



Australian Government

Grains Research and
Development Corporation



GRDC[®]

GRAINS RESEARCH
& DEVELOPMENT
CORPORATION

ANNUAL REPORT 2020–21

GRDC

Grains Research and Development Corporation is a corporate Commonwealth entity established to plan and invest in research, development and extension (RD&E) for the Australian grains industry.

Its primary objective is to drive the discovery, development and delivery of world-class innovation to enhance the productivity, profitability and sustainability of Australian grain growers and benefit the industry and the wider community.

Its primary business activity is the allocation and management of investment in grains RD&E

ENABLING LEGISLATION

Primary Industries Research and Development Act 1989

GRDC'S PURPOSE

To invest in research, development and extension to create enduring profitability for Australian grain growers.

MINISTER

The Hon David Littleproud MP

REPRESENTATIVE ORGANISATIONS

GrainGrowers Limited

Grain Producers Australia Limited

Letter of transmittal



7 October 2021

The Hon David Littleproud MP
Minister for Agriculture and Northern Australia
Parliament House
CANBERRA ACT 2600

Dear Minister

It is my pleasure to present the annual report of the Grains Research and Development Corporation (GRDC) for the year ended 30 June 2021, in accordance with section 46 of the *Public Governance, Performance and Accountability Act 2013* and section 28 of the *Primary Industries Research and Development Act 1989* (PIRD Act).

GRDC is confident that its performance in 2020–21 has contributed to the industry's and government's vision for a sustainable, productive, competitive and profitable Australian grains industry.

This performance is consistent with GRDC's responsibility to plan, execute and report against the:

- objects of the PIRD Act as they apply to GRDC;
- planned outcomes of GRDC's 2018–2023 Research, Development and Extension Plan and Annual Operational Plan 2020–21;
- outcome and performance measures set out for GRDC in the Agriculture Resources Portfolio Budget Statements 2020–21; and
- core requirements of the Funding Agreement 2020–30, in particular the five performance principles.

The annual report was prepared under the direction of the Board and approved by a resolution of GRDC's directors on 7 October 2021.

Yours sincerely

A handwritten signature in blue ink, appearing to read "John Woods".

John Woods
Chair



The Australian grains industry in 2020–21



\$13.77b

Gross value of production



Australia's second-biggest winter crop on record



Highest yields on record for wheat, barley, canola, chickpeas, field peas and lupins



Grains are the second largest Australian agricultural industry by value, accounting for 27% of total gross value of production

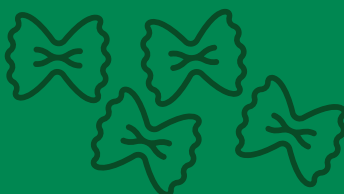


\$12.4b

Value of exported grains

759

million tonnes
Global wheat consumption



22,500*

Number of grain farms



36,499

million metric tonnes
Volume of grains exported

*ABARES definition of grain farms since 2015–16 = establishments with an estimated value of agricultural operations (EVAO) of \$40,000 or more

Investment and impact in 2020–21

\$168.9m

Total investment expenditure

602

Total number of active investments

Investments by objective — Number of investments and investment value

\$68.9m

Objective 1

\$9.3m

Objective 2

\$61.8m

Objective 3

\$1.7m

Objective 4

\$1.5m

Objective 5

14%

Percentage new investment (\$23.2m)

\$145.0m

Ongoing investments

Intellectual property statistics

Patents and trademarks, Plant Breeders' Rights (PBRs), new varieties

24

patent families across

110+

commercial agreements including

126

Plant Breeder's Rights across

43

countries

3

new agreements

20

crop species

GrainInnovate

13 investments and for every dollar invested by GRDC **over \$15** of co-investment has been contributed by Artesian and other sources

\$4.1m

royalty revenue

21

trademarks



Stakeholder engagement snapshot

Grains Research Updates

29

number of events
(face to face,
livestream and
webinars)

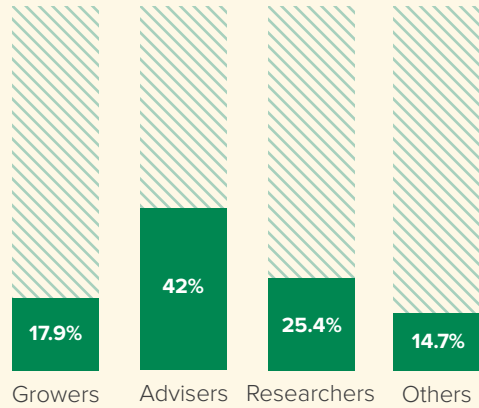
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relevance
of content



7200

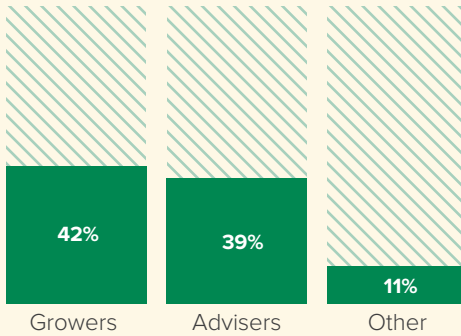
total
attendees



Farm Business Updates

24

events, on location
and livestream



1914

attendees
(avg 80 attendees
per event)

Livestream content
relevance rated
8.9/10

On site content
relevance rated
8.6/10

Feedback received
from **500**
respondents

GRDC subscribers

36,200

Groundcover

29,514

Regional newsletters



Five years at a glance



Revenue



Expenditure



Operating
result



Total assets



Total equity



Industry
contributions

2020–2021	2019–2020	2018–2019	2017–2018	2016–2017
\$244.0m	\$173.2m	\$206.9m	\$213.8m	\$242.4m
\$203.6m	\$218.7m	\$206.5m	\$219.8m	\$227.7m
\$39.9m	(\$45.9m)	\$0.26m	(\$6.5m)	\$14.8m
\$324.6m	\$279.3m	\$297.3m	\$268.2m	\$307.2m
\$276.9m	\$217.5m	\$263.0m	\$199.4m	\$205.8m
\$157.3m	\$95.8m	\$114.1m	\$117.3m	\$139.4m



Commonwealth
contributions



R&D
expenditure



Employee
benefits



Suppliers



Number
of projects

2020–2021	2019–2020	2018–2019	2017–2018	2016–2017
\$68.8m	\$59.4m	\$69.3m	\$71.3m	\$73.3m
\$168.9m	\$182.4m	\$174.0m	\$192.1m	\$198.1m
\$14.4m	\$13.6m	\$13.3m	\$13.2m	\$10.9m
\$12.1m	\$16.9m	\$16.6m	\$10.5m	\$11.6m
602	719	767	742	700



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Report from the Chair

I am pleased to present Grains Research and Development Corporation's Annual Report 2020–21 on behalf of the Board, Executive team and staff.

The 2020–21 cropping season was an above average one for many Australian grain growers, after in some cases years of drought. However, given the variable nature of agriculture there were still regions that struggled with dry conditions.

Understanding the increasing challenges that growers face with seasonal variability is one of the driving reasons we need an effective national research, development and extension (RD&E) organisation. GRDC is committed to investing in strategic RD&E to deliver outcomes that support growers dealing with unpredictable seasons, through new traits, improved farming systems knowledge, technology advances and other research outcomes.

Research also plays a pivotal role when it comes to crop protection and this has been evident across much of eastern Australia during the past year, as rural and regional communities struggled with a devastating mouse plague. There is no magic solution for mouse control, but GRDC's research investments with CSIRO helped to deliver recent changes in zinc phosphide bait concentrations that will improve efficacy and recently received APVMA approval. GRDC has invested more than \$4.6 million in mouse management and continues to support projects focused on ecology, biology and management, surveillance and mouse feeding preferences. During 2020–21 we delivered this information to growers through a range of on-line and face-to-face events, including a mouse management webinar that attracted more than 300 participants and has since had more than 800 views.

Reviewing where and how we invest on behalf of Australian grain growers and ensuring we continue to deliver RD&E that supports long-term grower sustainability and profitability remains GRDC's core purpose.

At an industry level GRDC is also involved in a number of key strategic initiatives that keep us firmly engaged with, and delivering for growers.

GRDC's involvement with Agricultural Innovation Australia (AIA) will deliver for growers, particularly those running livestock or involved in other commodities and contributing to multiple R&D levy schemes. This collaboration will drive improved interaction across agriculture, decrease duplication, and increase delivery on hard to solve, whole of sector challenges. This will include initiatives such as challenges with climate, biosecurity, soils and water, that will help agriculture reach the ambitious \$100 billion farmgate value national target by 2030.

In August 2020, GRDC was integral in the establishment of Grains Australia Ltd (GAL), which is an industry good organisation tasked with key functions to enhance outcomes and deliver value and efficiencies for growers and the broader supply chain. This year GAL has moved ahead under the leadership of inaugural chief executive officer, Jonathan Wilson and an experienced board, and is working with industry to explore trade and market access, commodity variety classification, market information and education.

Within GRDC, but with a decidedly outward focus, our commercialisation activity has gone from strength to strength. In April 2021, the \$11.5 million commercial oats breeding program passed from the R&D space to InterGrain, heralding a new era for this crop and improved opportunities for growers. New varieties coming through the InterGrain pipeline will assist industry meet that all important consumer demand.

COVID restrictions continue to challenge us all. But like our growers and research partners, who have been innovative and resourceful in overcoming the hurdles that have come with the pandemic, GRDC staff have been agile in ensuring an ongoing delivery of RD&E information to industry. During the past 12 months the organisation delivered more than 50 face-to-face and online events nationally as part of the GRDC Update series reaching an audience of more than 8800 growers and advisers. These were just a part of GRDC-supported events, workshops and field days developed to share research outcomes and build grower and adviser knowledge to inform on-farm decision making.



Engagement with our key stakeholders remains an integral part of our operation. We connect through our established regional advisory panels where 30 growers, advisers, researchers and industry stakeholders represent the sector to GRDC to inform RD&E investments. Panels ensure investments are developed in the best interests of growers and deliver impact to industry.

This year we reviewed our approach to industry engagement and evolved the Regional Cropping Solutions Network to what is now known as the GRDC National Grower Network (NGN). This incorporates the best of the old model into a responsive open forum to deliver local RD&E and provide feedback to GRDC on investments and priorities. This engagement model has traditionally seen GRDC reach an estimated 1000 growers and advisers across the country. Under the NGN the number of local forums will increase, which is expected to significantly boost the number of people we are engaging with at a grassroots level.

Encouragingly GRDC's 2021 annual grower survey indicated 79 per cent of respondents felt they had directly benefitted from RD&E that was supported by GRDC. The survey also showed grower confidence in the future of the grains industry was at the highest level since 2005, with just under 60 per cent of respondents viewing the industry in 'extremely good to good shape'. The survey also revealed that 96 per cent of growers are aware of GRDC's flagship investment, the National Variety Trials program, and 93 per cent are using NVT data to inform their on-farm decision making.

On the practice change front, nine out of 10 growers surveyed reported that they had changed on-farm practices over the past three years with nearly two thirds stating this was due to R&D outcomes and/or GRDC information. This is a powerful demonstration of the value of quality RD&E and the willingness and confidence growers have to embrace change that drives profitability.

In closing I would like to thank General Counsel and General Manager, People, Communications and Governance, Cathie Warburton, who stepped forward as Interim Managing Director in May 2021 following the departure of the former Managing Director. At the time of this report recruitment was well underway for a new Managing Director.

I would also like to thank my fellow Board Directors, the Regional Panel Chairs and members, the Executive Committee and staff, who work together to ensure GRDC's continued investment in high-quality RD&E on behalf of Australian grain growers. I am proud of the work that we do and the role we play in delivering improvements that result in greater profitability on farm.

Yours sincerely



John Woods
Chair



About GRDC

GRDC's purpose is to invest in research, development and extension (RD&E) to create enduring profitability for Australian grain growers.

GRDC invests in RD&E projects to deliver new and improved varieties, farming practices, technologies and capability to the Australian grains industry. These investments drive the discovery, development and delivery of world-class innovation.

Our role includes 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.

Board and executive

GRDC's Board is responsible for the stewardship of the corporation and oversees corporate governance within GRDC. The Board's functions include setting strategic direction and monitoring the ongoing performance of the business and the Managing Director. More information on the Board is provided in Part 3 of this report.

The Executive Committee is comprised of the Managing Director and the General Managers of GRDC's business groups. The committee leads GRDC's business activities, advises the Board and implements the Board's decisions. It meets regularly to ensure that GRDC's operations are monitored and managed efficiently and effectively.

Structure

Figure 1 shows GRDC's organisational structure at 30 June 2021.

Figure 1: Structure at 30 June 2021



Business groups

At 30 June 2021, GRDC had five business groups with subgroups as follows:

- Applied Research, Development and Extension—Agronomy, Soils and Farming Systems; Biosecurity and Regulation; Crop Protection; Extension and Communication
- Genetic and Enabling Technologies—Genetic Technologies; National Variety Trials; and Enabling Technologies
- Strategy and Business Development—Business Development; IP and Licensing; and Economics
- Operations—Finance; Regional Management; IT; and Business Support
- People, Communications and Governance—Human Resources; Communications; Digital and Publications; Governance; Industry and Government Relations; and Legal

Investment planning and assessment are performed by cross-functional teams involving input from relevant units across GRDC, while individual investment contracts are negotiated and monitored by managers within relevant units.

Advisory panels

Four advisory panels provide input on priorities and proposals for RD&E investment.

The National Panel:

- assesses national RD&E priorities across GRDC's investment portfolio and makes recommendations on investment priorities and investment proposals to the Managing Director
- assists the Managing Director to maintain links with grain growers, advisers and research partners.

Three regional advisory panels, one for each grain growing region—composed of grain growers, agribusiness representatives and researchers representing each of Australia's major grain-growing regions provide advice and input to the National Panel.

More information on the advisory panels is provided on GRDC website, at grdc.com.au/about/what-we-do/regional-panels.

Funding

GRDC is principally funded by levies paid by grain growers and contributions paid by the Australian Government.

The levies are collected at the first point of sale and based on a percentage of the net farm gate value of 25 crops:

- wheat
- coarse grains—barley, oats, sorghum, maize, triticale, millets/panicums, cereal rye and canary seed
- pulses—lupins, field peas, chickpeas, faba beans, vetch, peanuts, mungbeans, navy beans, pigeon peas, soybeans, cowpeas and lentils
- oilseeds—canola, sunflower, safflower and linseed.

The Australian Government matches the levy contributions up to a limit of 0.5 per cent of the three-year rolling average of the gross value of production of the 25 leviable crops.

Other sources, including interest, royalties and grants, contribute a smaller proportion of GRDC's income.



Collaboration and co-investment

Effective partnerships with co-investors enable GRDC to leverage resources and research capability; share market knowledge, technologies and intellectual property; and reduce the risk associated with individual investments. Significant collaborative arrangements during 2020–21 include:

Grains Australia Limited

A joint initiative between GRDC, Grain Growers Ltd, Grain Producers Australia and Grain Trade Australia, the formation of Grains Australia Limited combines a multitude of industry good functions under one organisation. Grains Australia's core functions will be to establish and maintain a grain variety classification system; provide services that maintain and improve trade and market access; develop long term market and consumer analysis and product awareness to support longer term demand and value creation and lastly, ensure technical support and training is available for customers of, and participants in the Australian grains industry.

While GRDC is currently the sole member of Grains Australia, the company has been established with widespread support from industry and will consolidate the delivery of important services and functions on behalf of the grains supply chain.

Agricultural Innovation Australia Limited

Agricultural Innovation Australia Limited (AIA), a new company targeting transformational innovation across agriculture, was formed in October 2020. All 15 Rural Research and Development Corporations (RDCs), including GRDC were its founding members.

AIA was established to catalyse public and private sector investment, and enhanced collaboration, in solving the biggest cross-sectoral challenges in Australian agriculture. As a single point of contact for cross-industry strategies, AIA will make it easier for investors from around the world to navigate and partner with the Australian agricultural system.

RDCs contribute subscription fees and will benefit from enhanced collaboration and more effective leveraging of funding, knowledge and resources.

The scope of AIA's strategies will cover the agriculture, fisheries and forestry value chains.

More information can be found here: aginnovationaustralia.com.au

Herbicide Innovation Partnership

The Herbicide Innovation Partnership (HIP) is a co-investment between GRDC and Bayer Cropsience to boost weed research capacity, discovery and development of herbicides with new modes of action.

HIP research places Australian growers' interests at the heart of Bayer's herbicide discovery program. As a part of this commitment, candidate compounds are routinely tested for efficacy against Australian weeds, including herbicide-resistant weed species, at the earliest stages of development, and are trialled in the field in Australian conditions to ensure suitability for Australian farming systems.

Climate change initiative

The Council of RDCs commenced a Climate Initiative to drive innovation that creates long-term adaptation to climate change. This Initiative has now developed an investment plan that was launched in February 2021. Its vision is to support a thriving agriculture sector irrespective of climate.

The next step is to work with Agricultural Innovation Australia to build an investment prospectus to attract the investment required to deliver the outcomes developed in the investment plan. GRDC will assist in developing the prospectus to ensure that the research supports Australian grain growers.

Joint RDC – Community Trust Program

Ten of the RDCs along with the NSW Department of Primary Industries and the National Farmers Federation are jointly investing in a program to gain insights into community trust in Australia's rural and agricultural industries. The aim of the program is to:

- Develop capability across the sector to monitor, anticipate and respond to shifts in the levels of trust the community has in Australia's rural industries.
- Build a common language and collective national narrative around the community trust challenge.
- Identify common best practice approaches, strategies and interventions for building, rebuilding and maintaining community trust.



Rural Health and Safety Alliance

The Rural Health and Safety Alliance (RSHA) is a partnership led by AgriFutures Australia in collaboration with GRDC and seven other RDCs. The RSHA has recently released a new national report that highlights the overlap in health and safety risks across 12 agricultural and fisheries sectors, which result in fatality, injury, and illness.

The report aims to inform the RSHA's cross-sector investment in research, development, and extension projects to reduce the incidence of death and serious injury.

This investment recognises the need for RDCs to work together on a cross-sectoral research, development, and extension strategy for WHS, as while each sector has specific health and safety challenges, the broader challenges need to be addressed by more than one RDC – WHS requires a strategic approach from the entire agricultural sector. This provides the greatest possible chance identifying key WHS pain points and in targeting research that supports a healthy and safe grain growing workforce.

Bilateral agreements

In order to further leverage levy funds and to strengthen capacity across the grains R&D sector, GRDC has bilateral agreements with research partners that were identified in the Grains Industry National RD&E Strategy as leading the research effort in specific priority areas. These bilateral agreements are targeted so that investments are directed toward areas that will deliver the greatest impact to growers and provide the best return on the investment.

Bilateral agreements provide funding certainty to key research partners, allowing for strategic investment and planning over the longer term to continually build Australia's technical capabilities. Grain growers benefit through highly targeted investments in areas of key importance to the Australian grains industry with research organisations that are best placed to deliver the desired results. The strategic and responsive management structures within the bilateral agreements allow greater flexibility to pursue research results showing potentially beneficial outcomes as they occur. In turn, the longer-term funding certainty, along with research flexibility, attracts the best researchers from within Australia and internationally.

Improved coordination and flexibility in managing a suite of research projects promotes collaboration, reduces duplication and fragmentation of effort, whilst driving down operational and corporate overhead costs for both parties.

Three bilateral agreements are currently in place with:

Curtin University, the Centre for Crop and Disease Management (CCDM), Curtin University has built a \$45M facility to house over 70 scientists working on Australian grains diseases.

The CCDM has four key program areas on which it focuses:

- Agribusiness and agronomy
- Cereal diseases
- Canola and pulse diseases
- Fungicide resistance

Agriculture Victoria, the bilateral agreement focusses on High Rainfall Zone cropping, cropping, regional capacity in development and extension activities, cereal pathology, biosecurity, soil and nutrient management

NSW Department of Primary Industries, the bilateral agreement has three programs, focussed on winter crop pathology, winter crop agronomy and physiology and infrastructure and capacity building.

Other collaborative arrangements

In addition to the specific initiatives and investments outlined above, we have a significant portfolio of co-investments with multiple RDCs. This includes work through the Rural R&D for Profit Program, AgVet Forum, Plant Biosecurity Initiative, Feedgrain Partnership, and the Managing Climate Variability program.

Most GRDC co-investors are also research collaborators. They include state government departments, CSIRO, universities, cooperative research centres, and private sector bodies. The number of effective linkages between GRDC and agribusiness participants, including farm advisers and agronomists, is also increasing. Partnerships with agribusiness have tended to focus on the identification of R&D priorities and facilitation of the adoption of R&D outputs by grain growers.



GRDC co-invests with other rural R&D corporations (RDCs), particularly in addressing cross-sectoral issues defined under the National Primary Industries Research, Development and Extension Framework. This includes three current collaborations funded under the Australian Government’s Rural R&D for Profit program.

GRDC also builds strong relationships with international partners, both to broaden the resources available to the Australian grains industry and to access international RD&E expertise and/or capacity not available in Australia. A list of all GRDC 2020–21 investments, including details of partners is provided on GRDC website.

Planning and reporting

GRDC is strongly committed to being accountable for its performance. More information on GRDC’s accountability to grain growers, and to the Australian Government and the broader community, is provided in Part 3 of this report.

Figure 2 outlines the core elements of GRDC’s annual cycle of planning and reporting against planned objectives and statutory requirements. The documents are available on GRDC’s website: <https://grdc.com.au/about/who-we-are/corporate-governance>

Location

Australian grains production occurs across three regions—comprising 13 different agroecological zones—with distinct climate, cropping and market characteristics, as described in Figure 3.

GRDC manages RD&E investments and delivers services to meet the needs of each region and the industry through a network of four offices: a national office in Canberra and regional offices in Adelaide, Perth and Toowoomba. GRDC also has satellite offices in Wagga Wagga and Horsham.

This network enhances GRDC’s ability to deliver tailored benefits to growers in regional locations. Regional staff have a focus on short-term and medium-term projects that address priority issues relating to farming systems, agronomy, soils, weeds, pests and diseases.

Contact details are listed inside the back cover of this report.

Figure 2: Planning and reporting framework

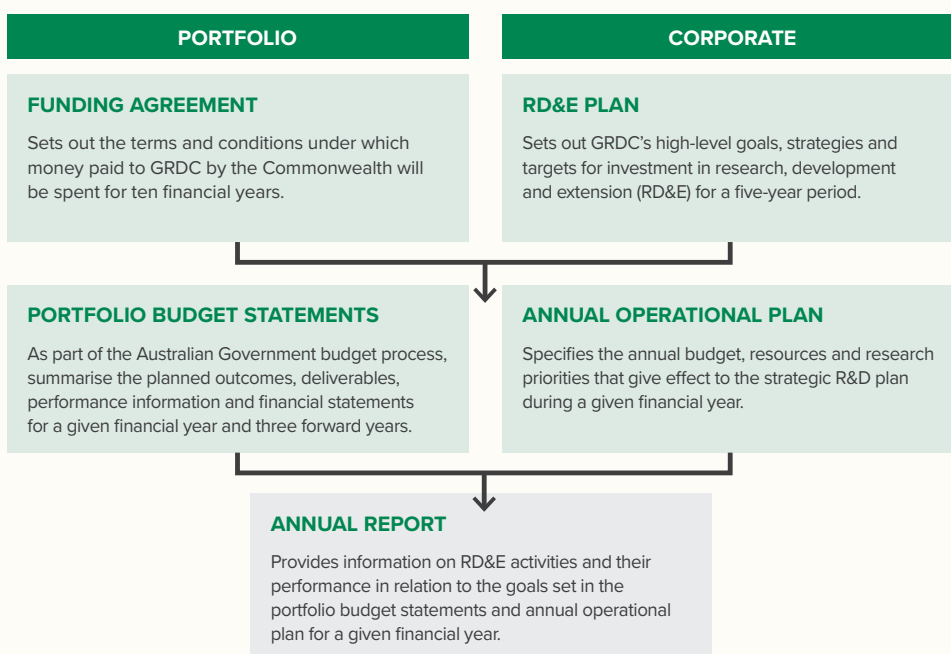
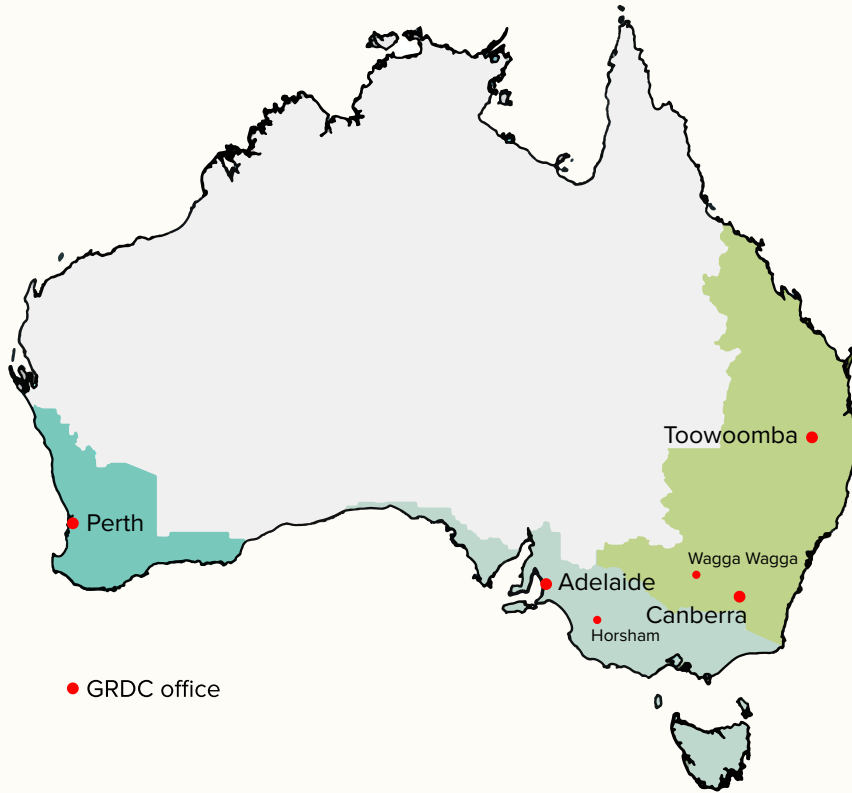


Figure 3: Grain-growing region characteristics



Northern Region	Southern Region	Western Region
<p>Key characteristics:</p> <ul style="list-style-type: none"> • high proportion of vertosol clay soils • tropical, sub-tropical and temperate environments • summer dominant cropping in Queensland, winter dominant cropping in New South Wales • high proportion of mixed farming, including sugarcane, cotton and pastures • large and diverse domestic and export markets. 	<p>Key characteristics:</p> <ul style="list-style-type: none"> • relatively infertile soils • temperate climate • yield depends on reliable spring rainfall • smaller enterprise size and diverse production patterns and opportunities • innovative phase farming with perennials • shift toward intensive livestock production and demand for feed grains • large and diverse domestic market. 	<p>Key characteristics:</p> <ul style="list-style-type: none"> • low soil fertility • Mediterranean climate • dependence on winter rainfall as spring rainfall is unreliable • large enterprise size • leading grain storage practices • narrow range of crop options • dominant export market, and transport advantage to South-East Asia.

Portfolio management

GRDC's RD&E investment portfolio in 2020–21 included 602 projects at various stages of development.

Under the 2018-2023 RD&E Plan, GRDC adopted a balanced portfolio approach to RD&E investment structured around five core objectives aligned with GRDC's purpose and government and industry objectives.

The objectives for RD&E investment focus on the four key drivers of profit—yield, price, costs (input and post farm-gate) and risk—and comprises a balanced mix of investments to:

- maintain grower profitability
- support incremental improvements in profitability in the short to medium term
- achieve transformational impact for the Australian grains industry in the long term.

Balance

The planning and delivery of an investment portfolio that delivers a balanced mix of investments to deliver outcomes to grain growers is a key function of GRDC. To achieve this GRDC considers the following elements across the portfolio of investments.

Transformational and incremental impact

Investment in RD&E can have a different quantum of impact (either directly or indirectly) on each profit driver, ranging from incremental improvements to transformational changes. Incremental profit improvements are important in maintaining grower competitiveness in current international markets. RD&E investment to support incremental improvements generally delivers on-farm changes in the short to medium term, and are characterised as having lower technical, commercial and/or adoption risk.

Transformational change underpins the innovation required to remain competitive in the long term and potentially provides opportunities for Australian growers to establish dominant positions in some markets. RD&E to support transformational change is generally high risk and requires longer time periods for delivery. In keeping with the focus on an investment culture, GRDC will shape the R&D investment portfolio to balance the need for continual incremental improvements in profit with the desire for larger transformational changes. Adjustments to the investment portfolio to transfer the focus to higher levels of integrated transformational approaches will take some time to implement, balancing current and ongoing investments with new opportunities.

Geography

GRDC's focus is on maximising the impact of RD&E on the profitability of all Australian grain growers. While investment on a regional and local basis is a critical component of any program seeking to influence grower attitude, motivation or ability to adopt new innovations, the location where the RD&E is performed will be determined only by the capability and capacity that is required. Therefore, for the provision of strategic and applied research at least, GRDC will continue to identify the most suitable providers based on merit regardless of location. This includes investment with international entities where appropriate.

GRDC continually assesses the balance of the portfolio to better understand gaps and opportunities for investment, as well as ensure that priority areas and industry wide issues are addressed.







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Measuring performance

Australian grain growers' profitability is the most definitive way to assess GRDC's performance in delivering on its purpose.

It demonstrates the achievements of our research and industry partnerships and helps to validate the rigour of our robust investment decision-making and processes.

While the impact of RD&E may be easy to see on a single farm, there is no standard unit of measurement across the sector—especially in a complex environment such as grains.

GRDC is proactively working to address factors influencing impact measurement:

We are exploring performance indicators that can calibrate the complexities and varieties of location, farming system, farm type, enterprise mix and the specific financial circumstances of individual grain-growing businesses (e.g. equity). This is important as profitability varies widely between farms and even across seasons within a single farm. Arriving at performance indicators that have relevance at a national level is therefore challenging but paramount.

We are considering how to best capture profit data. Some private sector advisers currently collect select financial performance data to assist their clients, particularly in business benchmarking exercises however, as yet there is no single collection of profit data across the industry to support standardised measurement.

We are looking at impact not only season by season but also in the long term, across decades. The long lag times between the conduct of R&D, the adoption of R&D outcomes on farm, and the impact of those outcomes on profit, as well as the number of interacting variables that can affect profit, make it difficult to directly link R&D investments to impacts.

Developing Tailored Impact Assessment Tools

We are continuing to work on developing targeted and appropriate impact assessment tools during the life of this five-year plan. Of major importance will be the establishment of farm performance data sets that allow the collection of data from like farms (e.g., based on region, enterprise mix or size) for analysis of trends in yield, price, input costs and management of risk that will inform future RD&E priorities. Aggregation of the data will also allow for more accurate assessment of the impact of GRDC RD&E investments.

Our performance measurement framework will be dynamic and will be continually reviewed and updated as new information is generated and new learnings on best practice are adopted. We will work with industry to develop performance measures that are relevant locally, regionally, and nationally.

Objectives will be monitored over a longer timeframe using a combination of data from the Australian Bureau of Statistics and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), information from industry and other survey data to track improvements and/or declines in achieving objectives but will need to make assumptions to attribute effects to RD&E outputs and outcomes.

Current data from ABARES surveys provides valuable insights into the performance of grain growers at a national scale but does not allow for more localised assessments and comparisons of performance. We are working with a range of stakeholders to determine the level of support and most appropriate methodology required for the collation of more localised farm performance data. Ultimately, analysis of more localised data over multiple years would allow not only a more informed assessment of farm performance but also the identification of new investments required to create enduring profitability and the exposure of gaps in adoption of new knowledge.



Figure 4: New performance framework



Annual performance statements

Accountable authority statement

I, John Woods, on behalf of the Board, as the accountable authority of the Grains Research and Development Corporation (GRDC), present the 2020–21 annual performance statements, as required under paragraph 39(1)(a) of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act) and section 28 of the *Primary Industries Research and Development Act 1989* (PIRD Act).

It is the Board's opinion that these annual performance statements are based on properly maintained records, accurately reflect the performance of GRDC, and are in accordance with subsection 39(2) of the PGPA Act.

Summary of performance






The results against GRDC's performance criteria in the portfolio budget statements and annual operational plan for 2020–21 are outlined in Table 1 on pages 17–19.

Analysis of our performance against targets is on pages 20–23.



John Woods
Chair, GRDC Board




Table 1: GRDC performance against portfolio budget statements measures

KEY PERFORMANCE INDICATOR	TARGET	METHODOLOGY/ UNIT OF MEASUREMENT	ACHIEVED	2020–21 RESULTS	PROGRESS/COMMENTS
<p>Purpose</p> <p>To invest in research, development and extension to create enduring profitability for Australian grain growers.</p>	<p>A minimum 6 per cent average farm business Rates of Return (RoR) by 2023</p>	<p>Measure is from ABARES Financial performance of cropping farms: 2018–19 to 2020–21 (excluding capital appreciation)</p>		<p>In 2020–21 the Rate of Return was 3.8%</p>	<p>The trend has decreased due to the drought across the east coast of Australia during between 2018 and 2020.</p> <p>Based on the 10-year trend, the expected RoR by June 2023 is 4.5%.</p>
<p>Objective 1 – Improve yield and yield stability</p>					
<p>Improve yield and yield stability</p>	<p>The impact of RD&E investment in meeting the objective of improving yield will be measured in terms of:</p> <ul style="list-style-type: none"> minimum yield increases equivalent to 1 per cent per annum for cereals, 2 per cent per annum for pulses and 1.5 per cent per annum for oilseeds, achieved while identifying and investing in technology for transformational improvement in yield potential and yield stability 	<p>The measure is calculated from the year-on-year percentage changes in the 5-year rolling average yields, sourced from the ABARES Australian Crop Report</p>		<p>7.04% increase on the 5-year average for wheat</p>	<p>The wheat yield was 2.19 tonnes per hectare, compared to the 5-year rolling average of 2.05 tonnes per hectare in 2019–20</p>
				<p>4.34% increase on the 5-year average for pulses</p>	<p>The pulse yield was 1.45 tonnes per hectare, compared to the 5-year rolling average of 1.39 tonnes per hectare in 2019–20</p>
				<p>5.80% increase on the 5-year average for oilseeds</p>	<p>The oilseeds yield was 1.42 tonnes per hectare, compared to the 5-year average of 1.34 tonnes per hectare in 2019–20. This is a 5.80% increase on the 5-year average</p>
	<ul style="list-style-type: none"> By 2023 a minimum 20 per cent closure of the gap between potential and actual yields 	<p>2019 National Paddock Survey (2015–2018 period surveyed)</p>		<p>Results from the 2019 National Paddock Survey showed no discernible yield gaps in 70% of surveyed wheat, barley and canola crops</p>	<p>GRDC is continuing to develop reliable measures of yield gap, including through the continuation of the National Paddock Survey and exploring Water Use Efficiency as alternative measure</p>





KEY PERFORMANCE INDICATOR	METHODOLOGY/ UNIT OF MEASUREMENT	ACHIEVED	2020–21 RESULTS	PROGRESS/COMMENTS
Objective 2 – Maintain and improve price				
Maintain and improve price	<ul style="list-style-type: none"> Active and ongoing investments that deliver improved support for grain prices 		<ul style="list-style-type: none"> Establishment of Grain Australia Limited Development of an accurate, high throughput, affordable screen for Late Maturity alpha-Amylase (LMA). 	New varieties of wheat will be screened for LMA markers at an earlier stage in the breeding process to minimise LMA reactions during high and low temperature stress events.
	<ul style="list-style-type: none"> Identification of potential new products that attract premium prices 		<ul style="list-style-type: none"> The Australian Export Grains Innovation Centre (AEGIC) has identified a market opportunity for soft wheat. Breeders and exporters are conducting research on production and quality to expand the number of varieties suitable for the market, while new varieties are in early-stage trials. 	
	<ul style="list-style-type: none"> Current investments in understanding market opportunities 		<ul style="list-style-type: none"> Surveys completed and associated diagnostics of the incidence and severity of diseases of cereals and pulses within the Northern, Southern (VIC & SA) and Western Region. 	
	<ul style="list-style-type: none"> Defence of current market access programs 		<ul style="list-style-type: none"> Current disease mitigation and market access investments 	
Objective 3 – Optimise input costs				
Optimise input costs	<ul style="list-style-type: none"> Results are drawn from the 2019–20 ABARES Australian Agricultural and Grazing Industry Survey 		<ul style="list-style-type: none"> The result in 2020-21 is ratio of 0.142 or \$92.10 per hectare 	The 10–year average cost is \$80.04 per hectare with costs increasing around 2% per year over the past 10 years.
	<ul style="list-style-type: none"> Maintain increases in chemistry costs below the five-year trend (2018–2023) equivalent to \$85.50/ha or a ratio of input to crop revenue of 0.166 		<ul style="list-style-type: none"> The result in 2020-21 is a ratio of 0.14 or \$90.95 per hectare. 	The 10–year average cost is \$84.35 per hectare with costs increasing around 0.075% per year over the past 10 years.
	<ul style="list-style-type: none"> Maintain increases in fertiliser costs below the five-year trend (2018–2023) equivalent to \$84.30/ha or a ratio of input to crop revenue of 0.164 			

KEY PERFORMANCE INDICATOR	TARGET	METHODOLOGY/ UNIT OF MEASUREMENT	ACHIEVED	2020–21 RESULTS	PROGRESS/COMMENTS
Objective 4 – Reduce post-farmgate costs					
Reduce post-farmgate costs	<ul style="list-style-type: none"> Timely RD&E-based submissions to government to support policy decision-making Timely addressing of technical barriers to trade issues 	Results of research and support for engaging with trading partners		Australian Participation in the European Union Product Environmental Footprint Technical Advisory Board The investment supports continued engagement with the EU to ensure that Australian agricultural commodities, including grains and oilseeds are not disadvantaged by the application of scientific methods not relevant to Australian production environments.	
Objective 5 – Manage risk to maximise profit and reduce losses					
Manage risk to maximise profit and minimise losses	<ul style="list-style-type: none"> The number of growers undertaking business training Establishment of a behavioural economics initiative to research grower decision-making 	Results drawn from 2021 GRDC Grower Survey Farm Business Updates data Results drawn from 2021 GRDC Grower Survey	 	99 % of growers accessed at least one GRDC information product or service. With 96% utilising hard copy channels and 21% through social media channels. 800 growers attended Farm Business Updates 62% of growers surveyed say that either themselves (29%) or their adviser (52%) uses a tool to predict ROI.	A new question in the 2021 GRDC Grower survey reveals that all respondents say that they have a method to predict return on investment (ROI) from crop inputs such as seeding and fertiliser rates. In addition to continuing an annual grower survey to understand grower sentiment, behaviours and motivations, GRDC will regular survey grain growers on specific farm practices and whether these practices are having an impact on grower profitability and productivity.

Note: Key performance indicators and targets are defined in the Agriculture Portfolio Budget Statements 2020–21 pages 287–290, and GRDC Annual Operational Plan 2020–21, page 8. Any survey results are taken from the most recent survey in which the target was measured.

Table 1 Key:

-  Target achieved
-  Target partially achieved



Analysis of performance against targets

Rates of Return and price

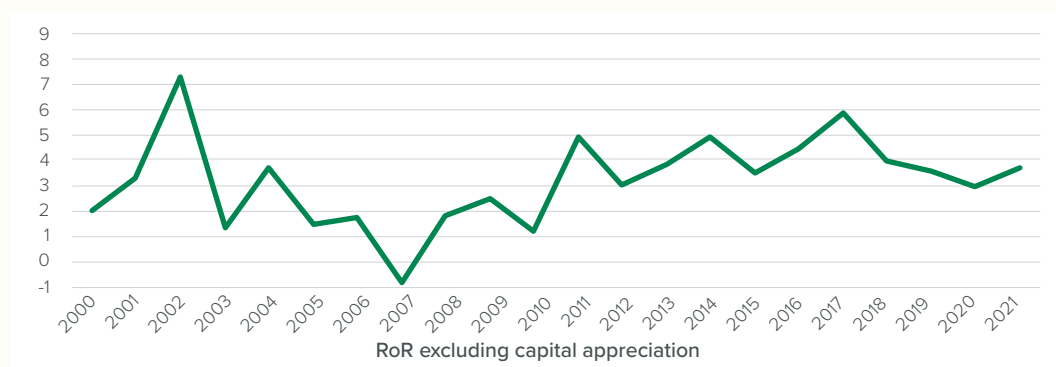
Following two years of below average production driven by droughts in NSW and Queensland, the 2020–21 season was a record breaker for all the right reasons. The largest wheat crop ever produced in Australia was accompanied by above average production numbers for barley, canola and pulses. While production was high, prices were mixed, with wheat averaging \$290 per tonne as the market softened due to abundant supply.

Barley followed suit and traded down to \$235 per tonne on average, while canola

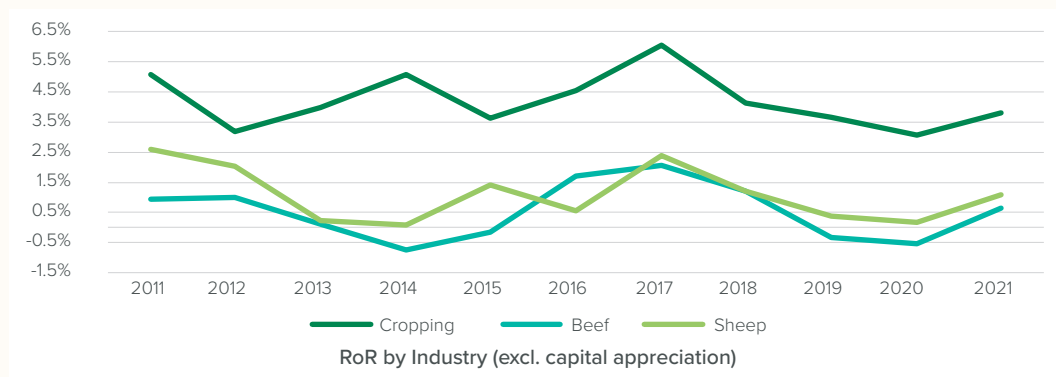
maintained its strength to trade near decade highs of \$595 per tonne. Lupins and lentils also sold for above average prices at \$338 and \$720 per tonne respectively. The area sown to both corn and sorghum also bounced back which drove prices lower to \$412 and \$326 per tonne respectively.

Despite impressive yields in 2020–21, the national Rate of Return for specialist cropping farms excluding capital appreciation was 3.82%. This is below both the five–year average of 4.15%, and the 10–year trend of 4.12%

Figure 5: Rate of Return 2000–2021



Source: ABARES Australian grains: financial performance of grain farms 2016–17 to 2019–20



Source: ABARES Australian grains: financial performance of grain/livestock farms 2016–17 to 2019–20

Yield

A significant rebound in average yield occurred in 2020 following very poor seasons on the east coast. GRDC analysed data from the leading varieties produced in 65 National Variety Trial sites around Australia. The data demonstrates that the 2016 growing season produced the highest yield in the five-year period to 2020 for all states except for Western Australia. The yield peaked in Western Australia in 2018.

New South Wales experienced the largest increase in yield (28%) followed by Queensland (17%). While Victoria, South Australia and Western Australia all experienced modest increases, with yields on average up by 11.1%

The table below shows the 2020 year relative to the 5-year average (2016–2020).

Table 2: Average yield across Australia 2016–2020

STATE	2016	2017	2018	2019	2020	5-YEAR AVERAGE	PERCENTAGE CHANGE
	TONNES/HA	TONNES/HA	TONNES/HA	TONNES/HA	TONNES/HA	TONNES/HA	
QLD	4.64	2.85	2.67	3.75	4.25	3.63	16.97
NSW	6.16	4.41	3.28	3.02	5.79	4.53	27.81
VIC	5.81	5.48	3.03	5.25	5.27	4.97	6.03
SA	4.27	2.77	2.81	3.35	3.40	3.32	2.34
WA	3.66	3.03	4.27	2.11	3.37	3.29	2.54
Average	4.91	3.71	3.21	3.50	4.42	3.95	11.14

Source: National Variety Trials data 2016–2020

Yield gap

The numbers presented in the following table are the maximum yield represented by the highest yield obtained from the average of the leading varieties in the region over a five-year period. The yield gap shown in Table 3 takes the 5-year average yield (2016–2020) from the 5-year maximum yield. This yield gap percentage represents the 5-year average yield as a proportion of the maximum yield; essentially a measure of the impact of seasonal variability, including drought.

The results show the maximum yield was 5.58 tonnes per hectare and the 5-year average was 3.95 tonnes per hectare, which produces a yield gap of 1.63 tonnes per hectare. This indicates that the 5-year average was 29.35% below the best season for each state in this period. The lowest percentage yield gap was achieved in Victoria and the highest yield gap was experienced in NSW primarily due to drought conditions in 2018 and 2019.

Table 3: Maximum yields and gap measure

STATE	MAX YIELD	5-YEAR AVERAGE	YIELD GAP	YIELD GAP
	TONNES/HA	TONNES/HA	TONNES/HA	%
QLD	5.32	3.63	1.69	31.72
NSW	6.67	4.53	2.14	32.07
VIC	6.48	4.97	1.51	23.30
SA	4.75	3.32	1.43	30.08
WA	4.67	3.29	1.38	29.56
Average	5.58	3.95	1.63	29.35

Source: National Variety Trials data 2016–2020



National Water Use Efficiency

Water use efficiency was calculated for each shire using Statistical Area Level 2 (SA2) data, where 15-year grain production was greater than 30,000 tonnes. The index calculates the kilograms of grain produced based on 30% of the rainfall between January and March and 70% of the rainfall between April and October.

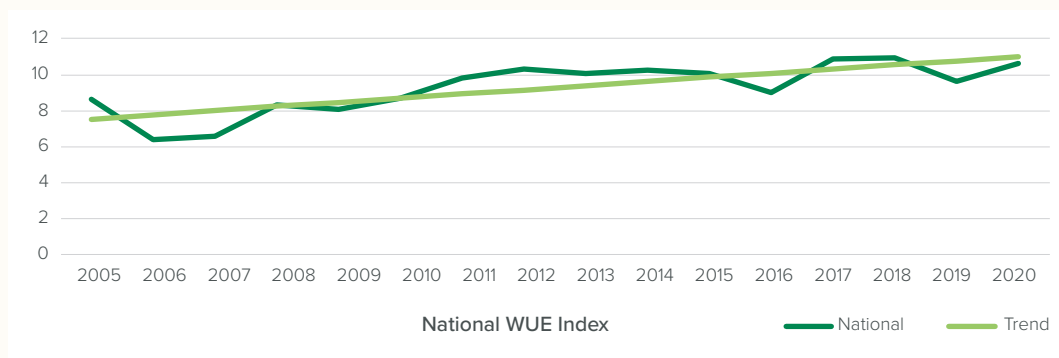
Shire level indices were weighted by their 15-year average wheat production to derive the national index values.

The 5-year average index for 2016–2020 was 10.22 which was 1.11% higher than the index (10.11) for the five years 2015–2019. This increase reflects average yield increase in most regions of Australia.

Table 4: Average Water Use Efficiency across Australia

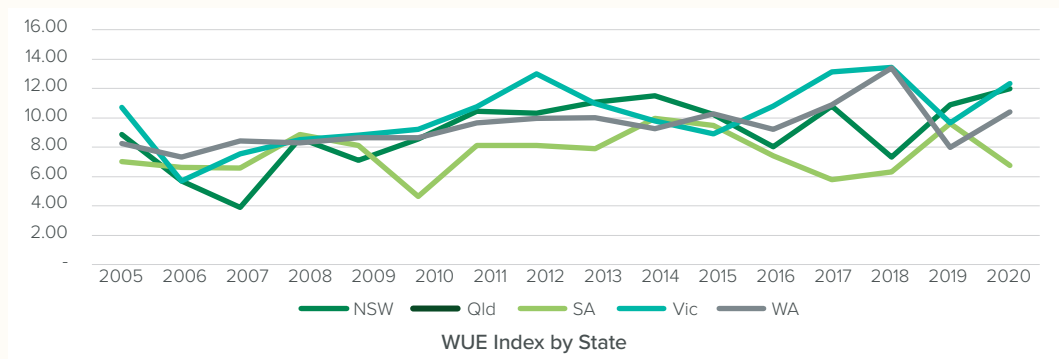
STATE	5-YEAR AVERAGE TO 2019	5-YEAR AVERAGE TO 2020	PERCENTAGE CHANGE
NSW	9.47	9.81	3.65
Qld	7.73	7.19	-7.03
SA	7.73	7.19	-7.03
Vic	11.19	11.88	6.14
WA	10.36	10.38	0.22
National	10.11	10.22	1.11

Figure 6: National Water Use Efficiency Index



Calculated using Australian Bureau of Statistics 2021 data and prior shire yields, and average monthly rainfall reported by the Bureau of Meteorology.

Figure 7: National Water Use Efficiency Index by State



Input costs

Input costs were higher due to the wet start to the season and the above average in-season rainfall, in 2020 the fertiliser costs were \$90.95 per hectare which is above the target. The five-year average fertiliser costs were \$82.22 per hectare versus the target of \$84.30 per hectare. Notably, while the dollar figure per hectare was higher than the target, the fertiliser input cost to total crop cash receipts ratio was 0.14 against the target of 0.164 which indicates an efficient use of fertilisers to maximise crop potential.

Chemical costs in 2020 were \$92.10 per hectare, with an average of \$84.54 per hectare over the 5-year period to 2020 which was below the target of \$85.50 per hectare. As with fertiliser costs, the ratio of chemical costs to total crop cash receipts was 0.142 and this was below the target of 0.166 which is a positive result for growers.

Long Term Total Factor Productivity

Long term total factor productivity (TFP) growth for the period 1977–78 to 2019–20 for cropping is 1.5%, with inputs increasing by 1% and outputs by 2.5%. For the past decade the TFP has remained at 1.5%, however, output growth was only 0.9% and input growth was minus 0.5%. These results show that growers were able to maintain productivity growth in a challenging decade of dryer than average conditions.

The breakdown of input factor use is shown in table 5 for all broad acre, cropping, beef, sheep and mixed livestock. The cropping index was 1% which indicates that more inputs were used in the 2019–20 season. Cropping land inputs, materials and services increased by 1.1%, 3.7% and 1.4% respectively while labour use and capital decreased 1.1% and 0.4% respectively.

Table 5: Productive growth by GRDC region (1977–78 to 2019–20)

INPUT	ALL INDUSTRIES %	CROPPING %	MIXED %	SHEEP %	BEEF %	MIXED LIVESTOCK %
Land	-0.9	1.1	-1.5	-2.8	-0.1	-3.1
Labour	-2.2	-1.1	-3.0	-3.1	-1.0	-2.9
Capital	-1.6	-0.4	-3.0	-3.8	0.1	-2.8
Materials	1.6	3.7	0.4	-0.4	1.9	0
Services	-0.3	1.4	-1.3	-1.9	0.6	-1.7
Total Inputs	-0.8	1.0	-1.8	-2.7	0.2	-2.5

Source: ABARES broadacre average annual input growth, by industry, 1977–78 to 2019–20



Benefit Cost Analyses of selected investments

GRDC undertakes Benefit Cost Analysis (BCA) to demonstrate the outcomes of its investments. GRDC adopts an ex-ante and ex post approach to predicting and measuring impact. Ex-post analyses use the framework developed by the Council for Rural RDCs.

Adoption rates are calculated using the ADOPT tool developed by the Farming Futures Cooperative Research Centre and updated by CSIRO with support from GRDC. GRDC uses a 25–30-year investment period. Net Present Value (NVP) is calculated as the present value of benefits less the present value of the investments. BC Ratio is calculated as the ratio of benefits to cost of the investment. The Present Value of Investment (PVI) is calculated as the value of the investment 25 years from today discounted to the present.

The following Benefit Cost Analyses are those relevant for 2020–21 against each objective in the 2018–23 Research, Development and Extensions Plan.

Project title: Early and dry sowing of wheat

Research partners/collaborators: CSIRO

Investment timeframe: 2012 to 2018

Investment aim: Assess the benefits generated through the development and implementation of early and dry sowing programs for wheat production.

Outcomes: Development & implementation of new management practices in the form of early and dry sowing programs has led to:

- increasing Australian wheat yields through application of new management practices and genetic solutions while adapting to the variabilities introduced by climate change (low rainfall + increased temperatures)
- addressing the needs of consolidated farms equipping farmers with required knowledge, awareness and implementation support to uptake new solutions with potential to benefit their bottom line while meeting market demands.

Dry sowing assisted with machine and labour utilisation and enabling the crop to respond to early breaks. Better fallow management has assisted this practice. Practice change was demonstrated by 25 per cent of growers moving their sowing dates forward by 1.6 days per year. The analysis reported potential yield gains between 0.7 to 1.2 T/ha from moving the sowing date earlier. Ten per cent of the potential yield benefit was claimed for the suite of investments. Adoption was assumed to rise from 1% in 2014 to peak at 5% for the benefit period: 2023–24. A social outcome from the investments was that growers had more time and less pressure to get sowing completed in a narrow time period.

Present value investment	\$3.4m
Present value benefits	\$18.5m
Net present value	\$15.2m
Benefit cost ratio	5.50
Internal rate of return	98%
Modified rate of return	187%

The associated investments were analysed by CSIRO at a discount rate of 7%. The CSIRO values were converted to a 5% discount rate to derive the values reported above.



Project title: High yielding canola

Research partners/collaborators:
NSW Department of Primary Industries

Investment timeframe: 2017 to 2020

Investment aim: Determine optimum sowing date and variety type for the Southwest Slopes region of NSW, including rates of and timing of fertiliser and water unlimited grain potential of a winter and spring variety.

Outcomes: Growers will be able to select the appropriate plant type, sowing date and canopy management strategies so environmental stresses are minimised and the critical growth periods coincide with the most favourable conditions during the season. This will raise crop yield potential and close the gap between achieved and potential grain yield.

- established agronomic guidelines for early sowing of canola
- defined constraints to achieving greater water use efficiency
- developed tactical management packages for canola in risky environments

Yield advantage from new varieties 15% and practice change benefits moved forward by one year.

Present value investment	\$1.5m
Present value benefits	\$1.8m
Net present value	\$0.2m
Benefit cost ratio	1.16:1
Internal rate of return	7.0%
Modified rate of return	4.5%

Adjusted to 5% interest and discount rates from NSW DPI analysis.

Project title: Optimising grain yield potential of cereals across the Northern growing region

Research partners/collaborators: NSW
Department of Primary Industries

Investment timeframe: 2017 to 2020

Investment aim: To optimise wheat yields in the northern growing region.

Outcomes: To identify the wheat varieties that have the strongest yield and highest grain quality per regional area.

The impact of this was expected to be that growers will have access and adopt the trial outcomes into their operations to use and grow more effective, resilient, and high yielding wheat crops with reference to the environmental conditions of their local area.

The analysis estimated the potential returns to the wheat industry by evaluating yield growth and grain quality throughout NSW and Queensland over the period of 2017 to 2019.

Present value investment	\$5.2m
Present value benefits	\$32.2m
Net present value	\$26.9m
Benefit cost ratio	6.16
Internal rate of return	29%
Modified rate of return	13%

Adjusted to 5% interest and discount rates from NSW DPI analysis.



Project title: Monitoring aphid vectors to develop a pulse virus prediction and management program

Research partners/collaborators:
NSW Department of Primary Industries

Investment timeframe: 2018 to 2021

Investment aim: Research aphid vectors to minimise yield losses from viruses transmitted by aphids for the chickpea industry in NSW and Queensland.

Outcomes: Aphid control strategies are all based on preventing aphid landings in crops through agronomic practices (retaining stubble, modifying planting dates) and killing aphids by insecticide applications before disease infection takes place in the crop. Once virus have been transmitted it is too late to control disease spread in crops.

This investment will develop an alert for major migratory aphid movements that would allow timely aphid control in chickpea crops. The use of this aphid movement alert by growers is then expected to reduce the chickpea yield losses that would otherwise incur from viral diseases spread by aphids.

Present value investment	\$0.5m
Present value benefits	\$1.7m
Net present value	\$1.2m
Benefit cost ratio	1.4:1
Internal rate of return	10%
Modified rate of return	7%

Adjusted to 5% interest and discount rates from NSW DPI analysis.

Project Title: Development of XT lentil varieties

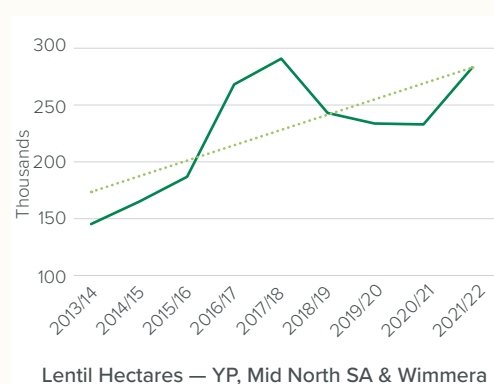
Research partners/collaborators: Department of Agriculture Victoria

Investment timeframe: 2000 to 2010

The development of XT lentil varieties means that growers have the option to sow lentils following Clearfield wheat, barley and canola varieties.

Outputs: Development and release of PBA Hallmark XT, PBA Highland XT, PBA Hurricane XT and PBA Kelpie XT lentil lines which have produced close to 900,000 tonnes of production since 2012. Figure 8 shows the increase in lentil hectares since 2013. This adds approximately \$93 per hectare to gross margins above wheat, barley or canola.

Figure 8: Lentil hectares York Peninsula and Mid north SA and Wimmera VIC.



Environmental benefits: The use of more pulses in the system will enable growers to use more organic nitrogen and may provide a disease break for other crops which may require fewer chemicals in the farm system.

Social benefits: Inclusion of pulses in the farm systems enables growers to spread their production risks over more crop types.

Present value of investment	\$14.1m
Present value of benefits	\$43.6m
Net present value	\$29.5m
Benefit cost ratio	3.08:1
Internal rate of return	11%
Modified Internal rate of return	8%

Discount rate 5%

Project title: Securing access to the \$1 billion European Union (EU) canola market

Research partners/collaborators:

Australian Export Grains Innovation Centre (AEGIC) and CSIRO

Investment timeframe: 2015 to 2018

Outcomes: AEGIC played a key role in securing access into the premium EU canola market by demonstrating Australian canola meets biofuel emission requirements. The EU is the largest buyer of Australian canola, accounting for more than 70% of total canola exports, worth over \$1 billion annually. While some of this canola is used in the cooking oil segment, the largest driver has been the renewable fuels sector. In 2013, the EU announced that tighter emission regulations would come into force in January 2018. These regulations require canola suppliers to provide information on the emissions associated with the use of that canola for biodiesel production. To keep this market open to Australian canola, a Country Report that tracked the greenhouse gas emissions of all facets of canola farming had to be produced and accepted by the European Commission. AEGIC worked with CSIRO to produce a Country Report that was formally accepted in December 2017, a few days before the tighter regulations came into force. This occurred in time for the 2018 shipping season which enabled Australia to maintain access to the premium paying EU biofuel market.

Other outcomes of this report were:

- Australia's canola industry better understands its greenhouse gas emissions and uses this information to secure access to discerning markets;
- EU's biodiesel industry better understands greenhouse gas emissions from Australian canola production and this influences its purchasing decisions; and
- Australian grain traders have confidence to purchase Australian canola, knowing it meets the requirements of the EU Renewable Energy Directive.

Benefits from this work were derived by ascertaining the value on ongoing access to the EU biofuels market and are a result of a combined effort across many organisations.

Present value of investment	\$0.5m
Present value of benefits	\$22.5m
Net present value	\$ 22m
Benefit cost ratio	42.43:1
Internal rate of return	271%
Modified Internal rate of return	250%

Discount rate 5%



Project title: Wheat quality preference insight informing industry stakeholder actions

Research partner/collaborators: Australian Export Grains Innovation Centre (AEGIC)

Investment timeframe: 2015 to 2020

Outcomes: Understanding the wheat quality requirements of customers is critical to maintaining and growing Australia's wheat markets. This information allows the Australian wheat industry to breed, produce, classify and supply wheat that meets the needs of our markets.

With the support of GRDC, AEGIC engaged the flour milling industries in Indonesia, Malaysia, Singapore, Philippines, Vietnam, Thailand, India, Myanmar, Japan and Australia to identify their wheat quality preferences for a wide range of noodle and bread products and how this influences their procurement decisions. These markets purchase roughly 55 per cent of Australian wheat exports. In each market, the project interviewed companies that controlled 80 per cent of the milling capacity.

This work helps industry stakeholders make investment decisions and take action to position the industry for the future. This AEGIC investment, along with contributions from many other industry organisations, has enabled the following outcomes:

- Wheat Quality Australia is reviewing its classification guidelines to ensure the industry has a classification system that is well suited to future market requirements;
- wheat breeders have commenced breeding programs for new classes (e.g. soft wheat) to address market needs;
- grain trading organisations have a better understanding of the grain quality characteristics valued by their customers; and
- Australian research organisations are better targeting grain product research to match the needs of key markets.

Present value of investment	\$1.7m
Present value of benefits	\$4671m
Net present value	\$91.2m
Benefit cost ratio	53.4:1
Internal rate of return	41%
AEGIC's share of benefits	20%

Discount rate 5%



Project title: Barley market development supports new and existing market opportunities

Research partners/collaborators: Australian Export Grains Innovation Centre (AEGIC) with the Department of Foreign Affairs and Trade and the Australian Government Agricultural Trade and Market Access Cooperation program

Investment period: 2014 to 2021

Outcomes: AEGIC's barley market development work is establishing new malting and feed demand for Australian barley and ensuring our malting barley meets our customer's requirements.

AEGIC has been working in China, Vietnam, India and Australia with maltsters and brewers to establish demand for Australian malting barley. With 70% of Australian barley exports previously going to China and its recent 80.5% tariff imposition, it is important to diversify our export markets. New malting barley markets such as India (500,000t market worth \$150 million) add new competition for Australian barley. AEGIC engaged malting and brewing industries in China, Vietnam, India and Australia to identify their barley, malt and beer quality requirements for premium and economy style beers.

In feed markets, AEGIC has been stimulating feed demand in Asia by using livestock nutrition experts to help feed buyers understand the benefits of using Australian grain for feed. On the back of this work, a brand-new feed market in Thailand has opened for Australian barley with barley exports rising from 22,000mt in 2016–17 to 870,000mt in 2019–20, with the potential to reach 1 million metric tonnes.

This investment, along with valuable contributions from many other industry organisations, has enabled the following outcomes:

- Maltsters and brewers better understand the quality attributes of Australian malting barley and how to use it, which assists their purchasing decisions;
- Australian industry better understands specific quality requirements which assists Barley Australia with accreditation decisions and breeders to apply quality targets and make breeding program decisions;
- Feed grain buyers and feed millers better understand the benefits of using Australian feed barley and how to use it in feed rations, and this stimulates demand;
- Trading partners better understand Australia's biosecurity, food safety and compliance regimes and practices, creating confidence in Australian supply chain management and biosecurity protocols;
- Industry stakeholders are better informed about future market opportunities for Australian barley and can respond to those opportunities as they arise.

Present value of investment	\$2.6m
Present value of benefits	\$549.8m
Net present value	\$109.4m
Benefit cost ratio	42.4:1
Internal rate of return	160%

Discount rate 5%



Objective 1—Improve yield and yield stability

A goal to close the gap between actual and potential yields is clearly a worthwhile objective. However, delivering enduring profitability to grain growers will also require investments aimed at further extending the yield potential and yield stability of all Australian grain crops. Extending yield potential can be achieved by increasing the genetic yield potential and by limiting the impact of yield constraints (e.g. frost, hostile soils and heat).

Maintaining yield stability under the impacts of various environmental factors is an important consideration in limiting exposure to production risk and underpins stability of supply. Investments in this area may involve relatively high risks and long timeframes to delivery.

2020–2021 INVESTMENT SUMMARY		
RD&E	PROJECTS	INVESTMENT
New	50	\$8.1m
Ongoing	154	\$60.8m
Total	204	\$68.9m

Key investments 2020–21

Highlights of investments in 2020–21 that support the achievement of this objective include:

FrostSense: An integrated modelling framework to rapidly map the extent of stem and reproductive frost damage in wheat and barley

Frost risk occurs virtually every year across southern and eastern Australian agricultural regions. Actual occurrence of frost is determined by location and landscape factors as well as climate. This project is demonstrating the capability of satellite data, combined with temperature maps and other data sources, to map frost damage in wheat and barley crops. This project is also investigating the farm scale economics of frost-damage mapping and the benefits of improvements that may be obtained from remote sensing data.

During 2020–21, outputs delivered by this project have included, validating performance of the frost-mapping model in new environments across Australia and completing analysis of remote-sensing products for value-adding to the frost mapping model. Negotiations are underway to license this technology to deliver benefits to agronomists and growers.

For information on how GRDC is extending information from this project to growers and advisers (link to outputs below):

[Paddock maps track Jack Frost](#)

[Remote-sensing tools offer prospect of identifying frost-affected crop areas](#)

Applying current knowledge to inform grower decision making to mitigate the impact of frost, now and in the future

The aim of this project is to extend and apply the outcomes of previous investments relating to frost to build knowledge that will inform grower and adviser decisions relating to pre-season planning, in-season management, and post-frost event response. During 2020–21, nine events were held in the southern region including: three spring frost discussion events, one pilot frost risk workshop and five farmer pre-season frost risk workshops.

Information from some of the frost events can be found at:

[Strategic approaches to managing frost risk and impact](#)

[Develop a personalised frost plan at workshops](#)

[Dodging frost a numbers game](#)

Lupin breeders' toolbox — a resource for lupin genetic improvement

A four-year investment with CSIRO is providing several tools to help breeders significantly improve traits for lupin growers, producers and consumers including:

- decoding the lupin genome sequence;
- generating a pan-genome resource to capture the genetic diversity in narrow-leafed lupins; and
- developing and screening a narrow-leafed lupin mutant population for traits of interest to breeders, growers, and consumers.

The resources generated within this project will allow rapid gene trait discovery. In turn, this will lead to acceleration of lupin crop improvement in yield and other agronomic traits of interest to the breeding program. This will help provide a viable grain legume crop for substantial parts of Australia's grain growing regions.



To date, a lupin Targeting Induced Local Lesions IN Genomes (TILLING) population resource comprising of 613 mutant lines has been generated and sequenced. This has yielded a set of 3,391,278 genome-wide SNPs (SNPs are DNA markers that detect subtle genetic differences in the genome), 11, 554 of which have the potential to alter the functionality of over 20 per cent of agronomically important lupin genes. These tools are central for the future delivery of narrow-leaved lupin varieties. They will allow the identification of new traits that improve cultivation in current growing areas as well as adaptations to changing environments, climates, and market demand for the continued prosperity of Australian growers.

Optimising plant establishment, density and spacings to maximise crop yield and profit in the southern and western regions

Rapid and even crop establishment is a foundation for vigorous crops that are competitive against weeds. In recent years there has been growing interest in Australia and overseas in adapting precision seeding technology that is widely used in summer crop production, to winter crops. However, there is limited information on the current levels of crop establishment and stand uniformity in the major winter crops, the potential for improvements in crop establishment and the potential agronomic and economic benefits of improving crop establishment and stand uniformity within modern farming systems.

This three-year investment, which started in 2018, will deliver a survey of crop establishment, seeder demonstration and comparison trials, and small plot field experimental data exploring the opportunity of improved sowing, in terms of reduced seed rates and costs, and increased crop uniformity, yield and profit. The concept of more precise seeding will be tested in three crops with contrasting seed size, canopy development and growth patterns – canola, lentil and faba bean in the south and canola, wheat and lupin in the west.

So far, this project has proved that precision planting allows more consistent inter-plant spacing and greater uniformity in crops but has not yet demonstrated consistent effects on yield. Yields are never lower with precision planting and in many cases yield improvements have occurred and this has indicated the potential to reduce seed input costs without a yield penalty.

However, at this stage we are unable to predict under which circumstances this will occur.

Results from seedling establishment trials have demonstrated the importance of seed quality to crop uniformity and the minimisation of large gaps along the sowing row. A tined precision planting unit was successfully developed in 2019–20 and it is planned to compare this with a disc-seeder.

Although improvements can be made with conventional equipment, large scale on-farm trials will examine ways that growers can improve establishment using conventional equipment and the effects on grain yield.

The project completed a series of case studies of growers, who have achieved high rates of crop establishment, based on the results of a paddock survey. This information has been delivered to growers and advisers through Research Updates in Adelaide and Bendigo, as well as video presentations and published articles.

Example of project case studies are provided here:

[New equipment improves crop establishment for Crystal Brook Grower](#)

[Crop establishment learnings from the Wimmera](#)

Optimising sorghum yield through agronomic management

This four-year investment, jointly led by University of Queensland and the Queensland Alliance for Agriculture and Food Innovation (QAAFI), with a multi-party research team including NSW Department of Primary Industries and Queensland Department of Agriculture and Fisheries will deliver a uniform research program on sorghum tactical agronomy across the northern grain growing region.

The overall objective of this project is to develop the knowledge and tools to assist growers and advisers make informed early sowing decisions for sorghum. The project will investigate whether combinations of sorghum hybrids, crop management and the environment modify stress environments and yield distributions in early sown sorghum, and what is the influence on the cropping system.



Research from this project has shown that optimising combinations of sorghum genetics and management can result in yield gains of up to 66 per cent with eight-fold increases in water use efficiency. Early sown sorghum, planted at soil temperatures of greater 12 degrees Celsius produces yields similar to or higher than traditional sowing windows, but with reduced risk of heat stress due to earlier flowering, reduced terminal stresses and improving grain quality through reduced screenings.

For examples of how GRDC is extending the information from this project to growers and advisers, please see links below:

[Radical rethink of sorghum cold tolerance](#)

[‘Tweaks’ to planting date to lift climate resilience](#)

[Sowing sorghum in spring offers growers farming system benefits](#)

Developing farming systems for the Low Rainfall Zone (LRZ) of Western Australia

The objective of this project was to research novel agronomy and soil water management practices to deliver increased profitability and reduced risk for farming systems in the low rainfall zone (LRZ) of Western Australia. Using field experimentation three complementary potential farming systems changes were evaluated. Novel soil moisture management techniques, early sowing and high value break crops (field peas, lentils, chickpeas and/or lupins) were tested, then used to underpin farming systems modelling.

Re-engineering soils to improve the access of crop root systems to water and nutrients stored in the subsoil

The aim of this investment is to identify the most profitable and long-lasting soil amelioration and amendment strategies for managing multiple interacting soil constraints; and demonstrate the benefits of re-engineering the soil profile through a combination of deep soil loosening; reconstituting profile layers and deep placement of nutrients and soil amendments. In 2020–21, five large field sites have been established and a survey of western region growers completed to benchmark practices to manage soil amelioration.

Increasing farming system profitability and longevity of benefits following soil amelioration

Research and analysis indicate that amelioration of sandplain soils in the western region is highly profitable, resulting in consistent and persistent improvement in crop water use efficiency and productivity. Factors that limit adoption of soil amelioration include uncertainty about how to sustain long-term benefits, poor crop establishment and potential for erosion in the year following amelioration.

This investment aims to identify management changes that preserve the benefits of soil amelioration and maximise profitability for growers. The research will determine the most profitable crop rotations, species choice and seedbed preparation that maintain the long-term benefits of soil amelioration while managing the risks, such as wind erosion and poor crop establishment.

Economics of ameliorating soil constraints in the northern region: Spatial soil constraint diagnoses

Approximately 75 per cent of Australian soils have single or multiple constraints that limit agricultural productivity. In the northern cropping region, these commonly take the form of sodicity, acidity, salinity, and compaction. GRDC is investing in a suite of projects that address the challenges currently faced by growers in identifying constraints occurring on their properties, where these constraints occur, and how and if the combination of constraints they face can be economically ameliorated and managed.

Commencing in 2018, this project has now delivered a spatial tool called **Constraint-ID** that has been developed using overlays of historical Normalised Difference Vegetation Index (NDVI) data and is now tested by industry. Currently **Constraint-ID** covers winter cropping layers, but additional work is being done to improve the resolution and include summer crops. GRDC is working with the University of Queensland to explore market opportunities for this product.



For examples of how GRDC is communicating findings from the Economics of soil constraints in the northern region project to growers and advisers, see links below:

[Better soil testing could 'save dollars on-farm'](#)

[New research into cost of improving farming country](#)

[Darling Downs' grower digging deeper into soil health](#)

[Lessons learned as soil tests beat costly assumptions](#)

Improving wheat yields on sodic, magnesic, and dispersive soils

This five-year project is led by the University of Adelaide and is a collaboration between research organisations in Western Australia, Victoria, NSW, and Queensland. A multidisciplinary team that brings together plant breeders, soil scientists, plant physiologists, agronomists, and crop geneticists. Germplasm from the project will be transferred to Australian wheat breeders. Yield trial results indicate that project germplasm may be useful donor material for breeders to use to improve sodicity tolerance in wheat breeding programs.

To date, this project has developed approximately 1100 pre-breeding wheat lines for the northern and southern grain growing regions. Yield assessment of germplasm developed in the project at Roseworthy, South Australia, has shown that many lines yield more than the parent and comparable to commercial varieties.

Multi-species DNA chip platform — A resource for pulse genetic improvement

This project has developed a low-cost multi-SNP (single nucleotide polymorphisms) genotyping platform for chickpea, lentil, lupin, and field pea, which is the first ever of its kind in the world for pulse crops. It has also captured genetic diversity in globally diverse germplasm including varieties, landraces, core research collections and wild relatives. This enables and facilitates accurate imputation to whole genome sequence level in any genetic background.

This has closed a major gap that has historically slowed the adoption of research outputs by breeders, and consequently the development of new varieties. Specifically, it provides a standardised genotyping platform for pulses which now makes it possible to seamlessly connect research generated across projects and time, and to better link pre-breeding outcomes with breeding. The SNP genotyping platform is delivering to the Australian pulse pre-breeding and breeding sectors via fee-for-service and has already had strong uptake, with more the 50K+ samples scheduled for genotyping in 2021.

Collection, phenotyping and exploitation of wild Cicer genetic resources for chickpea improvement

In 2020–21, wild Cicer accessions with chilling tolerance are being crossed with locally adapted chickpea cultivars, PBA HatTrick (b) and PBA Captain (b) to introgress chilling tolerance into domestic chickpea, paving the way to overcoming one of the most limiting challenges facing chickpea growers in Australia.





Objective 2—Maintain and improve price

Maintaining current market positions will depend on maintaining the premium quality of Australian grain. Important functions driving the maintenance of premium quality includes Australia's grain classification systems as well as the effective and prompt management of trade and market access issues as they arise.

Traceability and demonstrated food safety are also likely to remain key customer requirements and are expected to increase in importance in the short-to-medium term. While the export of bulk commodities will remain a significant part of future Australian grain trading, opportunities to change the functionality and/ or composition of traditional commodities will underpin future increases in demand and prices.

2020–2021 INVESTMENT SUMMARY

RD&E	PROJECTS	INVESTMENT
New	7	\$0.5m
Ongoing	22	\$8.8m
Total	29	\$9.3m

Key investments 2020–21

Examples of investments in 2020–21 that support the achievement of this objective include:

Who's eating what? Understanding the consumption of grain-based products in Southeast Asia

This project is doing a deep dive analysis of consumption of high value grain products in Indonesia. This will provide the Australian industry with high quality information to inform strategic actions to capture high value components of these markets.

Quantifying the value of pulse grains

One of the objectives of the pulse-breeding program is to ensure the quality traits of new varieties align with the preferences defined by the export markets and that the quality is equal to or better than the pulses produced by Australia's competitors. To assess pulse quality more accurately and efficiently, GRDC and Agriculture Victoria have invested in a project to develop digital image analysis and supporting algorithms as tools to measure quality.

The project involved measuring and characterising thousands of individual seeds and their corresponding images and using advanced programming and machine-learning methods (often referred to as artificial neural networks) to develop algorithms and classification models.

This project has successfully developed an impressive suite of high-throughput imaging technologies and phenomics assays to quantify high-value pulse quality and functionality traits. The tools consist of image-derived algorithms and models which have been validated over 3 to 5 years to achieve a minimum precision of 90 to 95 per cent. These tools have resulted in a 10-fold increase in sampling throughput.

Data from this project has been delivered to plant breeders and geneticists, which has enabled them to make informed germplasm selection. The information captured has helped shed important insights around the effect of genotype and environment on key pulse traits such as starch and protein content, and secondary metabolites. Further, the project has helped resolve market classification issues for two lentil varieties.

Australian Export Grains Innovation Centre (AEGIC) Projects

The Australian Export Grains Innovation Centre (AEGIC) held an Australian-Chinese wheat webinar involving experts from AEGIC, AGT and InterGrain in Australia, and MARA, COFCO and the two largest dry noodle producers in China.

The Australian-Chinese wheat webinar attracted 122 attendees with 70 per cent of participants from Chinese milling, grain trading and noodle manufacturing companies.

On 25 March 2021, AEGIC co-organised a webinar, Australian oats for healthy food products, with Austrade China. The webinar involved experts from AEGIC, Vitasoy, Healthy Garden Australia, and Austrade China. The event attracted 177 attendees with 80 per cent of participants from grain and oat product training companies, and flour and oat food manufacturing companies.

Of the webinar participants that completed an exit survey, over 80 per cent said they were more willing to buy or use Australian grains after attending the webinar.

AEGIC has established research collaboration agreements and technical exchange activities are in place with the Chinese Ministry of Agriculture and Rural Affairs and the two largest dry noodle processors in China – Hebei Jinshahe Flour Industry Co. Ltd and Kamen Noodle Manufacturing Co. Ltd.

Agricultural Trade and Market Access Corporation (ATMAC) and AEGIC barley extension: Improving access to Australian barley markets through technical extension

The ATMAC program is expanding trade in Australian agricultural, forestry and fisheries sectors into emerging export markets and/or export markets with high-growth potential. This will be achieved through support for diversification efforts that align with industry priorities.

The program is consistent with the Australian Government's support for enabling Australian agriculture to become a \$100 billion sector by 2030. It provides a mechanism for the Government to enter strategic partnerships, developed jointly with industry, that support trade diversification and expansion and provide direct benefits for the sector.



This project, delivered by AEGIC aims to provide technical platforms for Australian stakeholders to directly engage with customers on technical and policy issues that may be limiting the trade of Australian barley.

Since the project inception, several round table events were hosted virtually between September 2020 and June 2021 and included:

- India — malting barley
- Vietnam — malting barley
- Indonesia — Australian grains
- Vietnam — Australian grains
- Vietnam — Australian barley for pig production
- Vietnam — Australian barley for Dairy production
- Philippines — Australian barley for pigs
- Thailand — Australian barley for pigs
- China — Australian malting barley

Several webinars have also been held including:

- The Australian Grains Industry Conference Asia: Using lupins and barley in Asian dairy diets delivered by a specialist feed grain consultant
- The Australian Grains Industry Conference Asia: Strategic Grain Partnership Maximising value of the CEPA — Industry Collaboration and cooperation within the CEPA — what are the opportunities?

A broad range of industry stakeholders from Australian government, industry organisations and private companies attended these meetings and were able to interact with the broad range of international government officials and private business personnel who attended these forums.

The workshops and stakeholder engagement has increased the awareness of Australian grain and its uses in animal productions for malting. Participants surveyed after the workshops indicated that they found the information valuable and would attend future events. More than 50 per cent of the participants surveyed indicated they were more willing to buy Australian barley after the event.

A novel high-throughput, low-cost test to determine cause of starch damage in wheat grain

Late maturity α -amylase (LMA) is a grain defect causing a reduction in Hagberg falling number and results in potential failing to meet receival or market specifications.

This project aims to develop a low-cost test for starch degradation in wheat grains that can also assign the cause of starch damage as LMA or Pre-Harvest Sprouting (PHS). This will be achieved by establishing a laboratory-based method that uses sensor-based technology to map the spatial distribution of starch damage caused by α -amylase activity across the surface of the grain. The spatial distribution of α -amylase activity will be used to distinguish between LMA and PHS, since activity near the embryo is known to be caused by PHS, while that occurring within the endosperm is caused by LMA. Knowledge of the regions of the electromagnetic spectrum detected by the sensor technology that associate with starch damage caused by α -amylase activity will be used to inform the development of rapid, mobile and low-cost sensors. These tools will be useable by breeders and researchers to determine the cause of starch damage in breeding materials and research populations in the field to increase the speed at which LMA susceptibility can be controlled by genetics. They will also be suitable for growers to aid post-harvest decision making and allow grain receivers to determine starch damage rapidly and reliably.

So far, a new method for determining the cause of starch damage has been successfully developed. The model undergo validation in 2021–22.





Objective 3—Optimise input costs

On farm

International comparison of average input costs per tonne confirms that Australian growers have relatively high costs of production.

A wide range of opportunities exist that can lead to incremental and transformational reductions in input costs while optimising productivity.

The challenge is to identify and prioritise the incremental opportunities to match costs with production at a regional scale while also identifying transformational opportunities on a national scale.

2020–2021 INVESTMENT SUMMARY		
RD&E	PROJECTS	INVESTMENT
New	38	\$7.3m
Ongoing	136	\$54.5m
Total	174	\$61.8m

Key investments 2020–21

Examples of investments in 2020–21 that support the achievement of this objective include:

A platform to interpret soil attributes to support profitable farming systems

Profitable farming systems depend on high quality data, including soil data, to manage annual agronomic decisions affecting crop performance. Good soil management secures soil production potential into the future, reducing long term risk. While a number of sensors have been developed to measure soil properties quickly, cheaply and in situ, current work has focused on a single or small number of properties or developed calibrations that are only suitable for a given region or soil type.

This project was focussed on developing a system where soil and its related data could be measured at a finer scale than is currently feasible. The research aimed to deliver platforms for fine scale mapping of soil attributes to provide reliable real-time information to growers to support their decision-making processes.

This investment has demonstrated the scientific opportunity to use near-Infrared proximal sensors to significantly reduce the cost of sampling soil cores. The next steps will look at the commercial feasibility and ability to deliver products to the market.

Future Farm: Improving farmer confidence in targeted N management through automated sensing and decision support

Optimising the efficient use of nitrogen (N) fertiliser is an important goal for cereal growers across Australia. It typically represents 30–40 per cent of input costs and is a major determinant of both profitability and productivity.

This Future Farm investment aims to re-examine the way in which soil and crop sensors are used to inform decisions about input management. The project will target automating the process from data acquisition, through analysis, to the formulation and implementation of decision options. The initial focus is on improving the efficiency and profitability of applied nitrogen (N). This research is being conducted collaboratively with growers from each of the grain growing regions.

In 2020–21 progress has been made in validating multiple N decision making frameworks at core research sites across the country using farmer-scale nitrogen rate experiments. A framework has been developed to couple machine learning methods, off-farm data, and simple On-Farm Experiments (OFEs) to improve the value of proximal sensing tools on-farm. This framework has demonstrated the value of incorporating large-scale OFEs within different analytical techniques to improve agronomic decision making on-farm.

The performance of machine vision methods for sensing N status and providing N recommendations within a real-time workflow has been validated. This is a workflow that could be applied in farmer's paddocks using existing tractor-implement integrations.

Modelling methods and supporting software have been developed that could be licensed by commercial businesses and agricultural technology companies to develop more accurate digital decision aids for Australian grain growers and agronomists.



SoilWaterNow: Soil Water Nowcasting for the Australian Grains Industry

GRDC is investing in crop-monitoring analytics projects in a bid to close the gap between readily available on and off-farm data layers and the analytical tools that enable data-driven decisions. An analytical framework to accurately 'nowcast' soil plant-available water (PAW) is the target of another key GRDC investment in crop monitoring analytics.

The SoilWaterNow project aims to predict PAW in the present (nowcasting) at depth and at the sub-paddock scale using multiple layers of input data from on and off-farm sources

The project team includes experts in soil water prediction from the universities of Sydney and Southern Queensland, CSIRO, the Bureau of Meteorology and Australian National University, who will work closely with industry groups such as the Society of Precision Agriculture in Australia.

Outputs delivered in 2020–21 include:

- field-site validation data and identification of linkages with complementary projects
- analysis that identifies the key gaps in the publicly available soil moisture probe network
- sub-paddock scale hybrid water balance model on the R shiny platform across thousands of hectares for feedback by growers
- validation of new methods to use remotely sensed data and machine learning to generate more accurate predictions of PAW at the sub-paddock scale using low cost, scale-able methods
- initial model code and software required to power a 'minimum viable product' for sub-paddock scale monitoring of PAW across the country.

Mapping variability in soil constraints and predicting crop yield using machine learning techniques

This program, supported by GRDC, University of Sydney, Precision Cropping Technologies, Lawson Grains and Viridis Ag aims to develop tools to map fine-scale whole-of-paddock 3D variability of agronomically important soil constraints (sodicity, pH, salinity, gravel), and to map the depth at which these chemical and physical barriers become limiting and impact plant available water capacity. These data layers should improve prediction of crop yield variability pre- and in-season at the within-field scale, which in turn should improve input management and profitability.

Progress has been made on creating three dimensional (3D) maps to represent the soil constraints in both vertical depth, and horizontal space using the three different data sets. The research is currently assessing several Machine Learning methods to identify the most appropriate approach.

The Machine Learning methods being tested are:

- a fast implementation of random forests for high dimensional data
- XGBoost, a gradient boosted tree method
- Bayesian Neural Networks (BNN)
- Bayesian Linear Regression (BLR).

Concurrently, the use of the different data sets is being used to determine the extent of any benefit from using freely available off-farm data in the modelling and prediction processes.

Work has commenced on compiling the model code and supporting documentation required for the industry partners to use, and take to market, improved soil constraint mapping methods.



Weed species for potential research investment

This investment has assessed existing weed risk and prioritisation frameworks for their suitability to be applied to prioritising the research and development focus for weeds in the Australian grains industry.

A Weed Investment Prioritisation (WIP) tool for crop weeds, which includes a semiquantitative analysis and is compliant with the principles of Standards Australia's post-border weed risk protocol has been developed and will be used to assess existing and emerging weeds in terms of the importance for grain growers.

The WIP tool has been tested on 20 weeds of grain cropping systems chosen by an expert panel and assessments for these weeds were undertaken and then reviewed by the chair of the expert panel.

The purpose of the WIP tool is to prioritise weeds for research investment, and the WIP score rank allows an overall comparison to be made among weeds. However, whilst the WIP score is an overall summary figure, it summarises three component scores and therefore it is most informative to consider the scores separately as a matrix.

Paddock level herbicide resistance management for Western growers and advisers

A 'resistance estimation' study, involving a limited number of growers and advisers, was conducted to demonstrate the value of proactively testing herbicide resistance levels for a range of key production weeds and herbicides.

A significant number of the participants had not previously tested weeds for herbicide resistance.

Results show that many growers are confident in their herbicide resistance status assumptions for some types of resistance but not for more complex situations e.g., preemergent herbicides and herbicide mixtures, and this points to where resistance testing can add the most value.

Area Wide Management for cropping systems weeds, investigating the weed management, social and economic opportunity

Despite the constraints and periodic COVID-19 restrictions the project has established a strong foundation of regional partnerships in the three focus regions of the Darling Downs, Riverina and Sunraysia.

Progress on local weed management trials in each region is on-going. Preliminary results from field trials in the Sunraysia with broadacre and dried fruit growers to manage fleabane and ryegrass have been captured and in other regions there are plans for new trials to be implemented this forthcoming summer season. Other trials are multi-year and mature results are still to come.

Weed management models have been used to test likely economic impact of gaining the weed problems. This includes preliminary analysis using the Ryegrass Integrated Management (RIM) model to identify likely costs of gaining glyphosate resistant ryegrass in a 10-year winter cropping systems context. The analysis highlights the importance of taking a long-term perspective when determining potential costs of gaining a resistance problem.

Four summary reports have been produced that summarise data from interviewees. Achieving leadership, the demonstration of benefits and bringing people together to work on the problem were identified as the main challenges to implementing an AWM approach. The suggested benefits across all respondents were most commonly; greater awareness of the weed issues; learning new techniques and more effective weed control.

Preliminary findings have identified key opportunities and challenges in implementing AWM Wide approaches, including the need to identify optimal scales of AWM activity and engagement. Part of this includes identifying the extent to which AWM offers benefits to preventative management of mobile weed threats in districts and across industry sector boundaries (e.g., dryland and irrigated) and general benefits in terms of more collaborative approaches to weed management RDE, technical support and awareness across industries.



Soilborne diseases interaction in Australian farming systems

This investment has provided new knowledge and identified soilborne pathogens that have the potential to cause significant yield loss in pulse and oilseed crops.

Of note is new information on interactions between soilborne biotic and abiotic constraints under field conditions. The interaction between crown rot, root lesion nematodes and *Rhizoctonia*, and N nutrition have been demonstrated through this investment.

A report, which focussed on potentially novel control strategies identified 28 novel ideas with the ability to deliver short, medium, or long-term benefits to industry.

To date, project staff have contributed to 182 communication activities, including 144 for growers and their advisers and 38 for the research community.

The research findings have allowed the existing soilborne diseases management guide to be updated, which is now being used by cereal, oilseed, and pulse crops growers.

Durum Crown Rot benchmarking for improved grower access to durum varieties with greater Crown Rot resistance

Crown rot is a major disease constraint on the further development of the durum industry in Australia as all current durum varieties are susceptible to the disease. Several diverse sources of crown rot resistance have been identified and introgressed into adapted durum backgrounds by previous projects. The crown rot resistance and tolerance of new durum germplasm was determined across 12 sites over two years.

Eight lines with more than five novel sources of resistance and yields above current commercial cultivars under crown rot pressure have been shared with the Australian durum breeders.

Integrated disease management strategies for southern region cereal and pulse growers

A field inoculation method has been developed and validated in four field experiments that evaluated losses caused by turnip yellows virus (TuYV) in field pea and lentil. This work has established that the yield losses caused by TuYV in field pea can be up to 40 per cent and up to 41 per cent in lentil crops.

Using the information generated from this investment, Cereal and Pulse Disease Management Guides have been developed and provided to growers and advisers.

These annual Cereal and Pulse Disease Guides have been vital in the delivery of up-to-date disease ratings to the grains industry. The 2020 guides have been viewed 2,030 and 1,451 times, respectively, since June 2020 and are used as a key resource for current disease ratings.



Objective 4—Reduce post-farmgate costs

GRDC will continue to support R&D into understanding the variables that drive supply chain costs, to inform policy on these issues.

In addition, GRDC will consider transformational investments with the capacity to disrupt current freight dynamics, as well as developing extension packages that assist growers in minimising post-farm-gate costs.

2020—2021 INVESTMENT SUMMARY

RD&E	PROJECTS	INVESTMENT
New	3	\$1.2m
Ongoing	6	\$0.5m
Total	9	\$1.7m

Key investments 2020–21

Examples of investments in 2020–21 that support the achievement of this objective include:

Bagging grain profits — technical assessments of the use of silo bags in the Western Australian supply chain

Silo bags provide efficient and effective storage for cereals, particularly in high-production regions that regularly experience quality damage and yield loss due to delays in harvest and exposure to inclement weather. However, there have been concerns expressed by maltsters as to the impact that silo bags are perceived to have on the quality of barley (particularly germination). This project monitored storage conditions in the 2017–18 and 2018–19 harvest seasons (namely for temperature and humidity) in silo bags over time, as well as the grain moisture, germination, malting (through micro-malting) and brewing (pilot brewing) quality of barley that was stored in bags. In the past five years the use rate of grain silo bags in Australia has increased dramatically. The key driver for this is the logistical advantage of rapid harvest followed by on site storage of grain. Farmers have found their use to be vital in areas such as moisture and grain quality management as well as capturing freight cost advantages.

In March 2020, Barley Australia updated guidelines for malt barley stored in silo bags to raise concerns of using them for long periods, but as a short-term option they could be used to assist with harvest logistics.

Growers need to be aware that maintaining end use quality for malting barley is paramount to retaining its germination capacity in the malthouse and bags still pose a higher risk than other storage options. The process of making malt is dependent on live barley grain capable of vigorous germination. Therefore, when storing barley for malt purposes, it is vital that optimum storage conditions are adhered to.

Independent tools and knowledge to prepare, setup and managed temporary grain storage in grain bags have been delivered to growers and their advisors through the GRDC Grain Storage Factsheet: Successful storage in grain bags, the GRDC GrowNotes on Grain Storage and the [Stored Grain Information Hub](#).

Strategic oversight and coordination of grain protection chemicals

Through the continued use of various chemicals to control pests in grain crops, growers have been able to manage those pests and produce a quality crop that meets regulatory requirements for chemicals. Post-farm, the supply chain sector can use chemicals to manage any stored grain insects and therefore meet the regulatory requirement for nil live stored grain insects in exports.

Both sectors are now able to trade grain and manage that task with minimal impacts and by varying the production and supply chain segregation strategy, able to maximise the value of the grain in part due to this project.

This project has provided advocacy on the various control mechanisms available and able to be used for specific markets. Through provision of that information to industry, the project has enhanced industry's ability to comply with regulatory requirements, including following label directions when using those chemicals.

Climate Initiative

GRDC is participating in the Council of RDCs Climate Initiative to drive innovation that creates long-term adaptation to climate change. This Initiative has now developed an investment plan that was launched in February 2021. Its vision is to support a thriving agriculture sector irrespective of climate.

Agricultural Innovation Australia will build an investment prospectus to attract the investment required to deliver the outcomes developed in the investment plan. GRDC will assist in developing the prospectus to ensure that the research supports Australian grain growers.



Community Trust in Rural Industries Project

The Community Trust in Rural Industries Project is a collaboration of Australia's rural industries established in 2019 to address community trust collectively and proactively in the agriculture sector. The Program's aim is to develop an aligned approach to long-term engagement with the community through a three-year research and engagement program. The program is an Australian first, a partnership involving eleven Rural Research and Development Corporations including GRDC, as well as the National Farmers' Federation and the NSW Department of Primary Industries. In its first two years, the collaboration has given the sector access to a deeper, clearer understanding of what leads to community trust in rural industries.

Key findings to date include:

- In 2021, 89% of Australians trust rural industries, compared to 87% in 2020; while 93% of Australians accept rural industries in 2021, up from 87% in 2020.
- Almost two thirds (61%) of Australians agree that farmers, fishers, and foresters are responsible stewards of the land and the sea (up from 50% in 2020).

According to the research, trust in rural industries is dependent on four drivers; environmental responsibility, responsiveness to community concerns, the importance of products produced by rural industries and (new in Year Two) — distributional fairness (that the benefits of rural industries are shared fairly - especially with regional communities). Looking ahead the program is evolving to consider how we can work together in the long-term and present a unified response to critical shared issues, in response to community concerns.





Objective 5—Manage risk to maximise profit and minimise losses

Risk is an important part of the profit equation.

Risk management that is too conservative can limit profit in above-average production years, while approaches that are too aggressive can expose the grower to equity issues that adversely impact profit and future operations. In addition, grower attitude to risk is a key determinant of the speed and scale of uptake of new technology.

2020–2021 INVESTMENT SUMMARY		
RD&E	PROJECTS	INVESTMENT
New	3	\$0.1m
Ongoing	7	\$1.4m
Total	9	\$1.5m

Key investments 2020–21

Examples of investments in 2020–21 that support the achievement of this objective include:

Forewarned is Forearmed (FWFA): Managing the impact of extreme climate events

The Forewarned is Forearmed project, supported by the Australian Government Department of Agriculture, Water and the Environment as part of its Rural R&D for Profit programme, will provide forecasts of extremes beyond the 7-day weather forecast and equip farmers with the information and tools to be forewarned and prepared. The project outputs aim to decrease the impacts of extreme climate events on farm and business profit.

The project includes research, forecast product development and extension teams, representing a range of industries, including the grains industry, working directly with farmers and farm consultants, to link the forecasts to agricultural decisions and to develop risk management strategies to proactively prepare for these events. During 2020–21 the project has delivered several outputs that are of relevance and usefulness to grain growers. These include:

- Final selection of the five new extreme weather forecast products based on grower and producer feedback by the Bureau of Meteorology
- Development of an innovative climate risk management framework for complex farming decisions called the Rapid Climate Decision Analysis (RCDA) tool. The RCDA tool compares the outcomes across deciles of growing season rainfall of a higher risk and return choice (e.g. a higher N rate or a pulse crop) with a more conservative lower risk and return choice (lower N or a cereal). The key feature is that rather than budgeting for a single outcome, users are stepped through a process to provide information for three to five season types and presented with an interpolated graph that covers outcomes across all deciles. The RCDA tool, which has been presented at grower research updates and in-person workshops has upskilled dozens of growers and agronomists in climate risk management

- Monthly webinars on topical issues in climate risk management and seasonal climate forecasting with a diverse audience of stakeholders in the agricultural industry
- Work within the project has played a key role in the development and launch of the Bureau of Meteorology's ACCESS-S2 general circulation model (climate model) which will deliver improved multi-week forecasts and seasonal climate forecasts to Australian grain growers.

Managing Climate Variability (MCV) — Phase V

The Managing Climate Variability (MCV) Program Phase 5 is a long-term partnership of Rural Research and Development Corporation formed to advise on and invest in seasonal climate forecasting for Australian agriculture. Outputs deliver by the MCV project to date include:

- Delivered research that identified where there are significant and detectable changes in summer rainfall patterns across the mid-latitudes
- Delivered market research that used quantitative and qualitative techniques to identify grower and producer attitudes to seasonal climate forecasts.
- Contributed cash and in-kind co-investment to the Forewarned is Forearmed and AgScore projects. MCV has supported innovative research projects in Forewarned is Forearmed and AgScore to deliver more accurate and tailored climate information to growers across the country. This is already helping growers to improve climate risk management on a more granular level. More detailed impact analyses will occur once the research and development phases near completion.
- Delivered information services on climate-risk management via the popular Climate Kelpie news channels
- Worked with representatives from the Bureau of meteorology, the drought hubs, the climate initiative, and other relevant programs to identify pathways for MCV to support complementary initiatives following the end of the current MCV program management agreement.



- The Climate Kelpie news service has provided a forum for growers and other stakeholders in the agricultural industry to develop their understanding of applied climate science and climate-risk management in Australian agriculture.
- The work of the MCV program in helping support new climate initiatives and ensure its alignment with those programs will help growers and the grains industry benefit from a more co-ordinated approach to applied climate science in Australian agriculture.

AgScore: An agricultural approach to assessing the skill of seasonal climate forecasting systems and their value for aiding on-farm decision making

AgScore is being led by CSIRO, partnering with Weather Intelligence, a company that provides climate analytics services and research for the mining, energy, and agricultural industries in Australia. The first work package is testing a group of 10 models that currently produce operational forecasts for Australia, including systems such as NASA's GEOS-S2S-2 model and the United Kingdom Meteorology Office's GloSea5 model, as well as the Bureau of Meteorology's ACCESS-S1 system.

So far, a comprehensive analysis of climate model skill (accuracy) across Australia has been completed and the results workshopped with input from climate application specialists and growers. Grains, cotton, sugar, and rice growers have been identified for the development of case studies identifying the potential economic benefits of more relevant analyses of climate model accuracy.

Other work to date includes the near completion of the AgScore report card analyses and research that will help growers and advisors understand the skill of climate models for different locations, times of the year and decision points. This analysis will be a key tool in helping growers manage production-risk.





Framework performance in 2020–21

Biosecurity

Aims to invest in RD&E that is:

- *strategic, collaborative and coordinated to minimise grains biosecurity threats to production and trade in the context of common cross–industry objectives.*
- *contributing to the optimal management of grains industry plant biosecurity risks across the pre and post boundary continuum at national, state, region and farm levels with regard to pests, weeds and diseases that are either exotic (not yet established in Australia) or established (present in Australia).*

2020–2021 INVESTMENT SUMMARY

RD&E	PROJECTS	INVESTMENT
New	3	\$0.2m
Ongoing	13	\$2.7m
Total	16	\$2.9m



Key investments 2020–21

Distribution of ramularia across the Australian grain belt

Ramularia leaf spot (RLS) caused by *Ramularia collo-cygni* is a barley disease found in most areas of the world and recently confirmed to be present in Western Australia and Tasmania. Disease spreads aurally by spores within a season while internally infected seed also plays a role in its distribution. This project aims to determine the current distribution of RLS in Australia by testing leaf and seed samples from a combination of National Varietal Trial sites and commercial crops.

The high and medium rainfall areas of grain growing areas are expected to be the most likely to host the disease and consequently, survey efforts will be concentrated in these zones across Western, Southern and Northern regions. While the use of fungicides is expected to be useful against yield losses from RLS, this pathogen is a high risk for developing fungicide resistance, as is already present in Europe and New Zealand. Therefore, this project will also assess the fungicide resistance status of RLS isolates present in Australia to enabling selection of the most appropriate fungicides for control.

Prevention and preparedness for fall armyworm (*Spodoptera frugiperda*)

Fall armyworm (FAW), (*Spodoptera frugiperda*) is a significant global biosecurity threat because of its ability to spread rapidly within and between countries. It is a typical transboundary pest species that cannot easily be contained by individual country quarantine restrictions. In Australia, as elsewhere, the characterisation of FAW, including clarification of insecticide resistance status is an important first step in informing the development of management strategies and identification of research, development and extension needs. This project has two separate approaches involving bioassays of selected insecticides and *Bacillus thuringiensis* toxins, and whole genome sequencing methods to characterise resistance genes, thereby providing a holistic understanding of resistance threats posed by the FAW to Australia's and Southeast Asia's agricultural sectors.



Capacity and ability

The Capacity and Ability (C&A) Framework defines the intent and broad principles for GRDC's approach to develop and maintain the people, infrastructure, and delivery pathways to ensure the continued success of the Australian grains industry.

In addition, the C&A framework refines the relatively broad statutory scope of GRDC's investment in C&A to provide a greater strategic focus guided by principles for investment to deliver identified C&A priorities.

2020–2021 INVESTMENT SUMMARY

RD&E	PROJECTS	INVESTMENT
New	18	\$2.3m
Ongoing	73	\$5.6m
Total	91	\$7.9m



Key investments 2020–21

Australian Rural Leadership Program

GRDC provides support to the Australian Rural Leadership Program to develop industry leaders who will contribute now and into the future, ensuring the continued success of the Australian grains industry. The ARLP is Australia's longest and most in-depth experiential leadership program. The program gives participants valuable opportunities to nurture, challenge and build upon their leadership skills with people from diverse communities and industries.

Growers and Innovators

This investment aims to capture innovative concepts from growers and other non-traditional sources and placing these on a commercialisation pathway to deliver innovation for the Australian grain industry.

Australian Grains Genebank

The Australian Grains Genebank (AGG) represents the national, consolidated deposit of all major grains germplasm collections. The AGG has a mandate for germplasm introductions, quarantine, storage, maintenance, and information management to support Australian researchers and crop breeders to utilise international germplasm for the benefit of the Australian grains industry.

Australian Pastures Genebank

The Australian Pastures Genebank (APG) mandate includes all pasture and forage species of actual or potential value to Australian agriculture. This includes plants intended to be grown for:

- livestock
- crop rotation
- the environment.

The APG aims to conserve, maintain and distribute plant genetic material in the form of seed and associated data of mandate pasture and forage species.

Postdoctoral fellowships

GRDC currently supports approximately 17 outstanding postdoctoral scholars over a three period. Each fellow undertakes research in an area of priority for the Australian grains industry.

Grains Industry Research Scholarships

These scholarships are available to outstanding tertiary students to progress into postgraduate study in a field of work relevant to GRDC's research priorities. GRDC is currently supporting 27 students through this program.

Nuffield Scholars

Nuffield Australia is Australia's leading agricultural scholarship program. It a unique program that awards primary producers with a life-changing scholarship to travel and study an agricultural topic of choice.

GRDC's investment in the Nuffield Scholarship program supports the development of thought leadership in the grains industry through an award that enables growers or those associated with primary production to undertake a travel and study program on a relevant industry focus topic. In 2021, the GRDC Nuffield Scholar is Josh McIntosh. Josh farms at Nadda in the South Australian Mallee region. Through the scholarship, Josh plans to explore low-rainfall or semi-arid cropping areas in Central America, arid regions of Africa and Israel, and low-rainfall areas of Australia. He will investigate how to promote and maintain a healthy and profitable soil microbiome in low rainfall, broadacre, organic mixed farming systems.



Data management and analytics

This Framework aims to enable researchers and growers to capture and exploit data relevant to the grains industry, including R&D experimentation, paddock and farm, production, and economic, and environmental characterisation data. There are six strategic elements:

1. *Capture valuable data;*
2. *Make data accessible and actively share data and learnings;*
3. *Invest in analytics to create innovative insights and value;*
4. *Measure investment impact;*
5. *Ensure we have a workforce that has the necessary data and analytics skills and capacity; and,*
6. *Apply governance for effective data usage.*

2020–2021 INVESTMENT SUMMARY		
RD&E	PROJECTS	INVESTMENT
New	4	\$0.3m
Ongoing	29	\$7.7m
Total	33	\$8.0m

Key investments 2020–21

Statistics for the Australian Grains Industry (SAGI)

Statistics for the Australian Grains Industry (SAGI) is GRDC's flagship investment in statistical inputs for grains research, development, and extension. It provides statistical design and analysis services and consultancy, methodological research, and training to support GRDC's lab and field experimental R,D&E portfolio. In its current investment phase SAGI represents \$19 million of GRDC investment over five years between 2016 and 2021, with co-investment worth \$14 million from the four primary co-investment partners, Queensland Department of Agriculture and Fisheries, The University of Adelaide, University of Wollongong, and Curtin University.

National Phenology Initiative

The National Phenology Initiative aims to deliver accurate cultivar and environment specific estimations of wheat and barley phenology to grain growers and their advisers. It will achieve this by improving and validating the Australian Production Systems sIMulator (APSIM) next generation phenology routine and allowing cultivars to be parameterised using controlled environment data, molecular markers, single-nucleotide polymorphism genotypes (SNPs) or a combination of the above. Simulations are validated against field data for a wide range of phenology phenotypes (the Australian Phenology Panel comprising of 64 wheat and 32 barley genotypes) from diverse locations across the Australian wheat belt. Information is delivered to growers via a web interface on the National Variety Trials website.

INVITA — A technology and analytics platform for improving variety selection

Commencing in 2020, the INVITA AU project, leveraged off a similar existing initiative in Europe, will develop a platform for improving variety selection by accessing and developing enabling technologies and analytics solutions that will be deployed within National Variety Trials to support more profitable selection decisions by Australian growers. The project aims to:

1. support improved grower decision making by better accounting for environmental variability and its impacts on experimental treatments across trial sites and seasons;

2. improve site-specific trial plot estimates by better-quantifying and adjusting for site variability;
3. increase the speed and accuracy of trial result release and publication; and
4. inform continuous improvement of related trial programs by providing quantitative feedback on trial quality.

The project outputs should stimulate yield improvements in wheat, barley, canola, and sorghum, as a consequence of better variety and breeding selection and improved agronomic management.

Machine learning

Data has always been the mainstay of research, and statistical analysis that was once done by hand is now handled by skilled biometricians with larger and more complicated computer programs. However, while the volume of data has grown exponentially, traditional analysis methods have not been able to keep up.

Big data has the potential to solve some of most intractable problems, but the sheer size of it has moved beyond the capacity of our traditional methods of analysis.

The next quantum leap in analysis is 'machine learning' and it is increasingly becoming the only way to handle big data.

GRDC is investing in nine use-cases to put machine learning to the test with research data that has already been generated. The projects will tackle subjects as broad as:

- crop genetics;
- crop and soil variability mapping;
- agronomy and farming systems;
- crop monitoring; and
- information delivery.

The aim of this new investment is to build capacity in machine learning by linking researchers and GRDC with local and international expertise and draw on the lessons from other industries, such as engineering, logistics and finance to ensure Australian grain growers realise timely and robust benefits from machine learning.



Grower communications and extension

This framework builds on the significant progress GRDC has made to date in communicating Research & Development (R&D) outcomes to growers while increasing focus on extension that leads to increased technology adoption and practice change on farm.

The Framework also reflects GRDC's recognition of the changing extension landscape in Australia and aims to leverage and strengthen existing extension channels.

2020–2021 INVESTMENT SUMMARY		
RD&E	PROJECTS	INVESTMENT
New	10	\$2.4m
Ongoing	19	\$4.4m
Total	29	\$6.8m

Key investments 2020–21

GroundCover™

GroundCover™ is GRDC's flagship communication product for the Australian grains and is a nationally recognised trusted source of quality, comprehensive grains production information. It has been published as bi-monthly magazine since 1993 and is a familiar and trusted source of information for the grains industry.

In March 2019 *GroundCover™* online was launched, the new digital platform means that new stories are available online as soon as they are written. Stories are released daily and include seasonally and regionally relevant information on topics ranging from advances in plant breeding and biotechnology, new varieties, and agronomic best practice, through to harvest and on-farm grain storage.

GRDC Research Update series

The GRDC Grains Research Updates aim to deliver a strategic and innovative program to growers and advisers through face-to-face adviser and grower update events held in all grain growing regions across Australia. The events will provide cutting edge RD&E information that will assist growers and advisers to adopt new farming practices and technologies, and support industry networking for information exchange.

The Updates are an integral part of the GRDC's research extension events and play a key role in the adoption cycle. They are a valued delivery mechanism for grains researchers and industry experts to present their latest research and findings by showcasing the latest trial results directly to the grains industry.





3 OUR ORGANISATION

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Board

Directors

At 30 June 2021, the Board comprised nine directors, of which eight are non-executive Directors and one is an executive Director.

The Board has combined expertise in business management; commodity production, processing and marketing; economics; finance; management and conservation of natural resources; environmental and ecological matters; R&D administration; science and technology; technology transfer; communication; and public administration.

Directors at 30 June 2021



John Woods
BAppSc, MAICD

Appointed: 8 March 2012 to 30 September 2016

*Appointed as Chair:
First term — 1 October 2016 to 30 September 2019*

Second term — 1 October 2019 to 30 September 2022

Member: Remuneration, People and Performance Committee

John is partner and manager of a broadacre agribusiness based in northern New South Wales and southern Queensland. He has responsibility for all business aspects, including financial management, production and crop husbandry, marketing and logistics, resource management and work health and safety. He is also Chair of R&R Hire Services in Queensland.

John has a history of working collaboratively with a range of public and private organisations in the development, extension and adoption of new technology. He was Chairman of the Science Advisory Group of the National Agricultural Monitoring System (NAMS) between 2005 and 2009, and a member of the NAMS Advisory Reference Group and Steering Committee. He also spent six years, to 2005, on the National Rural Advisory Council.

John was Chairman of ChemCert Training Queensland from 2002 to 2004 and has held positions with Cotton Australia and Farmsafe Queensland.

Cathie Warburton

BA LLB, Dip Ed studies, GAICD

Interim Managing Director

Acting: 4 July to 2 August 2020, 6 May 2021 to 30 June 2021

Cathie Warburton has more than 20 years' experience working as a lawyer in government, university and private sectors. In recent years Cathie has moved into broader management roles at GRDC. As a graduate of the AICD Cathie also has experience as a non-executive director on not-for-profit boards.

Cathie is currently serving as Interim Managing Director at GRDC during its search for a new Managing Director. Cathie has been with GRDC for seven years where she commenced as General Counsel and Corporate Secretary before moving into General Management with responsibility for People, Communications and Governance.

Prior to this Cathie worked as head of the Legislation Unit at the NSW Department of Primary Industries where she was also the legal representative on the first response team for emergency outbreaks. Other experience includes University Solicitor at Charles Sturt University and head of consumer education at the Australian Securities and Investments Commission.



Richard Dickmann

BForSci (Hons), MAgSc, GAICD

Director (Non-executive)

Appointed: 1 October 2020 to 30 September 2023

Growing up on a southern Victorian farm, Richard obtained a bachelor's degree in Forest Science at the University of Melbourne and a Master of Science in Agriculture at the University of Sydney.

Richard has worked in state government agricultural extension in New South Wales and Victoria and the crop insurance industry. Richard undertook a 20-year international career in agribusiness, which involved postings to France, Singapore, Japan, China and Germany. Richard gained broad experience in research prioritization, marketing, global product management, product development and commercial operations.

Since returning to Australia in 2009, Richard has worked in new business development and public and government affairs. Richard worked to identify new business opportunities combining the innovation power of Australian and international organisations. Richard also developed sustainability programs seeking to better demonstrate the critical need for modern technology to address the twin challenges of food security and environmental responsibility.

Richard is a graduate of the Australian Institute of Company Directors and currently sits on the advisory board of the Australian Plant Phenomics Facility. Richard was formerly a Director of Cotton Grower Services Pty Ltd and a member of the Bayer Australia Ltd Board.



Roseanne Healy

BA(Econ), MBA, MBR(Com), GAICD

Deputy Chair

Director (Non-executive)

Appointed: 4 November 2014, reappointed to 30 September 2023

Member: Audit and Risk Committee (Chair from 6 December 2017)

Member: Remuneration People and Performance Committee

Roseanne has over 20 years corporate experience on mergers, acquisitions, capital raising and turnarounds; informed by investment banking, venture capital and start up roles over the course of her career.

Roseanne started in corporate advisory and investment banking as an economics and market analyst for ASX 100 and 200 companies in the resources, retail and automotive sectors.

As a tribunal member for the Office of Consumer and Business Affairs and CEO of SA Great, she influenced South Australia's economic credentials for investment attraction, spanning agriculture, aquaculture, food and wine, technology and infrastructure.

Roseanne is currently, Managing Director of corporate advisory Enterprise Corporation; Chair of Plexus Research Pty Ltd and Dairysafe. Non-executive director of Dairy Australia Ltd, Airborne Research Australia Ltd, Cashflow Manager Pty Ltd, Swarmer Pty Ltd, Food Manufacturing and Services Pty Ltd and Member, National Water Grid Advisory Body.

Roseanne was previously a non-executive director of the Rural Industries Research and Development Corporation (AgriFutures Australia).



Richard Heath

BSc (Hons), GAICD

Director (Non-Executive):

Appointed: 1 October 2017, reappointed to 30 September 2023

Chair: Remuneration, People and Performance Committee (from 9 December 2020)

Richard grew up on a family farm on the Liverpool Plains in north-west New South Wales. He managed the cropping operations of the farm for nearly 20 years, overseeing production of wheat, barley, chickpea, faba beans, canola, sorghum, sunflowers, mungbean and cotton. Richard has been an early adopter of new farming technologies and travelled on a Nuffield scholarship in 2003 to research precision applications of fertiliser.

Richard is the Executive Director of the Australian Farm Institute, an independent agricultural policy research organisation. Prior to this role, Richard was Associate Professor of Agronomy and Farm Management at the University of Sydney, with responsibility for the management of the university's north-west farms group, including the Plant Breeding Institute at Narrabri.

Richard was a member of GRDC's Northern Regional Panel from 2005 to 2011 and was a director of Nuffield Australia Farming Scholars from 2011 to 2017. He is currently a member of the external advisory committee of CSIRO Agriculture and Food.





Bob Nixon

Director (Non-Executive):

Appointed: 1 October 2020 to 30 September 2023

Member: Audit and Risk Committee (from 9 December 2020)

Bob manages a family farming business in the 300mm annual rainfall North-eastern wheatbelt of Western Australia. The family grow wheat, barley, canola, lupins, field peas and serradella cover crop. He has a strong interest in crop agronomy, soil health and resilient farming systems and communities.

Bob is past Chair of the Grain Industry Association of WA (GIWA) from 2017 to 2020. He currently sits on the WA Soil and Land Conservation Council, GRDC Soils Constraints West steering committee and is an active member of his local Liebe Grower Group. He completed a Nuffield Scholarship in 2014 looking into 'Mitigating Risk in a Dry and Variable Climate' in response to the drying out and increase in seasonal variability of the WA cropping belt. Bob was awarded the GRDC Seed of Light in 2019 for his work in managing soil constraints.



Andrew Spencer

BAGSc, GAICD

Director (Non-executive)

Appointed: 1 October 2020 to 30 September 2023

Member: Audit and Risk Committee (from 9 December 2020)

Andrew is the manager of his own consulting business in the Monaro Region of NSW, typically carrying out contractual work for some of Australia's rural research and development corporations. He has previously been a senior executive of diverse agriculture and agribusiness organisations, spanning more than 30 years in four countries.

From 2005 to 2019, Andrew was the Chief Executive Officer of Australian Pork Limited, the industry services and representative body for Australia's pork producers.

Prior to this time, he worked in the agricultural biotechnology, chemical and seed business in Australia, Europe and Africa particularly working in crops such as cereals, cotton, canola and rice. His roles included country management, global product management, crop business management and business development.

Andrew is Chair of the Australian Farm Institute and PorkScan Pty. Ltd., a small technology company in the pork industry.

Andrew studied agricultural science at the University of Melbourne.



Sharon Starick

Director (Non-executive)

Appointed: 30 November 2018, reappointed to 30 September 2023

Member: Audit and Risk Committee (from 9 December 2019 to 30 September 2020 and then from 9 December 2020).

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

Through Sharon's strong interest in policy development and collaboration within Australian agriculture, she currently holds the positions of:

- Chair of Animal Health Australia
- Director of the Regional Investment Corporation
- Chair of Rural Business Support
- Committee member, Murray Plains Farmers

She also has a passion for natural resource management and conservation that is reflected in her past involvement as Chair of the South Australian Murray–Darling Basin Natural Resources Management Board and as a member of South Australia's Natural Resources Management Council, the Australian Landcare Council and the Community Advisory Committee for the Murray–Darling Basin Ministerial Council. As a past director of Land & Water Australia, Sharon has experience in strategic planning for research and extension. Sharon is a past participant in the Murray -Darling Basin Leadership Program and was awarded the RIRDC Rural Women's Award for South Australia in 2003.





Gemma Walker

BAgrBus, MAICD

Director (Non-executive)

*Appointed: 1 October 2020 to
30 September 2023*

Gemma Walker and her husband run a mixed cropping and sheep property near Munglinup, in the Western Australia's south-east. In addition, she has worked for many years managing farming systems groups to deliver development and extension activities. These included Mallee Sustainable Farming and the Southeast Premium Wheat Growers Association.

Gemma is passionate about empowering all stakeholders in the grains industry to work together to build a sustainable and progressive supply chain which enables Australian growers and processors to profitably produce high quality goods for new and existing domestic and international markets.

Gemma is currently a Non-Executive Director on Rural Edge Limited Board (formerly Partners in Grain), Non-Executive Director on Esperance Organised Primary Producers and is a committee member of the Southern Biosecurity Group. Her Board roles have included National and Deputy Chair of Partners in Grain and Committee roles in business development and human resource management.

She has previously served as a GRDC Western Region Panel Member for seven years and as a Board or Committee Member on Muresk Institute of Agriculture Board, the Wheatbelt Area Consultative Committee, Grains West Reference Group, and the Rural Media Association (WA) Committee.

In South Australia, Gemma has held appointments on the Loxton Research Centre Consultative Committee and the AgExcellence Alliance Executive Committee in addition to her membership of the Mildura Young Professionals Network Executive Committee and Women Advancing Rural Communities group in Victoria.

Recognised for her significant contribution to sustainable agriculture at the National Landcare Awards, Gemma has also been a finalist in the AgriFutures Australia WA Rural Women's Awards.

The following Directors departed GRDC in 2020–21

Steve Jefferies

AM, BAgSc, PhD, GAICD

Managing Director (Executive)

Term: 4 July 2016 to 3 July 2020

Anthony (Tony) Williams

Managing Director (Executive)

Term: 3 August 2020 to

26 May 2021

Dianne Angus

BSc (Ed), BSc (Hons), M Biotech,
Grad Dip IP, MAICD

Director (Non-executive)

Term: 1 October 2017 to

30 September 2020

Chris Blanchard

BAppSci (Hons 1), PhD

Director (Non-executive)

Term: 1 October 2017 to

30 September 2020

Helen Garnett

PSM, BSc (Hons), PhD, FTSE, FAICD

Director (Non-executive)

Term: 4 November 2014

to 30 September 2020

Stephen Powles

BSc, MSc, PhD, FAA, FTSE

Director (Non-executive)

Term: 1 October 2017 to

30 September 2020



Board selection

Members of GRDC Board are selected and appointed in accordance with the Primary Industries Research and Development Act 1989 (PIRD Act). Under that Act, the Minister is responsible for the selection and appointment of the Chair of GRDC Board. The Managing Director is selected by the Board and holds office at the corporation's pleasure.

All other board members are selected by a selection committee, appointed by the Minister under the PIRD Act, in consultation with the industry representative organisation declared under the PIRD Act and other grower organisations. The selection committee is responsible for nominating five to seven candidates to be appointed as

GRDC directors. Nominations are made to the Minister and formal appointment of directors is made by the Minister.

In 2020–21 four new non-Executive Directors were appointed to the Board, and three non-Executive Directors were reappointed for a further three-year term.

Committees

At 30 June 2021, the Board had two committees, as described in Table 6. The Board receives formal reports from the committees, and any decisions that the Board makes in relation to those reports are recorded in the minutes of the subsequent board meeting.

Table 6: Board committees

ROLE	MEMBERSHIP
<p>Audit and Risk Committee</p> <p>Assists the Board in fulfilling its corporate governance responsibilities and reviews GRDC's:</p> <ul style="list-style-type: none"> external financial and performance reporting processes internal control system risk management strategy and processes internal and external audits statutory reporting obligations. 	<p>At least three non-executive directors appointed by the Board.</p>
<p>Remuneration, People and Performance Committee</p> <p>Reviews and makes recommendations to the Board on matters relating to:</p> <ul style="list-style-type: none"> the recruitment, remuneration, development, performance and retention policies of GRDC, including strategic workforce planning and organisational development fostering a performance culture the selection, remuneration and performance of the Managing Director the development and performance of the Board. 	<p>Chair, and three other non-executive directors appointed by the Board.</p>

Policies and practices

The Board Charter sets out the responsibilities and processes of the Board, including the code of conduct for directors. The Board reviews this document at least once a year.

Key policies and practices of the Board include:

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

- performance monitoring—The Board sets out a detailed plan for the corporation at the start of each year and reviews the corporation's performance against the plan throughout the year. This is a key factor in determining the level of any performance bonuses paid to GRDC staff.

Meetings

During 2020–21, the Board held one meeting in Canberra, with all other meetings conducted via videoconference due to COVID-19 travel restrictions.



Each director's attendance at meetings during the year is set out in Table 7.

Table 7: Attendance at board and committee meetings, 2020–21

MEMBERS	BOARD		REMUNERATION, PEOPLE AND PERFORMANCE COMMITTEE	
	MEETINGS ATTENDED	MEETINGS HELD AND ELIGIBLE TO ATTEND	MEETINGS ATTENDED	MEETINGS HELD AND ELIGIBLE TO ATTEND
Dianne Angus	4	4	n/a	n/a
Chris Blanchard	4	4	n/a	n/a
Richard Dickmann	8	9	n/a	n/a
Helen Garnett	4	4	1	1
Roseanne Healy	13	13	5	5
Richard Heath	13	13	4	4
Bob Nixon	8	9	n/a	n/a
Stephen Powles	4	4	n/a	n/a
Andrew Spencer	9	9	n/a	n/a
Sharon Starick	13	13	n/a	n/a
Gemma Walker	9	9	n/a	n/a
Cathie Warburton	1	1	n/a	n/a
Anthony Williams	7	7	n/a	n/a
John Woods	13	13	5	5

Audit and Risk Committee

GRDC's Audit and Risk Committee reports to the Board. Membership of the committee is comprised of four GRDC Directors that are appointed by the Board. The work of the Committee is articulated in an annual workplan, and the Charter for the Committee is published on GRDC's website: <https://grdc.com.au/about/who-we-are/our-structure/our-board>

On 30 September 2020, the Board membership changed. Table 8 includes both former and current Directors that have served on the Audit and Risk Committee between 1 July 2020 and 30 June 2021.



Table 8: 2020–21 Audit and Risk Committee membership and meetings

MEMBERSHIP OF GRDC'S AUDIT AND RISK COMMITTEE IN 2020–21	MEMBER'S EXPERIENCE	NO. OF MEETINGS ELIGIBLE TO ATTEND	NO. OF MEETINGS ATTENDED	REMUNERATION FOR THE PERIOD 2020–21 (AS PER THE REMUNERATION TRIBUNAL DETERMINATION)
<p>Ms Roseanne Healy</p> <p>Appointed: Chair from 6 December 2017 to 30 September 2020 and then from 9 December 2020.</p>	<ul style="list-style-type: none"> • BA(Econ), MBA, MBR(Com) • Graduate of the Australian Institute of Company Directors • Over 20 years of corporate advisory experience and expertise in strategy, investment analysis, due diligence and corporate governance • Managing Director of Enterprise Corporation, Chair of Plexus Research Pty Ltd and Dairysafe. Non-executive director of Dairy Australia Ltd, Airborne Research Australia Ltd, Cashflow Manager Pty Ltd, Swarmer Pty Ltd, Food Manufacturing and Services Pty Ltd and Member, National Water Grid Advisory Body. • Previously a director of the Rural Industries Research and Development Corporation, Great Artesian Oil & Gas Ltd, Maximus Resources, Marmota Energy Ltd, Tidewater Funds Management Ltd and HomeStart Finance 	4	4	\$16,320 per year
<p>Ms Dianne Angus</p> <p>Appointed: 1 October 2017 to 30 September 2020</p>	<ul style="list-style-type: none"> • BSc (Ed), BSc (Hons), M.Biotech, Grad Dip IP • Member of the Australian Institute of Company Directors • Leadership roles in the biotechnology industry for over 20 years • Non-executive director of ASX-listed companies Neuren Pharmaceuticals Ltd and Imagion Biosystems Ltd. 	1	1	\$8,160 per year
<p>Dr Helen Garnett</p> <p>Appointed: 1 October 2017 to 30 September 2020</p>	<ul style="list-style-type: none"> • PSM, BSc (Hons), PhD • Fellow of the Australian Academy of Technological Sciences • Fellow of the Australian Institute of Company Directors • Distinguished research career in pathogenesis and the development of diagnostics • Public Service Medal (2004) and the Centenary Medal (2000) for scientific and institutional leadership. • Over 15 years experience as a Chief Executive and over 20 years as a Non-Executive Director 	1	1	\$8,160 per year



MEMBERSHIP OF GRDC'S AUDIT AND RISK COMMITTEE IN 2020-21	MEMBER'S EXPERIENCE	NO. OF MEETINGS ELIGIBLE TO ATTEND	NO. OF MEETINGS ATTENDED	REMUNERATION FOR THE PERIOD 2020-21 (AS PER THE REMUNERATION TRIBUNAL DETERMINATION)
Mr Bob Nixon Appointed: 9 December 2020	<ul style="list-style-type: none"> • Manages a grain farming business in Western Australia • past Chair of the Grain Industry Association of WA (GIWA) from 2017 to 2020. • Currently sits on the WA Soil and Land Conservation Council, GRDC Soils Constraints West steering committee and is an active member of the local Liebe Grower Group • Nuffield Scholarship in 2014 	3	3	\$8,160 per year
Mr Andrew Spencer Appointed: 9 December 2020	<ul style="list-style-type: none"> • BAgSc, GAICD • Graduate of Australian Institute of Company Directors • Senior leadership positions in diverse agriculture and agribusiness organisations, spanning more than 30 years in four countries • Former Chief Executive Officer of Australian Pork Limited (2005-2019) • Current Chair of the Australian Farm Institute and PorkScan Pty. Ltd. 	3	3	\$8,160 per year
Ms Sharon Starick Appointed: 9 December 2019 to 30 September 2020 and then from 9 December 2020	<ul style="list-style-type: none"> • Grain and pork producer in Mallee region of South Australia • Chair of Animal Health Australia • Director of the Regional Investment Corporation • Chair of Rural Business Support • Committee member, Murray Plains Farmers • Past Chair of the South Australian Murray-Darling Basin Natural Resources Management Board • Previously, a member of South Australia's Natural Resources Management Council, the Australian Landcare Council and the Community Advisory Committee for the Murray-Darling Basin Ministerial Council • Past Director of Land and Water Australia • Agrifutures Rural Women's Award for South Australia in 2003 	4	4	\$8,160 per year



Accountability and governance

Legislation

GRDC was established in 1990 under the *Primary Industries Research and Development Act 1989* (PIRD Act).

As a corporate Commonwealth entity, GRDC is subject to the requirements of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act) and other Commonwealth legislation.

Accountability to the Australian Government

GRDC is part of the Australian Government's Agriculture portfolio.

During 2020–21 the Hon David Littleproud MP was Minister for Agriculture, Drought and Emergency Management. He was sworn in as Minister for Agriculture and Northern Australia on 2 July 2021.

Ministerial directions

GRDC fully complies with relevant directions made by ministers under the PIRD Act, the PGPA Act or other Commonwealth legislation.

Under section 143 of the PIRD Act, the Minister for Agriculture may give written directions to GRDC as to the performance of its functions and the exercise of its powers. No such directions were given in 2020–21.

Under section 22 of the PGPA Act, the Minister for Finance may give written directions to the Corporation regarding complying with the general policies of the government. No directions were given in 2020–21.

Funding agreement

Section 33(4) of the PIRD Act allows the Minister to enter into a funding agreement with GRDC. A new Funding Agreement with the Commonwealth was negotiated and agreed in April 2020. The Funding Agreement is underpinned by Performance Principles to guide GRDC's performance against the requirements of the Funding Agreement.

Significant events

The Chair of GRDC Board writes to the Minister after each board meeting, outlining all key decisions. Significant events in 2020–21 reported to the Minister were:

- The establishment of Agricultural Innovation Australia Limited
- The departure of Managing Director in May 2021
- The approval of 2020–23 Enterprise Agreement.

Government RD&E priorities

GRDC's RD&E investment strategies, as articulated in each five-year RD&E plan, are designed to address the Australian Government's Science and Research Priorities and Rural Research, Development and Extension Priorities. GRDC's R&D investments to meet the priorities are detailed in Appendix C.

Accountability to the grains industry

GRDC is accountable to the Australian grains industry through the industry's representative organisations, as described in the PIRD Act, and consults widely with other industry organisations and grower groups.

Representative organisations

GrainGrowers Limited and Grain Producers Australia Limited are the declared representative organisations under section 7 of the Act.

GRDC meets with the industry representative organisations at least once every six months and provides a formal opportunity for them to review GRDC's performance annually.

Consultation with the representative organisations in 2020–21 included discussions on:

- The establishment of Grains Australia Ltd
- Grains Sustainability Framework
- Levy Payer Register
- Director selection process and GGL's On-Board program



- National Grower Network
- Grain Industry Greenhouse Gas emissions project
- Community Trust in Rural Industries project

GRDC paid \$20,625.00 (GST incl.) to GrainGrowers and \$2,198.00 (GST incl.) to Grain Producers Australia for industry consultation costs during 2020–21, in accordance with section 15 of the PIRD Act.

Business relationships

Many of GRDC's business relationships are governed by research agreements, licence

agreements to commercialise resulting intellectual property, and agreements which procure services.

In some cases, the formation of companies and joint venture partnerships (for profit or not for profit) is the most effective way to deliver technologies, services, information and policy advice to Australian grain growers and the wider grains industry.

Table 9 describes the companies in which GRDC had shares or membership at 30 June 2019. In most cases GRDC also nominated one or more directors to the company's board.

Table 9: Companies in which GRDC had shares or membership at 30 June 2021

NAME	ACTIVITY	GRDC ROLE
Companies limited by guarantee		
Agricultural Innovation Australia Limited ACN 644 777 293	Facilitates joint investment and collaboration in cross-industry agricultural issues of national importance.	Is a member of the company. Does not nominate a director.
Australian Export Grains Innovation Centre Limited ACN 160 912 032	Provides research and development related to the Australian export grains industry.	Is a member of the company. Nominates a director.
Grains Australia Limited ACN 637 983 487	An industry good company with functions to enhance the competitiveness and profitability of the Australian grains industry across the value chain in domestic and international markets.	Is the sole member of the company. Does not nominate a director.
Wheat Quality Australia Limited* ACN 147 439 656 <i>*As of 1 July 2021 GRDC was no longer a member of Wheat Quality Australia Limited nor does it nominate a director.</i>	Manages and delivers the wheat variety classification process.	Is a member of the company and pays the company for services. Nominates a director.
Companies limited by shares		
Australian Grain Technologies Pty Ltd ACN 100 269 930	Undertakes commercial wheat and barley breeding.	Is a 39% shareholder. Nominates three directors.
InterGrain Pty Ltd ACN 128 106 945	Undertakes commercial wheat and barley breeding.	Is a 42.06% shareholder. Nominates one director.



Grains industry RD&E priorities

GRDC consulted extensively with grains industry participants to develop the RD&E Plan 2018–23. The consultation involved multiple consultative mechanisms to reach the widest range of stakeholders, including workshops, roadshows, face-to-face meetings, surveys and open submissions.

GRDC continually monitors evolving industry priorities, nationally and regionally, through its advisory panels and Regional Cropping Solutions networks; a wide range of other consultative forums, including Grower Solutions Groups; and direct feedback from growers and other industry participants.

Each year, the industry priorities are embedded in GRDC's annual operational plan and GRDC's performance in meeting the priorities is described in the corresponding annual report.

Industry levies

In 2020–21, a levy rate of 0.99 per cent applied to all leviable crops covered by GRDC, except for maize, which was levied at 0.693 per cent.

The levies were imposed and collected as stipulated by the:

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

GRDC paid the Department of Agriculture, Water, and the Environment \$841,135.05 for the collection and management of levies in 2020–21.

Corporate governance

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

Key corporate governance activities overseen by the GRDC Board in 2020–21 included the following:

- 2020–2023 Enterprise Agreement
- Compliance Framework
- Review of corporate and strategic risks
- Revised Delegations and Authorisations instrument
- Internal Audit reports

and the following new or revised policies

- Levy Payer Register Policy
- Conflict of Interest Policy
- Bullying and Harassment Policy
- Investment Management Policy
- Performance Appraisal Policy
- Workplace Grievance Policy
- Managing Misconduct Policy
- Procurement Policy

Risk management and fraud control

GRDC continually reviews and refines its risk management framework to reflect changes in the business environment and GRDC's structure.

The Board considers a strategic risk report at its monthly meeting and reviews the operational risks every six months, or more often if significant changes arise in the operating environment.

GRDC commissions external assessments of its fraud risk every two years. The Fraud Control Plan was finalised in 2020 and will be updated again toward the end of 2022. There were no incidences of fraud in GRDC in 2020–21.

The Board's Audit and Risk Committee oversees the preparation and implementation of GRDC's risk management initiatives and fraud control policy and plan.



Independent audits

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

The Auditor-General's independent audit report on GRDC's financial statements for 2020–21 is presented on pages 81–82.

Code of conduct

GRDC Code of Conduct sets out the principles and expected standards of behaviour for directors, staff and panel members. New directors and staff members are introduced to the code during induction, and presentations on the code are made to staff at regular intervals.

Indemnities and insurance premiums for officers

GRDC holds directors' and officers' liability insurance cover through Comcover. During the year, no indemnity-related claims were made. The cost of directors' and officers' indemnity insurance for 2020–21 was \$15,211.02 (GST excl.)

Judicial decisions and reviews by outside bodies

In 2020–21, GRDC was not affected by judicial decisions or reviews by administrative tribunals, parliamentary committees, the Commonwealth Ombudsman or the Office of the Australian Information Commissioner.



Work health and safety

GRDC's work health and safety mission is to create a workplace environment where the health, safety and wellbeing of employees are highly valued and people are encouraged and supported to adopt and maintain a healthy lifestyle.

Table 10 summarises GRDC's results in relation to reportable indicators of work health and safety performance in 2020–21.

Table 10: Work health and safety performance

INDICATORS	PERFORMANCE
Initiatives undertaken during the year to ensure the health, safety and welfare of workers who carry out work for GRDC	<ul style="list-style-type: none"> • Implementation and integration of the GRDC COVID-19 Safety Plan. • The Business Continuity Plan Working Group was established in March 2020 and remains in place for continuous monitoring of COVID-19 and the changing requirements in each of our office locations. • Influenza vaccination program offered to all staff. • Resilience training to assist employees in dealing with the uncertainties of COVID-19. • Counselling and employee support through the Employee Assistance Program. • Development of a model for effective hazard identification was completed and an audit of all GRDC premises was completed. • To facilitate safe remote working, an online tutorial "Workstation Setup Assessment" was provided to all staff. • All staff who engage in continued work from home arrangements are required to complete a home-based work health and safety evaluation which is signed by their General Manager.
Health and safety outcomes (including the impact on injury rates of workers) achieved as a result of initiatives	Nil notifiable incidents and 0 lost hours to injury
Statistics of any notifiable incidents of which GRDC became aware that arose out of the conduct of businesses or undertakings by GRDC	Nil notifiable incidents.
Details of any investigations conducted during the year that relate to the businesses or undertakings of GRDC, including details of all notices given to GRDC under Part 10 of the <i>Work Health and Safety Act 2011</i>	No investigations conducted
Other matters as required by the guidelines approved on behalf of the Parliament by the Joint Committee of Public Accounts and Audit	Nil





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Financial Performance Summary

Revenue

GRDC's total revenue in 2020–21, including government contributions was \$244.0m. This value is 26% higher than the budget published in the 2020-21 Portfolio Budget Statement of \$193.7m, and 41% higher than 2019–20. This significant increase has been driven by favourable national growing conditions combined with relatively strong grain prices. Levies receipts were \$157.3m, 36% higher than the 7-year rolling average and the largest amount in GRDC's history.

These higher industry conditions have resulted in 13% increase in government contributions. The government contribution is calculated from the 3-year rolling average of Gross Value of Production.

Other own-source revenues are largely in line with budget. Higher RD&E project refunds were offset by lower earnings on funds under management, reflecting the challenging fixed income and cash markets.

Expenditure

Total expenditure in 2020–21 was \$20.3m below budget and \$15.1m lower than 2019–20. This reduction in expenditure is accounted for by a 9% reduction on budget for research, development, and extension (RD&E) expenditure. Operational expenditure was lower due to continued reductions in legal expenses and lower accommodation and travel costs due to the COVID-19 pandemic.

GRDC's allocated overhead rate for 2020–21 is 9.1% of total expenditure (determined by allocating operating costs to RD&E activities). This is higher than the 2019–20 rate of 8.3% because of the lower RD&E expenditure. While operational costs were also lower, these were not to the same relative extent as RD&E.

Changes in equity

GRDC's returned an operating surplus of \$39.9m in 2020–21. This turnaround surpasses the budgeted deficit of \$30.2m and the \$45.9m deficit in 2019–20.

GRDC continues to invest in GrainInnovate and hold shares in the unlisted companies, Australian Grain Technologies (AGT) and Intergrain. Strong industry performance has had a positive impact on the values of both AGT and Intergrain, resulting in the \$19.5m gain in other comprehensive income.

In combination, (i.e. increased operating surplus plus other comprehensive gains) GRDC's total comprehensive income for 2020–21 was \$59.4m, which is a significant turnaround on the budgeted deficit of \$30.2m. Consequently, equity has increased to \$276.9m from the closing balance of \$217.5m at the end of last financial year.

Statement of financial position

The increase in equity is reflected in the statement of financial position primarily through the \$47.6m increase to financial assets and a reduction in total payables by \$12.4m over the financial year. Other categories within of the statement of financial position are relatively unchanged on last year.

Established in August 2020, Grains Australia (GAL) is an industry company limited by membership that consolidates grain industry good functions. At the time of reporting, GRDC is the sole member of the company, therefore the 2020–21 accounts for GAL have been consolidated in the GRDC financial statements.



Independent Auditor's Report



INDEPENDENT AUDITOR'S REPORT

To the Minister for Agriculture and Northern Australia

Opinion

In my opinion, the financial statements of the Grains Research and Development Corporation and its subsidiaries (together the Consolidated Entity) for the year ended 30 June 2021:

- (a) comply with Australian Accounting Standards – Reduced Disclosure Requirements and the *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015*; and
- (b) present fairly the financial position of the Consolidated Entity as at 30 June 2021 and its financial performance and cash flows for the year then ended.

The financial statements of the Consolidated Entity, which I have audited, comprise the following as at 30 June 2021 and for the year then ended:

- Statement by the Directors, Managing Director and Chief Financial Officer;
- Consolidated Statement of Comprehensive Income;
- Consolidated Statement of Financial Position;
- Consolidated Statement of Changes in Equity;
- Consolidated Cash Flow Statement; and
- Notes to the financial statements comprising a summary of significant accounting policies and other explanatory information.

Basis for opinion

I conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. My responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of my report. I am independent of the Consolidated Entity in accordance with the relevant ethical requirements for financial statement audits conducted by the Auditor-General and his delegates. These include the relevant independence requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants (including Independence Standards)* (the Code) to the extent that they are not in conflict with the *Auditor-General Act 1997*. I have also fulfilled my other responsibilities in accordance with the Code. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Accountable Authority's responsibility for the financial statements

As the Accountable Authority of the Consolidated Entity, the Directors are responsible under the *Public Governance, Performance and Accountability Act 2013* (the Act) for the preparation and fair presentation of annual financial statements that comply with Australian Accounting Standards – Reduced Disclosure Requirements and the rules made under the Act. The Directors are also responsible for such internal control as the Directors determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Directors are responsible for assessing the ability of the Consolidated Entity to continue as a going concern, taking into account whether the entity's operations will cease as a result of an administrative restructure or for any other reason. The Directors are also responsible for disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the assessment indicates that it is not appropriate.

GPO Box 707, Canberra ACT 2601
38 Sydney Avenue, Forrest ACT 2603
Phone (02) 6203 7300



Auditor's responsibilities for the audit of the financial Statements

My objective is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian National Audit Office Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

As part of an audit in accordance with the Australian National Audit Office Auditing Standards, I exercise professional judgement and maintain professional scepticism throughout the audit. I also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control;
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Consolidated Entity's internal control;
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Accountable Authority;
- conclude on the appropriateness of the Accountable Authority's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Consolidated Entity's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report. However, future events or conditions may cause the Consolidated Entity to cease to continue as a going concern;
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation; and
- obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Consolidated Entity to express an opinion on the financial report. I am responsible for the direction, supervision and performance of the Consolidated Entity audit. I remain solely responsible for my audit opinion.

I communicate with the Accountable Authority regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

Australian National Audit Office

S Bond.

Sally Bond

Executive Director

Delegate of the Auditor-General

Canberra

7 September 2021



Statement by the Directors, Managing Director and Chief Financial Officer

In our opinion, the attached financial statements for the year ended 30 June 2021 comply with subsection 42(2) of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act), and are based on properly maintained financial records as per subsection 41(2) of the PGPA Act.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Corporation will be able to pay its debts as and when they fall due.

The statement is made in accordance with a resolution of the directors.

Signed 

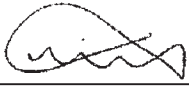
Mr J D Woods
Chairman

Date: 6 September 2021

Signed 

Ms Cathie Warburton
Managing Director (Interim)

Date: 6 September 2021

Signed 

Mr M W Priest
Chief Financial Officer

Date: 6 September 2021



Consolidated Statement of Comprehensive Income

For the period ended 30 June 2021

	NOTES	2021 \$'000	2020 \$'000	ORIGINAL BUDGET 2021 \$'000
NET COST OF SERVICES				
Expenses				
Employee benefits	1.1A	14,434	13,553	14,259
Research and development	1.1B	168,879	182,335	203,380
Suppliers	1.1C	12,128	16,861	-
Depreciation and amortisation	2.2A	6,161	5,668	6,292
Finance costs	1.1D	158	176	-
Losses from asset sales	1.1E	4	102	-
Other expenses	1.1F	1,844	44	-
Total expenses		203,608	218,739	223,931
Own-source Income				
Own-source revenue				
Revenue from contracts with customers	1.2A	8,866	10,811	11,123
Industry contributions	1.2B	157,279	95,767	116,017
Interest	1.2C	2,049	4,358	4,547
Project refunds	1.2D	6,100	1,486	-
Dividends	1.2E	617	1,207	1,000
Rental income	1.2F	171	170	176
Other revenue	1.2G	111	65	-
Total own-source revenue		175,193	113,864	132,863
Net cost of services				
Revenue from Government	1.2H	68,829	59,362	60,851
Share of associates and joint ventures accounted for using the equity method	2.1C	(472)	(417)	-
Surplus / (Deficit)		39,942	(45,930)	(30,217)
OTHER COMPREHENSIVE INCOME				
Items not subject to subsequent reclassification to net cost of services				
Changes in asset revaluation reserve		-	(95)	-
Items subject to subsequent reclassification to net cost of services				
Gains / (Losses) on financial assets at fair value through other comprehensive income	1.3A	19,456	(830)	-
Total other comprehensive income / (losses)		19,456	(925)	-
Total comprehensive income / (loss)		59,398	(46,855)	(30,217)

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



Consolidated Statement of Financial Position

As at 30 June 2021

	NOTES	2021 \$'000	2020 \$'000	ORIGINAL BUDGET 2021 \$'000
ASSETS				
Financial assets				
Cash and cash equivalents	2.1A	68,822	13,636	5,601
Trade and other receivables	2.1B	12,385	10,968	24,154
Equity accounted investments	2.1C	5,859	4,331	7,569
Investments in managed funds	2.1D	121,725	151,589	110,470
Other investments	2.1E	87,503	68,124	69,652
Total financial assets		296,294	248,648	217,446
Non-financial assets¹				
Buildings	2.2A	14,476	16,770	14,614
Property, plant and equipment	2.2A	1,528	2,179	2,185
Intangibles	2.2A	12,055	10,762	12,065
Other non-financial assets	2.2B	304	963	206
Total non-financial assets		28,363	30,674	29,070
Total assets		324,657	279,322	246,516
LIABILITIES				
Payables				
Suppliers	2.4A	2,015	2,952	38,497
Research and development	2.4B	26,250	37,253	-
Other payables	2.4C	2,128	2,634	1,858
Total payables		30,393	42,839	40,355
Interest bearing liabilities				
Leases	2.5	14,034	15,820	14,808
Total interest-bearing liabilities		14,034	15,820	14,808
Provisions				
Employee provisions	3.1	2,779	2,610	3,517
Other provisions	2.6	542	542	542
Total provisions		3,321	3,152	4,059
Total liabilities		47,748	61,811	59,222
Net assets		276,909	217,511	187,294
EQUITY				
Retained surplus		178,617	115,369	83,238
Contracted research reserve		97,900	101,750	104,056
Asset revaluation reserve		392	392	-
Total equity		276,909	217,511	187,294

¹ Right-of-use assets are included in the following line items: buildings, property, plant and equipment. The above statement should be read in conjunction with the accompanying notes.



Consolidated Statement of Changes in Equity

For the period ended 30 June 2021

	NOTES	2021 \$'000	2020 \$'000	ORIGINAL BUDGET 2021 \$'000
RETAINED EARNINGS				
Opening balance				
Balance carried forward from previous period		115,369	157,898	103,555
Adjustment on initial application of AASB 16		-	1,397	-
Adjusted opening balance		115,369	159,295	103,555
Comprehensive income				
Surplus / (Deficit) for the period		39,942	(45,930)	(30,217)
Other comprehensive (losses)		19,456	(830)	-
Total comprehensive income / (loss)		59,398	(46,760)	(30,217)
Transfers between equity components		3,850	2,834	9,900
Closing balance as at 30 June		178,617	115,369	83,238
ASSET REVALUATION RESERVE				
Opening balance				
Balance carried forward from previous period		392	1,671	12,206
Adjusted opening balance		392	1,671	12,206
Comprehensive income				
Other comprehensive income / (loss)		-	(95)	-
Total comprehensive income / (loss)		-	(95)	-
Transfers between equity components		-	(1,184)	-
Closing balance as at 30 June		392	392	12,206
CONTRACTED RESEARCH RESERVE				
Opening balance				
Balance carried forward from previous period		101,750	103,400	101,750
Adjusted opening balance		101,750	103,400	101,750
Transfers between equity components		(3,850)	(1,650)	(9,900)
Closing balance as at 30 June		97,900	101,750	91,850
TOTAL EQUITY				
Opening balance				
Balance carried forward from previous period		217,511	262,969	217,511
Adjustment on initial application of AASB 16		-	1,397	-
Adjusted opening balance		217,511	264,366	217,511
Comprehensive income				
Surplus / (Deficit) for the period		39,942	(45,930)	(30,217)
Other comprehensive (losses)		19,456	(925)	-
Total comprehensive income / (loss)		59,398	(46,855)	(30,217)
Closing balance as at 30 June		276,909	217,511	187,294

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



Consolidated Cash Flow Statement

For the period ended 30 June 2021

	NOTES	2021 \$'000	2020 \$'000	ORIGINAL BUDGET 2021 \$'000
OPERATING ACTIVITIES				
Cash received				
Industry contributions		157,161	95,423	119,687
Receipts from Government		64,778	72,537	49,596
Interest		1,749	4,225	4,260
Grants receipts		5,184	4,065	-
Dividends		617	1,207	1,000
Net GST received		16,562	18,907	18,245
Other		12,845	6,333	8,022
Total cash received		258,896	202,697	200,810
Cash used				
Research and development		196,503	201,331	224,178
Suppliers		14,255	18,041	
Employees		14,252	13,345	14,094
Interest payments on lease liabilities		159	176	-
Total cash used		225,169	232,893	238,272
Net cash from / (used by) operating activities		33,727	(30,196)	(37,462)
INVESTING ACTIVITIES				
Cash received				
Proceeds from sales of property, plant and equipment		-	3,000	-
Proceeds from loan repayments		1,512	-	-
Investments		30,000	95,001	45,000
Total cash received		31,512	98,001	45,000
Cash used				
Purchase of property, plant and equipment		4,394	5,536	4,365
Purchase of financial instruments		1,748	49,101	-
Purchase of investments		2,001	-	9,116
Total cash used		8,143	54,637	13,481
Net cash from investing activities		23,369	43,364	31,519
FINANCING ACTIVITIES				
Cash used				
Principal payments of lease liabilities		1,910	1,865	2,092
Total cash used		1,910	1,865	2,092
Net cash (used by) financing activities		(1,910)	(1,865)	(2,092)
Net increases in cash held		55,186	11,303	(8,035)
Cash and cash equivalents at the beginning of the reporting period		13,636	2,333	13,636
Cash and cash equivalents at the end of the reporting period	2.1A	68,822	13,636	5,601

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



Notes to and forming part of the financial statements

For the year ended 30 June 2021

Overview

The Basis of Preparation

The financial statements are general purpose financial statements and are required by section 42 of the *Public Governance, Performance and Accountability Act 2013*.

The financial statements have been prepared in accordance with:

- (a) *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015* (FRR); and
- (b) Australian Accounting Standards and Interpretations — Reduced Disclosure Requirements issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The consolidated financial statements have been prepared on an accrual basis and in accordance with historical cost convention, except for certain assets and liabilities that are at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position. The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Principles of Consolidation

AASB 10 requires a parent entity that is in a group to present consolidated financial statements that consolidate its investments in its controlled entities. The parent and the controlled entities apply consistent accounting policies, have the same reporting period and the effects of all transactions and balances between the entities are eliminated in full. The consolidated financial statements incorporate the assets and liabilities of all entities controlled by the Corporation as at 30 June and the results of the controlled entities for the year then ended. Details of Grains Australia Limited are included in note 5.4.

Going Concern

The directors have, at the time of approving the financial statements, a reasonable expectation that the Group have adequate resources to continue in operational existence for the foreseeable future. Thus, they continue to adopt the going concern basis of accounting in preparing the financial statements.

Impact of COVID-19

The GRDC have reviewed the impact of COVID-19 on its financial statements for FY 2021 (and FY 2020) and although there have been reductions to travel and accommodation costs associated with travel restrictions in place during FY 2021 (and FY 2020), there has been no material impact on the FY 2021 financial statements. The valuations of shareholdings in AGT and InterGrain in FY 2021 have also been reviewed by management and there has been no material impact to the valuations due to COVID-19.

New Accounting Standards

Adoption of New Australian Accounting Standard Requirements

No accounting standard has been adopted earlier than the application date as stated in the standard.

Taxation

The Corporation is exempt from all forms of taxation except Fringe Benefits Tax (FBT) and the Goods and Services Tax (GST).

Events After the Reporting Period

There was no subsequent event that had the potential to significantly affect the on-going structure and financial activities of the Corporation.

Comparatives

No adjustments have been made to comparatives to ensure consistency with 2020–21 disclosures.



Significant Accounting Estimates

Under AASB 9 *Financial Instruments*, shares in unlisted companies are required to be measured at fair value on initial application and then subsequently measured at fair value at the end of each reporting period.

In FY 2020 the GRDC engaged Ernst and Young (EY) to complete the revaluations of their shares in AGT and InterGrain, as well as the convertible note held with InterGrain. In FY 2021 the GRDC again engaged EY to complete the revaluations of their shares in AGT and InterGrain only, as the convertible note held with InterGrain was converted to shares on 25 June 2021. The valuation for FY 2021 was completed as a full and complete valuation whereas the valuation for FY 2020 was a limited valuation due to the nature of information available during the valuation process.

The GRDC have reviewed and accepted the valuations and have taken up the valuation adjustments from the lower end of the valuation range. This is consistent with the approach taken in FY 2020. Further details and fair value adjustments of the specific valuations can be seen at Note 2.1E.

Budget Variance Commentary

The following tables provide a comparison of the original budget as presented in the 2020–21 Portfolio Budget Statements (PBS) to the 2020–21 outcome as presented in accordance with Australian Accounting Standards for the Corporation. The Budget is not audited. Explanations of major variance are provided below.

Variances are considered to be ‘major’ based on the following criteria:

- The variance between budget and actual is greater than +/- 10% of the original budget and \$10 million for a line item; or
- The variance between budget and actual is greater than 2% of the relevant sub-total (i.e. total expenses, total income, total assets or total liabilities) and \$10 million for a line item; or
- An item below this threshold but is considered important for the reader’s understanding or is relevant to an assessment of the discharge of accountability and to an analysis of performance of the Corporation.



MAJOR VARIANCE AND EXPLANATIONS	AFFECTED LINE ITEMS
Statement of Comprehensive Income	
Total expenses were lower than budget by 9% (\$20m) due to a lower spend in Research and development.	<ul style="list-style-type: none"> • Research and development • Total expenses
Total own source revenue was up on budget by 32% (\$42m) due to higher Industry contributions. Industry contributions were higher than budget because of the exceptional year the industry has had, gross volume of production being the highest on record.	<ul style="list-style-type: none"> • Industry contributions • Total own source revenue
Surplus / (Deficit) has a variance to budget of \$69m, made up of \$20m lower Research and Development expenses, \$42m higher than budget Industry contributions, and \$8m of higher than budgeted Revenue from Government, which was also positively impacted by the higher gross volume of production achieved in FY 2021.	<ul style="list-style-type: none"> • Research and development • Industry contributions • Revenue from Government • Surplus / (Deficit)
Statement of Financial Position	
Total financial assets and total assets are higher than budget because of the exceptional industry value generated overall. These exceptional results (near perfect weather conditions resulting in higher volumes of grain produced and therefore higher levies received) have had a positive impact on cash and cash equivalents, and trade and other receivables, investment in managed funds, and the valuations in other investments.	<ul style="list-style-type: none"> • Cash and cash equivalents • Trade and other receivables • Investments in managed funds • Other investments • Total financial assets • Total assets
Total liabilities are lower than budgeted following continued efforts to optimise Research and development payables, resulting in a reduction in research and development expenses accrued at 30 June 2021.	<ul style="list-style-type: none"> • Research and development payables • Total liabilities
Total equity and net assets were positively impacted by the exceptionally good year the industry had following two drought effected years.	<ul style="list-style-type: none"> • Net assets • Total equity
Cash Flow Statement	
Total cash received was positively impacted by higher industry contributions and receipts from government in this financial year. Both line items were higher than budgeted due to the exceptional results achieved by the industry throughout the financial year.	<ul style="list-style-type: none"> • Industry contributions • Receipts from government • Total cash received
Lower research and development expenses during the year has resulted in lower than budgeted cash used for research and development. Research and development remain higher than research and development expenses as research and development accruals/payables were paid during the year.	<ul style="list-style-type: none"> • Research and development • Total cash used
Positively impacted levies, as a consequence of the industry's FY 2021 performance, have resulted in Net cash from operating expenses finishing above budget for the year.	<ul style="list-style-type: none"> • Net cash from operating activities
Net cash from investing activities was lower than budget as less cash was redeemed from managed funds during the year. A higher portion of cash was held at bank to mitigate against managed fund performance, and for operational cash flow purposes.	<ul style="list-style-type: none"> • Investments • Total cash received
The overall result of such a positive year produced net increases to cash held of \$63m higher than budget. This significant difference is largely the result of higher industry contributions and revenue from government, and as a result of less cash used for, Research and development and other operational expenditure.	<ul style="list-style-type: none"> • Industry contributions • Revenue from government • Research and development • Cash and cash equivalents at the end of the reporting period



Financial Performance

1.1: Expenses

	2021 \$'000	2020 \$'000
1.1A – Employee Benefits		
Wages and salaries	12,433	11,731
Superannuation		
Defined contribution plans	1,375	1,138
Defined benefit plans	129	139
Leave and other entitlements	168	168
Separation and redundancies	329	377
Total employee benefits	14,434	13,553

Accounting Policy

Accounting policies for employee related expenses are contained in People and Relationships section (Note 3.1).

	2021 \$'000	2020 \$'000
1.1B – Research and Development		
Research and development	162,309	177,067
Research and development for profit	5,874	5,268
Research and development consultants	696	875
Total research and development	168,879	182,335

1.1C – Suppliers		
Goods and services supplied or rendered		
Staff travel and accommodation	589	1,701
Consultants	827	625
Contractors	4,914	4,720
Corporate communications	446	736
Corporate governance	133	130
Corporate services	3,481	7,033
Levy collection costs	841	820
Other	846	1,004
Total goods and services supplied or rendered	12,077	16,769
Goods supplied	79	48
Services supplied	11,998	16,721
Total goods and services supplied or rendered	12,077	16,769
Other suppliers		
Workers compensation expenses	25	28
Short-term leases	26	64
Total other suppliers	51	92
Total suppliers	12,128	16,861

The Corporation has short-term lease commitments of \$26,000 as at 30 June 2021 (2020: \$64,000). The above lease disclosures should be read in conjunction with the accompanying notes 1.1D, 1.2F, 2.2A and 2.5.



Accounting Policy

Short-term leases and leases of low-value assets

The Corporation has elected not to recognise right-of-use assets and lease liabilities for short-term leases of assets that have a lease term of 12 months or less and leases of low-value assets (less than \$10,000). GRDC recognises the lease payments associated with these leases as an expense on a straight-line basis over the lease term.

	2021 \$'000	2020 \$'000
1.1D – Finance Costs		
Interest on lease liabilities	158	176
Total finance costs	158	176

The above lease disclosures should be read in conjunction with the accompanying notes 1.1C, 1.2F, 2.2A and 2.5.

Accounting Policy

All borrowing costs are expensed as incurred.

	2021 \$'000	2020 \$'000
1.1E – Losses from Asset Sales		
Loss from asset sales from:		
Plant & equipment	4	102
Total loss on asset sales	4	102
1.1F – Other Expenses		
Change in fair value through profit or loss	1,844	44
Total other expenses	1,844	44

1.2: Own-source Revenue and Gains

Own-source Revenue

	2021 \$'000	2020 \$'000
1.2A – Revenue from contracts with customer		
Sale of goods	3	2
Rendering of services	8,863	10,809
Total revenue from contracts with customers	8,866	10,811

Disaggregation of revenue from contracts with customers

Revenue from contracts with customers has been broken down into three categories: Major product/service lines representing revenue from royalties, grants for research and development, and revenue received from advertising in Groundcover. Revenue has also been broken down by type of customer, illustrating those revenues are derived from multiple sources including Australian Government, State and Territory Governments and non-government entities. Revenue is split to show the amount of revenue received over time and point in time.

Major product/service line:

IP licencing (royalties)	4,068	4,946
Research and development services (grant funded)	4,417	5,434
Groundcover advertising (print and online)	221	183
Other	160	248
	8,866	10,811



	2021 \$'000	2020 \$'000
1.2A – Revenue from contracts with customer		
Type of customer:		
Australian Government entities (related parties)	3,748	4,585
State and Territory Governments	2,575	2,794
Non-government entities	2,543	3,432
	8,866	10,811
Timing of transfer of goods and services:		
Over time	4,417	5,434
Point in time	4,449	5,377
	8,866	10,811

Accounting Policy

Revenue from the sale of goods is recognised when control has been transferred to the buyer. AASB 15 applies to all contracts with customers, except for contracts that are within the scope of other standards, such as leases, insurance contracts and financial instruments. AASB 1058 applies to transactions where the consideration to acquire an asset is significantly less than fair value and principally to enable GRDC to further its objectives, and the receipt of volunteer services, with some exceptions.

The following is a description of principal activities from which GRDC generates its revenue:

Royalties are in scope of AASB 15 and recognised at a point in time. Revenue from royalties is recognised when the GRDC is entitled and it can be reliably measured. There has been no change to how Royalties are currently recognised. Under AASB 15, the royalty arrangement would be considered a licence for intellectual property. Sales based on usage royalties promised in exchange for a licence to IP are recognised only when the later of the following occurs: subsequent sale or usage occurs; and performance obligations have been satisfied.

GRDC receives grants to complete specific research and development performance obligations. Each grant has been separately considered to determine whether it satisfies the AASB requirements to be accounted for as revenue from a contract with a customer, or whether AASB 1058 applies in full. Where the agreement creates an enforceable obligation for GRDC to transfer a specific good or service to a customer, AASB 15 applies. GRDC has determined that many of its grants are to deliver specific performance obligations, and therefore AASB 15 applies. In such cases, revenue is recognised as (or when) the performance obligation is satisfied. Where no sufficiently specific performance obligation can be identified, GRDC applies AASB 1058 and recognising income immediately on receipt.

Advertising income revenue for FY 2021 and FY 2020 is recognised, under AASB 15, when the advertising is published (point in time).

Publications revenue for FY 2021 and FY 2020 is recognised, under AASB 15, at a point in time when the publications are sold.

The transaction price is the total amount of consideration to which GRDC expects to be entitled in exchange for transferring promised goods or services to a customer. The consideration promised in a contract with a customer may include fixed amounts, variable amounts, or both. GRDC will adopt the practical expedient when adopting the AASB 15.

Receivables for goods and services, which have 30-day terms, are recognised at the nominal amounts due less any impairment allowance account. Collectability of debts is reviewed at end of the reporting period. Allowances are made when collectability of the debt is no longer probable.



	2021 \$'000	2020 \$'000
1.2B – Industry Contributions		
Coarse grains	33,575	28,786
Grain legumes	15,749	10,866
Oilseeds	29,267	15,103
Wheat	78,688	41,012
Total industry contributions	157,279	95,767

Accounting Policy

Revenue paid to the Corporation under Section 30 of the *Primary Industries Research and Development Act 1989*, where a research levy is attached to grain producers' output, is for the purpose of providing funds for research and development. Industry contributions (under AASB 1058) are recognised as control is gained.

	2021 \$'000	2020 \$'000
1.2C – Interest		
Deposits	1	107
Managed funds	1,748	4,101
Convertible notes	153	89
Loans	147	61
Total interest	2,049	4,358

Accounting Policy

Interest revenue is recognised using the effective interest method.

	2021 \$'000	2020 \$'000
1.2D – Project Refunds		
Project refunds	6,100	1,486
Total project refunds	6,100	1,486

Accounting Policy

Project refunds are recognised upon receipt of the refund when it relates to prior years expenditure and when the funds accrued are no longer required for the completion of the project.

	2021 \$'000	2020 \$'000
1.2E – Dividends		
Other	617	1,207
Total dividends	617	1,207

Accounting Policy

The full amount of the interim and final dividends are recognised in the year to which they relate even though the payment may not be received until the following year.



	2021 \$'000	2020 \$'000
1.2F – Rental Income		
Operating lease – Other ¹	171	170
Total rental income	171	170
Operating Leases		
GRDC sublets 130m ² of the Canberra Office to a government department, Prime Minister and Cabinet. The initial lease was renewed, and the current lease expires next financial year (November 2021). Rent is invoiced and received at the beginning of the month to reduce the risk of non-payment.		
Within 1 year	57	14
Total undiscounted lease payments received	57	14

The above lease disclosures should be read in conjunction with the accompanying note 1.1C, 1.1D, 2.2A, and 2.5.

	2021 \$'000	2020 \$'000
1.2G – Other Revenue		
Levy penalties	111	65
Total other revenue	111	65
1.2H – Revenue from Government		
Department of Agriculture, Water and Environment		
<i>PIRD Act 1989</i> contribution	68,829	59,362
Total Commonwealth Contributions	68,829	59,362

Accounting Policy

Revenue from Government

Revenue paid to the Corporation under Section 32 of the *Primary Industries Research and Development Act 1989*, representing no more than 0.5% of the gross value of production of grains, is for the purpose of funding research and development activities. Revenues from Government (under AASB 1058) are recognised as control is gained.

Funding received or receivable from non-corporate Commonwealth entities (appropriated to the non-corporate Commonwealth entity as a corporate Commonwealth entity payment item for payment to this entity) is recognised as Revenue from Government by the corporate Commonwealth entity unless the funding is an equity injection or a loan.

1.3: Gains/(Losses) through Other Comprehensive Income

	2021 \$'000	2020 \$'000
1.3A – Gains/(Losses) on financial assets at fair value through other comprehensive income		
Shares in unlisted companies	21,070	(803)
Investments in managed funds	(1,614)	(27)
Total other Gains/(losses)	19,456	(830)

This note is being added to provide clarity on what makes up the gain on financial assets at fair value through other comprehensive income.



Financial Position

2.1: Financial Assets

	2021 \$'000	2020 \$'000
2.1A – Cash and Cash Equivalents		
Cash at bank	68,822	13,636
Total cash and cash equivalents	68,822	13,636
2.1B – Trade and Other Receivables		
Goods and services receivables		
Goods and services	9,369	3,797
Contract assets	-	1,900
Accrued income	224	1,891
Total goods and services receivables	9,593	7,588
Other receivables		
Statutory receivables	2,767	1,986
Security deposits receivable	25	28
Loans receivable ¹	-	1,366
Total other receivables	2,792	3,380
Total trade and other receivables (net)	12,385	10,968

AASB 15

The contract assets represent the GRDC's right to consideration in exchange for goods or services that the GRDC has transferred to a customer, which will become receivable upon satisfaction of the performance obligation and invoicing (that is - they will require something more than the passage of time to become receivable).

No impairment loss allowance was recognised for trade and other receivables in FY 2021.

¹ At 30 June 2020 the Corporation had a loan receivable totalling \$1.37m. During FY 2021 the loan was repaid in full and there is Nil owing to GRDC at 30 June 2021.

Accounting Policy

Financial assets

Trade receivables, loans and other receivables that are held for the purpose of collecting the contractual cash flows where the cash flows are solely payments of principal and interest, that are not provided at below-market interest rates, are classified, and measured at amortised cost using the effective interest method adjusted for any loss allowance.



	2021 \$'000	2020 \$'000
2.1C – Equity accounted investments		
Grains Innovation Investment Trust ¹	5,859	4,331
Total investments accounted for using the equity method	5,859	4,331
Details of investments accounted for using the equity method		
		Ownership
Name of entity	%	%
Grains Research Development Corporation ²	100	100
<p>1 The investment in Grains Innovation Investment Trust is expected to be for more than twelve months.</p> <p>2 The value of the Grains Innovation Investment Trust is based on the net asset value which is \$5.9m (2020: \$4.3m)</p>		

Accounting Policy

Jointly Controlled Entities

Interests in jointly controlled entities in which the entity is a venture (and so has joint control) are accounted for using the equity method. Under the equity method, investments in the associates are carried in GRDC's statement of financial position at cost as adjusted for post-acquisition changes in GRDC's share of net assets of the associates. Goodwill relating to an associate is included in the carrying amount of the investment. There was no goodwill to include in the carrying value this financial year. After the application of the equity method, GRDC determines whether it is necessary to recognise any impairment loss with respect to the net investment in associates. No impairment loss was recognised this financial year.

	2021 \$'000	2020 \$'000
2.1D – Investments in Managed Funds		
Managed Funds Investments		
At market value	121,725	151,589
Total managed funds investments	121,725	151,589

Individually managed funds

The funds are available at call. Interest rates will vary to reflect varying market interest rates.

Ministerial approval

The Corporation has received approval under paragraph 59(1)(b)(iii) of the *Public Governance, Performance and Accountability Act 2013* to hold the investments listed above.

Accounting Policy

Managed funds are valued at *Fair Value Through Other Comprehensive Income (FVOCI)*. Full details of GRDC's accounting policies for investments in managed funds are contained in Note 5.1A.



	2021 \$'000	2020 \$'000
2.1E – Other Investments		
Shares in unlisted companies¹		
Australian Grain Technologies Pty Ltd (AGT) ²	65,692	51,382
InterGrain Pty Ltd ³	21,811	9,339
Total shares in unlisted companies	87,503	60,721
Hybrid contracts		
Convertible note ⁴	-	7,403
Total hybrid contracts	-	7,403
Net other investments⁵	87,503	68,124

The shares held are ordinary shares.

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

1 Under AASB 9 *Financial Instruments*, shares in unlisted companies are required to be measured at fair value on initial application and then subsequently measured at fair value at the end of each reporting period.

The Corporation has applied the irrevocable election to measure the equity instruments at fair value through other comprehensive income. On derecognition or reclassification, the cumulative gains or losses in other comprehensive income will not be recycled to profit or loss.

2 On 30 June 2020, AGT shares were valued at the fair value of \$51,382,000 in accordance with AASB 9. On 30 June 2021, the shares were subsequently revalued at \$65,692,000 with the gain in fair value of (\$14,310,000) being recognised in other comprehensive income.

3 On 30 June 2020, InterGrain shares were valued at the fair value of \$9,339,000 in accordance with AASB 9. On 25 June 2020 the number of shares increased by 8.6 million on conversion of the convertible note. On 30 June 2021, the shares were subsequently revalued at \$21,811,000 with the gain in fair value of (\$12,472,000) being recognised in other comprehensive income.

4 On 1 July 2020, the convertible note was valued at the fair value of \$7,403,505 in accordance with AASB 9. On 25 June the note was converted to shares and the convertible note was revalued to Nil. A loss of \$1,844,000 on conversion was recognised as a change in fair value through profit and loss (see note: 5.1B).

5 In accordance with AASB 9 *Financial Instruments*, Net Other Investments have increased from \$68.124 million in FY 2020 to \$87.503 million in FY 2021 a positive net change of (\$19.379 million) due to conversion of the convertible note and the revaluation of the shares held in AGT and InterGrain.

On 11 December 2020 GRDC registered an industry goods company limited by guarantee (Grains Australia Limited) where GRDC is the only member. On 30 June 2021 GRDC remains the sole member of Grains Australia. The operating results of Grains Australia have been incorporated into these financial statements along with a high-level overview of Grain Australia results for FY 2021.

Accounting Policy

Accounting policies for other investments are contained in Note 5.1A.



2.2: Non-Financial Assets

	BUILDINGS \$'000	PROPERTY, PLANT & EQUIPMENT \$'000	INTANGIBLES \$'000	TOTAL \$'000
2.2A – Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment and Intangibles				
Total as at 30 June 2020 represented by:				
Gross book value	20,967	4,642	18,235	43,844
Accumulated depreciation, amortisation and impairment losses	(4,197)	(2,463)	(7,473)	(14,133)
Total as at 30 June 2020	16,770	2,179	10,762	29,711
Additions:				
Purchase	71	156	3,755	3,982
Right-of-use assets	-	124	-	124
Depreciation and amortisation expense	(435)	(574)	(2,869)	(3,878)
Depreciation on right-of-use assets	(1,926)	(357)	-	(2,283)
Other movements	-	-	482	482
Work in progress				
Disposals:				
Other	(4)	-	(75)	(79)
Total as at 30 June 2021	14,476	1,528	12,055	28,059
Total as at 30 June 2021 represented by:				
Gross book value	21,034	4,922	22,397	48,353
Accumulated depreciation, amortisation and impairment losses	(6,558)	(3,394)	(10,342)	(20,294)
Total as at 30 June 2021	14,476	1,528	12,055	28,059
Carrying amount of right-of-use assets	12,972	176	-	13,148

No indicators of impairment were found during the year for buildings, property, plant and equipment, computer software or intangibles.

Revaluations of non-financial assets

No revaluations were required or took place in FY 2021 or FY 2020.

Accounting Policy

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Non-financial assets are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost, or for nominal consideration, are initially recognised as assets and income at their fair value at the date of acquisition, unless acquired as a consequence of restructuring of administrative arrangements. In the latter case, assets are initially recognised as contributions by owners at the amounts at which they were recognised in the transferor's accounts immediately prior to the restructuring.



Asset Recognition Threshold

Purchases of property, plant and equipment are recognised initially at cost in the statement of financial position, except for purchases costing less than \$2,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located. This is particularly relevant to 'make good' provisions in property leases taken up by the Corporation where there exists an obligation to restore the property to its original condition. These costs are included in the value of the Corporation's leasehold improvements with a corresponding provision for the 'make good' recognised.

Lease Right of Use (ROU) Assets

Leased ROU assets are capitalised at the commencement date of the lease and comprise of the initial lease liability amount, initial direct costs incurred when entering into the lease less any lease incentives received. These assets are accounted for by Commonwealth lessees as separate asset classes to corresponding assets owned outright but included in the same column as where the corresponding underlying assets would be presented if they were owned.

On initial adoption of AASB 16 the GRDC has adjusted the ROU assets at the date of initial application by the amount of any provision for onerous leases recognised immediately before the date of initial application. Following initial application, an impairment review is undertaken for any right of use lease asset that shows indicators of impairment and an impairment loss is recognised against any right of use lease asset that is impaired. No impairment was recognised for ROU assets in FY 2021.

Revaluations

Following initial recognition at cost, property, plant and equipment (excluding ROU assets) are carried at fair value (or an amount not materially different from fair value) less subsequent accumulated depreciation and accumulated impairment losses. Valuations are conducted with enough frequency to ensure that the carrying amounts of assets did not differ materially from the assets' fair values as at the reporting date. The regularity of independent valuations depended upon the volatility of movements in market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under the heading of asset revaluation reserve except to the extent that it reversed a previous revaluation decrement of the same asset class that was previously recognised in the surplus/deficit. Revaluation decrements for a class of assets are recognised directly in the surplus/deficit except to the extent that they reverse a previous revaluation increment for that class.

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

Depreciation

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

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

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

	2021	2020
Buildings	25 years	25 years
Other property, plant & equipment	2 to 12 years	2 to 12 years

The depreciation rates for ROU assets are based on the commencement date to the earlier of the end of the useful life of the ROU asset or the end of the lease term.



Impairment

All assets were assessed for impairment at 30 June 2021. Where indications of impairment exist, the asset's recoverable amount is estimated, and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to disposal and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the Corporation were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

There were no impairments to GRDCs assets in FY 2021.

Derecognition

An item of property, plant and equipment is derecognised upon disposal or when no further economic benefits are expected from its use or disposal.

Intangibles

The Corporation's intangibles comprise software and intellectual property. Software is carried at cost less accumulated amortisation and accumulated impairment losses. Software is amortised on a straight-line basis over its anticipated useful life as follows:

	2021	2020
Information management system	6 years	6 years
Other software	2.5 to 6 years	2.5 to 6 years

Intellectual property is carried at cost less accumulated depreciation and is depreciated on a straight-line basis over its anticipated useful life.

All intangible assets were assessed for indications of impairment as at 30 June 2021.

Development costs

Research and development costs are expensed when incurred. An intangible asset arising from development expenditure is only recognised when technical feasibility studies identify that the expenditure will deliver future economic benefits and these benefits can be measured reliably. Other development expenditure is recognised in the Statement of Comprehensive Income as an expense when incurred.

Following initial recognition of development expenditure, the cost model is applied requiring the asset to be carried at cost less any accumulated amortisation and accumulated impairment losses.

	2021 \$'000	2020 \$'000
2.2B – Other Non-Financial Assets		
Prepayments	304	963
Total other non-financial assets	304	963

All Other Non-Financial Assets are expected to be recovered in no more than 12 months.
No indicators of impairment were found for non-financial assets.



2.4: Payables

	2021 \$'000	2020 \$'000
2.4A – Suppliers		
Trade creditors – external parties	842	1,705
Accrued expenses – external parties	1,173	1,247
Total suppliers	2,015	2,952
Settlement is usually made within 30 days apart from those payables with specific settlement terms after 30 days.		
2.4B – Research and Development		
Research and development payables	4,709	-
Accrued research and development	21,541	37,253
Total research and development payables	26,250	37,253
2.4C – Other Payables		
Salaries & Wages	764	742
Unearned grant income – related parties	1,364	1,892
Total other payables	2,128	2,634

Accounting Policy

Accounting policies for payables are contained in Note 5.1A. Refer to Note 1.2A regarding the Corporation's accounting policy on grant income.

2.5 – Leases

	2021 \$'000	2020 \$'000
Lease liabilities – Motor Vehicles	564	658
Lease liabilities - Buildings	13,470	15,162
Total leases	14,034	15,820
Total cash outflow for leases for the year ended 30 June 2021 was \$2,069,000 (2020: \$2,041,000).		
Maturity analysis – contractual undiscounted cash flows		
Within 1 year	2,165	2,202
Between 1 to 5 years	7,815	9,564
More than 5 years	4,054	4,054
Total leases	14,034	15,820

Accounting Policy

Leases

For all new contracts entered into, the GRDC considers whether the contract is, or contains a lease. A lease is defined as 'a contract, or part of a contract, that conveys the right to use an asset (the underlying asset) for a period of time in exchange for consideration'.

Once it has been determined that a contract is, or contains a lease, the lease liability is initially measured at the present value of the lease payments unpaid at the commencement date, discounted using the interest rate implicit in the lease, if that rate is readily determinable, or the department's incremental borrowing rate.

Subsequent to initial measurement, the liability will be reduced for payments made and increased for interest. It is remeasured to reflect any reassessment or modification to the lease. When the lease liability is remeasured, the corresponding adjustment is reflected in the right-of-use asset or profit and loss depending on the nature of the reassessment or modification.



2.6: Other Provisions

	PROVISION FOR MAKE GOOD ¹ \$'000	TOTAL \$'000
As at 1 July 2020	542	542
Total as at 30 June 2021	542	542

The Corporation currently has an agreement for the leasing of premises which have provisions requiring the Corporation to restore the premises to their original condition at the conclusion of the lease.

The Corporation has made a provision to reflect the cost of this obligation. No change has been made to the value of this provision in FY 2021.

People and Relationships

3.1 – Employee Provisions

	2021 \$'000	2020 \$'000
Leave	2,779	2,610
Total employee provisions	2,779	2,610

Accounting Policy

Liabilities for short-term employee benefits and termination benefits expected within twelve months of the end of reporting period are measured at their nominal amounts. Other long-term employee benefits are measured as net total of the present value of the defined benefit obligation at the end of the reporting period minus the fair value at the end of the reporting period of plan assets (if any) out of which the obligations are to be settled directly.

Leave

The liability for employee benefits includes provision for annual leave and long service leave. The leave liabilities are calculated based on employees' remuneration at the estimated salary rates that applied at the time the leave is taken, including the Corporation's employer superannuation contribution rates, to the extent that the leave is likely to be taken during service rather than paid out on termination. The liability for long service leave has been determined by using the Australian Government shorthand method. The estimate of the present value of the liability considers attrition rates and pay increases through promotion and inflation.

Separation and Redundancy

Provision is made for separation and redundancy benefit payments. The Corporation recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

Superannuation

The Corporation's staff are members of the Commonwealth Superannuation Scheme (CSS), the Public Sector Superannuation Scheme (PSS), the PSS Accumulation Plan (PSSap), or other Superannuation funds held outside of the Australian Government.

The CSS and PSS are defined benefit schemes for the Australian Government. The PSSap and other superannuation schemes are defined contribution schemes.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported in the Department of Finance's administered schedules and notes.

For CSS and PSS members, the Corporation makes contributions based on the rates determined by an actuary to be sufficient to meet the current costs to the Government. The Corporation accounts for the contributions as if they were contributions to defined contribution plans.



For AustralianSuper and other approved superannuation schemes, the Corporation contributes a minimum of 9.5% of superannuable salaries.

As at 30 June 2021, superannuation contributions payable was \$Nil (2020: \$Nil).

3.2: Key Management Personnel Remuneration

Key management personnel are those persons having authority and responsibility for planning, directing, and controlling the activities of GRDC, directly or indirectly, including any director (whether executive or otherwise) of that entity. The Corporation has determined the key management personnel to be the Directors, including the Managing Director. Key management personnel remuneration is reported in the table below:

	2021 \$'000	2020 \$'000
Short-term employee benefits	765	829
Post-employment benefits (superannuation)	105	91
Other long-term employee benefits	2	11
Termination benefits	320	96
Total key management personnel remuneration expenses¹	1,192	1,027

The total number of key management personnel that are included in the above table are 9 individuals (2020: 8 individuals). During 2020 there were no changes to Directorships, and the number of key management personnel decreased to 8 with the resignation of the Deputy CEO in August 2019. In 2021 there were various changes to GRDC Board with some members reaching the end of their term and new members appointed, as such the number of key management personnel increased to 9 during the year.

Additionally, to the amounts disclosed in the table above, the Corporation had three fee-for-service contracted arrangements for the provision of Key Management Personnel services during the year. The Corporation incurred costs in relation to the first contract of \$12,858 (2020: \$51,432), and \$51,432 (2020: \$14,358) for the second contract. The Corporation entered into two new contracts during the year and incurred costs of \$12,878 (2020: Nil) and \$35,916 (2020: Nil).

¹ The above key management personnel remuneration excludes the remuneration and other benefits of all Cabinet Ministers and the Portfolio Minister. The Portfolio Minister's remuneration and other benefits are set by the Remuneration Tribunal and are not paid by the Corporation.

3.3: Related Party Disclosures

Related party relationships:

The Corporation is an Australian Government controlled entity. Related parties to this Corporation are Directors, Key Management Personnel including the Executive, and other Australian Government entities.

Transactions with related parties:

Given the breadth of Government activities, related parties may transact with the government sector in the same capacity as ordinary citizens. Such transactions include the payment or refund of taxes, receipt of a Medicare rebate or higher education loans. These transactions have not been separately disclosed in this note.

Several directors of the Corporation and their close family members hold directorships with other organisations. Any transactions between the Corporation and those organisations or any dealings between the Corporation and the Directors and their close family members individually are conducted using commercial and arms-length principles.

The Corporation made payments of \$790,903 (2020: \$701,075) to Charles Sturt University. At the time of payment and receipt of funds, a Director of the Corporation was a Director of the Charles Sturt University, Functional Grain Centre.

The Corporation made payments of \$1,443 (2020: \$1,448) to the Australian Farm Institute. At the time of payment, a Director of the Corporation was an Executive Director of the Australian Farm Institute.



The Corporation made payments of \$31,940 (2020: \$6,538) to Dairy Australia. At the time of payment, a Director of the Corporation was a Director of Dairy Australia. Transactions have been conducted on normal commercial terms.

The Corporation made payments of \$12,375 (2020: \$Nil) to Rural Edge Australia. At the time of payment, a Director of the Corporation was the Chair of Rural Edge Australia.

The Corporation made payments of \$NIL (2020: \$5,500) to Australasian Grain Science Association Inc. At the time of payment, a Director of the Corporation was the Chair of the Australasian Grain Science Association Inc.

The Corporation made payments of \$41,800 (2020: \$125,400) to Sugar Research Australia. The Corporation receipted funds from Sugar Research Australia of \$46,200 (2020: \$57,200). At the time of payment and receipt of funds, a Director of the Corporation was a Director of Sugar Research Australia.

All transactions have been conducted on normal commercial terms and no loans were made to the Directors or Director-related entities during the reporting period or in FY 2020/2021.

3.4: Supplementary Information for the Parent Entity¹

	2021 \$'000	2020 \$'000
Statement of Comprehensive Income		
Total expenses	205,958	219,986
Total own-source revenue	196,263	113,864
Revenue from Government	68,829	59,362
Total comprehensive income/(loss)	59,134	(46,760)
Statement of Financial Position		
Total current assets	202,880	175,790
Total assets	324,302	279,322
Total current liabilities	32,320	44,761
Total liabilities	47,655	61,811
Net assets	276,647	217,511
Equity		
Reserves	98,293	102,143
Retained surplus	178,354	115,368
Total equity	276,647	217,511

¹ The parent entity (Grains Research and Development Corporation (GRDC) is the sole member of the subsidiary (Grains Australia Limited (GAL)). The subsidiary is an industry based; public company limited by guarantee which was incorporated on 11 December 2019 which did not trade until FY 2021. The parent entity is required to pay \$10 to the subsidiary if the subsidiary is wound up. Apart from this the parent entity does not guarantee the subsidiaries debts, there are no contingent liabilities, and there are no capital commitments for PPE. Additional to this, as the subsidiary began trading in FY 2021 the comparatives FY 2020 as not consolidated.

Significant accounting policies

The accounting policies of the parent entity are consistent with those of the consolidated entity, as disclosed in note 1, except for the following:

Depreciation of office equipment is depreciated within 0-3 years in the subsidiary whereas office equipment is depreciated 2–12 years.



Managing Uncertainties

4.1 Unquantifiable contingencies

At 30 June 2021 the Corporation has engaged legal representation in relation to an ongoing intellectual property matter. The Corporation was successful at trial and the matter is now going to appeal. It is not currently possible to determine the amount of cash inflows resulting from this matter. Cash outflows are highly unlikely to occur because costs are not awarded in the jurisdiction where the litigation is underway, and the Corporation is not defending an allegation that would result in damages. In any event, the Corporation maintains a professional indemnity insurance policy. The Corporation believes if unsuccessful in defence of any proceedings related to this issue, insurance will indemnify for damages or judgments \$Nil (2020: \$NIL).

Accounting Policy

Contingent liabilities and contingent assets are not recognised in the statement of financial position but are reported in the notes. They may arise from uncertainty as to the existence of a liability or asset or represent an asset or liability in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

5.1: Financial Instruments

	2021 \$'000	2020 \$'000
5.1A – Categories of Financial Instruments		
Financial assets at amortised cost		
Cash and cash equivalents	68,822	13,636
Trade and other receivables	2,204	5,786
Total financial assets at amortised cost	71,026	19,422
Financial assets at fair value through other comprehensive income		
Investments in managed funds	121,725	151,589
Total financial assets at fair value through other comprehensive income	121,725	151,589
Financial assets at fair value through other comprehensive income (investments in equity instruments)		
Shares in unlisted companies ¹	87,503	60,721
Total financial assets at fair value through other comprehensive income (investments in equity instruments)	87,503	60,721
Financial assets at fair value through profit or loss		
Convertible note ¹	-	7,403
Total financial asset at fair value through profit or loss	-	7,403
Total financial assets	280,254	239,135
Financial Liabilities		
Financial liabilities measured at amortised cost		
Payables	28,143	40,069
Total financial liabilities measured at amortised cost	28,143	40,069
Total financial liabilities	28,143	40,069

¹ GRDC owns shares in two unlisted companies, 39.11% of AGT and 42.06% (FY 2020 38.33%) of InterGrain. Shares holdings in InterGrain increased this year by 8.6m shares on the early conversion of the convertible note on 25 June 2021 resulting in a percentage of ownership increase to 42.06% and the value of the convertible note reduced to Nil.



Accounting Policy

Financial assets

The Corporation, in line with AASB 9 *Financial Instruments*, classifies its financial assets in the following categories:

- (a) financial assets at fair value through profit or loss;
- (b) financial assets at fair value through other comprehensive income; and
- (c) financial assets measured at amortised cost.

The classification depends on both the Corporation's business model for managing the financial assets and contractual cash flow characteristics at the time of initial recognition. Financial assets are recognised when the Corporation becomes a party to the contract and, as a consequence, has a legal right to receive or a legal obligation to pay cash and derecognised when the contractual rights to the cash flows from the financial asset expire or are transferred upon trade date.

5.1A – Categories of Financial Instruments – continued

Financial Assets at Amortised Cost

Financial assets included in this category need to meet two criteria:

1. the financial asset is held in order to collect the contractual cash flows; and
2. the cash flows are solely payments of principal and interest (SPPI) on the principal outstanding amount.

Amortised cost is determined using the effective interest method.

Effective Interest Method

Income is recognised on an effective interest rate basis for financial assets that are recognised at amortised cost.

Financial Assets at Fair Value Through Other Comprehensive Income (FVOCI)

Financial assets measured at fair value through other comprehensive income are held with the objective of both collecting contractual cash flows and selling the financial assets and the cash flows meet the SPPI test.

Any gains or losses as a result of fair value measurement or the recognition of an impairment loss allowance is recognised in other comprehensive income.

Financial Assets at Fair Value Through Profit or Loss (FVTPL)

Financial assets are classified as financial assets at fair value through profit or loss where the financial assets either doesn't meet the criteria of financial assets held at amortised cost or at FVOCI (i.e., mandatorily held at FVTPL) or may be designated.

Financial assets at FVTPL are stated at fair value, with any resultant gain or loss recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest earned on the financial asset.

Impairment of Financial Assets

Financial assets are assessed for impairment at the end of each reporting period based on Expected Credit Losses, using the general approach which measures the loss allowance based on an amount equal to *lifetime expected credit losses* where risk has significantly increased, or an amount equal to *12-month expected credit losses* if risk has not increased.

The simplified approach for trade, contract and lease receivables is used. This approach always measures the loss allowance as the amount equal to the lifetime expected credit losses.

A write-off constitutes a derecognition event where the write-off directly reduces the gross carrying amount of the financial asset.



Financial liabilities

Financial liabilities are classified as either financial liabilities 'at fair value through profit or loss' or other financial liabilities. Financial liabilities are recognised and derecognised upon 'trade date'.

Financial Liabilities at Fair Value Through Profit or Loss

Financial liabilities at fair value through profit or loss are initially measured at fair value. Subsequent fair value adjustments are recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest paid on the financial liability.

Financial Liabilities at Amortised Cost

Financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs. These liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective interest basis.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

	2021 \$'000	2020 \$'000
5.1B – Net Gains or Losses on Financial Assets		
Financial assets at amortised cost		
Interest revenue	148	168
Net gains on financial assets at amortised cost	148	168
Investments in equity instruments at fair value through other comprehensive income (designated)		
Gains / (Losses) recognised in equity	21,070	(803)
Net gains / (losses) on investments in equity instruments at fair value through other comprehensive income (designated)	21,070	(803)
Financial assets at fair value through other comprehensive income		
Interest Revenue	1,748	4,101
Change in fair value	(1,614)	(27)
Net gains on financial assets at fair value through other comprehensive income	134	4,074
Financial assets at fair value through profit or loss		
Interest Revenue	153	89
Change in fair value	(1,844)	(44)
Net (losses) / gains on financial assets at fair value through profit or loss	(1,691)	45
Net gains on financial assets	19,661	3,484

There was no net gains or losses on financial liabilities.



5.2: Fair Value Measurements

Accounting Policy

The Corporation measures its managed fund investments using Level 1 inputs, that is, using quoted prices in active markets for identical assets that the Corporation can access at measurement date.

The share in unlisted companies is valued at fair value each year, in line with AASB 9 *Financial Instruments*, using Level 2 and Level 3 inputs.

Valuations of non-financial assets are conducted with sufficient frequency to ensure that the carrying amounts of assets do not differ materially from the assets' fair values as at the reporting date. The regularity of independent valuations depends upon the volatility of movements in market values for the relevant assets. Non-financial assets are measured using a range of Level 2 and Level 3 inputs.

The Corporation measures its Leasehold improvements using Level 3 inputs at the reporting date, using the Depreciated replacement cost valuation methodology.

The Corporation measures its Other property, plant and equipment using Level 2 inputs, using adjusted market transactions as a basis.

	2021 \$'000	2020 \$'000
5.2A – Fair Value Measurement		
Fair value measurements at the end of the reporting period		
Financial assets		
Investments in managed funds ¹	121,725	151,589
Shares in unlisted companies ²	87,503	60,721
Convertible note ³	-	7,403
Total financial assets	209,228	219,713
Non-financial assets		
Leasehold improvements ¹	1,504	1,917
Other property, plant and equipment ¹	1,352	1,770
Total non-financial assets	2,856	3,687
Total fair value measurements of assets in the Statement of Financial Position	212,084	223,400

1 No change in valuation technique occurred during the period.

2 The valuation for FY 2021 was a complete valuation whereas the valuation for FY 2020 was a limited scope valuation, due to the nature of information available during the valuation process. The GRDC have reviewed and accepted the valuations and have taken up the valuation adjustments from the lower end of the valuation range, consistent with last year's approach.

3 The early conversion of the Convertible note was approved by the Board and converted to shares on 25 June 2021. The balance of the convertible note at 30 June 2021 is Nil.



5.3: Current/Non-Current Distinction for Assets and Liabilities

	NOTES	2021 \$'000	2020 \$'000
Assets expected to be recovered in:			
No more than 12 months			
Cash and cash equivalents	2.1A	68,822	13,636
Trade and other receivables	2.1B	12,385	10,968
Investments in managed funds	2.1D	121,725	151,589
Other non-financial assets	2.2B	304	963
Total no more than 12 months		203,236	177,156
More than 12 months			
Equity accounted investments	2.1C	5,859	4,331
Other Investments	2.1E	87,503	68,124
Buildings	2.2A	14,476	16,770
Property, plant and equipment	2.2A	1,528	2,179
Intangibles	2.2A	12,055	10,762
Total more than 12 months		121,421	102,166
Total assets		324,657	279,322
Liabilities expected to be settled in:			
No more than 12 months			
Payables			
Suppliers	2.4A	2,015	2,952
Research and development	2.4B	26,250	37,253
Other payables	2.4C	2,128	2,634
Leases	2.5	2,165	2,202
Employee provisions	3.1	2,008	1,922
Total no more than 12 months		34,566	46,963
More than 12 months			
Leases	2.5	11,869	13,618
Employee provisions	3.1	771	688
Other provisions	2.6	542	542
Total more than 12 months		13,182	14,848
Total liabilities		47,748	61,811



5.4: Subsidiary Controlled by the GRDC

DETAILS OF INVESTMENTS IN SUBSIDIARIES	OWNERSHIP	
	2021 %	2020 %
NAME OF ENTITY		
Grains Australia Limited ¹	100	100

¹ Grains Research and Development Corporation (GRDC) is the sole member of Grains Australia Limited, an industry-based company limited by guarantee.

	2021 \$'000	2020 \$'000
Statement of Comprehensive Income		
Total expenses	479	-
Revenue from Government	742	-
Total comprehensive income	263	-
Statement of Financial Position		
Total current assets	374	-
Total assets	374	-
Total current liabilities	108	-
Total liabilities	111	-
Net assets	263	-
Equity		
Retained surplus	263	-
Total equity	263	-





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Appendix A



Executive remuneration PGPA Rule Section 17 BE (ta)

Information about remuneration for key management personnel

NAME	POSITION TITLE	SHORT-TERM BENEFITS			OTHER BENEFITS AND ALLOWANCES	POST-EMPLOYMENT BENEFITS			OTHER LONG-TERM BENEFITS			TOTAL REMUNERATION
		BASE SALARY	BONUSES	BENEFITS		SUPERANNUATION CONTRIBUTIONS	LONG SERVICE LEAVE	LONG-TERM BENEFITS	OTHER BENEFITS	TERMINATION BENEFITS	TERMINATION BENEFITS	
Steve Jefferies	Managing Director	\$4,202.55	-	\$378.22	\$435.17	-	-	-	-	-	-	\$5,015.94
Cathie Warburton*	Interim Managing Director	\$99,008.16	\$9,117.00	\$497.28	\$11,664.09	\$1,935.23	-	-	-	-	-	\$122,221.76
Anthony Williams	Managing Director	\$370,437.34	-	\$15,915.90	\$66,178.50	-	-	-	\$319,999.90	-	-	\$772,531.64
Dianne Angus	Director	\$11,923.17	-	-	\$1,321.47	-	-	-	-	-	-	13,244.64
Christopher Blanchard	Non-Executive Director	\$9,851.83	-	-	\$1,091.94	-	-	-	-	-	-	\$10,943.77
Roseanne Healy	Director	\$53,983.16	-	-	\$6,616.34	-	-	-	-	-	-	\$60,599.50
Richard Heath	Non-Executive Director	\$38,959.47	-	-	\$3,701.24	-	-	-	-	-	-	\$42,660.71
Stephen Powles	Non-Executive Director	\$9,851.83	-	-	\$1,091.94	-	-	-	-	-	-	\$10,943.77
John Woods	Non-Executive Director (Chair)	\$77,918.42	-	-	\$7,402.22	-	-	-	-	-	-	\$85,320.64
Richard Dickmann	Non-Executive Director	\$29,107.63	-	-	\$2,765.27	-	-	-	-	-	-	\$31,872.90
Robert Nixon	Non-Executive Director	\$33,689.70	-	-	\$3,200.50	-	-	-	-	-	-	\$36,890.20
Sharon Starick	Non-Executive Director	\$51,432.12	-	-	-	-	-	-	-	-	-	\$51,432.12
Helen Garnett	Non-Executive Director	\$12,858.03	-	-	-	-	-	-	-	-	-	\$12,858.03
Andrew Spencer	Non-Executive Director	\$35,915.97	-	-	-	-	-	-	-	-	-	\$35,915.97
Gemma Walker	Non-Executive Director	\$12,877.84	-	-	-	-	-	-	-	-	-	\$12,877.84

*This relates to the following periods: 7 July 2020 to 31 July 2020, 6 May 2021 to 30 June 2021

Information about remuneration for senior executives

TOTAL REMUNERATION BANDS	NUMBER OF OTHER HIGHLY PAID STAFF	SHORT-TERM BENEFITS			POST-EMPLOYMENT BENEFITS		OTHER LONG-TERM BENEFITS			TERMINATION BENEFITS	TOTAL REMUNERATION
		AVERAGE BASE SALARY	AVERAGE BONUSES	AVERAGE BENEFITS AND ALLOWANCES	AVERAGE SUPERANNUATION CONTRIBUTIONS	AVERAGE LONG SERVICE LEAVE	AVERAGE OTHER LONG-TERM BENEFITS	AVERAGE OTHER LONG-TERM BENEFITS	AVERAGE TERMINATION BENEFITS		
\$220,001 – \$245,000	1	\$172,499	\$28,810	\$1,490	\$18,606	\$6,115	-	\$0	\$227,520		
\$295,001 – \$320,000	2	\$238,327	\$29,670	\$1,010	\$25,798	\$6,648	-	\$0	\$301,452		
\$320,001 – \$345,000	1	\$268,279	\$35,031	\$0	\$28,551	\$6,358	-	\$0	\$338,220		
\$345,001 – \$370,000	1	\$263,781	\$36,010	\$21,085	\$29,350	\$5,286	-	\$0	\$355,511		

Information about remuneration for other highly paid staff

TOTAL REMUNERATION BANDS	NUMBER OF OTHER HIGHLY PAID STAFF	SHORT-TERM BENEFITS			POST-EMPLOYMENT BENEFITS		OTHER LONG-TERM BENEFITS			TERMINATION BENEFITS	TOTAL REMUNERATION
		AVERAGE BASE SALARY	AVERAGE BONUSES	AVERAGE BENEFITS AND ALLOWANCES	AVERAGE SUPERANNUATION CONTRIBUTIONS	AVERAGE LONG SERVICE LEAVE	AVERAGE OTHER LONG-TERM BENEFITS	AVERAGE OTHER LONG-TERM BENEFITS	AVERAGE TERMINATION BENEFITS		
\$230,001 – \$245,000	2	\$187,958	\$12,193	\$9,684	\$20,293	\$5,640	-	\$0	\$235,769		
\$245,001 – \$270,000	2	\$220,025	\$16,875	\$1,007	\$22,544	\$6,013	-	\$0	\$266,463		
\$270,001 – \$295,000	1	\$229,598	\$21,407	\$1,988	\$24,405	\$5,446	-	\$0	\$282,844		



Appendix B

Employee statistics

All Ongoing Employees Current Report Period (2020–21)

	MALE			FEMALE			INDETERMINATE			TOTAL
	FULL TIME	PART TIME	TOTAL MALE	FULL TIME	PART TIME	TOTAL FEMALE	FULL TIME	PART TIME	TOTAL INDETERMINATE	
NSW	1	0	1	0	0	0	0	0	0	1
Qld	6	0	6	8	0	8	0	0	0	14
SA	8	1	9	1	2	3	0	0	0	12
Tas	0	0	0	0	0	0	0	0	0	0
Vic	2	0	2	1	0	1	0	0	0	3
WA	2	0	2	6	1	7	0	0	0	9
ACT	19	0	19	16	4	20	0	0	0	39
NT	0	0	0	0	0	0	0	0	0	0
External Territories	0	0	0	0	0	0	0	0	0	0
Overseas	0	0	0	0	0	0	0	0	0	0
Total	38	1	39	32	7	39	0	0	0	78

All Non-Ongoing Employees Current Report Period (2020–21)

	MALE			FEMALE			INDETERMINATE			TOTAL
	FULL TIME	PART TIME	TOTAL MALE	FULL TIME	PART TIME	TOTAL FEMALE	FULL TIME	PART TIME	TOTAL INDETERMINATE	
NSW	0	0	0	0	0	0	0	0	0	0
Qld	0	0	0	0	0	0	0	0	0	0
SA	0	0	0	0	0	0	0	0	0	0
Tas	0	0	0	0	0	0	0	0	0	0
Vic	0	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0
External Territories	0	0	0	0	0	0	0	0	0	0
Overseas	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0



All Ongoing Employees Previous Report Period (2019–20)

	MALE			FEMALE			INDETERMINATE			TOTAL
	FULL TIME	PART TIME	TOTAL MALE	FULL TIME	PART TIME	TOTAL FEMALE	FULL TIME	PART TIME	TOTAL INDETERMINATE	
NSW	1	0	1	0	0	0	0	0	0	1
Qld	6	0	6	8	0	8	0	0	0	14
SA	9	1	10	2	0	2	0	0	0	12
Tas	0	0	0	0	0	0	0	0	0	0
Vic	2	0	2	1	0	1	0	0	0	3
WA	2	1	3	7	0	7	0	0	0	10
ACT	20	0	20	19	3	22	0	0	0	42
NT	0	0	0	0	0	0	0	0	0	0
External Territories	0	0	0	0	0	0	0	0	0	0
Overseas	0	0	0	0	0	0	0	0	0	0
Total	40	2	42	37	3	40	0	0	0	82

All Non-Ongoing Employees Previous Report Period (2019–20)

	MALE			FEMALE			INDETERMINATE			TOTAL
	FULL TIME	PART TIME	TOTAL MALE	FULL TIME	PART TIME	TOTAL FEMALE	FULL TIME	PART TIME	TOTAL INDETERMINATE	
NSW	0	0	0	0	0	0	0	0	0	0
Qld	0	0	0	0	0	0	0	0	0	0
SA	0	0	0	0	0	0	0	0	0	0
Tas	0	0	0	0	0	0	0	0	0	0
Vic	0	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0
External Territories	0	0	0	0	0	0	0	0	0	0
Overseas	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0



Appendix C

Expenditure against the National Science and Research Priorities and Rural R&D Priorities

The following tables summarise the total expenditure allocated against the Australian Government's Science and Research Priorities and Rural Research, Development and Extension Priorities within the 2020–21 financial year. The allocation of funds from GRDC research, development and extension portfolio is shown in both dollar and percentage terms for each priority.

Table 11: Australian Government Science and Research Priorities, dollar and percentage value

STAKEHOLDER PRIORITIES	ESTIMATED 2020–21 EXPENDITURE*	
	\$M	PERCENTAGE OF GRDC RESEARCH, DEVELOPMENT AND EXTENSION PORTFOLIO
National Science and Research priorities		
Food	\$63.2	37%
Soil and water	\$18.8	11%
Resources	\$1.2	1%
Environmental change	\$26.5	16%
Other [^]	\$50.2	30%
Not yet assessed	\$9.0	5%
Total	\$168.9	100%

[^] Other includes R&D Management cost, Framework investments such as website, publications, data management, biosecurity and all other investments that are not consistent with the National Science and Research Priorities definitions.

Note: GRDC contributes to several of the National Science and Research Priorities. The full list and definitions of the National Science and Research Priorities can be found at: <https://www.industry.gov.au/data-and-publications/science-and-research-priorities>

Table 12: Australian Government Rural Research, Development and Extension Priorities, dollars and percentage values

STAKEHOLDER PRIORITIES	ESTIMATED 2020–21 EXPENDITURE*	
	\$M	PERCENTAGE OF GRDC RESEARCH, DEVELOPMENT AND EXTENSION PORTFOLIO
Rural RD&E priorities		
Advanced technology	\$22.0	13%
Biosecurity	\$30.9	18%
Soil, water and managing natural resources	\$23.1	13%
Adoption of R&D	\$49.1	29%
Other ^a	\$35.5	22%
Not yet assessed	\$8.3	5%
Total	\$168.9	100%

^a Other includes R&D Management costs, and Framework investments such as website maintenance, publications, data management, biosecurity and all other investments that are not consistent with the definitions of the Priorities.







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Abbreviations list

AASB	Australian Accounting Standards Board
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ADOPT	Adoption Diffusion Outcome Prediction tool
AEGIC	Australian Export Grains Innovation Centre
AGT	Australian Grain Technologies
AIA	Agricultural Innovation Australia Limited
AgVet	Agricultural and veterinary chemicals
APVMA	Australian Pesticides and Veterinary Medicines Authority
ATMAC	Agricultural Trade and Market Access Corporation
BCA	Benefit Cost Analysis
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DNA	deoxyribonucleic acid
EU	European Union
GAL	Grains Australia Limited
GRDC	Grains Research and Development Corporation
GST	goods and services tax
GVP	Gross Value of Production
HIP	Herbicide Innovation Partnership
HRZ	high rainfall zone
LMA	late maturity α -amylase
LRZ	low rainfall zone
Minister, the	Minister for Agriculture and Northern Australia
N	nitrogen
NVP	Net Present Value
NVT	National Variety Trials
PAW	plant available water
PBA	Pulse Breeding Australia
PBR	plant breeder's rights
PGPA Act	<i>Public Governance, Performance and Accountability Act 2013</i>
PIRD Act	<i>Primary Industries Research and Development Act 1989</i>
QAAFI	Queensland Alliance for Agriculture and Food Innovation
R&D	research and development
RDCs	research and development corporations
RD&E	research, development and extension
RoR	Rate of Return
SNPs	single nucleotide polymorphisms
WHS	Work, health and safety
WLYP	water-limited yield potential
WUE	water use efficiency



Compliance index

REQUIREMENT	SOURCE	PART OF THE REPORT
Primary Industries Research and Development Act 1989 (PIRD Act)		
R&D activities	Paragraph 28(a)(i)	Page iii, pp. 2-3, Chapter 2, pp. 14-61
Marketing activities funded by levy	Paragraph 28(a)(ia)	Not applicable
Expenditure on R&D activities	Paragraph 28(a)(ii)	Page iii, Chapter 2, pp. 14-61 and Chapter 4
Impact of R&D activities on the grains industry	Paragraph 28(a)(ii)	Page iii, pp. 2-3, pp.14-29
Revisions of the R&D plan	Paragraph 28(a)(iii)	Not applicable
Agreements under sections 13 and 14	Paragraph 28(a)(iv)	Published separately
Patents and commercialisation	Paragraph 28(a)(v)	Page iii
Companies	Paragraph 28(a)(vi) and (vii)	Table 9, page 73
Real property	Paragraph 28(a)(viii)	Chapter 4, Financial Statements
Assessment of operations	Paragraph 28(b)	Annual Performance Statements, pp. 16-23
Contribution to the objects of the Act	Paragraph 28(c)	Pp. 14-61
Sources and expenditure of funds	Paragraph 28(d)	Pages iii and v, Chapter 4, Annual Financial Statements
Selection committee report	Paragraph 141 (f)	Not applicable
Public Governance, Performance and Accountability Rule 2014		
Approval of the report by directors	Section 17BB	Letter of transmittal
Parliamentary standards of presentation	Section 17BC	Throughout
Plain English and clear design	Section 17BD	Throughout
Enabling legislation	Paragraph 17BE(a)	Inside front cover and pages 68, 72 and 94
Legislated objects and functions	Paragraph 17BE(b)(i)	Inside front cover and page 72
Purpose	Paragraph 17BE(b)(ii)	Inside front cover and page 72
Responsible minister	Paragraph 17BE(c)	Inside front cover and page 72



REQUIREMENT	SOURCE	PART OF THE REPORT
Ministerial directions	Paragraph 17BE(d) and (f)	None to report
Policy orders	Paragraphs 17BE(e) and (f)	None to report
Annual performance statements	Paragraph 17BE(g)	Pp. 16-29
Significant issues related to financial compliance	Paragraph 17BE(h) and (i)	None to report
Information on members of the accountable authority	Paragraph 17BE(j)	Page 4, pp. 64-71, page 104 and Appendix A
Organisational structure	Paragraph 17BE(k)	Figure 1, page 4
Location	Paragraph 17BE(l)	Page 9 and inside back cover
Governance	Paragraph 17BE(m)	Page 8, pp. 72-75
Related entity transactions	Paragraphs 17BE(n) and (o)	Pp. 104-105
Significant activities and changes	Paragraph 17BE(p)	Page 72
Judicial decisions or decisions of administrative tribunals	Paragraph 17BE(q)	Page 75
Reports by the Auditor-General, a parliamentary committee, the Commonwealth Ombudsman or the Office of the Australian Information Commissioner	Paragraph 17BE(r)	Page 75
Information from subsidiaries	Paragraph 17BE(s)	Not applicable
Indemnity and insurance	Paragraph 17BE(t)	Page 75
Compliance index	Paragraph 17BE(u)	Pp. 123-124
Funding Agreement 2020–2030		
Stakeholder engagement	9.2(a)	Pp. iv, 3, 5-7 14-61
Balanced portfolio	9.2(b)	Page 10
Collaboration	9.2(c)	Report from the Chair and pp. 6-8
Governance	9.2(d)	Pp. 68-75
Performance	9.2(e)	Pp. iii-iv, 3 and 14-61
Other reporting requirements		
Government R&D priorities incorporated into the annual operational plan as requested by the Minister		Appendix C, page 118
<i>Work Health and Safety Act 2011</i>	Schedule 2, Part 4	Page 76
Employee statistics		Appendix B, pp.116-117
Executive remuneration		Appendix A, pp. 114-15



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