Prosperity through Innovation

Driving national collaborative grains research, development and delivery for grower profitability and sustainability
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
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Overview

This Strategic R&D Plan, *Prosperity through Innovation*, sets out the objectives that the Grains Research and Development Corporation (GRDC) will work to achieve in the period from 2007–08 to 2011–12, and the strategies that the corporation will adopt to achieve these objectives.

The Strategic R&D Plan provides a framework for investment and delivery of outputs that will address the priorities of Australian grain growers and the Australian Government over the next five years. It also describes the GRDC’s business processes and the performance indicators that will be used to measure the success of the strategies and their impact on the grains industry and the wider community.

The GRDC operates in an ever-changing grains industry. Over the next five years the most likely drivers of change in the GRDC’s business environment include productivity growth, growers’ terms of trade, climate change, water scarcity, grain market dynamics, customer expectations and farm demographics.
The GRDC’s primary objective is to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and environmental sustainability. This objective will be achieved by four overarching corporate strategies that will drive the activities of the GRDC over the next five years:

> coordinate a national grains R&D agenda and portfolio
> deliver against Australian Government priorities
> grow and leverage total grains R&D investment
> ensure R&D is market-driven.

Underlying these corporate strategies are the operational strategies of the GRDC’s four lines of business (LOBs). The development of the operational strategies involved extensive discussions and consultation with the GRDC’s stakeholders, including grain growers, grower groups, grower organisations, the Australian Government and research partners.

The Strategic R&D Plan will be implemented through five annual operational plans. The GRDC will annually review the Strategic R&D Plan, taking into account changes in its business environment and making adjustments to the strategies if necessary.

The effective implementation of the corporate and operational strategies depends on the GRDC’s culture and values, structures, systems, skills and resources. The GRDC will ensure that these are aligned with its strategies so that the Strategic R&D Plan delivers grower profitability and environmental sustainability.

Prosperity through Innovation is a plan for action and for seizing the opportunities presented by changes in the business environment. Over the past 16 years the GRDC and its research partners have been driving innovation in the grains industry. The GRDC is confident that the objectives and strategies outlined in Prosperity through Innovation will contribute to increased productivity in the grains industry in the years ahead and meet the priorities of Australian grain growers and the Australian Government.

TERRY J. ENRIGHT
Chair
The GRDC

Purpose

The GRDC was established to help the Australian grains industry meet the aims of the Primary Industries and Energy Research and Development Act 1989 (PIERD Act), namely:

> increasing 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
> achieving sustainable use and management of natural resources
> making more effective use of the resources and skills of the community in general and the scientific community in particular
> improving accountability for expenditure on R&D activities.

The functions of the GRDC under the PIERD Act include coordinating or funding R&D activities; monitoring, evaluating and reporting on the impact of R&D activities on the grains industry and the wider community; and facilitating the dissemination, adoption and commercialisation of the results of R&D.

Funding

The primary sources of the GRDC’s annual revenue are a levy collected from grain growers, based on the farm gate value of grain produced, and contributions from the Australian Government. There are 25 leviable crops, spanning temperate and tropical cereals, coarse grains, pulses and oilseeds.¹

The amount of levy revenue received each year depends on a number of risks, including drought or other weather events, pest or disease outbreaks, grain price fluctuations, the Australian dollar exchange rate and significant shifts away from grains in the farm business mix. During the plan period, the GRDC will continue to manage its financial reserves to minimise its exposure to risk from such factors.

The amount of the Government contribution is determined annually by the Australian Government and based on the three-year rolling average gross value of production of the 25 leviable crops.

Relationships with stakeholders

The GRDC works closely with its two key customer groups: Australian grain growers and the Australian Government.

Grain grower interests are served by ensuring the GRDC Board and the GRDC’s national and regional panels have grains industry expertise, and through the consultation and reporting relationships established by statute between the GRDC and the grains industry’s representative organisation, the Grains Council of Australia.

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, but particularly the Department of Agriculture, Fisheries and Forestry. The Australian Government has set out National Research Priorities and closely related Rural R&D Priorities, which are subject to periodic review. The Strategic R&D Plan, Prosperity through Innovation, demonstrates how the GRDC will address these research priorities over the next five years.

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

Organisational structure

The GRDC’s organisational structure is shown in Figure 1.

Board

A board of directors, headed by a Chairman, governs the GRDC. The Board has combined expertise in business management, commodity production, processing and marketing; economics; finance; sociology; management and conservation of natural resources and the environment; R&D administration; intellectual property management; science and technology transfer; and public administration. In accordance with the PIERD Act, the GRDC Board members are appointed based on their skills and experience.

¹ Leviable crops are: wheat; coarse grains—barley, oats, sorghum, maize, triticale, millets/panicums, cereal rye and canary seed; pulses—lupins, field peas, chickpeas, faba beans, vetch, peanuts, mung beans, navy beans, pigeon peas, cowpeas and lentils; and oilseeds—canola, sunflower, soybean, safflower and linseed.
Executive Management Team
An Executive Management Team, headed by the Managing Director, leads the GRDC’s nationwide operations. As well as advising the GRDC Board, the Executive Management Team is responsible for realising the Board’s priorities and managing and evaluating R&D investments in the Australian grains industry.

Panel system
The panel system is a key strength of the GRDC. The panels play an important advisory and strategic role in GRDC investments. The Board makes decisions with the support of the National Panel, informed by the knowledge and experience of regional panels and program teams. The program teams comprise members of the regional panels and GRDC managers. The panel system helps to ensure that the GRDC’s investments are directed towards the interests of Australian grain growers and the Australian Government and remain closely aligned with the lines of business (LOB) strategies.

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

Regional panels
The GRDC’s three regional panels cover the northern, southern and western grain growing regions of Australia. They are made up of grain growers, agribusiness practitioners, scientists and the GRDC’s executive managers, with provision for other industry experts to participate as appropriate. Regional panel members also participate as members of the GRDC’s investment program teams.

The panels work closely with grower groups and organisations, and have formal interactions with local Research Advisory Committees, which refer research issues to the panels on an annual basis. The regional panels develop and monitor the regional priorities in the GRDC’s R&D investments. Supported by the LOBs and Corporate Strategy & Program Support, panel members assess regional investment proposals and undertake risk analyses of these investments. The regional panels help to ensure that the investment plan responds to the regional and national priorities of grain growers and the Australian Government, and is aligned with the GRDC’s corporate strategies and LOB strategies.
Lines of business and enabling functions

At the operational level, the GRDC’s organisational structure is divided into four LOBs: Practices, Varieties, New Products and Communication & Capacity Building. These closely reflect the four pathways to market that demonstrate the most potential to deliver profits to Australian grain growers and reward sustainable farming practices. The LOBs are supported by the two enabling functions of Corporate Services and Corporate Strategy & Program Support.

Strategic approach

Objective and strategies

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

Figure 2 shows how the GRDC’s four corporate strategies and associated LOB strategies for the next five years support the primary objective. This Strategic R&D Plan explains in detail how these strategies will be applied to the GRDC’s business activities.

The GRDC’s business activities include the allocation and management of R&D investments in pre-breeding, breeding, national variety trials, agronomy, soils and environment, crop protection, validation and integration, extension and grower programs, new grain products, new farm products and services, capacity building and communication.

Note: Superior varieties – varieties with superior yield, quality and disease resistance
Value chain

The GRDC ‘value chain’, shown in Figure 3, illustrates how the GRDC implements its strategies, to create value for its stakeholders, through five core business processes and eight key enabling activities. The starting point of the value chain is the grain growers’ levy and funds from the Australian Government, while the end point is ensuring, through the achievement of the LOB strategies, that grain growers effectively compete in global grain markets.

Figure 3—Value chain
**Collaboration with other RDCs**

To increase the effectiveness and efficiency of Australia’s rural R&D investment, by eliminating duplication and fragmentation on cross-industry issues, the GRDC will continue to collaborate with other RDCs through a range of co-investment, coordination and communication activities.

Joint projects which the GRDC will continue to support over the next five years include:

> Cooperative Venture for Capacity Building—with Australian Wool Innovation, Dairy Australia, the Grape and Wine RDC, Meat and Livestock Australia, the Rural Industries RDC and the Sugar RDC

> Managing Climate Variability Program—with Australian Wool Innovation, Dairy Australia, Land and Water Australia, Meat and Livestock Australia, the Rural Industries RDC and the Sugar RDC

> Pastures Australia—with Australian Wool Innovation, Dairy Australia, Meat and Livestock Australia and the Rural Industries RDC.

Through the Council of Rural Research and Development Corporation Chairs, the GRDC will continue to identify and pursue areas of common interest for investment, including biosecurity, food safety and energy.

The GRDC will also take part in a joint project to develop an online tool that enables government agencies and other authorised users to access a central database of research information generated by RDC-supported projects.

The GRDC is committed to working with the other RDCs to ensure that enabling technologies will deliver a single entry point that allows access and connectivity to RDC repositories of research information.

**Performance evaluation and reporting**

Evaluating the impact of R&D investments and reporting to stakeholders on performance are part of the GRDC’s core business. During the plan period, the GRDC will continually assess the performance of programs and projects against its strategies and stakeholders’ priorities, and report to stakeholders regularly.

The GRDC will periodically survey its research partners, Australian grain growers and the Australian Government to measure their satisfaction on the effectiveness of the corporation’s activities, with a view to continually improving its performance. The GRDC will also conduct impact assessments of its R&D investments to effectively evaluate the benefits that GRDC-supported R&D is delivering to the grains industry as well as the benefits that flow on to the wider community.

Productivity trends in the grains industry are used as a measure of the benefits of R&D activities. The GRDC will monitor total factor productivity across the main agroecological zones to assess the industry-wide impact of the GRDC’s corporate strategies and corresponding R&D investments.

In addition, each LOB strategy has specific and relevant performance indicators that will be used to evaluate the implementation of the strategy during the plan period.

**Corporate governance**

The GRDC recognises the value of strong corporate governance. In seeking to continuously improve its performance, the GRDC periodically assesses its overall approach and ongoing development against the Australian National Audit Office Guidelines for Best Practice Corporate Governance.

As a statutory corporation, the GRDC must meet certain corporate planning and reporting requirements. Through its Board, the GRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry and the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry.

An outline of the GRDC’s corporate governance framework, including the GRDC’s planning and reporting approach, is provided in Table 1.

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*To increase the effectiveness and efficiency of Australia’s rural R&D investment, by eliminating duplication and fragmentation on cross-industry issues, the GRDC will collaborate with other RDCs through co-investment, coordination and communication.*
Enabling legislation
The Primary Industries and Energy Research and Development Act 1989 (PIERD Act) sets out the legislative framework and rules for the establishment and operation of the GRDC.

Governance legislation
As well as its responsibilities under the PIERD Act, the corporation has accountability and reporting obligations set out in the Commonwealth Authorities and Companies Act 1997, the Commonwealth Authorities and Companies (Report of Operations) Orders 2005 and annual Commonwealth Authorities and Companies Orders (Financial Statements).

Quality management system
The GRDC applies systematic processes, certified to quality standard AS/NZ ISO 9001:2000, designed to demonstrate clear leadership on quality and the benefits to be derived from continuous improvement and to promote quality assurance to stakeholders and other people or organisations with whom the GRDC is involved.

Environmental management

Financial control
The GRDC maintains accounts and records of transactions and affairs in accordance with accepted accounting principles generally applied in commercial practice and with legislative requirements.

Audit processes
Independent internal and external audits are applied to financial, risk, fraud, quality and R&D management.

Fraud and risk management
As part of the quality management system, the GRDC's fraud and risk management framework includes processes for project, program and portfolio level risk management, general compliance and operational risk management and financial risk management, and prudential guidelines for business ventures.

Monitoring performance
The GRDC monitors and measures performance to continually improve its effectiveness and efficiency.

Reporting to stakeholders
The GRDC reports regularly to stakeholders, including through formal reporting to the Grains Council of Australia; publication of annual reports, R&D newsletters and stakeholder reports; and participation in conferences, workshops, grower updates and other activities.

Planning and reporting
The elements of the GRDC's corporate planning and reporting approach include:
- 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
- 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
- annual procurement plan—makes procurement information publicly available through the Australian Government’s AusTender procurement management website
- 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
- 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
- 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
- stakeholder report—meets legislative requirements for reporting to the grains industry’s representative organisation, the Grains Council of Australia
- Statement of Intent—describes how the GRDC will meet the requirements of the Australian Government’s Statement of Expectations during a given financial year.

Table 1—Elements of the GRDC’s corporate governance framework

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Planning considerations

The grains industry at a glance

Figure 4 shows Australian grains industry production trends over the past three decades. A switch from grazing to cropping in the mid 1990s, due to the higher relative profitability of cropping after wool prices fell, brought about a significant increase in land area being used for crop production. This in turn has contributed to higher average grain production since the mid 1990s.

Figures 5 and 6 demonstrate why increasing productivity growth in the grains industry is an essential element of the GRDC’s Strategic R&D Plan. In Figure 5 trends in total factor productivity (TFP) and in growers’ terms of trade for broadacre agriculture are compared. TFP for Australian broadacre agriculture rose by 3.5 times between 1953 and 2003. The trend in the growers’ terms of trade declined for about 40 years from 1953. However, since the early 1990s the rate of decline of the terms of trade has been slower, at least for the sector as a whole.

Figure 6 shows that the gross value of agricultural production in Australia, in real terms, grew slowly from about $30 billion in 1953 to just under $35 billion in 2003. It also illustrates that about 70 percent of the gross value of agricultural production in 2003 came from various productivity growth sources such as infrastructure and communications, higher quality inputs and new farming practices and technologies from R&D activities. If half of the productivity growth is attributed to...
The GRDC operates in an ever-changing business environment in the grains industry. The key factors in the GRDC’s business environment are shown in Figure 7. The GRDC continually monitors and reviews these factors to identify emerging issues and potential new drivers of change. During the plan period the GRDC will continue to ensure that its strategies are relevant to business conditions and make any necessary adjustments to the Strategic R&D Plan.

Drivers of change over the next five years

Based on consultations with grain growers, the Australian Government, research partners and other stakeholders, the GRDC has identified the most likely drivers of change in the GRDC’s immediate and broader business environments over the next five years. They include grain market characteristics, environmental issues, R&D and delivery, customer expectations and social issues.

Grain market characteristics

Declining terms of trade for growers

Australian grain growers have been facing declining terms of trade (ratio of prices received by growers to prices paid by growers) over the past decades. However, the rate of decline in the terms of trade was lower from 1991 to 2003 in comparison with the previous four decades (Figure 6). It is expected that over the next five years the growers’ terms of trade will continue to decline, albeit at the lower rate established over the past 15 years. The overall decline in terms of trade is being driven by higher costs of fuel, fertiliser and agricultural chemicals and rising land prices.

Need to increase overall productivity growth

Sustained productivity growth has been driving the success of Australia’s agriculture sector and remains essential for international competitiveness. Historically, Australian growers have relied on productivity growth to counter the long-term deterioration in their terms of trade. The lower rate of decline in the terms of trade since the early 1990s, noted above, means that productivity growth is now contributing to real growth in the long-term profitability and competitiveness of the agricultural sector. However, there is evidence that this advantage has been offset by the slowing of total factor productivity (an indicator of overall productivity) in the past decade, primarily because of farm investments being deferred during the drought years. Over the next five years, increasing the rate of growth in total factor productivity in the grains industry will be essential to maintain growers’ profitability, sustainability and international competitiveness.
PLANNING CONSIDERATIONS

Grain market dynamics
The global grain markets are undergoing significant changes. Non-traditional grain exporters, such as Brazil, Argentina, India and Black Sea countries, are emerging as important players. Growth in the biofuels industry in Europe, the United States and South America and the adoption of genetically modified crops in the United States and South America are also having significant impact on the grains industry.

Within Australia, a change in the characteristics of the grains industry is taking place. Western Australia and parts of South Australia are export-oriented, while the eastern states are more focused on domestic markets and feed grains. In the eastern states of Australia there is increasing competition for grains between domestic traders, the livestock industry and the emerging biofuels industry. Any change in wheat export marketing arrangements could also impact on grain market characteristics in Australia.

Environmental issues
Climate change
The combined effects of rising carbon dioxide levels, higher temperatures, changes in evaporation and changes in the mean, variability and intensity of rainfall will have a significant impact on grains production. As unpredictability and changes in temperature and rainfall across Australia are expected to continue, growers’ capacity to manage climate variability and seasonal conditions will become increasingly important. Growers may also seek to reduce their emissions of greenhouse gases such as nitrous oxide, which currently represents 18 percent of all agricultural greenhouse gas emissions.

In order to reduce greenhouse gas emissions, carbon trading markets are also expected to be developed in Australia. Sequestration services through reforestation on non-forested lands are one potential area where growers could see benefits from carbon trading. This may offer an incentive for growers to plant trees and sell the resulting carbon credits to industrial companies, subject to certain eligibility criteria. Cost-effective actions to reduce greenhouse gases from agriculture are expected to have a positive impact on the industry.

Water use efficiency
Managing water stress and increasing water use efficiency will continue to be important drivers of change in Australian agriculture. Over the next five years, water harvesting and tillage systems and drought tolerant crops and pastures will be important for growers’ profitability and sustainability.

Path to market for genetically modified crops
Genetic engineering technologies can enhance the agronomic performance of crops and produce specialty products for a range of food/feed and non-food/feed markets. Genetically modified (GM) crops have the potential to significantly change the range of crops grown and production systems used by Australian grain growers and thereby increase the sustainability, productivity and profitability of modern agriculture.

In Australia, the path to market for GM food crops is still unclear. This is resulting in a lack of commitment by the Australian grains breeding programs to embrace GM technologies. However, state government moratoria on the growing of GM food crops are expected to end early in the plan period, clearing the way for new market opportunities.

R&D and delivery
Grains R&D funding
It is expected that downward pressure on grains R&D funding will continue over the next five years. This is likely to require rationalisation of grains industry investments, particularly to clarify the roles of public and private investments in basic, strategic and applied research.

Research infrastructure in Australia
Research infrastructure in Australia is limited so there will be a continued need to take advantage of overseas technology and bring it to Australia through effective delivery channels. There is also a possibility that agricultural research capacity at Australian universities will reduce after the introduction of a new research quality framework to govern university funding.

Changing technology
Changes in technology are expected to drive changes in grains R&D over the next five years. New technologies will emerge in a number of research areas, including reverse genetics and nanotechnology.

Changing industry information needs and delivery channels
Private agronomists, accountants and other consultants will play increasingly important roles in interpreting information
and providing specific advice to grain growers. There will also be changes in the roles of the internet and print media in the delivery of information.

Customer expectations

Consumer attitude towards food grains

Consumers of food grains are highly discerning, and will remain so over the next five years. Consumer perceptions of GM and functional foods, grain quality and segregation will continue to be critical issues for meeting consumer demand. International customers for wheat and other grains will require consistent quality, supply choice, logistics management, technical support and value.

Traceability

Traceability is an attribute that customers value highly. Customers will want information on all linkages through the supply chain, including information on the quality, cost, standards and consistency of the product, as well as details of all participants in the chain and the ownership of each phase of transportation and other related processes.

Social issues

Changing farm population and workforce structure

Demographic shifts in rural and regional Australia will continue to reduce the number of farms owned by individual growers. The number of share/lease growers is expected to increase, as is the number of large commercial farms.

A continuing decline in the number of young people entering farming is expected to lead to an ageing rural workforce and less availability of farm labour. Agriculture will continue to face strong competition for skilled and unskilled labour from the energy and mining sectors.

Farm business management

There will be an increasing need to shift from the conventional management of farming practices to farm business management. Business practices, including managing finances and risk and understanding market requirements, will need to be integrated into whole-of-farm business management. Many growers will need to develop a new set of business skills to maintain their industry capacity.

Planning assumptions

The GRDC’s planning assumptions for this Strategic R&D Plan are based on the drivers of change in its business environment over the next five years. The Strategic R&D Plan assumes that the following conditions will apply in Australia over the next five years:

> increasing
  - climate variability
  - need for water use efficiency
  - energy costs
  - average farm size with fewer growers
  - importance of delivery channels such as agribusinesses
  - market penetration from competing countries
  - market opportunities for higher value grains

> decreasing
  - growers’ terms of trade
  - government contributions to grains research
  - grains research quality capacity at universities, as a likely result of the implementation of a new research quality framework

> continuing
  - research and analysis on market acceptance of GM food grains so as to facilitate informed decision making by consumers and to provide choices to growers
  - focus on biosecurity, natural resource management and environmental issues
  - rationalisation and evolution of Australian grains industry structures
  - strong relationships between the GRDC and the Australian Government and Australian grain growers.

The GRDC’s planning assumptions for this Strategic R&D Plan are based on the drivers of change in its business environment over the next five years.
Australian grain grower priorities

The Strategic R&D Plan addresses the identified priorities of Australian grain growers. The key grower priorities for the next five years are:

- **environmental**
  - responses to climate change
  - improved water use efficiency
  - sustainability and resource management
  - soil health and biology

- **farm management**
  - integrated farming practices and technologies
  - integrated management of weeds, diseases and pests
  - herbicide resistance management

The GRDC addressing environmental issues

The GRDC will invest in research, development and delivery mechanisms that meet the environmental priorities of the Australian Government and Australian grain growers. These investments underpin the sustainable development of a globally competitive Australian grains industry. The GRDC will continue to address the triple-bottom-line issues of immediate concern to the grains industry and deliver improved and integrated farm management practices and technologies.

The GRDC will achieve its environmental objectives through partnerships and collaborations with national, state and local bodies such as the Natural Heritage Trust, the National Land and Water Resources Audit, CSIRO, state agencies with responsibilities for environmental legislation, catchment and grower groups, and individual growers.

Climate change

Over the plan period the GRDC in collaboration with the Australian Centre for Plant Functional Genomics will continue to invest in the development of more resilient grain varieties under predicted climate change scenarios, including drought and frost tolerant grain varieties. The GRDC will be involved in the South-east Australian Climate Initiative, which seeks to understand the drivers of climate change in south-east Australia as well as how growers and land managers can best respond to climate change. The project will also focus on effective within season predictive tools in the context of climate change. The GRDC will work with research partners to turn climate-related risks into opportunities for growers, including through ongoing investment in the Managing Climate Variability Program. The objectives of the program are to: improve seasonal forecasting (including accuracy, lead time, and ease of use); provide tools and services to growers for managing climate risk; and increase adoption of climate risk management techniques by growers and natural resource managers. In addition, the program will also look at how agriculture in Australia can adapt to climate change. The GRDC will work closely with government, industry, research partners and other RDCs to ensure a national collaborative approach to climate change.

Greenhouse gas emissions

Agricultural production contributes to the emission of greenhouse gases, such as carbon dioxide, methane and nitrous oxide, which have a considerable impact on agricultural productivity through their effects on climate. The GRDC will deliver and facilitate the adoption of practical approaches for minimising nitrous oxide emissions, including efficient application of nitrogenous fertilisers. The GRDC will be working on understanding the impacts of elevated atmospheric carbon dioxide on grain yield and quality. The GRDC will also continue to communicate with growers about adopting farming practices, such as no-till and controlled traffic. These practices help to reduce fuel costs and carbon dioxide emissions and minimise loss of valuable resources from farming systems.

Water use efficiency

Water use efficiency is defined as crop yield per unit of water use. Water scarcity is a national challenge. Both water availability and efficiency of water use restrict grain production. Over the next five years, the GRDC will implement strategies to develop methods for maximising the profitable use of water and deliver them to growers.

The Bureau of Rural Sciences has identified agroecological zones in Australia where water use efficiency is relatively low. Improving efficiency in some zones has the potential to lift the productivity and profitability of the whole industry significantly. The GRDC will support the development of regionally based technologies that will make it easier to estimate available water in a paddock, as a step towards more profitable water use in the grains industry.
On 16 February 2006, the Agriculture and Food Policy Reference Group, in association with the Australian Government Minister for Agriculture, Fisheries and Forestry, the Hon. Peter McGauran, MP, released its report—Creating our Future: Agriculture and Food Policy for the Next Generation.

The GRDC identified grower priorities during the development of the Strategic R&D Plan:

> through surveys undertaken by independent consultants
> by taking into account the principal issues and challenges that the Agriculture and Food Policy Reference Group identified as needing attention if agriculture and food businesses are to be successful over the next ten to fifteen years.2

### Australian Government priorities

One of the four corporate strategies of the GRDC is to deliver against the Australian Government's:

> National Research Priorities, as outlined by the Prime Minister in December 2002

#### Table 2—Alignment between Australian Government priorities and GRDC strategies

<table>
<thead>
<tr>
<th>National Research Priorities</th>
<th>Rural R&amp;D Priorities</th>
<th>Related GRDC strategies</th>
<th>Examples of GRDC activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting and maintaining good health</td>
<td>Productivity and adding value</td>
<td>New Products strategies on new food grain products with focus on human health and nutrition, food safety and grain hygiene</td>
<td>An international joint venture, called Arista Cereals Technologies, will deliver higher margin, specialised grain products suitable for the health food market. High amylose wheat is one such product with the potential to address bowel health. The science utilises leading edge technology developed at CSIRO and with the participation of Group Limagrain will provide the market signals and expertise to develop products for market.</td>
</tr>
<tr>
<td>Supply chain and markets</td>
<td>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</td>
<td>New Products strategy on undertaking product development to meet market requirements Varieties strategies on breeding and pre-breeding programs that are market-driven</td>
<td>A project to investigate opportunities for soybean products, such as natto, tofu and soybean milk for export, and soybean flour and soy milk for the domestic market</td>
</tr>
</tbody>
</table>

2 On 16 February 2006, the Agriculture and Food Policy Reference Group, in association with the Australian Government Minister for Agriculture, Fisheries and Forestry, the Hon. Peter McGauran, MP, released its report—Creating our Future: Agriculture and Food Policy for the Next Generation.
## RESEARCH AND DEVELOPMENT PRIORITIES

### An environmentally sustainable Australia

**Natural resource management**  
Support effective management of Australia’s natural resources to ensure primary industries are both economically and environmentally sustainable  
**Climate variability and climate change**  
Build resilience to climate variability and adapt to and mitigate the effects of climate change.

**Practices strategy on sustainable**  
management of natural resources including climate change and water use efficiency.

- A number of projects related to climate change, including work to:  
  - gain a better understanding of the impacts of climate change on the Australian grains industry  
  - develop strategic responses to a range of climate change scenarios  
  - examine the impact of elevated carbon dioxide levels on crop growth  
  - estimate ammonia and nitrous oxide emissions from mixed farming systems.

### Safeguarding Australia

**Biosecurity**  
Protect Australia’s community, primary industries and environment from biosecurity threats.

**Practices strategies relating to**  
biosecurity and practical integrated pest management, management of weed control options in changing farming systems, and durable genetic resistance as the ‘first line of defence’ against crop diseases.

- A range of projects with the CRC for National Plant Biosecurity, including work to:  
  - examine the gene flow of insecticide-resistant insects in the grains supply chain  
  - coordinate and develop effective resistance management programs  
  - prepare a diagnostic test for the khapra beetle  
  - examine ways to detect grain contaminated by insects  
  - examine novel treatment technologies for contaminated grain  
  - coordinate and develop effective resistance management programs.

**A project to explore the potential role of preemptive breeding in raising the grains industry’s preparedness for a number of biosecurity threats, including wheat streak mosaic virus.**

### Supporting the Rural R&D Priorities

#### Frontier technologies for building and transforming Australian industries

**Innovations Skills**  
Improve the skills to undertake research and apply its findings.

**Technology**  
Promote the development of new and existing technology.

**Communication & Capacity**  
Building strategy to develop new and innovative publications and products.

**Varieties strategies on breeding**  
and pre-breeding practices on developing and delivering new technologies and farming practices.

**A project to build industry (grower and agribusiness) capacity by developing and implementing integrated programs on education, training and technology transfer.**  
A project to develop an accepted methodology for tracking the movement and effect of beneficial microbes within cropping systems, to facilitate speedier registration and faster delivery to market of beneficial microbial products.

**The international Brassica A genome sequencing program to identify candidate genes and molecular markers for significant agronomic traits.**  
A study to establish if grain can be used to produce metal nanoparticles.
The GRDC addressing biosecurity

The GRDC will continue to address the Australian Government’s priority of safeguarding Australia by investing in the biosecurity of the grains industry through:

**Plant Health Australia**

Plant Health Australia is responsible for developing a nationally coordinated plant health preparedness and prevention system for exotic and endemic plant pests and diseases. The GRDC will continue to invest in relevant and targeted research programs of Plant Health Australia via the CRC for National Plant Biosecurity.

**CRC for National Plant Biosecurity**

The GRDC is a core participant in the CRC for National Plant Biosecurity. As the central coordinating body for plant biosecurity research across all Australian states and territories, this CRC focuses on preparedness and prevention, diagnostics, surveillance, impact management, and delivery and adoption.

The GRDC will continue to invest in selected grains industry projects with this CRC, notably in the diagnostics, preparedness and prevention programs. Additional investments will be negotiated taking into account the potential impact of climate change on biosecurity threats.

**Australian Cereal Rust Control Program**

The GRDC will continue to support the Australian Cereal Rust Control Program (ACRCP), a partnership between the GRDC, the University of Sydney, CSIRO and the International Maize and Wheat Improvement Center (CIMMYT), which includes a strong national and/or international biosecurity component.

The program develops improved germplasm for Australian cereal breeders to combat current and anticipated rust threats. The University of Sydney provides a continuous surveillance service to the grains industry which monitors the occurrence and frequency of cereal rust pathotypes. This service provides early warnings to the grain grower community of the development or incursion of new virulent pathotypes, and recommends effective management responses.

**Weed Management**

The GRDC will continue to invest over the plan period in programs designed to protect the grains industry from new weed threats, whether they eventuate through invasions due to international trade and travel by individuals, or through the spread of previously unidentified ‘sleeper weeds’.

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**Table 3—Investment allocation against the Australian Government’s Rural R&D Priorities in 2007–08, the first year of the Strategic R&D Plan 2007–12**

<table>
<thead>
<tr>
<th>Rural R&amp;D Priorities</th>
<th>Natural Resource Management</th>
<th>Climate Variability and Climate Change</th>
<th>Productivity and Adding Value</th>
<th>Supply Chain and Markets</th>
<th>Biosecurity</th>
<th>Innovation Skills</th>
<th>Technology</th>
<th>Othera</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16.5%</td>
<td>4.0%</td>
<td>37.2%</td>
<td>0.5%</td>
<td>13.3%</td>
<td>18.5%</td>
<td>9.7%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

a Other includes a joint RDC program on farm health and safety and a number of investments that relate to commercialisation.

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The GRDC will invest in research, development and delivery that address the environmental priorities of the Australian Government and Australian grain growers, and underpin the sustainable development of a globally competitive Australian grains industry.
The GRDC’s primary objective is to support effective competition by Australian grain growers in global grain markets through enhanced profitability and environmental sustainability. The GRDC has adopted four corporate strategies, underpinned by strategies for each LOB, to drive the corporation’s R&D investments to achieve the greatest benefits for the grains industry and the wider community. An overview of the relationships between the strategies and the primary objective is shown in Figure 8.

The GRDC’s four corporate strategies are to:
> coordinate a national grains R&D agenda and portfolio
> deliver against Australian Government priorities
> grow and leverage total grains R&D investment
> ensure R&D is market-driven.

The following sections set out how these corporate strategies will be implemented through the operational strategies of the Practices, Varieties, New Products and Communication & Capacity Building LOBs.

Figure 8—The GRDC’s primary objective and corporate strategies
Practices

Objective
Better practices developed and adopted faster

Strategies
The Practices LOB will achieve its objective by implementing four strategies:
> identify and develop profitable, innovative and integrated practices and technologies
> ensure active grain grower involvement and commitment
> undertake targeted extension and adoption through appropriate delivery channels
> enhance sustainable management of natural resources.

These strategies will be implemented by investing in agronomy, soil, environmental management and crop protection. Results from these investments will be validated and integrated into farming systems, and grower programs will be developed to assist with their adoption.

Identify and develop profitable, innovative and integrated practices and technologies
The GRDC will develop and deliver new technologies and farming practices to overcome soil constraints, use soil biology to productive advantage, manage efficient use of water and nutrients, assist growers to deal with climate change and climate variability, and provide a wider range of species options for use in rotations.

These technologies and farming practices will include:
> methods to maximise the profitable use of water
> new technologies for more efficient agronomy
> methods that match nutrient inputs to crop demands
> methods to economically remove soil constraints to crop production
> practical integrated pest management (IPM) strategies that reduce reliance on prophylactic use of broad spectrum pesticides.

As well as integrating new crop and pasture varieties into cropping systems and soil biology into healthy soil management packages, the GRDC will combine genetic, cultural and chemical approaches to disease management.

In addition, the GRDC will:
> advise plant breeders on which traits are required in crops
> increase the diversity of weed control options, and improve the management of weed control options in changing farming systems
> coordinate national approaches to weed management
> encourage the adoption of durable genetic resistance as the ‘first line of defence’ against crop diseases
> respond rapidly to changing disease threats
> facilitate the development of a national network to capitalise on regional centres of expertise in IPM
> maintain national capability in invertebrate pest research through better coordination and use of resources and provision of training opportunities.

Figure 9—Practices objective and strategies
To ensure active grain grower involvement and commitment, the GRDC will engage grain growers in local farming systems through participatory research, development and delivery.

Undertake targeted extension and adoption through appropriate delivery channels
Grain growers are required to assimilate and interpret a profusion of increasingly complex agronomic information. The industry is experiencing rapid changes in demographics, farming systems and production goals, and changing delivery channels and new technologies are influencing the ways growers access GRDC information.

The GRDC will work on matching delivery channels (such as grower groups, retail advisers and fee-for-service advisers) with segments of the grain grower population (for example, innovators, early adopters or non-adopters) to encourage grain growers to adopt new technologies and practices.

The GRDC will:
> collect accurate market intelligence to understand industry needs
> utilise a range of delivery networks and programs to deliver GRDC outputs
> produce and coordinate the delivery of timely, relevant, high-quality information and experiences to grain growers, grower groups and advisers
> develop a range of formatted and integrated information and technology packages for stakeholders.

Enhance sustainable management of natural resources
The GRDC has a significant partnership role in dealing with environmental issues. Through the Practices LOB, the GRDC will continue to make a contribution by aligning sustainable production systems research at a farm level with broader, community-based land use initiatives.

The Practices LOB will also deliver outputs relating to a better understanding of the drivers for climate change and variability and how growers and land managers can best respond and adapt to these factors. To enhance sustainable management of natural resources, the GRDC will:
> identify and minimise the environmental impacts of the grains industry
> provide the industry with tools to manage climate variability within the context of climate change
> assist the industry to demonstrate its environmental credentials.
<table>
<thead>
<tr>
<th>Strategies</th>
<th>Critical success factors</th>
<th>Key performance indicators*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify and develop profitable, innovative and integrated practices and technologies</td>
<td>• R&amp;D partners focused on innovative and integrated approaches to cropping constraints • Innovative practices and technologies integrated into farming systems</td>
<td>• Water use efficiency in targeted agro-ecological zones increases by 10% • The proportion of growers taking up precision agriculture and related practices represents 60% of growers surveyed • The area of cropping land with retained stubble is increases by 10% • The proportion of growers with improved confidence in managing pests, weeds and diseases averages 90% of growers surveyed, up from 80%</td>
</tr>
<tr>
<td>Ensure active grain grower involvement and commitment</td>
<td>• Growers motivated to participate • Effective grower feedback mechanisms</td>
<td>• The number of growers and industry representatives participating in GRDC funded activities (crop updates, field days, research projects) increases from 16,000 by 10% • The number of growers directly involved in planning, priority setting and evaluation of LOB R&amp;D and extension portfolio increases from 220 to 440</td>
</tr>
<tr>
<td>Undertake targeted extension and adoption through appropriate delivery channels</td>
<td>• Clearly segmented grain growers, grower groups and advisors • Research outputs aligned with segments • Target audiences aware of and accessing information from a broader range of sources</td>
<td>• A customer relationship management database is implemented by the end of 2008 • The proportion of growers adopting new or improved farming practices due to GRDC activity increases from 20% to 40% of growers surveyed • The proportion of growers accessing the GRDC’s web site increases from 25% to 50% of growers surveyed</td>
</tr>
<tr>
<td>Enhance sustainable management of natural resources</td>
<td>• Reduced environmental footprint of the grains industry • Industry adapting to climate variability and climate change</td>
<td>• The proportion of growers who indicate that GRDC has had a positive impact on the adoption of actions relating to long-term sustainability increases from 45% to 60% • The proportion of growers actively monitoring dryland salinity, as indicated by the number of growers monitoring the depth of the water table, increases from 24% to 30% • The number of growers improving and maintaining soil condition increases, as indicated by the increased use of: – Lime from 39% to 45% – Gypsum from 49% to 55% – Controlled traffic from 20% to 30% • The number of growers managing nutrients and minimising nutrient loss increases, as indicated by the increased use of: – Nutrient budgeting from 54% to 60% – Variable rate technology from 20% to 30% • The percentage of growers using climate risk management tools to actively manage climate variability increases from 27% to 40%</td>
</tr>
</tbody>
</table>

* Key performance indicators are over the plan period, unless otherwise stated.
Varieties

Objective
Growers have access to superior varieties that enable them to effectively compete in global grain markets.

Strategies
The Varieties LOB will achieve its objective by implementing four strategies:

> build and sustain world-leading breeding programs
> focus pre-breeding research on key traits
> develop a path to market for genetically modified crops
> facilitate faster adoption of superior varieties.

These strategies will be implemented by investing in gene discovery, breeding technologies, genetic resources, functional genomics, germplasm enhancement, genetic transformation, plant breeding, crop variety testing, grain quality research and plant pathology (when directly related to breeding).

The performance of new crop varieties developed by GRDC-supported breeding programs is independently tested through the National Variety Trials (NVT).

Build and sustain world-leading breeding programs
The GRDC will work with its research partners to ensure that:

> breeding programs are market-driven—that is, they are integrated with medium to long term demand signals (in terms of quality traits) from consumers
> strong leadership and communication exist throughout the breeding chain, including pre-breeding research, breeding, variety commercialisation, variety uptake by growers and use by consumers
> effective linkages exist between all segments of the breeding chain
> each individual activity in the breeding process is performed efficiently and effectively.

The GRDC will also work with the grains industry to improve the way End Point Royalties (EPRs) are collected and managed, so that breeders are appropriately rewarded for innovation and effort.

Wheat breeding
The GRDC will work with its partners to:

> encourage the development of national wheat-breeding programs
> facilitate the transition process to a viable number of breeding programs while maintaining competitive neutrality
> improve EPR collection and management
> communicate with and engage grain growers, to explain the need for change and ensure their concerns are considered in the transition process.

The GRDC will continue to support activities that ensure market signals are effectively relayed to wheat breeding programs. These include the work of the Wheat Quality Objectives Group, an expert panel that provides specialist advice in identifying wheat quality requirements for consumer products and manufacturing processes. Together with wheat marketers, the GRDC will support an annual Industry Forum for wheat breeders, researchers and customers, to communicate market signals to those directly involved in developing new varieties for Australian wheat growers.

Figure 10—Varieties objective and strategies

Growers have access to superior varieties that enable them to effectively compete in global grain markets

Focus pre-breeding research on key traits

Build and sustain world-leading breeding programs

Facilitate faster adoption of superior varieties

Develop a path to market for genetically modified crops
Barley breeding
The GRDC will continue to work with its partners in the new, national program Barley Breeding Australia (BBA), to achieve efficiencies through greater integration and collaboration at the national level, while catering for specific regional and consumer requirements.

Pulse breeding
In consultation with research partners, the GRDC has facilitated the establishment of a national pulse-breeding program, Pulse Breeding Australia (PBA), that unites the breeding programs for field peas, chickpeas, faba beans and lentils. PBA brings together the major state government pulse-breeding agencies, Pulse Australia, the University of Adelaide and the GRDC into a coordinated, national endeavour.

The GRDC will work with its partners in PBA to ensure that all the pulse-breeding programs share germplasm, technologies and intellectual property so that benefits flow freely across the states, while ensuring that the program meets the regional needs of growers, marketers and consumers.

Canola breeding
The GRDC will work with its partners, including the Australian Oilseeds Federation, to facilitate the development of a number of world-leading, national, self-sustaining canola-breeding programs, which will compete for market share and be rewarded through seed royalties and EPRs.

Summer crops
The GRDC will continue to work with its partners to improve the performance of breeding programs for summer crops, including sorghum, soybeans, peanuts, mung beans and sunflowers.

Focus pre-breeding research on key traits
Pre-breeding research includes gene discovery, functional genomics and the establishment of genetic marker-trait associations, the development of new breeding tools, and the development of genetic traits ready for use in breeding programs. Pre-breeding research is typically high-tech, expensive and high-risk, with long lead times.

The GRDC’s pre-breeding strategy will have the following characteristics:
> input from consumers, growers and breeders to ensure the research is market-driven
> focus on the traits that will deliver maximum benefit to the Australian grains industry
> depending on the crop, non-exclusive, equitable access to publicly funded pre-breeding research by breeding programs, to ensure the maximum benefit to the Australian grains industry
> effective intellectual property protection and management arrangements that encourage rapid uptake of R&D outputs by breeding programs
> effective communication, collaboration and coordination between institutions, to minimise duplication and fragmentation and maximise progress
> efficient technology transfer between pre-breeding and breeding programs
> relationships that provide ready access to R&D outputs developed overseas, including R&D outputs from the private sector
> mechanisms for recognising and rewarding good performance, including collegiate behaviour.

The GRDC will integrate pre-breeding research into existing research in smaller, publicly funded breeding programs in barley and pulses.

For wheat and canola, which have larger breeding efforts that span the public and private sector, the GRDC will facilitate the establishment of national pre-breeding research programs focused on more generic, ‘foundation’ traits of particular value to the industry. The GRDC will maximise the impact of the research by making the outcomes available to all the wheat and canola breeding programs in Australia, non-exclusively. The GRDC’s pre-breeding strategy in wheat and canola will address the increasing barriers to information and germplasm exchange between public sector and private sector breeding programs.

The GRDC will facilitate the establishment of national pre-breeding research programs focused on more generic, ‘foundation’ traits of particular value to the industry.
Develop a path to market for genetically modified crops

The GRDC and its research partners invest in research projects that aim to develop GM crops and derived products. When this research approaches proof-of-concept stage, further investment will be required to bring these crops and products to market. While the delivery platform and infrastructure requirements for GM canola have been established, the path to market for other GM crops, including wheat and barley, remains unclear.

The GRDC will commission research to:

> determine the issues around the management of GM-based production systems for wheat and barley, including the management processes and traceability required to achieve market and consumer acceptance of the final product
> identify suitable GM wheat and barley crop transformation systems with freedom to operate
> determine time lines and costs for bringing GM wheat and barley crops and products to the Australian and international markets.

Facilitate faster adoption of superior varieties

To achieve faster adoption of varieties with superior yield, quality and disease resistance, the GRDC will work with its partners to:

> improve the effectiveness of competition in driving efficiency gains through EPRs
> enhance the links between the breeding process and the variety commercialisation process
> commence seed increase earlier in the breeding process
> explore grower contracts that allow increased adoption rates of new plant varieties
> improve coordination of the release of new varieties
> promote and improve the NVT program to ensure that growers select the varieties that offer them the greatest potential.

The GRDC will work with its partners to facilitate faster adoption of superior varieties.
## Varieties objective:
 Growers have access to superior varieties that enable them to effectively compete in global grain markets

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Critical success factors</th>
<th>Key performance indicators*</th>
</tr>
</thead>
</table>
| Build and sustain world-leading breeding programs | • Breeding programs with clearly defined technical breeding targets and performance criteria  
• Breeding programs with regular access to reliable market signals  
• Breeding programs using efficient and cost-effective royalty collection systems (including seed royalties and EPRs) and improved management systems  
• Breeding programs that are commercially run  
• Research partners continuing to invest in breeding programs for crops where market failure exists | • Annual yields as measured in NVT trials increase by:  
  - 1.0% for wheat and barley  
  - 1.5% for canola  
  - 2.0% for pulses  
  - 1.5% for sorghum  
• By 2010, 90% of the wheat entries in NVT trials meet minimum disease standards for rust resistance  
• By 2010, 90% of the canola entries in NVT trials have blackleg resistance scores of 7 or above  
• Australian wheat continues to enjoy price premiums in important Asian markets  
• By 2010, EPR and seed royalty compliance is greater than 80% nationally (measured by consolidating breeding program data)  
• Breeding population size is expanding or being maintained on reduced resources  
• Where market failure exists, the GRDC’s research partners contribute at least 50% of the costs of running the breeding program |
| Focus pre-breeding research on key traits        | • Pre-breeding research that is world class and coordinated nationally and internationally  
• Key traits identified and prioritised  
• Research partners continuing to invest in pre-breeding research  
• Genetic resource centres supported | • Evidence of excellent scientific research and effective collaboration both nationally and internationally through independent, expert scientific reviews to be conducted in 2008 and 2010  
• By 2008, organisations responsible for at least 80% of the pre-breeding research have agreed to focus 50% or more of their resources on an agreed set of national and regional traits  
• There is evidence that genes, germplasm and enabling technologies developed in GRDC supported pre-breeding research are being utilised in breeding programs  
• The GRDC’s research partners contribute at least 50% of the cost of all pre-breeding research  
• There is evidence of pre-breeding and breeding programs using the material and information from the genetic resources centres (measured in terms of the number of accessions used) |
| Develop a path to market for genetically modified crops | • Increased market confidence in the coexistence of GM and non-GM crops in Australia  
• Access to leading-edge technologies with freedom to operate for Australian R&D  
• Effective commercial partnerships in place, with the capacity and the commitment to deliver transgenic crops to Australian grain growers | • By 2008, responsible stewardship protocols for GM crops have been developed and adopted by industry  
• By 2008, there is increased market acceptance for GM canola  
• By 2009, Australian researchers have access to key enabling technologies  
• Market acceptance for GM crops other than canola has been achieved  
• Australian breeding programs have access to novel traits which reduce key limitations to grain production  
• Value propositions have been developed and effective delivery platforms are in place for the production of GM crops in Australia |
| Facilitate faster adoption of superior varieties  | • Improved marketing of new varieties  
• Faster increase of quality seed  
• More efficient seed distribution systems  
• Breeding programs continuing to enter varieties into the NVT  
• Growers accessing information that enables them to make informed decisions about variety selections | • By 2010, there has been a 20% increase in the rate of adoption of new varieties (measured by consolidating breeding program data)  
• By 2010, 80% of all paid advisers are using NVT results to assist growers with variety selections  
• By 2010, 90% of relevant breeding programs are participating in the NVT  
• There is an increase in the number and effectiveness of variety management packages |

* Key performance indicators are over the plan period, unless otherwise stated
**New Products**

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

**Strategies**
The New Products LOB will achieve its objective by implementing four strategies:

> identify national and international technology relevant to the grains industry
> develop partnerships to deliver new technology
> undertake product development to meet market requirements
> build robust business cases that demonstrate stakeholder return on investment.

These strategies will be implemented by investing in new grain products and new farm products and services. New grain products covers grain uses, such as food and industrial uses (including biofuels), feed and food safety, and grain hygiene. New farm products and services covers farm inputs (goods and services) and grain handling and storage.

**Identify national and international technology relevant to the grains industry**
The GRDC will:

> monitor developments and opportunities in technology in Australia and overseas through research and interaction with other organisations
> identify opportunities to help new technology reach the Australian industry and market sooner.

**Develop partnerships to deliver new technology**
The GRDC will:

> build partnerships to deliver new technology, developed in Australia or overseas, to the Australian marketplace
> leverage R&D in new grain products to increase the quantum of investment.

**Undertake product development to meet market requirements**
The GRDC will equip the industry to meet the rising demand for feed grains in Australia by seeking a better way to assess the value of feed grain qualities for specific feed markets. As a member of the Feed Grain Partnership, which involves representatives from throughout the grain supply chain, the GRDC will support activities to survey and periodically report on the Australian feed grain situation.

In the area of biofuels, the GRDC will seek to investigate and identify opportunities for Australia in terms of either breeding targets for the Varieties LOB or new technologies to be deployed. This will include supporting studies to examine the feasibility of producing ethanol from crop residue in different Australian regions.
New Products objective: Deliver new products and services (both on farm and off farm) that will assist growers to effectively compete in global grain markets

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Critical success factors</th>
<th>Key performance indicators*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify national and international technology</td>
<td>• New sources of technology identified                                                   • Six new technologies with the potential to deliver benefits to growers are identified each year</td>
<td></td>
</tr>
<tr>
<td>relevant to the grains industry</td>
<td>• International and national technology suppliers engaged                                 • At least one new international supplier is engaged each year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The GRDC perceived as a reliable partner by technology suppliers                       • The GRDC receives five unsolicited offers of new technology each year</td>
<td></td>
</tr>
<tr>
<td>Develop partnerships to deliver new technology</td>
<td>• Existing partnerships developed                                                        • The Crop Biofactories Initiative identifies a pathway to market for each product being developed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• New partnerships developed to deliver technology to growers                             • The Philom Bios (Australia) Pty Ltd joint venture delivers new technology to the Australian market</td>
<td></td>
</tr>
<tr>
<td>Undertake product development to meet market</td>
<td>• Potential new products identified                                                     • The high-amylose wheat joint venture delivers a new product to market</td>
<td></td>
</tr>
<tr>
<td>requirements</td>
<td>• Market assessments undertaken                                                          • A national industry stored grain partnership is established</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• New products tested under market conditions                                            • One new partnership is established each year</td>
<td></td>
</tr>
<tr>
<td>Build robust business cases that demonstrate</td>
<td>• Business cases developed for all new investments, using valuation methodology to      • Any new investment greater than $250,000 per annum is supported by a full business case</td>
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<tr>
<td>stakeholder return on investment</td>
<td>demonstrate returns to growers and investors                                             • Investment income generated for the GRDC is greater than $500,000 each year across all investments</td>
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<tr>
<td></td>
<td>• Where there are returns to the Australian Government, business cases developed         • Investment generated from external sources for the GRDC’s New Products projects is $5 million each year</td>
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<td></td>
<td>that identify the Government research priorities that will be actively addressed</td>
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* Key performance indicators are over the plan period, unless otherwise stated

The GRDC will develop a business case for each investment having a commercial focus to ensure that the proposed new products and services have sufficient market demand to justify the investment. The GRDC will select the right investment partners, who will:

> have a good understanding of the relevant market
> identify the right market signals
> help with the development of market-ready products and services beyond the R&D stage.

Build robust business cases that demonstrate stakeholder return on investment

The GRDC will:

> follow its commercialisation investment guidelines in identifying appropriate projects to support
> conduct sound market analysis to establish a robust business case, based on the balance of risk and rate of return to growers, commercial investors and the GRDC, before supporting an investment proposal.

The GRDC will develop a business case for each investment having a commercial focus to ensure that the proposed new products and services have sufficient market demand to justify the investment.
Communication & Capacity Building

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

Strategies
The Communication & Capacity Building LOB will achieve its objective by implementing four strategies:
> ensure planned, targeted, measured communication
> coordinate a national approach to building industry and research capacity
> leverage delivery through partnerships
> develop demand-driven publications and products.

These strategies will be implemented by focusing on corporate communication, delivery of publications and products, and capacity building.

Ensure planned, targeted and measured communication
The GRDC will package and deliver information in a range of formats designed to meet the specific needs of its diverse stakeholders, who have a variety of communication styles and preferences. To maximise the effectiveness of communication information, the GRDC will use the customer segments identified in the Practices LOB to target delivery and impact.

The GRDC will:
> disseminate current information on R&D activities and results to stakeholders
> facilitate the uptake of research outcomes by the Australian grains industry
> maximise the efficient and effective use of research funds (fostering research collaboration and eliminating duplicated efforts)
> establish industry confidence in, and support for, the research directions and strategies developed by the GRDC, by generating awareness of the GRDC’s activities, predominantly through campaigns coordinated across all LOBs
> create a feedback loop from Australian grain growers, the Australian Government and research partners to the GRDC to measure the effectiveness of activities and improve performance

Figure 12—Communication & Capacity Building objective and strategies

Coordinate a national approach to building industry and research capacity
The GRDC will work collaboratively with the State, Territory and Australian Governments, Australian research institutions, private businesses, and other industry partners to coordinate a national approach to building industry and research capacity. This will help to reduce duplication in the courses and training opportunities available to growers, consultants and agribusiness organisations.

Leverage delivery through partnerships
The GRDC will collaborate with universities, state departments, other RDCs, private agribusinesses and other private companies, and grower groups, to build innovative ways to make better use of communication networks, reduce duplication of research outputs and strengthen key messages.

Develop demand-driven publications and products
The GRDC will develop new and innovative publications and products that:
> are driven by grain growers’ needs
> ensure timely delivery of relevant and important information
> are in formats that are appropriate for their intended users
> use effective distribution networks to reach targeted audiences.
**Communication & Capacity Building objective:**

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

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Critical success factors</th>
<th>Key performance indicators*</th>
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</table>
| Ensure planned, targeted, measured communication | • Strong internal understanding of the GRDC’s stakeholders’ needs  
• Greater stakeholder familiarity with the extent and diversity of the GRDC’s role  
• Strong two-way communication and information exchange between the GRDC and its stakeholders  
• High levels of brand recognition among target audiences (with the GRDC regarded as a principal source of technical and industry information)  
• Key stakeholder awareness of the GRDC’s research activities, outputs, impacts and value to industry  
• Communication strategies developed for each delivery channel | • Innovative communication initiatives are delivered each year  
• The proportion of growers significantly valuing *Ground Cover* supplements as a credible source of information increases from 25% to 50%  
• National media coverage of the GRDC’s research activities is increased (to be measured against benchmarks established in 2007)  
• Unaided awareness of the GRDC increases through targeted communication activities (from 68% in 2006 to 90% by 2010)  
• The number of favourable mentions of the GRDC in the media increases (to be measured against benchmarks established in 2007)  
• By 2010, the proportion of growers who are aware of the GRDC’s regional panels increases to 70% |
| Coordinate a national approach to building industry and research capacity | • Capacity supply chain and needs analysis completed  
• Strong relationships with industry and research capacity suppliers nationally  
• Awareness of skill and knowledge development opportunities for researchers, grain growers, farm advisers and industry members  
• Strategic capacity-building investment portfolio in place | • By 2008, a nationally coordinated agricultural research capacity-building strategy is developed  
• Industry satisfaction that agreed knowledge gaps are being addressed increases (to be measured against benchmarks established in 2007)  
• The number and value of co-funding arrangements with industry and research partners, including other RDCs, increases from the current baseline |
| Leverage delivery through partnerships | • Strong cooperative relationships with national and international research partners  
• Collaboration in R&D communication and extension activities with research partners  
• Delivery channels identified and relationships developed | • The effectiveness of industry collaborations to deliver the GRDC’s research outputs can be demonstrated  
• Participation in the GRDC’s training and development programs increases  
• Innovative partnerships are developed to maximize the impact of information dissemination |
| Develop demand-driven publications and products | • Cross-LOB collaboration to identify potential opportunities for developing and delivering new publications and products—including through existing agribusiness networks  
• Regular monitoring of current and emerging issues  
• Resources for the development of responsive, stakeholder-specific information products  
• Accessibility of knowledge and information emerging from current and completed research projects (through a standardised final report template for research publications) | • The number of new opportunities identified by LOBs and jointly delivered to stakeholders increases  
• Stakeholders are satisfied that information products are timely, targeted, coherent and specific to needs (to be measured against benchmarks established in 2007)  
• The proportion of growers accessing the GRDC’s web site increases from 25% to 50% of growers surveyed |

* Key performance indicators are over the plan period, unless otherwise stated

The GRDC will work collaboratively with the State, Territory and Australian Governments, Australian research institutions, private businesses, and other industry partners to coordinate a national approach to building industry and research capacity.
**Commercialisation**

Commercialisation is a means of delivering technology to Australian grain growers so that they can effectively compete in global grain markets. The GRDC’s primary objective in commercialising research outputs is to make new, improved technology and crop varieties available to Australian grain growers quickly and as cost-effectively as possible.

The GRDC will achieve its objective in commercialising research outputs through:

- ensuring commercialisation activities are aligned with the GRDC’s corporate strategies and relevant to the GRDC’s LOB strategies
- leveraging capital and expertise from co-investors, to maximise opportunities to bring the technology to the marketplace and give grain growers access to the technology
- developing comprehensive business plans for delivering satisfactory returns to grain growers and investors.

As part of the overall commercialisation strategy, the GRDC recognises that, after the proof-of-concept stage, the following are necessary for commercialisation: a sustainable market size, expertise, funds, and distribution channels. Investments in joint ventures and companies will be based on the merits of business cases that demonstrate these attributes.

In selecting investment structures, the GRDC will follow its internal guidelines, and identify and implement the most appropriate structure for holding its equity in each business arrangement. The GRDC will ensure that all commercial entities with which it is involved have appropriate boards that possess the broad range of skills required to manage a business.

The GRDC’s primary objective in commercialising research outputs is to make new, improved technology and crop varieties available to Australian grain growers quickly and as cost-effectively as possible.
Investment approach

Over the next five years, the GRDC’s R&D investments will be driven by the corporate and LOB strategies set out in the Strategic R&D Plan. The three regional panels and the National Panel will ensure that the GRDC’s investment portfolio reflects both growers’ priorities in each region and the Australian Government’s priorities.

Figure 13—Allocation of investment funds by line of business, 2007–08

Portfolio balance analysis

The GRDC will undertake an internal portfolio balance analysis early in the plan period. This will be followed by a similar exercise at the national level. It is expected that the portfolio balance exercise at the national level will lead to the development of centres of excellence in Australia, which in some cases will be based on a realignment of existing infrastructure and skills.

The R&D portfolio balance will be measured in terms of:

- pure basic research, strategic basic research, applied research, and experimental development
- public good (including goods related to market failure) and industry-specific good
- financial benefits to growers and risks
- delivery time to growers of R&D products and services and probability of success.
Grains value driver analysis

The GRDC’s value driver analysis will prioritise the drivers of grower profitability and sustainability in the grains industry. A graphical representation of the analysis is shown in Figure 14.

Figure 14—Grains value driver analysis

In broad terms, revenue, costs and capital form the basis of the grains industry’s total factor productivity. Similarly, environment and market viability form the basis of the growers’ sustainability. The analysis will further break down each of these factors to measure the relative impact of the underlying variables.
As outlined in this Strategic R&D Plan, *Prosperity through Innovation*, the grains industry is continuing to experience significant change driven by market dynamics and the challenges of climate change and climate variability and sustainability. The plan goes into considerable detail on these changes and how they will impact the Australian grains industry.

Over the years, research and development has played a pivotal role in the success of the grains industry and contributed significantly to total factor productivity growth, which has tracked well ahead of other rural industries and the Australian economy as a whole. The RDC model, a co-investment partnership in agricultural research and development between the Australian Government and rural industries, remains the envy of many of our overseas competitors.

The aim of the Strategic R&D Plan is to continue to focus on driving the outputs of research and development into technologies and services, through the lines of business strategies, which will support Australian grain growers to effectively compete in the constantly changing grain markets. The strategies to achieve this aim are clearly articulated in the plan and are consistent with the National Research Priorities and Rural R&D Priorities.

The successful implementation of these strategies will depend on the GRDC working closely with its key stakeholders and research partners to:

- jointly determine key research priorities
- design appropriate R&D investments with clearly defined outcomes
- monitor these investments right through to delivery.

The main emphasis in this Strategic R&D Plan is on collaboration with clearly defined performance measures and outcomes that will provide growers with the technologies and practices they require to remain competitive in global grain markets.

PETER F. READING
Managing Director

Postscript

Abbreviations list

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ACRCP</td>
<td>Australian Cereal Rust Control Program</td>
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<tr>
<td>BBA</td>
<td>Barley Breeding Australia</td>
</tr>
<tr>
<td>CCB</td>
<td>Communication and Capacity Building</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>International Maize and Wheat Improvement Center</td>
</tr>
<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
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<tr>
<td>EPR</td>
<td>End Point Royalty</td>
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<tr>
<td>FOB</td>
<td>Free on board</td>
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<tr>
<td>GM</td>
<td>Genetically modified</td>
</tr>
<tr>
<td>GRDC</td>
<td>Grains Research and Development Corporation</td>
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<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
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<tr>
<td>LOB</td>
<td>Line of Business</td>
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<td>NVT</td>
<td>National Variety Trials</td>
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<td>PIERD Act</td>
<td>Primary Industries and Energy Research and Development Act 1989</td>
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<tr>
<td>PBA</td>
<td>Pulse Breeding Australia</td>
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<tr>
<td>RAC</td>
<td>Research Advisory Committee</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>RDC</td>
<td>Research and Development Corporation</td>
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