**TABLE 11—OBJECTIVES AND PLANS FOR KEY OPERATIONAL ACTIVITIES** (continued)

Objective	Plans
<b>Human resource management</b>	
Maintain best practice in human resource management and remain clearly focused on delivering business objectives.	<ul style="list-style-type: none"> <li>• Negotiate an initial enterprise agreement to comply with the <i>Fair Work Act 2009</i>, using good faith bargaining to achieve a balanced agreement and preserve the GRDC's organisational culture.</li> <li>• Ensure a smooth transition for staff onto the GRDC's new enterprise agreement.</li> <li>• Ensure GRDC staff positions are correctly graded and remunerated under the new GRDC Enterprise Agreement.</li> <li>• Continue competency-based performance appraisals.</li> <li>• Achieve a performance-driven and customer-focused culture.</li> <li>• Ensure staff have clearly defined management objectives, critical success factors and performance indicators.</li> <li>• Ensure reward systems are clearly linked to management objectives, critical success factors and key performance indicators.</li> <li>• Conduct training skills needs analyses and rectify identified gaps.</li> <li>• Continue the formal succession planning process, identifying appropriate talent at all levels within the corporation.</li> </ul>
<b>Finance and administration</b>	
Manage the accounting and treasury functions in accordance with statutory obligations and requirements and the direction of the GRDC Board.	<ul style="list-style-type: none"> <li>• Maintain a monitoring system through the Finance, Risk and Audit Committee and the internal audit program.</li> <li>• Continue to develop the budget and reporting framework to foster financial responsibility at the business unit level.</li> <li>• Continue to develop, update and implement treasury management systems that enable the corporation to meet the funding requirements of the annual operational plan.</li> <li>• Continue to improve and upgrade reporting systems and templates to encapsulate best practice.</li> </ul>
<b>Corporate governance and legal services</b>	
Maintain a robust system of governance and protection of the GRDC's legal interests.	<ul style="list-style-type: none"> <li>• Continue to ensure compliance with requirements under the <i>Primary Industries and Energy Research and Development Act 1989</i>, the <i>Commonwealth Authorities and Companies Act 1997</i> and ministerial directions.</li> <li>• Ensure that planning and reporting documents (the annual report, annual operational plan, and portfolio budget statements) meet statutory requirements and are published and submitted on time.</li> <li>• Manage compliance through appropriate control systems and an ethical business culture.</li> <li>• Provide legal support to the organisation that is timely and high in quality and builds relationships with stakeholders.</li> <li>• Continue to seek opportunities for harmonisation of legal services and standard form contracts with other RDCs.</li> <li>• Provide high-quality secretarial support to the Chairman, Board and Executive Management Team.</li> </ul>

RDC = rural R&D corporation



# 5 Estimated Income and Expenditure

## Income

The GRDC's total income in 2010–11 is forecast to be \$124.8 million.

Figure 5 shows the sources of the GRDC's forecast total income for 2010–11 in percentage terms. In dollar terms:

- Australian Government contributions are expected to be \$47.1 million
- levy contributions from grain growers are expected to be \$63.0 million
- income from grants is estimated to be \$2.2 million
- other income, which includes interest on investments and royalties, is expected to be \$12.5 million.

Figure 6 shows the sources of the GRDC's forecast levy income for 2010–11, in percentage terms, by leviable crop. The 2010–11 forecast is based on several assumptions, including:

- wheat production will be 21.9 million tonnes
- the average price of Australian Premium White wheat will be \$235 per tonne
- the gross value of grains production will be \$8.9 billion
- levy rates applied in 2009–10 will be maintained in 2010–11.

The GRDC considered the following two income scenarios for 2010–11:

- **Scenario 1** is the baseline case, underlying the income information in figures 5 and 6. This scenario indicates that projected income would be \$124.8 million with liquid reserves of \$86.6 million at the end of the year.
- **Scenario 2** projects a pessimistic case reflecting average production levels for the last three drought years. Under this scenario, projected income for 2010–11 would be \$106.2 million (a reduction of \$18.6 million compared to Scenario 1). Liquid reserves at the end of the year would fall to \$67.9 million, which is within the target range of the GRDC's reserve policy.

## Expenditure

The GRDC Board has approved an annual expenditure of \$146.4 million in 2010–11, an increase of approximately 12 percent in comparison to the 2009–10 expenditure budget.

The GRDC is estimating an operating loss in 2010–11. This loss will be funded by the GRDC's accumulated financial reserves.

Table 12 summarises the GRDC's estimates of expenditure for 2010–11. Of the total forecast R&D expenditure, new investments for 2010–11 amount to \$37.4 million, while ongoing commitments amount to \$95.8 million.

FIGURE 5—FORECAST TOTAL INCOME

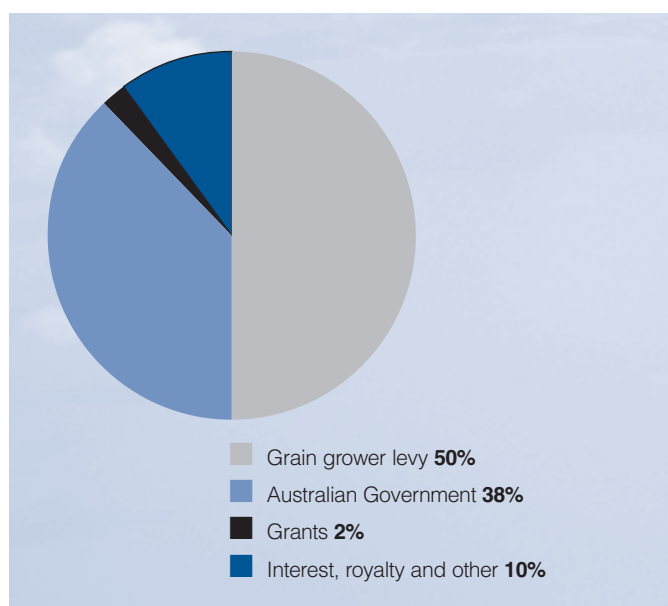


FIGURE 6—FORECAST LEVY INCOME

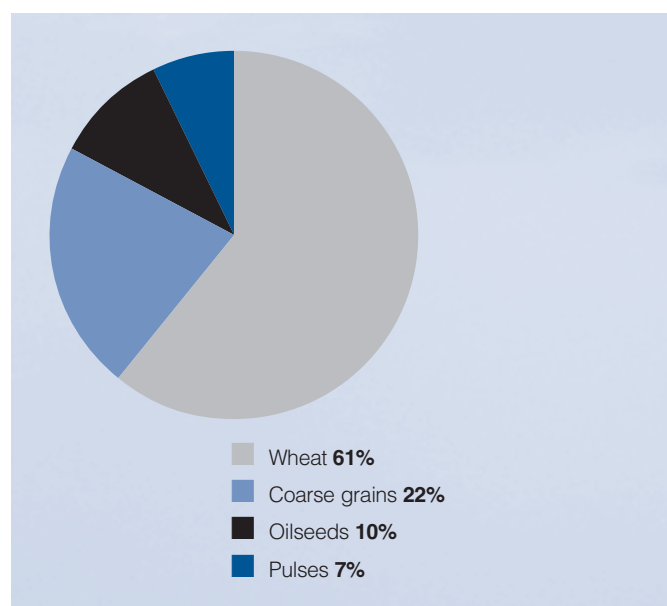


TABLE 12—ESTIMATES OF EXPENDITURE

Budget allocation	2009-10 \$m	2010-11 \$m	2010-11 %
<b>R&amp;D investments</b>			
1 Practices	41.3	51.4	35.1
2 Varieties	50.9	53.7	36.7
3 New Products	13.2	14.4	9.8
4 Communication & Capacity Building	5.0	8.3	5.7
Strategic investment <sup>a</sup>	8.0	5.4	3.7
<b>Management</b>			
Employees	6.6	6.9	4.7
Suppliers <sup>b</sup>	6.1	6.3	4.3
<b>Total</b>	<b>131.1</b>	<b>146.4</b>	<b>100.0</b>

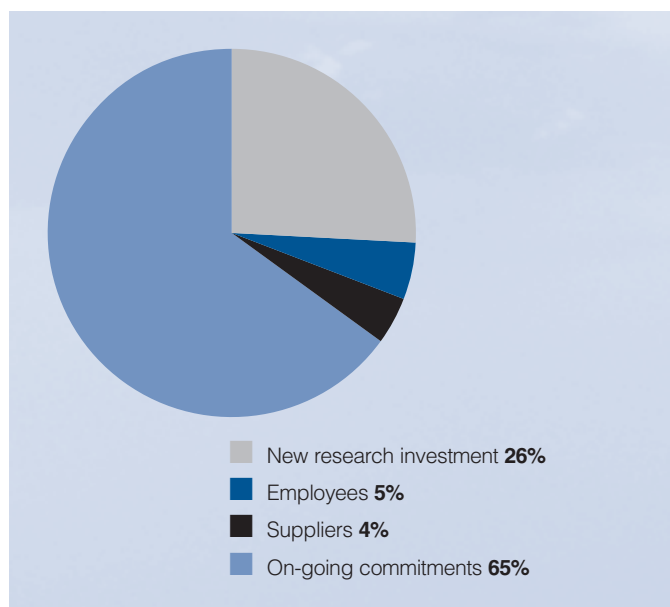
<sup>a</sup> Strategic investment includes the development of the Grains National RD&E Strategy, emerging issues, contingency planning, project variation, impact assessment, project reviews and share amortisation.

<sup>b</sup> Supplier costs include depreciation and amortisation.

These figures are indicative only. Changes in the GRDC's operating environment may require the corporation to vary the total expenditure or specific allocations to secure its financial objectives.

Figure 7 shows the break-up of the proposed expenditure in percentage terms. Costs of employees and suppliers account for 9 percent of the forecast expenditure in 2010-11.

FIGURE 7—FORECAST EXPENDITURE



## Reserves

The GRDC's revenue depends on grain production levels, prices and growers' marketing intentions—all of which can be highly variable, given the volatility of the grains industry environment. To reduce the impact of fluctuations in these variables on the industry's annual R&D effort, and safeguard its ongoing R&D investment, the GRDC manages liquid financial reserves. The reserves are accumulated in years of high-value production and drawn on in years when revenue is lower.

The GRDC aims to maintain the reserves at a level between 40 percent and 70 percent of the following year's expenditure. Currently, the level slightly exceeds the 70 percent target. The reserves have recently grown because of increases in income over budget expectations, caused by a sharp increase in grain prices in 2007-08 and a change in arrangements for bulk wheat export that altered the ratio of grain sold for cash to grain sold into pools. These events coincided with a period of expenditure restrictions caused by drought.

Careful management of the reserves has placed the GRDC in a strong position to increase R&D expenditure above the projected income for 2010-11 (which will be affected by the current low grain prices). Therefore, the GRDC is budgeting for an operating deficit of \$21.6 million for 2010-11, to be funded from the reserves.

## Payments to the Grains Council of Australia

The GCA is the GRDC's representative organisation under the *Primary Industries and Energy Research and Development Act 1989*.

The GRDC has budgeted to pay the GCA up to \$100,000 in 2010-11, to:

- meet the GCA's costs in preparing for and attending consultative meetings with the GRDC to assess the GRDC's performance against the industry's expectations
- provide the GCA with funding for agreed projects and support the GCA's participation in key conferences relevant to the GRDC's functions.

## Australian Government Research Priorities

Table 13 summarises the expected total expenditure allocated against each of the Australian Government's National Research Priorities and their associated goals for the 2010-11 financial year. The allocation of funds is shown in both dollar and percentage terms for each output group and the Corporate Strategy & Impact Assessment enabling function. The total expenditure in Table 13 does not include emerging issues, project reviews, impact assessment and project variation.

Table 14 summarises the expected total expenditure allocated against each of the Australian Government's Rural R&D Priorities for the 2010-11 financial year. The allocation of funds is shown in both dollar and percentage terms for each output group and the Corporate Strategy & Impact Assessment enabling function.

TABLE 13a—AUSTRALIAN GOVERNMENT NATIONAL RESEARCH PRIORITIES (\$m values)

National Research Priorities	An environmentally sustainable Australia							Promoting and maintaining good health				Frontier technologies for building and transforming Australian industries					Safeguarding Australia						
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	Other <sup>a</sup>	Total <sup>b</sup>
Practices	4.75	10.19	3.60	–	–	–	6.08	–	–	–	–	–	0.48	–	–	9.94	–	–	13.33	–	–	3.05	51.42
Varieties	0.20	–	0.20	–	–	–	10.07	–	–	–	–	–	28.30	–	5.70	1.01	–	–	5.47	–	–	2.76	53.71
New Products	–	0.80	0.14	–	–	–	1.34	–	–	1.42	–	–	4.06	1.70	–	0.46	–	–	3.32	–	–	1.17	14.41
CCB	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6.80	–	–	–	–	–	–	6.80
CSIA	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.50	–	–	–	–	–	–	1.50
<b>Total</b>	<b>4.95</b>	<b>10.99</b>	<b>3.94</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>17.49</b>	<b>–</b>	<b>–</b>	<b>1.42</b>	<b>–</b>	<b>–</b>	<b>32.84</b>	<b>1.70</b>	<b>5.70</b>	<b>19.71</b>	<b>–</b>	<b>–</b>	<b>22.12</b>	<b>–</b>	<b>–</b>	<b>6.98</b>	<b>127.84</b>

TABLE 13b—AUSTRALIAN GOVERNMENT NATIONAL RESEARCH PRIORITIES (% values)

National Research Priorities	An environmentally sustainable Australia							Promoting and maintaining good health				Frontier technologies for building and transforming Australian industries					Safeguarding Australia						
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	Other <sup>a</sup>	Total <sup>b</sup>
Practices	3.72	7.97	2.81	–	–	–	4.75	–	–	–	–	–	0.37	–	–	7.78	–	–	10.43	–	–	2.38	40.22
Varieties	0.16	–	0.16	–	–	–	7.88	–	–	–	–	–	22.14	–	4.46	0.79	–	–	4.28	–	–	2.16	42.01
New Products	–	0.63	0.11	–	–	–	1.05	–	–	1.12	–	–	3.18	1.33	–	0.36	–	–	2.59	–	–	0.92	11.27
CCB	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.32	–	–	–	–	–	–	5.32
CSIA	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.17	–	–	–	–	–	–	1.17
<b>Total</b>	<b>3.87</b>	<b>8.60</b>	<b>3.08</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>13.68</b>	<b>–</b>	<b>–</b>	<b>1.12</b>	<b>–</b>	<b>–</b>	<b>25.68</b>	<b>1.33</b>	<b>4.46</b>	<b>15.42</b>	<b>–</b>	<b>–</b>	<b>17.30</b>	<b>–</b>	<b>–</b>	<b>5.46</b>	<b>100.00</b>

CCB = Communication &amp; Capacity Building CSIA = Corporate Strategy &amp; Impact Assessment

**Notes:**<sup>a</sup> Other includes a number of investments that relate to marketing and commercialisation.<sup>b</sup> Total does not include emerging issues, project review, impact assessment, project variation and contingencies.



TABLE 14a—AUSTRALIAN GOVERNMENT RURAL R&amp;D PRIORITIES (\$m values)

Rural R&D Priorities	Productivity and adding value	Supply chain and markets	Natural resource management	Climate variability and climate change	Biosecurity	Innovation skills	Technology	Other <sup>a</sup>	Total <sup>b</sup>
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Practices	11.60	3.04	8.10	5.27	13.13	10.15	0.12	0.01	51.42
Varieties	15.27	2.68	0.20	10.31	5.47	6.51	13.19	0.08	53.71
New Products	1.92	1.38	0.14	1.92	3.67	—	5.24	0.14	14.41
CCB	—	—	—	—	—	6.80	—	—	6.80
CSIA	—	—	—	—	—	1.50	—	—	1.50
<b>Total</b>	<b>28.79</b>	<b>7.10</b>	<b>8.44</b>	<b>17.50</b>	<b>22.27</b>	<b>24.96</b>	<b>18.55</b>	<b>0.23</b>	<b>127.84</b>

TABLE 14b—AUSTRALIAN GOVERNMENT RURAL R&amp;D PRIORITIES (% values)

Rural R&D Priorities	Productivity and adding value	Supply chain and markets	Natural resource management	Climate variability and climate change	Biosecurity	Innovation skills	Technology	Other <sup>a</sup>	Total <sup>b</sup>
	%	%	%	%	%	%	%	%	%
Practices	9.07	2.37	6.33	4.12	10.27	7.94	0.09	0.01	40.21
Varieties	11.95	2.10	0.16	8.07	4.28	5.09	10.32	0.06	42.03
New Products	1.50	1.08	0.11	1.50	2.87	—	4.10	0.11	11.27
CCB	—	—	—	—	—	5.32	—	—	5.32
CSIA	—	—	—	—	—	1.17	—	—	1.17
<b>Total</b>	<b>22.52</b>	<b>5.55</b>	<b>6.60</b>	<b>13.69</b>	<b>17.42</b>	<b>19.53</b>	<b>14.51</b>	<b>0.18</b>	<b>100.00</b>

CCB = Communication &amp; Capacity Building CSIA = Corporate Strategy &amp; Impact Assessment

**Notes:**

- a** Following advice from the Minister in his letter to the GRDC on 9 February 2010, investments in pest management that were previously included under 'Biosecurity' are now included under 'Supply chain and markets'.
- b** Other includes a number of investments that relate to marketing and commercialisation.
- c** Total does not include emerging issues, project review, impact assessment, project variation and contingencies.

# Abbreviations list

ACRCP	Australian Cereal Rust Control Program
AWCPA	Australian Winter Cereals Pre-breeding Alliance
BBA	Barley Breeding Australia
CIMMYT	International Maize and Wheat Improvement Center
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DRT	drift reduction technologies
EPR	end point royalty
GCA	Grains Council of Australia
GM	genetically modified
GRDC	Grains Research and Development Corporation
ICARDA	International Center for Agricultural Research in the Dry Areas
MEMS-IR	micro electrical mechanical infrared
NVT	National Variety Trials
PBA	Pulse Breeding Australia
PHA	Plant Health Australia
R&D	research and development
RD&E	research, development and extension
RDC	rural R&D corporation
RWA	Russian wheat aphid

# Key contacts

## Chairman:

Keith Perrett

## Managing Director:

Peter Reading

## Executive Managers:

### **Practices:**

Stephen Thomas

### **Varieties:**

John Harvey

### **New Products:**

Vince Logan

### **Communication & Capacity Building:**

John Harvey and Stephen Thomas

### **Corporate Services:**

Gavin Whiteley

### **Corporate Strategy & Impact Assessment:**

Leecia Angus

### **Legal & Procurement:**

Geoff Budd



