G36

Annual Report

Rīpoata ā-tau

2021

agresearch

āta mātai, mātai whetū

Contents

Rārangi take

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About us

Ko wai mātou

AgResearch is one of seven Crown Research Institutes in New Zealand. We are responsible for delivering innovative science and research outcomes specifically for the agricultural sector.

Our approximately 850 staff, spread throughout New Zealand, drive economic and environmental sustainability for New Zealand's food production systems. We have three overarching goals on behalf of the New Zealand Government. These are to:

- help foster and support prosperous land-based enterprises
- produce research that protects and enhances natural resources in a sustainable fashion
- contribute scientific understanding to added-value foods and bio-based products to meet evolving consumer demands.

We have two national centres (in Palmerston North and Lincoln) and two regional centres (in Hamilton and Mosgiel).

Research Centres

Ruakura - Hamilton
Grasslands - Palmerston North
Te Ohu Rangahau Kai - Palmerston North
Lincoln - Christchurch
Invermay - Mosgiel

Research Farms

Tokanui - Te Awamutu
Ruakura - Hamilton
Aorangi - Palmerston North
Ballantrae - Manawatu Gorge
Kaitoke - Upper Hutt
Woolford Block - Bulls
Lincoln - Christchurch
Invermay - Mosgiel
Woodlands - Invercargill

Chair and Chief Executive's review

Ngā arotakenga o te Heamana me te Tumuaki Whakahaere

In a year of extraordinary challenges and operating conditions, AgResearch is pleased to report we have achieved another strong financial result and strong performance in science delivery for our stakeholders.

Our organisation withstood the challenge thrown at us by the global COVID-19 pandemic by adapting our business to new, flexible ways of working. In doing so, we displayed the same resilience and underpinning characteristics of New Zealand's pandemic response.

As our nation transitioned to a recovery phase, AgResearch achieved several milestones. One of these was the culmination of several years of planning and work, making it particularly poignant for the future of our organisation. We refer, of course, to the official opening of Te Ohu Rangahau Kai, our new joint food-science facility located on Massey University's Palmerston North campus. The building is a bricks-and-mortar example of the future shape of research in this country. While we are the building's majority owner, we share the facility with researchers from the Riddet Institute and academic staff and students from Massey University.

The facility, with state-of-the-art food handling facilities, is already incubating new talent, ideas and research collaborations from within a nationally significant hub of food science specialists who are helping to shape the future of food and supply chain technology. It is a model for taking new knowledge forged by closer relationships with our colleagues in the Crown Research Institute (CRI) and university sectors and improving the transfer of this knowledge to the next generation of scientists through collaboration and direct supervision of post graduate researchers.

The New Zealand Government has set clear policy objectives in regard to meeting international climate change obligations. Lowering agricultural greenhouse gas (GHG) emissions through innovation and science is a key part of that. The He Waka Eke Noa working group is a cross-sector initiative that unites the nation's policy makers and sector experts. CRIs and AgResearch scientists are filling key roles in several of the workstreams.

We require knowledge, vision, understanding and strong relationships, particularly with tangata whenua. The Ministry of Business Innovation and Employment's (MBIE) Science Review of AgResearch and Te Pae Kahurangi (TPK) were catalysts for AgResearch to build on the work we did on our new Science Plan in Financial Year (FY) 20 and, at the request of our Board, refresh our strategic thinking and direction.

What followed was a comprehensive strategic review and then reshaping of our science engine around six new Innovation Centres of Excellence. Researchers were mobilised into teams focused on Beyond Food, Consumer Interface, Digital Agriculture, Ethical Agriculture, Resilient Agriculture and Smart Foods, which we believe better represent the contribution we make to the New Zealand research environment.

This new articulation of our strategic focus was made with the support of our stakeholders. It is timely also to acknowledge their contribution and the positive feedback we have had from them in regard to who we are, what we do, and why. It provided further validation of our work and the value it adds to the primary sector.

One of those key stakeholder groups is our Māori agri-business partners. We are committed to moving our Māori partnerships to the next level. Te Ara Tika outlines the way we will embed mātauranga Māori throughout our organisation so that we deliver for both Māori agri-business and Aotearoa. We greatly look forward to reporting more on the progress we make towards this goal in future annual reports.

We were also very pleased that AgResearch officially came off MBIE's "performance watch" in FY21 after being on the list for nearly a decade due to risks associated with past capital infrastructure projects and restructuring. The status change was acknowledgement of the progress we have made in strengthening our finances and the wider confidence of our primary sector stakeholders in the value of our science contributions.

Running a business as large and complex as AgResearch during a pandemic has had its challenges. We appreciated receiving crucial Government support through the COVID-19 Response and Recovery Fund and the contribution to the new facility now underway in Lincoln.

It was both a relief and hugely gratifying to observe strong demand for our scientific services throughout the year. Commercial stakeholder enquiries increased following the de-escalation in COVID-19 alert levels and gathered further momentum in the second half of FY21. Our Partnership and Programmes account managers have reported continued stakeholder interest in science solutions and see this as recognition of the leading role the sector will play in New Zealand's broader and long-term economic recovery.

We are proud of the impact our science is making towards New Zealand's economic prosperity. In the 'Our research' section of this annual report, we provide a number of

examples of this impact and the ways our innovative science is making a difference for end-users. They traverse a wide spectrum of science from mitigation of methane to using new technology to design the dairy farm of the future.

In summary, AgResearch experienced a year of many challenges, but our people, who drive our business, delivered throughout the year. The Board would like to thank everyone who contributed to that success. We recorded a solid financial result, strong science delivery and growth in pan-CRI and cross-sector collaboration. The support we received from our shareholders and commercial partners was vital to that, but our people were the key. Without them we would not be in the position we are today.

We can now look forward to capitalising on our healthy position with renewed confidence. We will do so while continuing to deliver the science and innovation our agricultural sector and communities need to ensure their businesses are fit-for-purpose and responsive to future challenges.

Dr Paul Reynolds
Chair
AgResearch

Dr Sue Bidrose
Chief Executive Officer
AgResearch

Our strategy

Tā mātou rautaki

AgResearch embarked on a review of its strategy during the reporting year.

Our overall vision–to develop the smartest, most sustainable land-use systems and most sought-after, high-value food and bio-based products–remained unchanged, as did our Statement of Core Purpose. However, it was necessary to refresh our strategy to better articulate who we are, what we do, and why. We did this not only for ourselves but also for the benefit of our stakeholders and collaborators.

The process was thorough; our stakeholders and staff provided invaluable feedback, which was the foundation for what has become our strategy document.

What our strategy means and why

The purpose of our strategy is to define what our four focus areas will be for the next five years. It begins with Science Excellence–the driving force behind our agri-science and the driving force that helps us meet the challenging needs of the sector and (importantly) its consumers. It then sets out the philosophy that underpins our partnerships. Our strategy is to create world-class research teams and co-design what they do with Māori, industry, farmers, Government, other CRIs and science organisations to deliver the most impactful outcomes.

Science, like many professions and disciplines, is becoming more aware of the benefits of adopting different perspectives. This was one of the consistent themes to emerge during the formation phase of our strategy. Placing mātauranga Māori as a focus area strengthened AgResearch's commitment to enrich our science in a uniquely Aotearoa based way. We will build capacity and capability to deliver to Māori agri-business by embracing different world views. Last but not least, the fourth focus area is Smart Investments. The strategy states that we will invest wisely in our people and our science to deliver the right science to meet New Zealand's needs.

If AgResearch is to deliver on its purpose to lead agri-based science innovation, we need a strategy that is both fit for purpose and adaptable. The agricultural landscape, in commercial, regulatory and environmental senses, is constantly evolving.

Our strategy also had to be designed within the context of the AgResearch Science Plan, Te Ara Tika, and build on and complement work already completed in TPK and the MBIE AgResearch Science Review. The strategy also needed to be sensitive to the Ministry for Primary Industries' (MPIs) Fit for a Better World COVID-19 Recovery Roadmap and position us to support the Government's science and innovation priority areas.

Government priority areas included climate change; transitioning New Zealand's primary industries into higher value products and exports; maintaining the health of land, water, and living systems; moving to a low-carbon emissions society; reversing the decline in biodiversity; and maintaining biosecurity, including a focus on pests and weeds. The importance of a long-term strategic view of biosecurity needs, particularly with the environmental impacts of climate change, cannot be overstated. The desire to do things better for Te Taiao (our natural world), our people, communities, and businesses is a common thread running through New Zealand's primary sector and government strategies. All have similar goals about creating a more productive, sustainable and inclusive economy. The sector aims to be seen as a trusted guardian that is sustainably profitable; captures premium value; and supports vibrant, resilient businesses and communities.

The strategy will also help AgResearch strengthen our connectedness to New Zealand's broader research sector. To ensure our science meets the needs of our end users we organised our capability into Innovation Centres of Excellence (ICEs): Beyond Food, Consumer Interface, Digital Agriculture, Ethical Agriculture, Resilient Agriculture and Smart Foods.

Having a clear articulation of what we do will not only help our stakeholders but will also help other CRIs connect and create research teams that can bring otherwise unachievable scale to science programmes. There are many such examples of this already underway with a pan-CRI approach being taken.

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Our pastoral farming sector is facing unprecedented challenges.

Farming practices must both mitigate and adapt to climate change, while also changing to improve water quality, to meet consumer and regulatory demands and to deal with emerging biosecurity and disease risks.

Now, more than ever, excellent world-class science is needed to provide farmers and industry with evidence and tools to make sound and innovative decisions across the agri-food value chain.

That is our mission.

Āta mātai, mātai whetū
In pursuit of far horizons while firmly grounded

Our purpose is to use science to enhance the value, productivity and profitability of New Zealand's pastoral, agri-food and agri-technology sector value chains to contribute to economic growth and beneficial environmental and social outcomes for New Zealand.

Leading agri-based science innovation

Prosperous land-based enterprises

Protected, enhanced and sustained natural resources

Added-value foods and bio-based products that meet consumer needs

Our Science

DIGITAL AGRICULTURE
Improving productivity, quality, security and safety of agricultural systems through digital technologies and advanced data analytics.

RESILIENT AGRICULTURE
Empowering sectors and communities to respond and adapt to changes in the environment, regulations and economic conditions.

ETHICAL AGRICULTURE
Ensuring our agricultural systems align with societal, customer and consumer values and our sector processes are robust and defensible.

SMART FOODS
Understanding and designing high-value protein-based foods and ingredients whose intrinsic properties bring demonstrated functional and health benefits for consumers.

CONSUMER INTERFACE
Fusing consumer insights with our science and innovation to optimise the design, development, value and uptake of novel agri-food products, technologies, processes and solutions.

BEYOND FOOD
Developing value-added bio-based products from pastoral agriculture bioresources, maximising the utilisation of resources and delivering verified attributes to the consumer.

Our Focus 2020 – 2025

SCIENCE EXCELLENCE

Driving the agri-science agenda for Aotearoa and tailoring our science to meet the changing needs of the sector and its consumers.

PARTNERSHIPS

Forming the right teams to create the most impactful outcomes. Actively co-designing with Māori, industry, farmers, government, innovation and research organisations.

MĀTAURANGA MĀORI

Building our understanding between science and Māori knowledge systems to deliver to Māori and enrich our science in a uniquely Aotearoa based way.

SMART INVESTMENT

Creating value for Aotearoa and our sector by investing wisely in our people and our science. As a profitable company, commercial returns from our work will be reinvested back into innovative science that enhances our ability to deliver on our core purpose.

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Kua putahia mai ētahi whakataratara tūhāhā e whakapā atu ana i tō mātou rāngai ahuwhenua.

Me whakamaru, me urutau hoki ngā whakaritenga ahuwhenua ki te panonitanga o te āhuarangi, e whakarerekē haere hoki ana kia whakapai ake i te kounga wai hei whakatutuki i ngā tono kaihokohoko, i ngā tono whakaritenga, hei whāwhā i ngā tūraru haumaru koiora, i ngā tahumaero hoki.

Ināianei, he pūtaiao hiranga e matea ana hei whakarato i ngā taunakitanga, i ngā taputapu ki ngā kaipāmu, ki te ahumahi hoki hei whakatau whaitake, auaha hoki kei te ara whai hua ahuwhenua-kai.

Ko te wawata, kia piki te huamoni, hei whakangao i te pūtaiao

Koia rā tō mātou whakatakanga.

Ko tā mātou aronga, ka whakamahi pūtaiao hei whakarākei i te whai hua, i te tōnui, i te huamonitanga o te ngā ara whai hua o te rāngai ahuwhenua, kai mai, hangarau mai kia whakarato atu ki te whakatipuranga ōhanga, ki ngā whakaputanga ā-taiao, ā-hapori hoki mō Aotearoa.

He auahatanga pūtaiao ahuwhenua pūharu

He hinonga ā-whenua taurikura

He kai whaihua, he hua koiora hei tutuki ngā wawata

He rawa māori haumaru, whakahaumako, toitū hoki

Tā mātou pūtaiao

AHUWHENUA MATIHIKO

E whakapai ana i te tōnui, i te kounga, i te ranea o ngā pūnaha ahuwhenua mā ngā hangarau matahiko me ngā tātaritanga raraunga.

AHUWHENUA MANAWAROA

E whakamana i ngā rāngai, i ngā hapori hoki ki te whakahoki, ki te urutau ki ngā rerekētanga i te taiao, i ngā whakaritenga, i ngā āhua ōhanga hoki.

AHUWHENUA MATATIKA

E tīaroaro pū tonu ana i ā mātou pūnaha ahuwhenua ki ō mātua whai hua ā-hapori, ā-kaitango, ā-kiritaki, e pakari hoki ana, e whakawawao hoki ana i ngā whakaritenga rāngai.

HE KAI TAUTIKA

E whakawhanake ana i ngā kai whakauru whai painga, i ngā tukuatuka kai kore, ko aua mea e aro atu ana ki ā kiritaki wawata whānui, o nāianei, ā mua hoki.

TE PŪTAHI KIRITAKI

Ka hono ngā whakaaro o ngā kiritaki me ngā āhuatanga pūtaiao kia whakapai i te ahua, te whakaahu me te hokona o ngā hua, ngā tukanga, me ngā whakataunga.

I TUA ATU I TE KAI

Ka hanga whai hua, ka whakaiti para mā te whakawhanake i ngā hua kore-kai hou i ngā pūnaha ahuwhenua, i ngā tukatuka e raro iho ana.

Tō mātou aronga 2020 – 2025

HE HIRANGA PŪTAIAO

E uruhi ana i te take ahuwhenua-pūtaiao ki Aotearoa, e whakaumu ana i tā mātou pūtaiao kia tutuki i ngā matea o te rāngai me ngā kiritaki.

NGĀ HONONGA

E whakarite ana i ngā tima pai rawa atu hei whakaputa i ngā hua whakaaweawe. E whakaahua tahi ana mātou ko ngāi Māori, ko te ahumahi, ko ngā kaiahuwhenua, ko te Kāwanatanga, ko ngā hinonga rangakura hoki.

MĀTAURANGA MĀORI

Ka whakawhanake i tō mātou māramatanga i waenga i te pūnaha pūtaiao me te ao Māori kia whakarato ki ngāi Māori, kia whakahaumako ahurei i tō mātou mahi pūtaiao ki Aotearoa.

HE HAUMI ATAMAI

Ka whakangaotia ki ā mātou kaimahi, ā, i te pūtaiao kia whakamana i a tatou kātoa ō Aotearoa. Ka whakahoki ā mātou huamoni, kia whakangao i ngā mahi pūtaiao kia tutuki pai i ō mātou tino aronga.

Our Science Plan

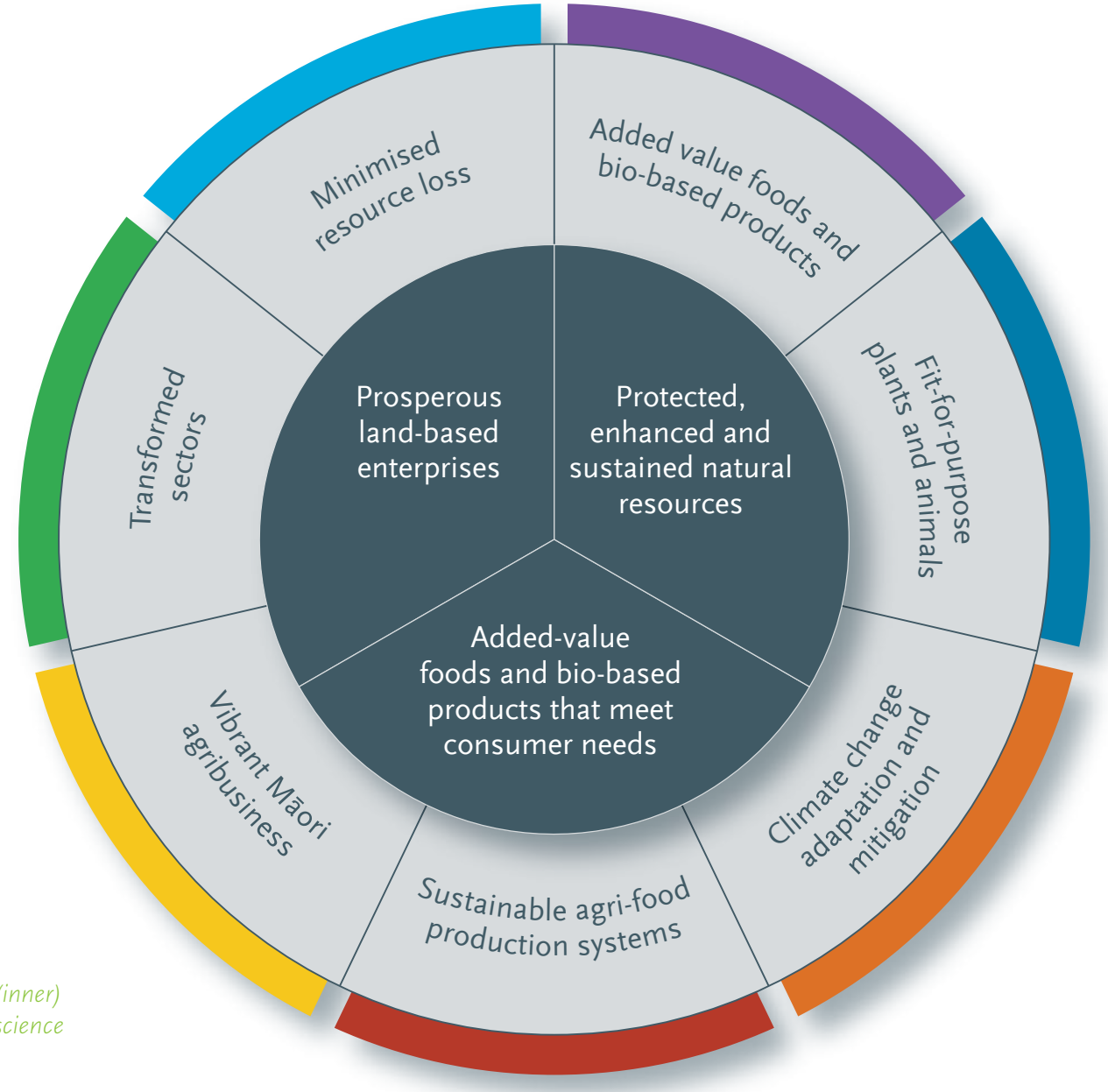
Tā mātou Mahere Pūtaiao

Our Science Plan is the operational plan that describes the strategic research priorities we will focus on. It will ensure we deliver the science-led innovation needed for the impacts and outcomes described in our *Statement of Corporate Intent.*

Our Science Plan reflects a whole-of-value-chain, customer-centred approach that acknowledges the challenges and opportunities across global, national, regional and local scales.

It recognises the increasing complexity of the agricultural innovation system, the availability of new scientific tools, and the focus on contributing to impact.

Our Science Plan acts as a framework to guide the research we lead, where we collaborate, and how we invest the money we receive each year through the Strategic Science Investment Fund (SSIF). It also serves to reinforce the cross-discipline, collaborative behaviour we need to embrace to achieve the objectives and outcomes described in the plan.



Our three overarching principles (inner) and seven highly interconnected science objectives (outer).

Our research

Tā mātou rangahau

In this section, we provide a snapshot of science impact and innovation stories from all areas of funding that exemplify our Science Plan. These stories are laid out against the following overarching principles:

Protected, enhanced and sustained natural resources: Our land use must operate within natural resource boundaries on a global and local scale.

Prosperous and land-based enterprises: New Zealand's regions still depend on primary production to deliver inclusive and equitable wellbeing that flows on to national benefit.

Added-value foods and bio-based products that meet consumer needs: We will transform volume-based production systems into value-based systems where producers share in the generated economic benefits.

Please note, contracted funding from the Government (e.g., SSIF) has separate reporting arrangements.

Dairy's low carbon footprint

New Zealand dairy farmers have the world's lowest carbon footprint. That is the key finding of a life cycle assessment (LCA) study by AgResearch.

The research, using case studies from all the major dairy producing nations, found New Zealand dairy products produce about half the emissions of other international producers.

It does not mean that farms in other market places are not producing the same or even less emissions, as the model averages emissions across an entire country.

The findings, however, provide the New Zealand dairy industry with peer-reviewed evidence. This evidence appeals to environmentally conscious consumers across the globe and allows them to compete with niche producers and marketers of dairy products who make the same claims. It also sets a benchmark for other nations to follow suit and reduce their carbon footprint.

Dr Stewart Ledgard and Dr Andre Mazzetto led the research commissioned by DairyNZ.

The research analysed 55 percent of global milk production, including major milk-producing countries.

In the case studies used, New Zealand was the most efficient producer at 0.74 kg carbon dioxide equivalent (CO_2e) per kilogram (kg) fat and protein corrected milk (FPCM), which is 46 percent less than the average of the countries studied. The average is 1.37 kg CO_2e per kg FPCM.

At 0.74 kg CO_2e per kg FPCM, New Zealand was followed by Uruguay at 0.85, Portugal at 0.86, Denmark at 0.9 and Sweden at 1. Peru was the highest emissions producer among the countries studied at 3.29 kg CO_2e per kg FPCM. Peru was followed by Costa Rica at 2.96 and Kenya at 2.54. The carbon footprint is measured in total GHG emissions per kg of product. The research compares CO_2e emissions per kg of milk (fat and protein corrected milk–the nutritional content recognised in the study as CO_2e per kg FPCM). While farmers in places such as Ireland will be reducing much less than the national averages in the LCA study, the method uses an internationally recognised scale and is in line with International Organisation for Standardisation benchmarking.

Science to support sheep milk

New Zealand's sheep milk industry is rapidly expanding. However, little was known about the environmental footprint of the niche industry.

A five year MBIE-funded research programme was established to support the sheep milk industry through this growth. To contribute to this research, a team of AgResearch scientists made an initial assessment of the industry's sustainability credentials. Science team leader Dr Diana Selbie and her team measured and compared nitrogen leaching to that in the bovine dairy industry on two farms (one in the North Island and one in the South Island.)

Data from infrared cameras used to measure urine patches which validated what the industry has been saying: sheep produce less nitrogen. It also validated claims that sheep milking is a better land-use option in nitrogen-stressed catchments. The science also provided industry stakeholders with some important evidence about GHG emissions.

Emissions of enteric methane per kg of milk solids are similar to that from dairy cows. Dr Selbie said it is important the industry has the evidence not only to back up the claims it makes in the market place but also to influence future farm management systems and practices. She and her team produced a booklet summarising their findings, which the industry body will use to determine what guidelines to adopt and options for mitigation (such as the disposal dairy cow effluent).

The research was funded by MBIE, AgResearch SSIF and various industry partners.

Innovation to mitigate methane

AgResearch is taking action on climate change to reduce enteric methane emissions from cows.

AgResearch is a research provider for Royal DSM, a global science-based company active in health, nutrition and sustainable living. DSM has developed a product called Bovaer®, a methane inhibitor that reduces methane emissions from ruminants (such as cattle, sheep, deer and goats) when added to feeds.

AgResearch provided expertise to support DSM's evaluation of the efficacy and application of Bovaer® in pastoral-based farming systems specific to New Zealand. Much of DSM's international research into Bovaer® had previously been done on feedlot farms in both the Northern and Southern Hemispheres.

The early stage of research was focused on in vitro testing and then moved to cattle studies, specifically assessing the responses to Bovaer® when added to fresh pasture diets. Further work consisted of evaluating the methane mitigation effects of Bovaer® in different formulations and feeding models. These studies showed that Bovaer® formulations can reduce methane emissions by approximately 30 percent for up to six hours after the additive is fed to cattle in a small amount of feed supplement. This work with AgResearch has helped DSM develop plans for further research and production of a slow-release version of Bovaer® that may be more suitable for New Zealand pastoral systems.

AgResearch Principal Research Scientist Dr Peter Janssen explains, "We've been working with DSM over the past five years looking into the development of a pasture-based model for Bovaer®, investigating a number of formulations and feeding models. Otago University has also been involved. We are learning more and further trials are being generated as we move towards a formulation suitable for New Zealand farming systems."

Data for sustainable land use

A COVID-19 lockdown project has resulted in 70 years of field fertiliser trial data being made available to a global audience.

A team of AgResearch scientists collated the data while on an enforced break from regular lab and field work, the results of which were published in prestigious journal *Nature: Scientific Data*.

The data had been gathered from a single farm (Winchmore), formerly owned by AgResearch. The property was purchased in 1946 to provide research into the use of superphosphate and irrigation. The published paper contains quality and assurance checks; an explanation of the data and how they have been used; and insights into how, or what, that data might be used for in the future.

The Winchmore trials were established in 1948–1949 and examined either different rates of phosphorus (P) fertiliser on the same irrigation schedule (fertiliser trial), or different irrigation scheduling at the same rate of P application (irrigation trial). About 96,000 records of soil chemistry, physical data, pasture yield and botanical composition are available, along with nearly 7,000 soil samples.

Portions of the data have been used in 475 publications. These publications have explored diverse topics, including improvements in sheep, dairy and deer production; the efficacy and scheduling of irrigation; improvements in pasture and crop production; agronomic and environmental soil and water research; and entomology. The data is also invaluable for calibrating models to predict long-term issues (e.g., the accumulation of soil carbon or contaminants such as cadmium) and informing policy on climate change and agricultural practices.

Sensing the future of dairy farming

Within our SSIF-funded, New Zealand Bioeconomy in a Digital Age (NZBIDA) programme we are researching what a dairy farm will look like in the future and how it will use technology and data.

Digital technologies have the potential to transform New Zealand farms. And the NZBIDA research programme is using multi-disciplinary teams of researchers to look at the New Zealand digital landscape and integrate its research and co-design of science solutions into our farming sector.

There is also a strong social element to the required transformation, including the adoption and use of technology. The dairy farm of the future will provide farmers (and consumers) with a wealth of information about its animals and their wellbeing. In a case study, the NZBIDA team is using a suite of sensors to record what an animal has experienced throughout a day. This information will provide insight into whether an an animal, based on temperature and activity levels, is well. Sensors can help farmers be much more proactive in spotting symptoms and stopping animals getting sick. However, there has been an explosion in the market for animal sensors in recent years. The market is confusing, so one goal is to bring clarity and provide evidence of what is useful and what is not. The sensor will produce data on temperature (heat, humidity and wind speed), respiration rate, rumen temperature, milk yield and activity with pedometers. Rumination and GPS tracking will also be used to detect interaction between animals.

The team reviewed 90 technology options to gather the data they needed. The number of sensors on the market, all offered at different price points, is a major barrier to uptake. The NZBIDA team found that farmers are unsure which products to use and how to make sense of the data they produce. The future farm research will provide an example, using a New Zealand pastoral farming context, to follow in the future.

Fighting weeds and sustaining the land

Farmers can now measure and, as a result, better manage weeds on their property with the help of a phone app developed by AgResearch.

The scientists behind the Grassland Cover Estimator phone app ran a series of "in-paddock tutorials" to instruct farmers how to use the technology and get their feedback on how to make it better.

The app provides an estimate of the percentage of a paddock that is occupied by giant buttercup, which is unpalatable to dairy cows due to its production of the toxin protoanemonin. It spreads through dairy pasture, reducing pasture quality and dry matter yield and has been a particular problem in the Golden Bay area. Nineteen dairy farmers took part in an in-paddock session with AgResearch scientists where they got hands-on experience using the phone app to measure the cover of giant buttercup in the paddock. The measurements are augmented by the Giant Buttercup Decision Support Tool (web application) to model the expected net financial benefit from a selection of the herbicide options available in the app.

Data from the app can also help map giant buttercup infestations at various geographical scales from paddock to farm to district. The app appeals to a variety of users working directly or indirectly in the pastoral sector. Users include regional councils, biosecurity officers, rural professionals, farm advisors, scientists and students. The app has been downloaded across New Zealand, China, the UK, France, Germany, the USA and Canada.

Meat innovation adds value

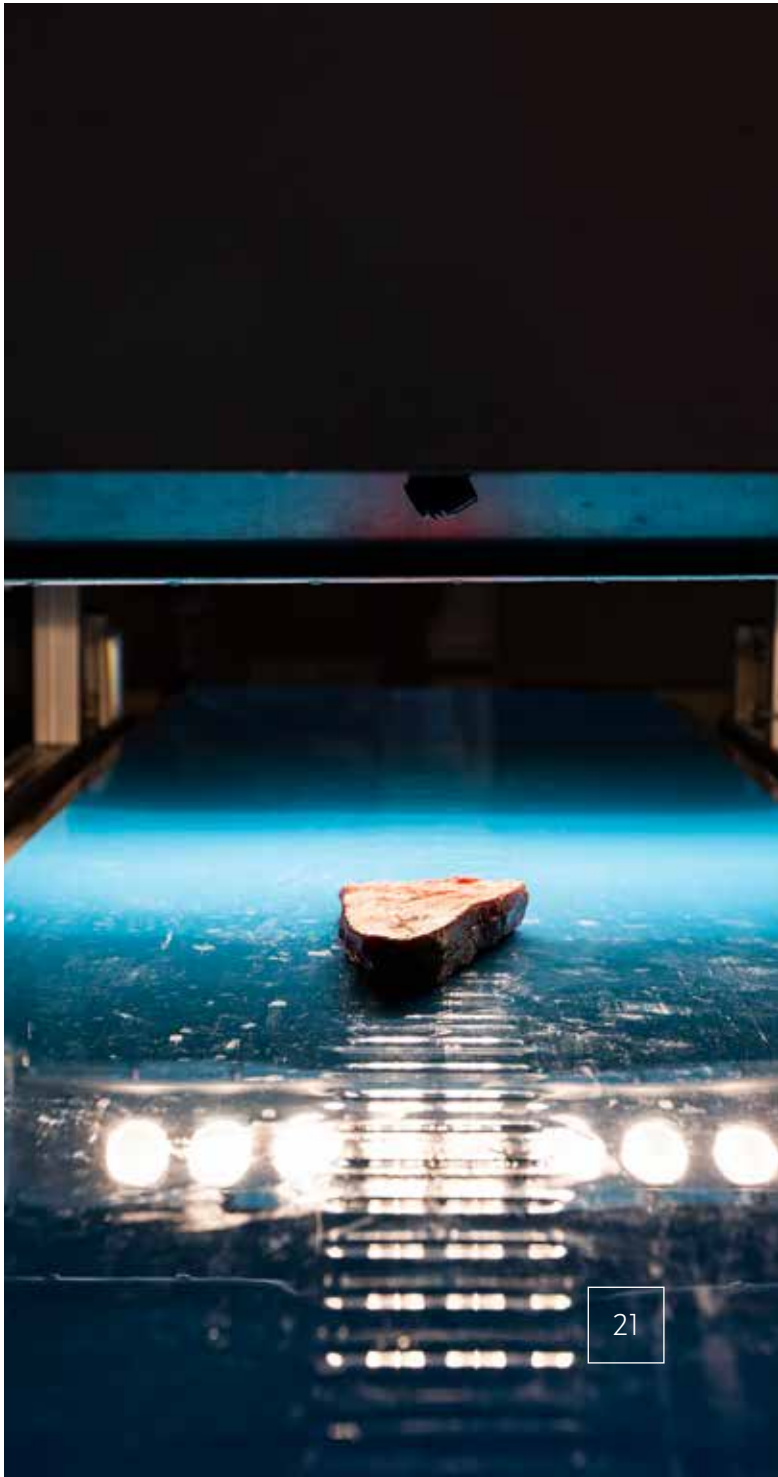
AgResearch has developed a machine to help deliver more consistent and objective lamb meat grading quality using hyperspectral imaging technology.

Named Clarospec, the unit can measure meat pH, tenderness and intramuscular fat levels; all key benchmarks for determining what makes a piece of meat more appealing to consumers. The technology was supreme winner at this year's Food, Fibre and Agritech Challenge.

Hyperspectral imaging technology gives not only spatial information but also structural and molecular information. The AgResearch team translated that data into a formula that will provide an objective determinant of the meat's quality, in an area that has been lacking in objective measurement until now. Lead researcher Dr Cameron Craigie expects the project will have strong industry backing from Meat Industry Association (MIA), and Beef+Lamb NZ (B+LNZ) who are already showing interest.

Dr Craigie said the technology will allow lamb producers to better meet the needs of global consumers, who are eating red meat less often and instead opting to focus on quality. He said the technology would enable meat processors to shift their model from a volume-based processor to a value-based one. Dr Craigie and his team worked with the AgResearch engineering department to build the hardware. The software and prediction equations were also designed in-house.

The machine produces statistical information in real time and, depending on market factors, can provide the type of information needed so that processors can target specific markets such as food service, retail or meal kits. The research was funded by MBIE and could be adapted to measure other foods and biomaterials, which could also lead to less waste. Stakeholders in Australia are also interested in adopting the technology.



Science collaboration to beat COVID-19

We used our broad pool of scientific expertise and experience to tackle the COVID-19 virus.

Using funding from MBIE's COVID-19 Innovation and Acceleration Fund, a team of researchers developed a new COVID-19 test that can detect the presence of the virus earlier than current tests can and before the onset of symptoms. AgResearch typically focuses on agricultural science but also has expertise in detection of infectious diseases. AgResearch scientists joined colleagues from fellow CRI ESR and the University of Otago on the project. The team focused on finding a molecular pattern that signals a human body's response to the virus. The method involving detection of patterns relating to microRNAs has been used successfully by AgResearch scientists to diagnose cattle infected with Johne's Disease.

In a separate project we are investigating how mass spectrometers could be used to screen the virus. Mass spectrometers can measure hundreds of molecules in samples of saliva in a matter of minutes, potentially slashing the current testing turnaround time. The new method will support the current testing methods used here in New Zealand. Scientific literature shows that viral infections lead to metabolic changes, which can be detected in blood using lab-based mass spectrometers. A new generation of much smaller, more portable mass spectrometers is now available to find the "metabolic fingerprints" from samples within seconds of measurement.

Health benefits of eating pasture-raised protein

AgResearch is assessing the physical effects eating different foods has on the body including psychological elements such as satisfaction, sleep and stress levels. The research is supported by MIA and jointly funded with B+LNZ, the High-Value Nutrition National Science Challenge and MBIE.

The research team includes meat scientists, agricultural academics, dietitians, behavioural experts and social scientists from AgResearch, the Riddet Institute and the University of Auckland. Approximately 100 people will be monitored in two clinical studies aimed to dispel myths and misinformation about the production and benefits of eating red meat and bring balance to what consumers are hearing.

Results from these two studies will provide baseline data about pasture-raised beef and lamb and its consumption in comparison to other foods. Researchers will then investigate both the short-term and long-term wellbeing and health benefits of red meat consumption. The research, which began in FY21, will conclude in FY22.

It will also include a clinical study involving members of 40 households on a managed flexitarian dietary regime over 10 weeks. The participants will be monitored over the course of the study and changes in health status, behaviours, attitudes and perceptual wellbeing will be recorded.

Senior Scientist Dr Emma Bermingham of AgResearch said, “We will carry out an advanced analysis of red meat, looking at its unique components, such as bioactive lipids and minerals, that make red meat such a nutritious form of protein when included as part of a balanced healthy diet.”

Partnerships

Ngā hononga

AgResearch leverages its world-leading capability and reputation to grow and maintain a strong national and international network of research partners and collaborations.

For AgResearch to move from transactional relationships to strategic ones, partnerships must be a key focus. Success is being measured through more than just a financial lens. Instead, we are embracing sustained economic, environmental, social and cultural outcomes.

Through continued engagement with existing stakeholders and targeted business development with new stakeholders, we are ensuring a greater strategic alignment with their priorities and ours. This has resulted in more formal partnerships and more co-design of research priorities and programmes.

We have engaged closely with our stakeholders following the COVID-19 pandemic and adapted to changes in their short and medium-term strategies to support their recovery efforts.

In this section, we provide updates on our activity and collaborations with our wide stakeholder base and highlight key projects across the reporting year.

Commercial partnerships

Two key factors influenced AgResearch's engagement with New Zealand commercial stakeholders in the FY21 year–the ongoing impact and influence of the COVID-19 pandemic and the influence of key regulation relevant to the primary sector.

Our commercial stakeholders continued to be exposed to the impact of COVID-19 throughout the financial year. Variables requiring critical focus included market and channel access, logistics and labour challenges, and keeping abreast of the resulting (and potentially long-term) changes in consumer behaviour and aspirations.

The domestic regulatory environment also continued to influence the strategic priorities of our commercial stakeholders, particularly in the areas of on-farm emissions and fresh water.

At a high level, there has been an increasing alignment between regulatory and consumer aspirations, and as a consequence some key themes have been evident in terms of the strategic priorities of our commercial stakeholders.

These key themes include:

- Climate change: mitigation and adaptation
- Fresh water: quality and utilisation
- Regenerative practices
- Animal welfare.

In addition, commercial stakeholders are often looking for opportunities when tackling these challenges. In seeking solutions, they proactively consider points of differentiation that can be validated and are aligned to consumer needs. This offers the potential for in-market leverage for higher returns.

AgResearch is well positioned to support commercial stakeholders in this journey with capability across our six ICEs (mentioned earlier) spanning the pastoral agriculture value chain.

This alignment has been best represented by ongoing engagement with our commercial stakeholders in developing applications for submission into the MPI Sustainable Food and Fibre Futures (SFF) Fund. While a number of these engagements have already resulted in confirmed projects, the process is an ongoing commitment, with this fund being a critical enabler for the primary sector's research and development.

During the FY21 year, the key environmental impacts for AgResearch have been a reduction in specific development processes. This has been the case because other priorities

have been the focus for our commercial stakeholders and there has been some impairment of international revenue streams. While these key factors have shaped engagement and strategic priorities, the critical pastoral agriculture sectors (dairy and red meat) have shown exceptional resilience over the past year. Export returns for both have remained strong; they underpin New Zealand's economic performance and provide the platform to support future research considerations.

AgResearch's international commercial stakeholders have continued to grapple with the ongoing impact of COVID-19 throughout FY21, which has continued to cause a significant disruption.

In the short term, a significant impact of COVID-19 has been the inability to interact face to face. This has created a challenge for progressing our commitment to future workstreams. While existing contracted work has been able to continue, securing commitment to refresh the future pipeline of research with existing stakeholders and expanding the international stakeholder base has been impaired.

Looking forward to FY22, the foundations for AgResearch's commercial stakeholder engagement remain the same. We will increase the breadth and depth of interation with existing stakeholders, with an emphasis on co-design processes. We will also build resilience into our revenue pipeline by expanding our stakeholder base through targeted business development.

To build on these two key foundations, three key areas of focus will be evident in FY22:

1. Strategic alignment: As our commercial stakeholders become more strategy led in response to regulatory and consumer aspiration change, AgResearch will ensure alignment of focus, capability and investment around the critical areas of priority aligned to our core purpose.
2. Visible leadership: We will run a proactive campaign to promote AgResearch as visible leaders in the areas of overlap between sector priorities. AgResearch's core capability will be progressed to enhance the external understanding of our value proposition and create further pull toward our services.
3. Commercialisation: We will invest in AgResearch's commercialisation function and effectiveness of processes to further enhance science impact and maximise the potential of recurring future revenue streams. This will assist financial resilience and reinvestment into the delivery of quality science.

Research collaborations

Collaboration with other agencies and industry bodies delivers wide benefits. Researchers learn from their peers, funding constraints are eased, and the end user of the research benefits from the broad application of knowledge and thought leadership.

In this section we give a snapshot of how our relationships across a wide range of disciplines have led to innovative developments that are invaluable for New Zealand.

An organisational priority for AgResearch is to ensure we play a strong role in sharing knowledge and creating efficiencies across CRIs–a key recommendation embraced from the TPK review. In FY21, we contributed to a number of Government initiatives, many of them focused on climate change research and policy advice.

AgResearch represented CRIs in a series of MPI SFF Fund workshops pertaining to utilising and creating value from primary sector by-products, data and the use of automation. MPI is working with sector groups to devise new ideas to support their Fit for a Better World strategy and a SFF Fund investment approach. We had good feedback that AgResearch conveyed the collective capabilities and expertise of the CRI sector well and added value in the discussions.

AgResearch was also highly engaged in MPI's Regenerative Practices Initiatve. In support of this initiatve, the cross-CRI cluster–AgResearch, Plant and Food (PFR), Scion, NIWA, and Manaaki Whenua–developed a list of science capabilities that may be useful for stakeholders bidding into MPI's SFF Fund.

To that end, AgResearch is facilitating a new CRI working group to collaborate and share knowledge on genetic technology. Senior-level staff have led discussions involving colleagues from PFR, Scion and the University of Otago.

Dialogue has focused on understanding current uses surrounding genetic modification and gene editing technology and collectively engaging with the Environmental Protection Agency (EPA). AgResearch, PFR and the University of Otago made a formal application to the EPA for a determination of null segregants under section 26 of Hazardous Substances and New Organisms Act (HSNO) with the outcome pending in FY22.

Our pan-CRI clusters are leading to tangible science outcomes. PFR, Lincoln Agritech and AgResearch scientists are investigating the benefits of catch crops as a management tool to reduce nitrate leaching. The team shared their finding–that the catch crops can be used for a cleaner freshwater–at a farmers' workshop. A catch crop is any crop that is sown, with the primary objective of utilising excess nitrogen in soils that otherwise may be lost to the environment through leaching. Trials completed in Canterbury, Waikato and Southland have found cereals were more effective than grass species following winter grazing.

AgResearch also has extensive international networks. AgResearch was invited to join a European Union group of researchers that have established a network to address the urgent need to improve the welfare, health, and performance of calves born from dairy cows.

The network includes Trouw Nutrition R&D, the Netherlands; IRTA, Spain; Leibniz Institute, Germany; Teagasc, Ireland; UCD, Dublin, Ireland; University of Aarhus, Denmark; INRAE, France; Swedish University of Agricultural Sciences, Sweden; and Euro group for farm animals, Belgium. Our global influence can be seen in our life cycle assessment research, particularly with researchers at the University of Melbourne; both New Zealand and Australia are export nations that are eager to provide evidence-based research to the carbon footprint to overseas consumers.

We are active members in the Global Research Alliance into combatting GHGs, and we also work with large commercial agrichemical companies such as DSM to develop tools to mitigate and measure GHG.

Our researchers are also involved in the Pacific Islands, offering bio control expertise in combatting the Coconut Rhinoceros Beetle. This international work provides income, exposure to new ideas and the latest in specialist areas of science. It also provides a unique New Zealand perspective to urgent matters such as climate change research.

National Science Challenges

National Science Challenges

AgResearch hosts

AgResearch contributes to

AgResearch is proudly involved in a number of National Science Challenges, which unites the country's top scientists and allows them to work collaboratively across disciplines and institutions to tackle the biggest science-based issues and opportunities facing New Zealand.

AgResearch hosts the Our Land and Water National Science Challenge (NSC), which is funded by MBIE, and whose research partners include other CRIs and universities. The Our Land and Water Challenge aims to preserve the most fundamental taonga ecosystems– our land, water and associated ecosystems– while producing value from those same taonga.

As well as hosting the Challenge, AgResearch plays a key role in leading and participating in projects within it. This includes the Land Use Opportunities: Whitiwhiti Ora programme, which aims to identify a much greater range of suitable land opportunities and a greater diversity of benefits for New Zealand.

AgResearch's Senior Scientist, Dr Robyn Dynes, leads a team of researchers from Manaaki Whenua, PFR, NIWA and DairyNZ. This team engages with stakeholders to identify opportunities to add value alongside the community.

An important part of this work to date has been understanding what an authentic Te Ao Māori-centred programme needs to look like and the approach to be adhered to. The programme has required agility in responding to partners' need and recognising that the two worldviews cannot be easily merged.

AgResearch is also a key partner of the High Value Nutrition NSC, particularly contributing our metabolomic and microbiome capabilities into three priority research programmes: immune health, digestive health and infant health.

AgResearch's senior scientist, Dr Karl Fraser has conducted the metabolomics analyses for the psyllium and kiwifruit study to gain a systems nutrition understanding of how the consumption of two Zespri SunGold Kiwifruit a day over 28 days improves gut comfort and physical and mental wellbeing in participants.

Mātauranga Māori

Māori knowledge

AgResearch continues to build its understanding between science and Māori knowledge systems to deliver to Māori and enrich its science.

This is a key focus area of AgResearch's new strategy and outlines plans to embed an internal environment that is responsive to mātauranga Māori and supports our partners and their communities. Recently we launched Te Ara Tika, our internal plan for growth to address our science capability needs and support our corporate environment.

Externally, we are embracing mātauranga Māori as an equal knowledge system and aligning our values to the values of our partners. In this section, we provide updates on progress internally and externally across the reporting year.

Te Ara Tika

Our way of being

Te Ara Tika is AgResearch's strategy for how we apply, live and breathe te ao Māori and mātauranga Māori and how we will honour our commitment to Te Tiriti o Waitangi.

"Te ara" means "the pathway" and "tika" means "correct" or "right". Together Te Ara Tika means, "the right pathway". Therefore, Te Ara Tika is the journey along the pathway for the right way to work with Māori and for the engagement in and the introduction of Te Ao Māori (the Māori worldview) to AgResearch. Te Ara Tika will help us change the culture at AgResearch and enable us to work in partnership with Māori. It will guide us on the right behaviours during our collaborations with our partners, and it will help us deliver science outcomes with Māori in a consistent and "tika" or "correct" way.

Te Ara Tika will have its own, full implementation plan. It will ensure we have the right educational offerings–from te reo Māori to Te Tiriti o Waitangi to advanced tikanga Māori proficiency–and guidelines for engagement to Te Ao Māori advisors and mentors to help AgResearch embrace mātauranga Māori in our research and other work.

Tua o Mātai Whetū science team

A key part of Te Ara Tika is the establishment of a new science team, Tua o Mātai Whetū. This team is focussed on bringing mātauranga Māori and kaupapa Māori into the research and science of AgResearch. It is a multi-disciplinary team with a shared focus on engagement with Māori and understanding Te Ao Māori.

Māori agri-business

Pakihi Ahuwhenua Māori

AgResearch is working closely with whenua-based partners to co-design a Te Ao Māori approach to our long-term partnerships to ensure our research is relevant to Māori and whenua-based agri-businesses.

AgResearch celebrates and recognises the indigenous value systems of whakapapa, rangatiratanga, kaitiakitanga, whanaungatanga and manaakitanga. Our whenua-based partners move beyond business as usual, by providing for communities, reaffirming and honouring their culture and obligations as kaitiaki. These ways of valuing the world we live in create a pathway of opportunity for all of Aotearoa.

Māori agri-business aims to produce food and connect with the whenua in a way that honours responsibilities and values, maintains, and restores the mana and mauri of the land and waters. AgResearch acknowledges the value of mātauranga Māori and, in agreement with our whenua-based partners, we establish a shared space in research for Māori knowledge that is informed by AgResearch's science skills and knowledge.

During the reporting year, we formed a number of strategically important partnerships and entered into new agreements. This included a formal Memorandum of Understanding (MoU) with Wakatū Incorporation as the key Māori partner for the MBIE-funded Fermented Foods Programme. Wakatū helped facilitate the collection and characterisation of New Zealand indigenous microbial strains. Further work with Wakatū includes extending our geographical reach and relationship building with iwi through a wider network of shareholders. There are also mutual areas of interest (both commercial and scientific) in the food and beverage industry, including export.

In January, AgResearch signed a new partnership agreement with Waikato-Tainui to work on areas of mutual interest to enhance environmental outcomes, especially water quality.

A Kotahitanga agreement was also signed with Poutama, an independent charitable trust established to provide business development services to Māori. The partnership will maximise the skills, networks, and capabilities of both organisations to help whenua-based businesses and communities flourish.

Another important relationship was established with Māori land and business collective Te Pū Oranga Whenua to establish Māori-led research funded through the NZBIDA programme. The collective of Māori agri-businesses worked alongside AgResearch to co-design, co-lead and co-deliver digital transformation outcomes for their people.

AgResearch has worked with the Kohimarama Collective, a group of Māori land owners that spreads across four regions. The collective draws together mātauranga Māori and western science knowledge systems to bring a transcultural, multidisciplinary approach exploring solutions to complex issues for Māori land development in a rapidly changing environment covering integrated land management and diversification. These solutions deliver to the social, environmental, cultural and economic wellbeing aspirations expressed by the communities involved.

Working with Ngāti Pāhauwera

How can Māori agri-business entities improve the value derived from their land and water resources to achieve gains across multiple cultural, economic, social and environmental goals?

This was a question originally posed in a programme funded through MBIE's Vision Mātauranga Capability Fund and is now one of the key underpinning objectives and attributes to AgResearch's SSIF Māori agri-business activities. It was also one of the major themes in a joint AgResearch Ngāti Pāhauwera (made up of 80 hapū from the northern Hawke's Bay) research initiative.

AgResearch worked in partnership on research projects with Ngāti Pāhauwera to help their people understand their land resources, define their aspirations and develop plans towards meeting those aspirations. The researchers met with interested landowners and facilitated engagement to identify potential enterprises and development pathways for integrating fragmented land parcels. A feasibility analysis was conducted using AgResearch tools (e.g., Overseer, AgInform) and aligned to the Ngāti Pāhauwera values.

A new piece of work has been funded by MPI's Sustainable Land Management and Climate Change fund. This builds on previous work with Ngāti Pāhauwera using the semi-structured interviews to understand landowner aspirations and identify options for future use of their land. The methodology will be expanded to include the impact of climate change on future land use, with particular consideration of limited water availability.

As well as developing individual plans for their land, participants will contribute to hui considering whether community resilience can be increased through a collective approach to the use of the land blocks.

Science excellence

He hiranga pūtaiao

Science excellence is vital for any science-based organisation, and our new strategy highlights this as a focus area for AgResearch going forward.

We are focussed on being thought leaders and setting the science agenda rather than being reactive.

A key component in science excellence is celebrating the successes of our people and rewarding excellence in our organisation. In this section, we share stories of success in science over the reporting year.

Celebrating our people

Whakanui i ō mātou iwi

2020 Cooper Award:

Improving health and fertility of dairy cows

Dr Mallory Ross received the Royal Society Te Apārangi Early Career Research Excellence Award for Technology, Applied Science and Engineering (the Cooper Award).

The Cooper Award is presented to an early career researcher undertaking research in technology, applied science and engineering. Dr Ross received it for key advancements in the use of pragmatic solutions that support immune function around calving to improve animal health on New Zealand dairy farms.

She uses her expertise in disciplines such as biochemistry, immunology and molecular biology to understand critical issues that affect livestock on New Zealand dairy farms. She then provided practical solutions which can be readily applied on-farm.

Dr Ross' PhD research was the first to describe seasonal changes in immune function in low-to-moderate yielding grazing animals, which had previously only been reported in high-yielding animals in confinement systems. This research created the opportunity to use applied technology to improve the "dampening" of harmful inflammatory immune reactions regarding calving, thereby improving animal health in New Zealand dairy systems.

Dr Ross' research post-PhD has continued to focus on methods to improve the health and welfare of New Zealand dairy cows by improving immune function around calving.

Dr Mallory Ross

2020 Thomson Medal:

Improving the value of grasslands for New Zealand

Dr John Caradus, CEO of AgResearch subsidiary Grasslanz Technology, was awarded the Thomson Medal by Royal Society Te Aparangi. This award was given in recognition of his leadership to farmers (from publicly and privately funded research) and his contribution to improving pastoral sector productivity.

Dr Caradus has spent his whole career focused on improving the value of grasslands for New Zealand farmers. He joined AgResearch in 1992, eventually becoming Science General Manager. He became CEO of Dexcel (now DairyNZ) in 2003 and was appointed CEO of Grasslanz Technology in 2006. This allowed him to combine his strong research background with the opportunity to direct research and development investment.

As a plant breeder he was involved in developing 16 white clover cultivars. More recently he has become recognised for his understanding of the area of Epichloë grass endophytes, a fungal symbiotic partner of grass that can protect it from insect pests.

Dr John Caradus receiving the Thomson Medal from Dame Patsy Reddy, New Zealand's Governor General.

2021 ANZCCART Animal Care Award

Trevor Watson was the recipient of the 2021 ANZCCART Animal Care Award, which acknowledges a significant contribution made by New Zealand-based technicians and research assistants to the welfare of animals.

Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART) is an independent body established more than 30 years ago in response to particular concerns in both the scientific and wider communities about the use of animals in research and teaching.

Trevor has been involved in many studies, including those related to:

- The health and behavioural needs of goats on farms
- Pain reduction with certain husbandry procedures in calves and kids
- Goat lameness
- Personality and mood in goats, calves, cattle and sheep
- Water quality for dairy cows
- Winter management of dairy cows
- How best to mititage the effects of hot weather on dairy cows.

Additionally, his background includes dairy farming, shepherding, and technician work and animal care on various research stations over more than 40 years.

Trevor Watson

Brooke Marshall

KiwiNet winner:

Commercialisation professional category

Brooke Marshall was the winner of the Commercialisation Professional category at the KiwiNet Awards. Acting as an "intraprenuer" within the organisation, Brooke instigated a range of key initiatives to fast track cultural change within AgResearch. She also strengthened its commercial capability whle increasing revenue and deal flow along the way.

In Brooke's first year at AgResearch she increased royalty and licensing revenue by 349 percent and pipeline activities by 33 percent. She also developed the "A-Prize" competition to stimulate a culture of innovation within AgResearch. This generatied a novel pipeline of 17 commercialisation opportunities in 2019 and a newly minted team of entrepreneurs who have recently completed KiwiNet's inaugural Rewa Tran-Tasman Pre-Accelerator programme. Brooke left AgResearch in late 2020.

Membership:

Wool Industry Project Action Group

Andy Cooper was a member of the Wool Industry Project Action Group that reported to Government and the wool industry, acknowledging the big challenges but offering recommendations to improve the fortunes of the sector.

Their report outlined a number of opportunities and recommendations to help provide a future direction and tangible steps to achieving success. They included partnering with a group of global experts who specialise in consumer-focused strategy and establishing the capability to address immediate pan-sector industry good needs.

Andy Cooper

Appointment:

Editor-in-Chief, Journal of the Royal Society of New Zealand

Prof Richard McDowell

AgResearch's Principal Scientist Prof Richard McDowell was appointed to the position of Editor-in-Chief of the Royal Society Te Apārangi, Journal of the Royal Society of New Zealand (JRSNZ). The JRSNZ is the Society's flagship multidisciplinary title and New Zealand's oldest learned periodical.

Prof McDowell has been the Chief Scientist for the Our Land and Water National Science Challenge since 2014 and is also a professor at Lincoln University.

MBIE College of Assessors

Five AgResearch science staff were selected to MBIE's College of Assessors.

The College of Assessors is a wide pool of scientists both in New Zealand and overseas who assess all the research proposals that MBIE receives. The new assessors–Dr Li Day, Dr Karl Fraser, Dr Axel Heiser, Dr Jiafa Luo and Dr Wayne Young–join eight other AgResearch scientists who are also MBIE assessors.

Science New Zealand Awards

Each year, Science New Zealand holds National Awards. CRIs gather to celebrate the success of their people across three categories. These are AgResearch's winners from the November 2020 awards.

Dr Stewart Ledgard

Lifetime Achievement:

Stewart Ledgard, Principal Scientist

Dr Stewart Ledgard has been with AgResearch for over 40 years and specialises in nitrogen cycling in agricultural systems and life cycle assessment (LCA) of agricultural products. He has published eight book chapters and 139 peer-reviewed science journal articles, of which 84 are indexed in Scopus, an H index of 35 and more than 2000 citations.

During his career Dr Ledgard has been active in applied soil sciences research in the pastoral livestock industry. These activities have focused on nutrient management, fertiliser efficacy and management, and farm management practices that increase nutrient efficiency and reduce contaminant losses.

He has led development and testing of several novel nitrogen mitigation technologies and management practices for use on livestock farms, which has resulted in two patents. He has also worked with farmer and policy groups in large-scale research projects to evaluate reductions in nitrogen leaching to waterways in research systems and on commercial farms.

Over the past 15 years Dr Ledgard has been a significant contributor to the international development of LCA protocols as a method for determining the whole-of-lifecycle footprint of agricultural products. His focus has been on the robust and accurate determination of data and protocols for pastoral farm systems.

Dr Ledgard is an Adjunct Professor of the New Zealand Life Cycle Management Centre, Massey University, and co-leader of an international project in the United Nation's Food and Agriculture Organisation Livestock Environmental Assessment and Performance partnership programme on "nutrient cycles, modelling and impact assessment in livestock supply chains", which includes research experts from across the globe. He has also mentored many postgraduate students and early career scientists.

Early Career Research:

Dr Nikola (Nik) Palevich, Post-Doctoral Scientist

Dr Palevich works in the rumen microbiology team and already has over 20 publications either published, in print or under journal review.

His postgraduate studies were centred on butyrivibrio and pseudobutyrivibrio from the rumen. These critical pieces of science have generated significant new knowledge that will allow the science community to use rumen microbiome data to engineer rumens that reduce methane emissions and improve productivity and sustainability outcomes.

For his post-doctoral research, he investigated parasite-host interactions by securing and leading a highly competitive AGMARDT Post-Doctoral Fellowship.

Highlights from this work include numerous first-author publications in *Trends in Parasitology, Genome Biology and Evolution (GBE)* and *Frontiers in Genetics*.

Dr Nik Palevich

Some members of the pastoral genomics research team

Team:

Pastoral genomics research team

The pastoral genomics research team delivered a five-year project embedding the latest tools of plant genomics and genetics in the leading New Zealand seed companies associated with commercial ryegrass and white clover breeding. The team also produced 35 scientific papers and supported PhD and Master's students.

The team included scientists Brent Barrett, Craig Anderson, Sai Arojju, Mingshu Cao, Jim Crush, Marty Faville, Kioumars Ghamkhar, Andrew Griffiths, Angus Heslop, Tony Hilditch, Won Hong, Wajid Hussain, Jeanne Jacobs, Zulfi Jahufer, Anna Larking, Dongwen Luo, Peter Moran, Shirley Nichols, Jessica O'Connor, Lily Ouyang, Jana Schmidt, Prue Taylor, Mike Trolove; and PhD students Lucy Egan and Grace Ehoche.

The team has been supported by Pastoral Genomics, a joint venture co-funded by DairyNZ, B+LNZ, Dairy Australia, AgResearch, Barenbrug, Grasslands Innovation and MBIE.

Celebrating long service

Emeritus recipients

Long-serving AgResearch scientists Dr Tony Conner and Dr Liz Wedderburn were awarded emeritus scientist status at a special event in late 2020 to mark their retirements. Combined, Dr Conner and Dr Wedderburn have significant experience at AgResearch/CRIs and they will both continue to play a role within the organisation.

Dr Conner's role as emeritus scientist will allow him to continue to mentor AgResearch scientists, especially in the context of building quality CVs–the major currency associated with competitive science funding. He will also be able to provide excellent in house/independent peer review of science outputs and ongoing science engagement with AgResearch. He will focus on science writing and authoring/co-authoring science papers that will contribute to enhancing the science reputation of AgResearch.

Dr Wedderburn's role as emeritus international ambassador will enable her to introduce and share her international networks by continuing in the role of co-chair of Action Network 2: Restoring Value to Grasslands and membership of the Guiding Group of the Global Agenda for Sustainable Livestock. AgResearch has been a participating member since its inception. She will also continue to mentor AgResearch scientists and assist the research director with his new leadership team by sharing her institutional knowledge.

Dr Tony Conner and Dr Liz Wedderburn

Smart investment

He haumi atamai

AgResearch is investing wisely in its people, infrastructure and science to create value for Aotearoa and the agricultural sector.

We are committed to leveraging our world-leading science capabilities with appropriate and effective infrastructure. This will ensure we are able to attract, support and retain high-quality staff and be an effective partner for national and international collaborations that sustain our culture of innovation excellence.

In this section, we detail some examples where AgResearch has led innovation in the reporting year, provide more information on our integrated research facilities and our people and culture report.

Leading innovation

Te ārahi auahatanga

As the leading source of land-based science research and development, AgResearch has a strong bias towards entrepreneurship and innovation.

We aim to create value for New Zealand and our sector by investing wisely in our people and our science. As a profitable company, commercial returns from our work can be reinvested into innovative science that enhances our ability to deliver on our core purpose. Our researchers are innovation leaders in a wide range of sciences–from digital technology to the fibre and food sectors–and this was very much in evidence in FY21. One such example was the winning Bridge Hub Water Challenge team (Chandra Ghimire, Vikki Yeoman, Aswathi Soni, Val Snow and Stuart Bradley from Inverse Acoustics Ltd). The Bridge Hub Water Challenge is an Australian, New Zealand and Israeli challenge to identify researchers and entrepreneurs who have solutions that can change the societal status quo of water. Their research project–Real-time control of irrigation through acoustic sensing to prevent runoff and pollution (Acoustic sensing for Irrigation)–uses acoustic technology to help irrigators to be smarter with their water efficiency.

A number of other AgResearch researchers were acknowledged for their innovative research. Cameron Craigie, Mos Sharifi, Sam Hitchman and Yash Dixit were overall winners of the first ever Food, Fibre and Agritech Supernode Challenge. This event tested New Zealand innovators and change makers to develop new, disruptive solutions that can be applied to the food, fibre and agritech sector. They have been driving development of Clarospec–a tool to deliver consistent lamb meat quality (for the full story see 'Our research' section).

AgResearch also entered into an agreement to help develop the next generation of innovators. The University of Canterbury, Lincoln University, PFR, Manaaki Whenua, and AgResearch entered into a multilateral partnership dedicated to a postgraduate school focusing on food sustainability. The theme of the school is Food Transitions 2050 and the school's core purpose is to support the transition to more future-focused, sustainable food systems and preparation.

In FY21 we also supported New Zealand AgriFood Week as the naming rights sponsor. The week delved into the scientific, technological, and talent solutions that can be applied to the sector to ensure sustainable growth and resilience in a competitive global market of rising consumer awareness and changing trends.

Integrated research facilities

Ngā wāhi rangahau pāhekoheko

AgResearch has a four-campus model to ensure we have a unique and distinctive balance of capabilities in each region.

The strategy supports our refreshed Science Plan by ensuring we have one or more centres of excellence with proximity to our stakeholders and partners for improved collaboration and innovation. It also heeds messages from our people and recognises the importance of maintaining vibrant regional research centres.

We have nationally significant research centres in Palmerston North (Grasslands) and Lincoln and two additional research hubs in Hamilton (Ruakura) and Mosgiel (Invermay), which both provide vital science support to the upper North Island and lower South Island respectively.

The newest addition to our four-campus model is Te Ohu Rangahau Kai.

The new building is situated on Massey University's Manawatu Campus and is jointly owned by AgResearch (78 percent) and the Riddet Institute (22 percent). The name means a co-operative community of food researchers. About 140 scientists are co-located in the 5075m^2 building, which has new laboratories, food-grade meat and dairy pilot plants. The modern fit for purpose facility will serve as an attractor of science talent from across the globe; it also underpins the Manawatu region as a nationally and internationally significant location for food research and innovation.

To complement our work in the food sector AgResearch is also developing new animal research facilities in the region. Massey owns a 220 hectare commercial, research and teaching farm with approximately 600 spring calving cows near our Grasslands campus. The two research organisations have struck an agreement to build two rotary milking platforms, which will allow detailed research projects to take place alongside the farm's daily operations. Other new facilities include a covered veterinary area for individual cow measurements and a multi-lane feed pad to enable differential feeding to various groups of cows. There will also be an effluent treating system, a data centre within the shed to store and manage research data, a teaching room and a biosecurity station.

AgResearch is also planning to replace our earthquake damaged research centre in Lincoln. Our plans gained Ministerial approval in FY20. In FY21 we gained a title for the land we purchased and plan to build on Lincoln University's campus. We also gained a land use resource consent and completed detailed design work for the new facility. We look forward to starting construction work in FY22.

People and culture

Tāngata me te ahurea

Our culture

An aligned "One AgResearch" culture will provide the environment to deliver high levels of sustained performance and our core purpose. AgResearch's desired culture is highly constructive, collaborative and underpinned by the care we have for our people's health, safety, and wellbeing.

Our leaders play a crucial role in embedding our desired culture by creating an inclusive environment where people can be at their best and reach their potential.

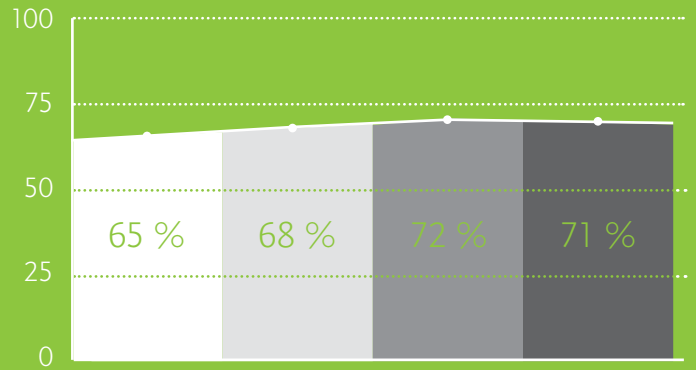
Active investment in leadership development will involve looking for ways to broaden options for all our people (working in science and non-science) at all levels of the organisation. We want all employees to have the ability, capacity and opportunity to take leadership roles in the creation, development and delivery of science outcomes for AgResearch.

Several programmes are underway that will help us to achieve a "One AgResearch" culture:

- Toi Ora (our health and wellbeing framework): designed to manage psychosocial risks and address wellness and mental health in the workplace
- An equity, diversity and inclusion working group that focusses on the development of a work plan to drive equity, diversity and inclusion initiatives in our workplace
- Continuously improving the way we reward, recognise and support our people
- Science vitality: focuses on creating, sustaining, and growing science vitality at AgResearch.

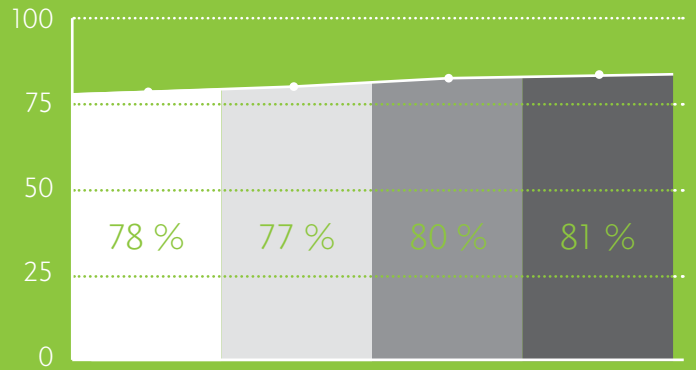
"Our Voice" Survey

Engagement index



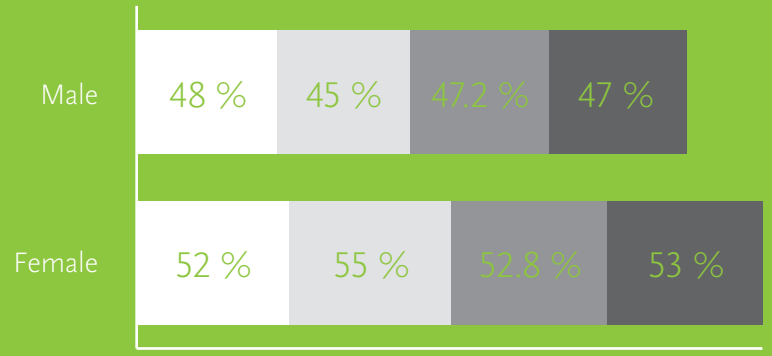
The engagement index result from the March 2021 survey was down 1% on the 2020 result.

Participation rate



Participation rate, however, has increased steadily in the past five years, reaching 81% in 2021.

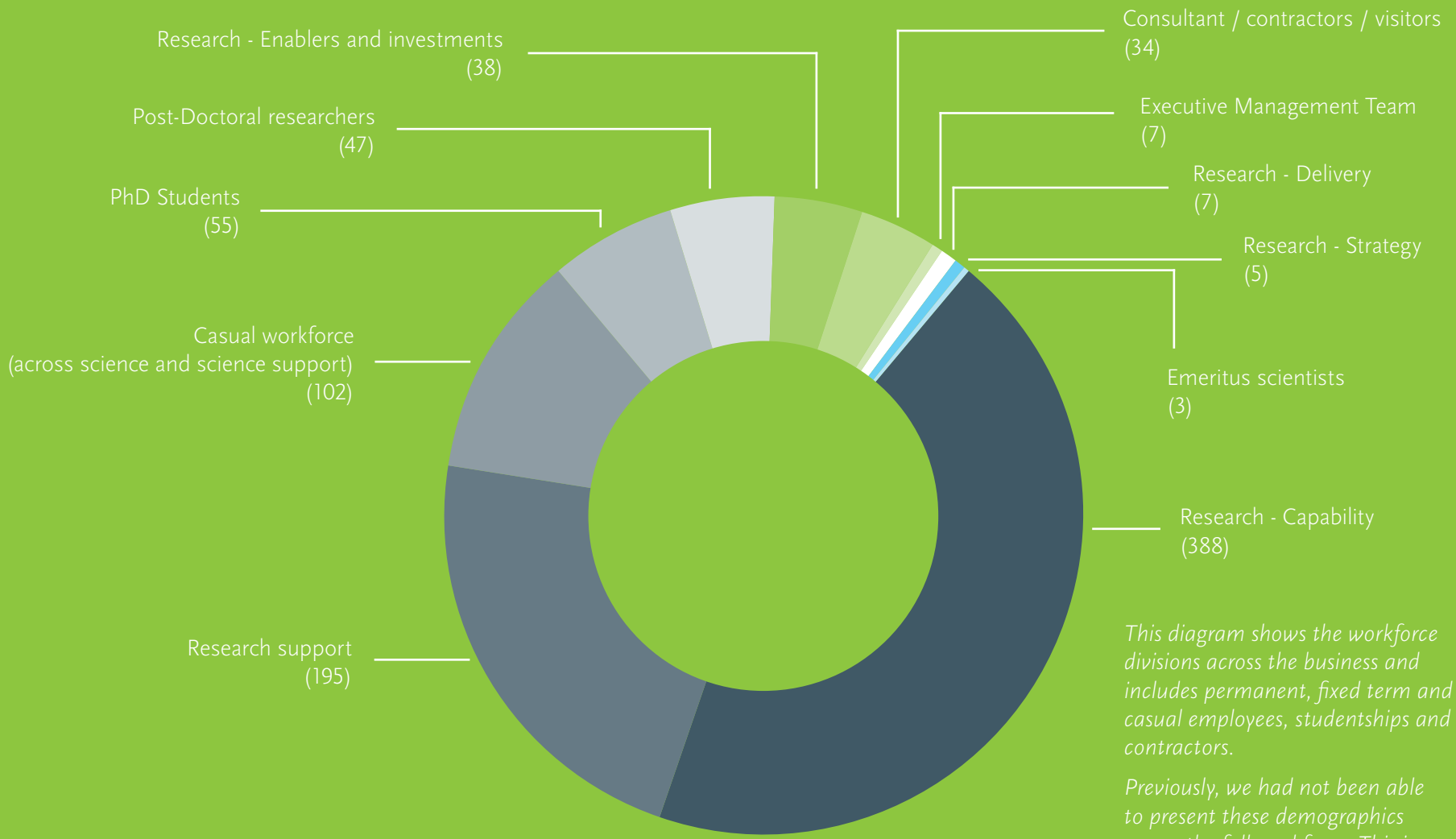
Gender profile



As at 30 June 2021, AgResearch had a total of 881 permanent, fixed term and casual employees, studentships and contractors.

53% of these employees are female, 47% are male.

Divisions of workforce



This diagram shows the workforce divisions across the business and includes permanent, fixed term and casual employees, studentships and contractors.

Previously, we had not been able to present these demographics across the full workforce. This is now possible with the new people information platform in place.

New ways of working

New people information platform

Managing over 800 people across various work agreements and campus locations, AgResearch needed a modernised and digitalised people information platform that could consolidate its numerous, highly customised systems.

Our systems for managing payroll, leave, timesheeting, and employee information were out of date, no longer supported, and hosted on-premises. The systems were presenting concerns regarding their robustness, privacy, security risks, and business agility. With 60 percent of people-service processes managed manually, we needed a more reliable and automated platform with the intelligence, capabilities, and modern integration to make people management more convenient, seamless, and consistent.

The power of automation has ensured complete oversight and accuracy of people management functions, eliminating various manual and paper-based processes and several legacy systems. Ongoing improvements are being refined regarding transactional activity and management accountability; this new system empowers managers and employees to be more autonomous, informed, and better aligned to industry best practice.

Flexible working arrangements

Flexible working arrangements are one of several initiatives we have implemented to promote and encourage new ways of working. These arrangements are about more than just working from home for a few days each week. We want to do things differently to promote work/life balance, be inclusive and retain staff from diverse backgrounds. We have introduced three types of flexible working arrangements that have all been well received by our people:

- **Flexi-time** to support working part time, job sharing, school term-time working, working within a different or variable period and not standard office hours
- **Flexi-place** that supports working from home for a few days each week
- **Flexi-career** enables our people to take a period of extended leave to pursue caregiving, study, travel, sporting or volunteer pursuits then returning to work; a transitional phased exit out of, or back into, the organisation to fit in with changes to our people's lifestyles.

Transitioning to a new structure

A new structure for research was implemented in FY21 to generate more significant science impact and alignment with our Science Plan. The changes to the structure maintain our ability to focus on the science our sector and broader stakeholders want and reset how we deliver our science on a day-to-day basis.

We also expect that these changes will support the broader organisation to thrive by:

- Driving a "One AgResearch" culture that enables science excellence by fostering a culture of creativity, inclusiveness, trust, and innovation. We strive for a culture that helps us attract, develop, and retain people who are the best at what they do and strengthen our team's collective expertise.
- Reshaping and refocussing our internal capability and organisational science culture into areas of distinctive strength for the organisation and its stakeholders.
- Providing a systematic and efficient approach to strategy development, design thinking, tactical portfolio management, operational/project support and team resources.
- Clearly defining roles and functions and differentiating accountabilities from responsibilities.

Co-designing capability gap analysis and workforce planning

To deliver on our purpose, we need to ensure we have people with the right capabilities in the right roles at the right time in line with our strategy. To achieve this, we need to support the organisation to build the capability we will need in the future. We also need to look far enough ahead to foresee and mitigate any people-related risks; this will ensure we retain core science capability within the organisation. This includes weaving in initiatives to effectively manage risks around an under-representation of Māori and Pasifika in research roles, under-representation of women in senior research roles, and succession risks with an aging science workforce.

Significant investment has been placed in building leadership capability. We provide leaders with the tools they need so we can take a more innovative approach to optimise our workforce.

Building cultural competency in Mātauranga Māori

Our Mātauranga Māori programme comprises six formal offerings designed to build base level capability within AgResearch to support Te Ara Tika–the plan to transform AgResearch with Te Ao Māori. Supporting our people to build cultural competency in mātauranga Māori will continue to be a focus for us.

There has also been a shift to online learning with Te Tiriti o Waitangi, cultural competency workshops, and Te Reo lessons being run virturally. This has made these offering more accesible to all our people.

Additional internal resource has also been added to drive initiatives aligned with Te Ara Tika and provide advanced development opportunities to build cultural competency champions within the organisation.

AgResearch also collaborated on a pan-CRI proposal led by Te Ara Putaiao to access funding available through the new Equity, Diversity and Inclusion Capability Fund. The overall objective is for all the CRIs to work collaboratively to develop and provide pathways for Māori graduates and grow the next generation of Māori researchers.

Corporate governance

Te kāwanatanga ā-rangatōpū

Our Board

Tō mātou Poari

Dr Paul Reynolds, QSO

Chair

Dr Paul Reynolds served as Chief Executive of the Ministry for the Environment from 2008 until 2015. Prior to that he worked at the Ministry of Research, Science and Technology (1998–2002) as Chief Policy Adviser and then, from 2002–2008, was Deputy Director General (Policy) at the Ministry of Agriculture and Forestry.

Paul has a background in scientific research, holding a PhD in Biochemistry from the University of Otago. He is also Deputy Chair of Manaaki Whenua–Landcare Research, Chair of Trust Tairāwhiti and Chair of the Sir Peter Blake Trust.

Paul was made Companion of the Queen's Service Order in the Queen's Birthday Honours, 2018.

Kim Wallace

Deputy Chair

Chair–Audit and Risk Committee

Kim Wallace is an experienced independent director. She currently serves on the boards of Quotable Value and Port Nelson. Before pursuing a full-time career in governance in 2017, Kim enjoyed a 24-year career in the global dairy industry, which included working in senior executive roles based in New Zealand, the USA, Germany and Australia.

Jackie Lloyd

Director

Chair–People and Culture Committee

Jackie Lloyd is an independent director. She is currently a director of Kiwi Group Holdings and Naylor Love Enterprises, a Board member of New Zealand Cricket and Museum of New Zealand Te Papa Tongarewa, a trustee of The Lion Foundation and a member of the National Council of the Institute of Directors in NZ (Inc).

Colin Armer

Director

Colin Armer has been involved in the agricultural industry for 30 years and is a partner and director of Dairy Holdings Ltd. His farming interests are focused in the Bay of Plenty and Central Plateau region. Colin resigned from the Board effective 30 June 2021.

Dr Louise Cullen

Director

Louise Cullen combines her environmental science and dairy farming backgrounds to bring a pragmatic, evidence-based focus to the businesses and organisations she works with. Louise is currently a director for the Tatua Co-operative Dairy Company and a member of a number of agricultural industry groups.

Lain Jager

Director

Lain Jager is best known for his time with Zespri where he was CEO from 2008 to 2017. Today, Lain is involved in a range of investment projects in tourism and agri-business, serves as a director on several Boards and acts as a strategic advisor to a small number of companies. Lain was appointed to the Board in July 2020.

Rukumoana Schaafhausen

Director

Rukumoana Schaafhausen is an experienced independent director. She was recently the Chair of Waikato-Tainui and is currently serving across a number of Iwi, community, private and public organisations in governance roles including Contact Energy, Te Waharoa Investments, Water Governance Board, Miro Berries, Tindall Foundation, and The Princes Trust. She has received the Sir Peter Blake Award and the US embassy Wahine Toa Award for Leadership. Rukumoana practised as a commercial and property lawyer and holds a Bachelor's in Law.

The Board promotes the highest standards of corporate governance practice and ethical conduct by all Directors and employees of AgResearch Limited and its subsidiaries.

The Board endorses the overall principles embodied in the New Zealand Institute of Directors' "Code of Practice for Directors". It has only independent Directors on the Board whose skills and experience bring balance and diversity to decision making.

Role of the Board

The Board is responsible to shareholders for charting the direction of the company by setting objectives, strategy and key policies and monitoring management's running of the business to ensure it is aligned with the direction set.

The Board delegates the conduct of the day-to-day affairs of the company to the Chief Executive. The Board is responsible for the appointment, from time to time, of the Chief Executive and annually reviews their performance.

The workings of the Board and its code of conduct are governed by the Companies Act 1993, AgResearch's constitution, the Crown Research Institutes Act 1992, the Crown Entities Act 2004, the annual *Statement of Corporate Intent* and the Board's manual. This manual sets out all the functions and operating procedures of the Board. The policies approved by the Board clearly set out those matters on which only the Board can make decisions. These include dividend payments, solvency certificates, raising new capital, major borrowings, approval of the annual financial statements, appointment of Directors to subsidiaries and associates, major capital expenditure and acquisitions.

Each year, the company produces a *Statement of Corporate Intent* and an operating budget, which are reviewed and approved by the Board. Monthly management accounts are prepared and these are reviewed by the Board throughout the year to monitor management's performance against the budget and the *Statement of Corporate Intent*.

Independent professional advice

With the prior approval of the Chair, each Director has the right to seek independent legal and other professional advice at the company's expense concerning any aspect of its operations or undertakings to help them fulfil their duties and responsibilities as a Director.

Director education

The Board had a budget of $15,000 to assist Directors with the financial costs of attending courses and conferences on governance matters. Directors who attend report back at Board meetings on matters learnt that would improve the governance of the company. The Chair authorises expenditure from this budget.

Board membership

The constitution currently sets the size of the Board at a minimum of two Directors and a maximum of nine Directors.

In the financial year the Board consisted of the Chair and six other Directors.

Directors are generally appointed for a three-year term and may be reappointed for further terms.

Lain Jager was appointed to the Board in July 2020. He joined Colin Armer, Dr Louise Cullen, Jackie Lloyd, Rukumoana Schaafhausen, Kim Wallace and Board Chair Dr Paul Reynolds.

Board and standing committee meetings

The following table sets out the Board and committee meetings that Directors attended during the financial year. The Board has established two standing committees to guide and assist the Board with overseeing certain aspects of corporate governance–the Audit and Risk Committee and the People and Culture Committee.

The Board and each committee are empowered to seek any information they require from employees in pursuing their duties and to obtain independent legal or other professional advice.

Board of Directors	Board meetings attended	Audit and Risk Committee	People and Culture Committee
Dr Paul Reynolds (Chair)	7	4	5
Kim Wallace (Deputy Chair, Chair–Audit and Risk Committee)	7	4	1
Jackie Lloyd (Chair–People and Culture Committee)	7		5
Colin Armer	7	4	
Dr Louise Cullen	7		5
Rukumoana Schaafhausen	7		5
Lain Jager	7	4	
Number of meetings held	**7**	**4**	**5**

Statutory reporting–Board

To our shareholders and stakeholders

The Directors are pleased to report that AgResearch Limited met its obligations in all material aspects under the Crown Research Institutes Act 1992 for the year ended 30 June 2021.

Dividends

No dividends were declared during the year to 30 June 2021.

Directors' interests

The Board received no notices during the year from Directors requesting the use of company information that would not otherwise have been available to them. There were no share dealings by Directors with the company.

Directors' interests disclosed during the year to 30 June 2021 are set out in the table right. The "Director" and "Trustee" columns also identify Chair and Deputy Chair roles where relevant. Interests do not include trusteeships, directorships or shareholdings in private trusts and small companies with whom no transactions have occurred during the year. These interests have been appropriately recorded within the interest register, which is updated regularly.

Director salaries

Board of Directors	2020	2021
Dr Paul Reynolds	$ 74,744	$ 73,315
Kim Wallace	$ 42,372	$ 50,286
Jackie Lloyd	$ 42,372	$ 40,943
Colin Armer	$ 37,372	$ 35,943
Dr Louise Cullen	$ 10,949	$ 35,943
Rukumoana Schaafhausen	$ 37,372	$ 35,943
Lain Jager	-	$ 35,943
Dr Peter Stone	$ 9,264	-
	$ 254,445	**$ 308,316**
Grasslanz Technology Limited		
Robert John Hay (Chair)	$ 20,000	$ 20,000
	$20,000	**$20,000**
Farmax Limited		
Andrew MacPherson (Chair, 2021)	$ 8.332	$24,996
Greg Lambert (Chair, 2020)	$ 1,000	-
	$ 9,332	**$24,996**
Total	**$ 283,777**	**$ 353,312**

AgResearch interest list FY21

Board of Directors	Director of	Trustee of	Shareholder of
REYNOLDS, Paul (Chair)	Landcare Research Ltd (Deputy Chair) Toitu Envirocare (Chair)	Student Volunteer Army Foundation (Chair) Trust Tairāwhiti (Chair)	
ARMER, Colin	Armer Farms (NI) Limited Armer Group Limited Calf Co Limited Dacca Investments Limited Dairy Holdings Limited and its subsidiaries Hirata Dairies Limited Icena Investments Limited Pasture Conference Limited Pure Pasture Investments Limited	Pasture Conferences Trust	Armer Farms (NI) Limited Armer Group Limited Ballance Calf Co Limited Dacca Investments Limited Dairy Holdings Limited and its subsidiaries Fonterra Hirata Dairies Limited Icena Investments Limited Pure Pasture Investments Limited Ravensdown Silver Fern Farms
CULLEN, Louise	Acorn Goats Ltd Balachraggan Farms Ltd Capra Farming Ltd Cookson Trust Farms Ltd Tatua Co-operative Dairy Company Ltd		Ballance Agri-Nutrients Ltd Dairy Goat Co-operative Fonterra Co-operative Group Livestock Improvement Corporation Ravensdown Tatua Co-operative Dairy Company

Board of Directors	Director of	Trustee of	Shareholder of
JAGER, Lain	Carrfields DMS Limited Miro Limited Nibblish Origin Capital Partners Management Limited Spring Sheep	The Jager Family Trust	Eastern Gold Orchard Flossie Limited Nibblish Olive Hill Ltd Origin Capital Partners Management Limited SLC Limited Partnership TreeQuest Limited Willows Rd Orchard
LLOYD, Jackie	Kiwi Group Holdings Limited Museum of New Zealand Te Papa Tongarewa Naylor Love New Zealand Cricket (Board Member)	Lion Foundation	
SCHAAFHAUSEN, Rukumoana	Contact Energy Limited Hautupua GP Limited Te Wharaoa Investments GP Limited	The Princes' Trust Tindall Foundation	Schaafhausen Inc Limited
WALLACE, Kim	Kim Wallace Limited Origin Capital Partners Management Limited (Audit Chair) Port Nelson Limited (Audit Chair) Seahorse Beach Investments Limited		Kim Wallace Limited Seahorse Beach Investments Limited

Our Executive Management Team

Tō mātou Tumuaki Whakahaere

Dr Sue Bidrose

Chief Executive

Dr Sue Bidrose joined AgResearch as CEO in July 2020. She started her working life with the Ministry of Agriculture and Fisheries as a laboratory technician specialising in metabolic diseases of dairy cattle.

She then worked in the community sector and, after completing her Doctorate in Psychology, worked in central government in research, policy and operational leadership roles.

Sue then moved across to local government, most recently as Chief Executive of Dunedin City Council, before returning to the agricultural science sector here at AgResearch.

Stuart Hall

Deputy Chief Executive: Commercial Partnerships

Stuart Hall's key areas of experience include sales and marketing, leadership and strategy development. He has extensive experience in a number of executive sales and commercial roles.

Dr Trevor Stuthridge

Research Director

Dr Trevor Stuthridge brings extensive international executive and governance experience in science, innovation and technology commercialisation organisations. He has served as director on 10 Boards and strategic advisor for 12 industry/ academic research consortia.

Jo Brady

Communications and Marketing Director

Jo Brady has an executive leadership background in central government and tertiary sectors and brings significant expertise in strategy development, marketing, communications, business development and organisational change. She has also held several governance and national industry advisory roles.

Fleur Evans

People and Culture Director

Fleur Evans is an experienced organisational development professional with a proven track record in leading organisational culture change programmes, developing strategies to build critical skills and leadership capability, and strategic workforce planning.

Tony Hickmott

Finance and Business Performance Director

Prior to joining AgResearch as Finance and Business Performance Director in October 2017, Tony Hickmott was the Chief Financial Officer at Capital and Coast District Health Board in Wellington where he provided leadership for the DHB. He has a wealth of experience in finance, audit and risk, government funding models, and finance team leadership.

Greg Rossiter

Technology and Digital Services Director

Greg Rossiter is an experienced IT professional with an extensive background leading cross-functional teams to deliver major change projects.

Chris Koroheke

Kaiurungi Ahuwhenua Māori

Chris Koroheke's role on the Executive Leadership Team is to strengthen the relationships across the burgeoning Māori agri-business sector. His background is in developing relationships across organisations and iwi.

Statutory reporting–company

For the year ended 30 June 2021

Remuneration greater than $100,000

During the year ended 30 June 2021, 201 staff received remuneration of or exceeding $100,000 per annum, as shown in the table adjacent.

Remuneration included performance awards, superannuation benefits, vehicle benefits, and severance and exit payments.

Remuneration band	Number of employees	Remuneration band	Number of employees
$ 100,000 to $ 109,999	37	$ 210,000 to $ 219,999	1
$ 110,000 to $ 119,999	28	$ 220,000 to $ 229,999	1
$ 120,000 to $ 129,999	40	$ 240,000 to $ 249,999	1
$ 130,000 to $ 139,999	29	$ 250,000 to $ 259,999	2
$ 140,000 to $ 149,999	20	$ 290,000 to $ 299,999	1
$ 150,000 to $ 159,999	11	$ 310,000 to $ 319,999	1
$ 160,000 to $ 169,999	8	$ 360,000 to $ 369,999	1
$ 170,000 to $ 179,999	6	$ 410,000 to $ 419,999	2
$ 180,000 to $ 189,999	4	$ 450,000 to $ 459,999	1
$ 200,000 to $ 209,999	6	$ 500,000 to $ 509,999	1
		Total	201

Termination payments

During the year, the Group made the following payments to former employees in respect of termination of their employment with the Group.

Total amount paid	**$ 633,358**
Number of employees	12

Executive remuneration reporting

AgResearch's remuneration policy is to reward employees at all levels of the organisation fairly and consistently under the following principles:

Market relativity

Market practice

Market position

Labour market conditions

Internal relativity

Recognising different levels of complexity and accountability between roles

Ability to pay

Balancing company responsibilities with commitment to competitive market positioning

Performance

Reward for delivery and high performance

Total remuneration is made up of fixed remuneration and variable remuneration. Fixed remuneration includes base salary and employer contribution of Kiwisaver.

Base salary is agreed with reference to the fixed pay market median data provided by external independent advisors and is reviewed by the Board annually.

Chief Executive's remuneration

Dr Sue Bidrose was appointed Chief Executive in July 2020, and Tony Hickmott remained in an handover Acting Chief Executive capacity through to August 2020. The remuneration that the Chief Executive and Acting Chief Executive received for the year ending 30 June 2021 and comparative periods are disclosed as following:

in thousands of New Zealand dollars	2021	2020
Salary and other short-term employee benefits	576	894
Termination payments	0	292
Total	576	1,186

Donations

Donations paid during the year ended 30 June 2021 were $1,836.

Directors and employees indemnity and insurance

During the year, the company indemnified Directors and certain employees to the fullest extent permissible by law. The company also has Directors and officers insurance.

Auditor

Anthony Smith of Deloitte Limited is the appointed auditor of the company under contract from the Office of the Auditor-General and under section 21 of the Crown Research Institutes Act 1992.

Performance indicators

Ngā whāinga paearu mahi

AgResearch's 2020/2021–2024/2025 *Statement of Corporate Intent* (SCI) identified the following non-financial operating indicators against which progress to achieve the SCI operating outcomes is measured. Target figures are from AgResearch's 2020/2021–2024/2025 SCI.

Core operating indicators

ID	Indicator	Definition	FY21 Result	*FY21 Target*
G.1	End-user collaboration	Revenue per full-time equivalent (FTE) from commercial sources.	$95.3k	*$97.8k*
G.2	Research collaboration	Publications with collaborators. Percentage of publications with: a) Only AgResearch authors b) Other New Zealand authors c) International authors d) A combination of New Zealand and international authors. *(Data for this indicator is reported for calendar years.)*	 a) 13% b) 31% c) 32% d) 24%	 *a) 14%* *b) 39%* *c) 26%* *d) 21%*
G.3	Technology and knowledge transfer	Commercial reports per scientist FTE.	1.16	*1.0*
G.4	Science quality	Impact of scientific publications. The average of two-year citations per document for scientific journals assessed by SCImago, in which AgResearch staff published during the year, weighted by the number of AgResearch publications in each journal. *(Data for this indicator is reported for calendar years.)*	3.99	*2.7*
G.5	Financial indicator	Revenue per FTEs over the year.	$256.0k	*$261.8k*

AgResearch-specific indicators of end-user engagement and science revenue

ID	Indicator	Definition	FY21 Result	*FY21 Target*
1.1	External stakeholder engagement	Consistent implementation of agreed stakeholder services plans.	*	*Achieved*
1.2		Stakeholder relationship measure - "Very good" or "Better" satisfaction rating.	*	*>65%*
1.3		Satisfaction with our service - "Very Good" or "Better" satisfaction rating.	*	*>75%*
1.4		Dealing with us - "Preference to Work" rating.	*	*>60%*
1.5		Familiarity with our capability - "Very Familiar" rating.	*	*>45%*
1.6		Contribution to stakeholder strategy - "Good" or "Better" rating.	*	*>90%*
1.7		Consistent implementation of agreed science service/interaction plan.	*	*Achieved*
1.8		a) Total revenue	a) $166.42m	*a) $175.64m*
		b) Total science revenue	b) $111.18m	*b) $112.03m*
		c) Commercial science revenue	c) $55.41m	*c) $57.68m*
		d) Intellectual property revenue	d) $11.18m	*d) $11.02m*
		e) International revenue	e) $3.04m	*e) $5.49m*
		f) Māori revenue	f) $0.25m	*f) $0.55m*
		g) COVID-19 response and recovery fund	g) $13.57m	*g) $0m*

* The 2021 annual stakeholder satisfaction survey is in market with results unavailable at the time of going to print.

AgResearch-specific operating indicators of delivery to Vision Mātauranga

ID	Indicator	Definition	FY21 Result	*FY21 Target*
2.1	Collaboration with Māori	Cultivate collaboration to support Māori agri-business by co-developing funding proposals with stakeholders.	23	*6*

AgResearch-specific workforce indicators

ID	Indicator	Definition	FY21 Result	*FY21 Target*
3.1	Staff engagement	Increase engagement index by five points.	71%	*78%*
3.2	Health and safety	No notifiable injuries and less than two notifiable events.	0	*<2*

AgResearch-specific financial performance

ID	Indicator	Definition	FY21 Result	*FY21 Target*
2.1	Financial target	Operating profit budget achieved.	Achieved	*Achieved*

Financials

Pūrongo pūtea

Financial performance indicators

For the year ended 30 June 2021

Cash flow	Actual 2021	Budget 2021	Actual 2020
Net cash flow from operating activities $k	**42,958**	24,760	34,384
Net cash flow from investing activities $k	**85**	11,814	(25,427)
Net cash flow from financing activities	**(2,198)**	(1,977)	(2,179)
Total net cash flow $k	**40,845**	34,597	6,778
Effect of exchange rate changes $k	**(10)**	-	43
Cash at the beginning of the year $k	**55,007**	47,156	48,186
Cash at the end of the year $k	**95,842**	81,753	55,007

Operating margin %	**24.4%**	5.7%	9.6%
Operating margin per FTE $k	**62.1**	15.6	23.1
Revenue growth %	**6.6%**	10.8%	(0.8%)
Quick ratio	**5.1**	1.9	2.9
Interest coverage	**46.2**	24.9	15.0
Operating margin volatility %	**84.4%**	20.7%	45.1%
Forecasting risk %	**3.5%**	-	1.8%
Adjusted return on equity %	**14.6%**	2.9%	4.1%
Capital renewal	**-**	-	1.9
Equity ratio %	**70.5%**	67.5%	76.0%

Indicator definitions:

Adjusted return on equity: Surplus after tax (excluding fair value movements net of associated tax impact) ÷ average shareholder's funds excluding asset revaluation reserve, expressed as a percentage.

All other indicators are based on the Treasury prescribed calculations, which may differ from normal accounting calculations for that indicator.

Consolidated statement of comprehensive income

For the year ended 30 June 2021

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Revenue	1			
Ministry of Business, Innovation and Employment				
Strategic science funding	1	**44,963**	44,888	43,889
Our Land and Water National Challenge	1	**8,768**	14,969	4,289
COVID-19 Response and Recovery Fund	1	**13,570**	-	13,570
Other	1	**16,780**	29,716	17,049
Commercial	1	**61,817**	65,639	56,929
Farm produce	1	**4,855**	5,466	4,530
Other revenue	1	**15,662**	14,959	15,817
Total operating revenue		**166,415**	175,637	156,073
Operating expenditure	2	**(153,788)**	(168,693)	(149,265)
Other gains/(losses)	3	**18,145**	-	(1,046)
Finance costs	4	**(874)**	(857)	(962)
Share of deficit of associates	5	**(1,591)**	-	(1,020)
Surplus/(deficit) before tax		**28,307**	6,087	3,780
Tax expense/(benefit)	6	**3,824**	1,704	(2,203)
Net surplus/(deficit) after tax for the year		**24,483**	4,383	5,983

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Other comprehensive income				
Items that will not be reclassified subsequently to surplus or deficit:				
Revaluation of properties	**8**	6,807	-	(1,992)
Income tax relating to components of other comprehensive income	**6**	**(1,141)**	-	(169)
Other comprehensive income for the year net of tax		**5,666**	-	(2,161)
Total comprehensive income for the year net of tax		**30,149**	4,383	3,822
Net surplus/(deficit) is attributable to:				
Equity holders of the parent		**24,483**	4,383	5,983
Total comprehensive income is attributable to:				
Equity holders of the parent		**30,149**	4,383	3,822

The statement of accounting policies and the accompanying notes form an integral part of these financial statements.

Consolidated statement of financial position

For the year ended 30 June 2021

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Current assets				
Cash and cash equivalents		**95,842**	81,753	55,007
Trade and other receivables	10	**43,767**	26,735	22,175
Prepayments		**5,017**	-	2,250
Lease receivable - current	13	**-**	-	196
Biological assets - livestock	12	**3,832**	4,571	3,933
Inventory		**1,074**	1,256	1,142
Property held for sale		**75**	3	-
Current tax	6	**-**	(600)	-
Total current assets		**149,607**	113,718	84,703
Non-current assets				
Investments in associates and joint ventures	5	**5,707**	5,281	6,035
Other investments	16	**2,638**	2,659	2,659
Property, plant and equipment	8	**216,546**	210,253	210,791
Biological assets - forestry	15	**1,327**	1,245	1,245
Goodwill	18	**907**	907	907
Intangible assets	9	**1,612**	1,487	2,450
Right-of-use assets	14	**23,845**	23,639	27,154
Total non-current assets		**252,582**	245,471	251,241
Total assets		**402,189**	359,189	335,944

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Less:				
Current liabilities				
Trade and other payables	11	**80,242**	40,862	42,322
Derivative financial instruments		**-**	-	11
Provisions	19	**5,880**	5,486	6,181
Current tax	6	**2,556**	-	2,638
Lease liabilities	17	**1,711**	-	2,099
Other current liabilities		**-**	3,875	-
Total current liabilities		**90,389**	50,223	53,251
Non-current liabilities				
Deferred tax	6	**13,283**	13,982	11,579
Lease liabilities	17	**22,792**	-	25,449
Other non-current liabilities	20	**447**	51,940	536
Provisions - non-current	19	**22**	23	22
Total non-current liabilities		**36,544**	65,945	37,586
Total liabilities		**126,933**	116,168	90,837
Net assets		**275,256**	243,021	245,107

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Equity				
Share capital	7	**47,268**	47,268	47,268
Revaluation reserves	7	**96,558**	89,402	90,950
Retained earnings		**131,430**	106,351	106,889
Total equity		**275,256**	243,021	245,107

Dr Paul Reynolds
Chair
30 August 2021

Kim Wallace
Deputy Chair
30 August 2021

The statement of accounting policies and the accompanying notes form an integral part of these financial statements.

Consolidated statement of changes in equity

For the year ended 30 June 2021

in thousands of New Zealand dollars	Note	Share capital	Revaluation Property, plant and equipment	Retained earnings	Total equity
Balance at 1 July 2019		47,268	93,111	100,906	**241,285**
Profit after tax for the year		-	-	5,983	**5,983**
Revaluation of properties	8	-	(1,992)	-	**(1,992)**
Transfer of revaluation reserve on sold assets		-	-	-	**-**
Income tax relating to components of other comprehensive income	6	-	(169)	-	**(169)**
Total comprehensive income		-	(2,161)	5,983	**3,822**
Balance at 30 June 2020		47,268	90,950	106,889	**245,107**
Balance at 1 July 2020		47,268	90,950	106,889	**245,107**
Profit after tax for the year		-	-	24,483	**24,483**
Revaluation of properties	8	-	6,807	-	**6,807**
Transfer of revaluation reserve on sold assets		-	(58)	58	**-**
Income tax relating to components of other comprehensive income	6	-	(1,141)	-	**(1,141)**
Total comprehensive income		**-**	**5,608**	**24,541**	**30,149**
Balance at 30 June 2021		**47,268**	**96,558**	**131,430**	**275,256**

The statement of accounting policies and the accompanying notes form an integral part of these financial statements.

Consolidated statement of cash flows

For the year ended 30 June 2021

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Cash received from operating activities				
Receipts from customers		**184,923**	193,222	175,522
Interest received		**1,032**	453	1,155
Dividends received		**35**	-	-
Total cash received from operating activities		**185,990**	193,675	176,677
Cash disbursed on operating activities				
Payments to employees		**69,450**	68,532	71,463
Payments to suppliers		**68,729**	95,026	68,033
Restructuring		**636**	2,477	1,173
Income tax paid		**3,343**	2,023	662
Interest paid		**874**	857	962
Total cash disbursed on operating activities		**143,032**	168,915	142,293
Net cash flow from operating activities	22	**42,958**	24,760	34,384
Cash received from investing activities				
Disposal of property, plant and equipment		**14,200**	9,132	17
Disposal of investments and intangible assets		**56**	-	742
Government grant		**-**	29,000	-
Total cash received from investing activities		**14,256**	38,132	759

in thousands of New Zealand dollars	Note	Actual 2021	Budget 2021	Actual 2020
Cash disbursed on investing activities				
Investment in property, plant and equipment		**12,392**	24,518	22,684
Purchase of other investments and intangible assets		**979**	825	2,577
Partner contribution to research consortiums		**800**	975	925
Total cash disbursed on investing activities		**14,171**	26,318	26,186
Net cash flow from investing activities		**85**	11,814	(25,427)
Cash disbursed on financing activities				
Repayment of the lease liabilities		**2,198**	1,977	2,179
Total cash disbursed on financing activities		**2,198**	1,977	2,179
Net cash flow from financing activities		**(2,198)**	(1,977)	(2,179)
Total net cash flow		**40,845**	34,597	6,778
Cash at beginning of year		**55,007**	47,156	48,186
Effect of exchange rate changes on the balance of cash held in foreign currencies		**(10)**	-	43
Cash at end of year		**95,842**	81,753	55,007

The statement of accounting policies and the accompanying notes form an integral part of these financial statements.

Statement of accounting policies

For the year ended 30 June 2021

Reporting entity

The Consolidated Financial Statements of AgResearch Limited and its subsidiaries, associates and joint arrangement interests (collectively, the Group) for the year ended 30 June 2021 were authorised for issue by the Directors on 30 August 2021. AgResearch Limited (the company or parent) is a limited liability company incorporated in New Zealand.

Operating as a Crown Research Institute, its principal activity is research and development in the pastoral sector of New Zealand. The Consolidated Financial Statements have been prepared in accordance with the requirements of the Companies Act 1993, the Financial Reporting Act 2013, the Crown Research Institutes Act 1992 and the Public Finance Act 1989. Information on related party relationships of the Group is provided in Note 26.

Basis of preparation

The Consolidated Financial Statements have been prepared in accordance with Generally Accepted Accounting Principles in New Zealand. They comply with the New Zealand Equivalents to International Financial Reporting Standards (NZ IFRS) and other applicable financial reporting standards as appropriate for tier 1 profit-orientated entities.

The Consolidated Financial Statements have been prepared on the basis of historical cost, except for the revaluation of biological assets, certain non-current assets and financial instruments. Cost is based on the fair value of the consideration given in exchange for assets.

Accounting policies are selected and applied in a manner that ensures the resulting financial information satisfies the concepts of relevance and reliability so that the substance of the underlying transactions or other events is reported.

The Consolidated Financial Statements are presented in New Zealand Dollars, which is the presentation currency of the Group unless otherwise indicated.

Critical accounting estimates and judgements

The preparation of Consolidated Financial Statements conforming with NZ IFRS requires the use of certain critical accounting estimates. It also requires the Directors to exercise judgement in the process of applying the Group's accounting policies. The areas involving a higher degree of judgement or complexity, or where assumptions and estimates are significant to the Consolidated Financial Statements, are disclosed in the relevant accounting policy or note.

The estimates and associated assumptions are based on historical experience and various factors that are believed to be reasonable under the circumstances. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the periods affected by the revision.

Information about significant areas of estimation uncertainty and critical judgements in applying accounting policies that have the most significant effect on the amounts recognised in the financial statements are:

Significant influence

Pastoral Greenhouse Gas Research Consortium is treated as an associate of the Group as it has significant influence over the Consortium by virtue of:

- Its participation in the Board activities
- The provision of funding
- Its undertaking science research for the consortia.

Joint operation

Grasslands Innovation Limited is considered a joint operation by virtue of the contractual arrangements that specify the parties' rights to the economic inputs and outputs of the joint arrangement and retention of ownership rights to pre-existing IP contributed by the parties.

Impairment of assets

Before balance date each year, the Directors review property, plant and equipment not held at fair value, intangible assets and other assets for indications of impairment. In particular, consideration is given to whether there are indications that:

- The market value assets has significantly declined
- Significant changes have taken place during the period, or will take place in the near future, in the technological, market, economic or legal environment in the market to which the asset is dedicated
- Market interest rates or other market rates of return on investments have increased during the period, and those increases are likely to affect the discount rate used in calculating an asset's value in use and decrease the asset's recoverable amount materially
- There has been obsolescence or physical damage of the asset
- Significant changes with an adverse effect on the Group have taken place during the period or are expected to take place in the near future, which impacts the extent to which, or manner in which, an asset is used or is expected to be used. These changes include the asset becoming idle, plans to discontinue or restructure the operation to which an asset belongs, plans to dispose of an asset before the previously expected date, and reassessing the useful life of an asset
- From internal reporting, the economic performance of an asset is, or will be, worse than expected
- Other relevant factors.

Where an indication of impairment exists, the recoverable amount is the higher of fair value less costs to sell or value in use. The value in use is based on the net present value of future cash flows where no active market exists.

Impairments made appear in Notes 3 and 8.

Revenue from contracts with customers

The Group applied the following judgements that significantly affect the determination of the amount and timing of revenue from contracts with customers:

Identifying performance obligations in a contract

The Group provides research services that are either for an entire project or part of a project that is managed by the Group for customers. The research services are a promise to report findings and related IP in the future and are part of the negotiated work performed between the Group and the customer.

The Group determined that the milestones within each contract are generally not capable of being distinct. The fact that the Group would not be able to sell the individual milestones on a stand-alone basis indicates that a customer could not benefit from an individual milestone. In addition, the individual milestones are highly correlated, because the Group would not be able to transfer the work performed to date if the customer terminated the contract prior to completion.

The Group determined that the input method is the best method in measuring progress of the research services because there is a direct relationship between the Group's effort (i.e., cost hours incurred) and the transfer of service to the customer. The Group recognises revenue on the basis of the cost incurred relative to the total expected cost to complete the contract.

Principal versus agent consideration

The Group occasionally enters into contracts with its customers that require a third party to perform the work, on the customer's behalf, with the third party receiving full consideration and autonomy by the Group. Under these contracts, the Group provides hosting services (i.e., coordinating the selection of third parties and managing the delivery of contract). The Group determined that it does not control the service, and it does not obtain benefits from the services performed. Therefore, the Group determined that it is an agent in these contracts.

Revaluation of campus assets

The Group's campus assets, encompassing farm land, land improvements, buildings and building fitouts, are stated at their revalued amounts, being the fair value at the date of revaluation less any subsequent depreciation and impairments.

The Group's campus assets have been valued using either market value or optimised depreciated replacement cost. For non-specialised assets where there is an active market for the same or a similar asset, value is determined by one or more of the following:

- Direct comparison
- Income
- Cost approach.

Assets that have a specialised use for the Group have been valued at optimised depreciated replacement cost. These assets include site improvements such as roads, fences and buildings. Optimised depreciated replacement cost is a method of valuation based on an estimate of the current gross replacement cost of an asset less allowances for physical deterioration and optimisation for obsolescence and surplus capacity. The Group's campus assets have been classified as non-specialised assets and have therefore been assigned a market-based value. Refer to Note 8 for further information of revaluation of campus assets.

Fair value estimates

The fair value of financial assets and financial liabilities must be estimated for recognition, measurement and disclosure purposes.

The fair value of financial instruments traded in active markets is based on quoted market prices at the end of the reporting period. The quoted market price used for financial assets held by the Group is the current bid price. Financial liabilities are held at amortised cost.

The fair value of financial instruments that are not traded in an active market (e.g., over-the-counter derivatives and forward exchange contracts) are determined using the mark to market rate provided by the banking institution or using forward exchange market rates at the end of the reporting period.

For instruments not to take the mark to market rate from observable markets where possible, a degree of judgement is required in establishing fair values. Judgements include considerations of inputs such as liquidity risk, credit risk and volatility. Changes in assumptions relating to these factors could affect the reported fair value of financial instruments.

The nominal value less estimated credit adjustments of trade receivables and payables are assumed to approximate their fair values.

Budget figures

The budget figures are those approved by the Board and presented in the *Statement of Corporate Intent*, noting that the Board approval is of the Statement of Comprehensive Income, Statement of Financial Position and Capital Expenditure budget. The budget has been prepared using the same accounting policies as for these Consolidated Financial Statements.

Changes in accounting policies and disclosures

Accounting policies are changed only if the change is required by a standard or interpretation or otherwise provides more reliable and more relevant information.

During the year, the Group revised its accounting policy in relation to upfront configuration and customisation costs incurred in implementing SaaS arrangements in response to the International Financial Reporting Interpretations Committee agenda decision clarifying its interpretation of how current accounting standards apply to these types of arrangements. The new accounting policy is presented below. Historical financial information has not been restated to account for the impact of the change as the impact was not material to the prior-year financial statements.

Software-as-a-Service (SaaS) arrangements

SaaS arrangements are service contracts providing the company with the right to access the cloud provider's application software over the contract period. Costs incurred to configure or customise, and the ongoing fees to obtain access to the cloud provider's application software, are recognised as operating expenses when the services are received.

Some of these costs incurred are for the development of software code that enhances or modifies–or creates additional capability to–existing on-premise systems and meets the definition of and recognition criteria for an

intangible asset. These costs are recognised as intangible software assets and amortised over the useful life of the software on a straight-line basis.

Capitalisation of configuration and customisation costs in SaaS arrangements

Part of the customisation and configuration activities undertaken in implementing SaaS arrangements may entail the development of software code that enhances, modifies, or creates additional capability to the existing on-premise software to enable it to connect with the cloud-based software applications (referred to as bridging modules or application programming interfaces). Judgement was applied in determining whether the additional code meets the definition of and recognition criteria for an intangible asset in NZ IAS 38 or PBE IPSAS 31 Intangible Assets. During the year, the Group recognised $48k of customisation and configuration costs as intangible assets.

Determination whether configuration and customisation services are distinct from the SaaS access

Costs incurred to configure or customise the cloud provider's application software are recognised as operating expenses when the services are received. In a contract where the cloud provider provides both the SaaS configuration and customisation, and the SaaS access over the contract term, judgement was applied to determine whether these services are distinct from each other or not, and therefore, whether the configuration and customisation costs incurred are expensed as the software is configured or customised (i.e. upfront), or over the SaaS contract term.

Specifically, where the configuration and customisation activities significantly modify or customise the cloud software, these activities will not be distinct from the access to the cloud software over the contract term. Judgement has been applied in determining whether the degree of customisation and modification of the cloud-based software that would be deemed significant. During the year, the Group recognised $1,013k as prepayments in respect of customisation and configuration activities undertaken in implementing SaaS arrangements, which are considered not to be distinct from the access to the SaaS access over the contract term.

Significant accounting policies

The significant accounting policies used in the preparation and presentation of the Consolidated Financial Statements are (where applicable) disclosed in the corresponding note. The remaining significant accounting policies are set out below.

a) Basis of consolidation

The Consolidated Financial Statements comprise the financial statements of the company and its subsidiaries as at 30 June 2021. Control is achieved when the Group is exposed, or has rights, to variable returns from its involvement with the investee and has the ability to affect those returns through its power over the investee. Specifically, the Group controls an investee if, and only if, the Group:

- Has power over the investee
- Is exposed, or has rights, to variable returns from its involvement with the investee
- Has the ability to use its power to affect its returns.

The Directors reassess whether the Group controls an investee if facts and circumstances indicate that there are changes to one or more of the three elements of control listed above.

When the Group has less than a majority of the voting rights of an investee, it has power over the investee when the voting rights are sufficient to give it the practical ability to direct the relevant activities of the investee unilaterally. The Directors consider all relevant facts and circumstances in assessing whether or not the Group's voting rights in an investee are sufficient to give it power, including:

- The size of the Group's holding of voting rights relative to the size and dispersion of holdings of the other vote holders
- Potential voting rights held by the Group, other vote holders or other parties
- Rights arising from other contractual arrangements
- Any additional facts and circumstances that indicate that the Group has, or does not have, the current ability to direct the relevant activities at the

time that decisions need to be made, including voting patterns at previous Shareholders' meetings.

Consolidation of a subsidiary begins when the Group obtains control over the subsidiary and ceases when the Group loses control of the subsidiary. Specifically, income and expenses of a subsidiary acquired or disposed of during the year are included in the profit and loss from the date the Group gains control until the date when the Group ceases to control the subsidiary.

Profit or loss and each component of other comprehensive income are attributed to the owners of the company. Total comprehensive income of subsidiaries is attributed to the owners of the company.

When necessary, adjustments are made to the Consolidated Financial Statements of subsidiaries to bring their accounting policies into line with the Group's accounting policies.

All intragroup assets and liabilities, equity, income, expenses and cash flows relating to transactions between members of the Group are eliminated in full on consolidation.

Consistent accounting policies are employed in the preparation and presentation of the Consolidated Financial Statements.

b) Comparatives

When the presentation or classification of items is changed, comparative amounts are reclassified unless the reclassification is impracticable. In addition, a Consolidated Statement of Financial Position is presented as at the beginning of the earliest comparative period, when the Group has applied an accounting policy retrospectively, makes a retrospective restatement of items, or when it has reclassified items.

c) Government grants

Government grants are assistance provided by the Government in the form of transfers of resources to the Group in return for past or future compliance with certain conditions relating to the operating activities of the Group. Government grants are only recognised when there is a reasonable assurance that:

(i) the Group will comply with the conditions attaching to them; and

(ii) the grants will be received.

The income approach is adopted when government grants are recognised and they are recognised in profit or loss on a systematic basis over the periods in which the Group recognise as expenses, the related costs for which the grants are intended to compensate. The Group receives two streams of government grants. Sustainable science investment funding (previously core funding) from the Crown commenced from 1 July 2011 and is recognised in the profit and loss in the year it is received. The primary condition is that the Group should undertake research activities as defined under the contractual agreement that awards the funding.

The Group received $13.57m of the COVID-19 Response and Recovery Fund (the CRRF) from MBIE during FY21. COVID-19 continues to impact the commercial revenue stream of the Group. Some science research project revenue was permanently lost and some has been delayed. The CRRF is a fund to replace the revenue lost due to COVID-19 and support the Group to maintain its national science capability and continue capital investment programmes, which will support the health and primary sectors and New Zealand's COVID-19 recovery path. There are no conditions or obligations associated the grant and it is recognised in the year when the fund is received.

d) Foreign currency

The individual financial statements of each Group entity are presented in the currency of the primary economic environment in which the entity operates (its functional currency). For the purpose of the Consolidated Financial Statements, the results and financial position of each group entity are expressed in New Zealand dollars (NZ$), which is the functional currency of the Group and the presentation currency for the Consolidated Financial Statements.

In preparing the financial statements of the individual entities, transactions in currencies other than the entity's functional

currency (foreign currencies) are recorded at the rates of exchange prevailing at the dates of the transactions. At each balance date, monetary items denominated in foreign currencies are retranslated to the functional currency at the rate prevailing at the end of the reporting period. Non-monetary items carried at fair value that are denominated in foreign currencies are retranslated to the functional currency at the rates prevailing at the date when the fair value was determined. Non-monetary items that are measured in terms of historical cost in a foreign currency are not retranslated.

Exchange differences are recognised in the profit and loss in the period in which they arise except for the following:

- Exchange differences that relate to assets under construction for future productive use, which are included in the cost of those assets when they are regarded as an adjustment to interest costs on foreign currency borrowings
- Exchange differences on transactions entered into in order to hedge certain foreign currency risks
- Exchange differences on monetary items receivable from or payable to a foreign operation for which settlement is neither planned nor likely to occur, which form part of the net investment in a foreign operation, and which are recognised in the foreign currency translation reserve and recognised in profit or loss on disposal of the net investment.

e) Financial assets

Derivatives not designated as hedging instruments reflect the positive or negative change in fair value of those foreign exchange forward contracts that are not designated in hedge relationships, but are, nevertheless, intended to reduce the level of foreign currency risk for expected sales and purchases.

Equity instruments designated at fair value through profit and loss include investments in equity shares of non-listed companies. The Group holds non-controlling interests (between 0.01% and 7%, 2020: between 2% and 9%) in these companies. These investments were irrevocably designated at fair value through profit and loss as the Group considers these investments to be strategic in nature.

Financial assets at fair value through profit or loss include investments in listed equity shares. Fair values of these equity shares are determined by reference to published price quotations in an active market.

Hedging activities and derivatives

The Group is exposed to certain risks relating to its ongoing business operations. The primary risks managed using derivative instruments are credit risk, market risk, and liquidity risk.

The Group's risk management strategy and how it is applied to manage risk are explained in Note 27.

Derivatives not designated as hedging instruments

The Group uses foreign currency-denominated borrowings and foreign exchange forward contracts to manage some of its transaction exposures. The foreign exchange forward contracts are not designated as cash flow hedges and are entered into for periods consistent with foreign currency exposure of the underlying transactions, generally in next 12 months.

Fair values

Set out in Note 27 is a comparison, by class, of the carrying amounts and fair values of the Group's financial instruments, other than those with carrying amounts that are reasonable approximations of fair values.

The management assessed that the fair values of cash and short-term deposits, trade receivables, trade payables, bank overdrafts and other current liabilities approximate their carrying amounts largely due to the short-term maturities of these instruments.

The following methods and assumptions were used to estimate the fair values:

- Long-term fixed-rate and variable-rate receivables/borrowings are evaluated by the Group based on parameters such as interest rates, specific country risk factors, individual creditworthiness of the customer and the risk characteristics of the financed project. Based on this evaluation, allowances

are taken into account for the estimated losses of these receivables.

- The fair values of the non-listed equity investments have been estimated using the quoted rates on the unlisted market or the rates provided by the entity itself. The probabilities of the various estimates within the range can be reasonably assessed and are used in management's estimate of fair value for these non-listed equity investments.
- Listed equity investments are valued at the quoted price on an active market.

The Group enters into derivative financial instruments with various counterparties, principally financial institutions with investment-grade credit ratings. Foreign exchange forward contracts are valued using valuation techniques, which employ the use of market observable inputs. The most frequently applied valuation techniques include forward pricing and swap models using present value calculations. The models incorporate various inputs including the credit quality of counterparties, foreign exchange spot and forward rates, yield curves of the respective currencies, currency basis spreads between the respective currencies, interest rate curves and forward rate curves of the underlying commodity. Some derivative contracts are fully cash collateralised, thereby eliminating both counterparty risk and the Group's own non-performance risk. As at 30 June 2021, the Group is not party to any foreign exchange contracts.

Financial assets held at amortised cost

Financial assets held at amortised cost are non-derivative financial assets that are held solely for the collection of principal payments and interest. Financial assets held at amortised cost are stated at amortised cost using the effective interest method less impairment. Interest income is recognised by applying the effective interest rate.

Impairment of financial assets

Financial assets, other than those accounted for at fair value through OCI, are assessed for indicators of impairment at the end of each reporting period. Financial assets are impaired where there is objective evidence that, as a result of one or more events that occurred after the initial recognition of the financial assets, the estimated future cash flows of the investment have been impacted.

For unlisted shares, a significant or prolonged decline in the fair value of the security below its cost is considered to be objective evidence of impairment.

For all other financial assets, including redeemable notes and finance lease receivables, objective evidence of impairment could include the following:

- Significiant financial difficulty of the issuer or counterparty
- Default or delinquincy in interest or principal payments
- It becoming probable that the borrower will enter bankruptcy or financial re-organisaton

For certain financial assets held at amortised cost, such as trade receivables, the Group recognises a loss allowance for expected credit losses (ECL) on trade receivables. The amount of expected credit losses is updated at each reporting date to reflect changes in credit risk since initial recognition of the respective financial instrument.

The Group measures the provision for ECL using the simplified approach to measuring ECL, which uses a lifetime expected loss allowance for all trade receivables. The Group determines lifetime expected credit losses for groups of trade receivables with shared credit risk characteristics. Groupings are based on customer, trading terms and ageing.

An expected credit loss rate is determined based on the historic credit loss rates for the Group, adjusted for other current observable data that may materially impact the Group's future credit risk. This other observable data includes specific factors in relation to each debtor or general economic conditions of the industry in which the debtors operate.

Trade receivables are written off when there is no realistic chance of recovery.

f) Inventories

Inventories are valued at the lower of cost, determined on a first-in first-out basis and net realisable value. The cost of harvested agricultural produce is measured at fair

value less estimated point-of-sale costs at the point of harvest.

g) Right of use of asset and lease liability

The Group as a lessee

The Group assesses whether a contract is or contains a lease, at inception of the contract. The Group recognises a right-of-use asset and a corresponding lease liability with respect to all lease arrangements in which it is the lessee, except for short-term leases (defined as leases with a lease term of 12 months or less) and leases of low value assets. For these leases, the Group recognises the lease repayments as an operating expense on a straight-line basis over the term of the lease unless another systematic basis is more representative of the time pattern in which economic benefits from the leased assets are consumed.

The lease liability is initially measured at the present value of the lease payments that are not paid at the lease commencement date, discounted by using the rate implicit in the lease. If this rate cannot be readily determined, the group uses its incremental borrowing rate.

Lease payments included in the measurement of the lease liability comprise:

- Fixed lease payments (including in-substance fixed payments), less any lease incentives
- Variable lease payments that depend on an index or rate, initially measured using the index or rate at the commencement date
- The amount expected to be payable by the lessee under residual value guarantees
- The exercise price of purchase options, if the lessee is reasonably certain to exercise the options
- Payments of penalties for terminating the lease, if the lease term reflects the exercise of an option to terminate the lease.

The lease liability is subsequently measured by increasing the carrying amount to reflect interest on the lease liability (using effective interest rate method) and by reducing the carrying amount to reflect the lease payments made.

The Group remeasures the lease liability (and makes a corresponding adjustment to the related right-of-use asset) whenever:

- The lease term has changed or there is a change in the assessment of exercise of a purchase option, in which case the lease liability is remeasured by discounting the revised lease payments using a revised discount rate
- The lease payments change due to changes in an index or rate or a change in expected payment under a guaranteed residual value. In these instances the lease liability is remeasured by discounting the revised lease payments using the initial discount rate unless the lease payments change is due to a change in a floating interest rate. In this case, the lease liability is remeasured by discounting the revised lease payments using a revised discount rate.

The right-of-use assets comprise the initial measurement of the corresponding lease liability, lease payments made at or before the lease commencement date and any initial direct costs. They are subsequently measured at cost less accumulated depreciation and impairment losses.

Right-of-use assets are depreciated over the shorter period of the lease term and useful life of the underlying asset. If a lease transfers ownership of the underlying asset or the cost of the right-of-use asset reflects that the Group expect to exercise a purchase option, the related right-of-use asset is depreciated over the useful life of the underlying asset. The depreciation starts at the transition date of the lease.

The Group applies NZ IAS 36 to determine whether a right-of-use asset is impaired.

Variable rents that do not depend on an index or rate are not included in the measurement of the lease liability and the right-of-use assets. The related payments are recognised as an expense in the period in which the event or condition that triggers those payments occurs and are included in the statement of comprehensive income.

The Group uses the following practical expedients:

- A single discount rate is applied to a portfolio of leases with reasonably similar characteristics
- Not to apply the new lessee accounting model to leases for which the lease

term ends within 12 months after the date of initial application
- Apply the exemption for low-value assets leases which, are the leases with annual lease payments less than NZ$7k. The lease payments associated with those leases are recognised as an expense on a straight-line basis over the lease term.

The Group as a lessor

The Group enters into lease arrangements as a lessor. Leases for which the Group is a lessor are classified as finance or operating leases. Whenever the terms of the lease substantially transfer all the risks and rewards of ownership to the lessee, the contract is classified as a finance lease. All other leases are classified as operating leases.

When the Group is an intermediate lessor, it accounts for the head lease and the sublease as two separate contracts. The sublease is classified as a finance or operating lease by reference to the right-of-use asset arising from the head lease.

Rental income from operating leases is recognised on a straight-line basis over the term of the relevant lease. Initial direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognised on a straight-line basis over the lease term.

Amounts due from lessees under finance leases are recognised as receivables at the amount of the Group's net investment in the leases. Finance lease income is allocated to accounting periods so as to reflect a constant periodic rate of return on the Group's net investment outstanding in respect of the leases.

h) Impairment of non-financial assets

At each reporting date, the Group reviews the carrying amounts of its tangible and intangible assets that are subject to amortisation or depreciation to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the assets is estimated in order to determine the extent of the impairment loss (if any). Where the asset does not generate cash flows that are independent from other assets, the Group estimates the recoverable amount of the cash-generating unit to which the asset belongs.

Goodwill, intangible assets with indefinite useful life and intangible assets not yet available for use are tested for impairment annually and whenever there is an indication that the asset may be impaired. An impairment of goodwill is not subsequently reversed.

If the recoverable amount of an asset (or cash-generating unit) is estimated to be less than its carrying amount, the carrying amount of the asset (cash-generating unit) is reduced to its recoverable amount. The recoverable amount is the higher of an asset's fair value less cost to sell and value in use. An impairment loss is recognised in the profit and loss immediately, unless the relevant asset is carried at a revalued amount, in which case the impairment loss is first treated as a revaluation decrease.

Where an impairment loss subsequently reverses, the carrying amount of the asset (cash-generating unit) is increased to the revised estimate of its recoverable amount, but only to the extent that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset (cash-generating unit) in prior years. A reversal of an impairment loss is recognised in the profit and loss immediately, unless the relevant asset is carried at a revalued amount, in which case the impairment loss is treated as a revaluation increase.

i) Employee benefits

Provision is made for benefits accruing to employees in respect of wages and salaries, annual leave, retirement leave/ gratuities and sick leave where it is probable that settlement will be made and they are capable of being measured reliably.

Provision for employee benefits expected to be settled within 12 months are measured at their nominal values using the remuneration rates as at the reporting date and are recorded as current liabilities.

Provision for employee benefits that are not expected to be settled within 12 months are measured at the present value of the estimated future cash outflows to be made

by the Group in respect of services provided by employees up to reporting date and are recorded as non-current liabilities.

Liabilities for non-accumulating sick leave are recognised when the leave is taken and measured at the rates paid or payable.

Defined contribution plan

There are a small number of employees that are a part of the Crown Defined Benefit Superannuation Plan. Future benefits are generated by the Crown and the Group has no legal or financial contribution liability for future benefits. The Group's contributions to the Plan are expensed when incurred.

All employees of the Group can elect to join the KiwiSaver scheme. The only obligation of the Group is to contribute a specified percentage to the KiwiSaver scheme in line with employee contributions as part of payroll costs.

j) Goods and Services Tax (GST)

The Consolidated Financial Statements are prepared on a GST exclusive basis with the exception of receivables and payables which include GST.

k) Statement of cashflows

Cash and cash equivalents

Cash and cash equivalents include cash on hand, cash in banks, demand deposits and other highly liquid investments readily convertible into cash.

Operating activities

Operating activities include all transactions and other events that are not investing or financing activities.

Investing activities

Investing activities are those activities relating to the acquisition and disposal of current and non-current investments and any other non-current assets.

Financing activities

Financing activities are those activities relating to changes in the equity and debt structure of the Group.

l) Standards and interpretations effective in the current period

In the current year the Group has adopted all mandatory new and amended standards and interpretations applicable to the Group.

There are no standards or interpretations issued, but not yet effective, that are expected to have a material impact on the Group.

1 Revenue

Revenue recognition

Ministry of Business, Innovation and Employment.

Revenue received from New Zealand's Strategic Science Investment Fund (SSIF) is considered to be a grant for research purposes and is accounted for under NZ IAS 20, Accounting for Government Grants and Disclosure of Government Assistance.

Our Land and Water National Science Challenge

Revenue received in respect of "Our Land and Water" National Science Challenge funding is accounted for as research revenue and brought to account as services are provided, based upon the proportion of completion of the contract at the end of the reporting period. The stage of completion is the proportion of contract costs incurred for work performed to date compared to the estimated total contract costs.

Commercial revenue

The Group derives revenue from the provision of research services to a range of agriculture-based customers in New Zealand. The Group determined that the milestones within each research contract are generally not capable of being distinct. The fact that the Group would not be able to sell the individual milestones on a stand-alone basis indicates that a customer could not benefit from an individual milestone. In addition, the individual milestones are highly correlated, because the Group would not be able to transfer the work performed to date if the customer terminated the contract prior to completion. Therefore these contracts are typically determined to have one single performance obligation that is integrated and are fulfilled over time.

The transaction price is normally fixed at the start of the project. The nature of commercial contracts can sometimes lead to variations in the job scope, which is known as contract modification. It is also normal practice for contracts to include bonus and penalty elements based on timely construction or other performance criteria known as variable consideration. An estimate of variable consideration is included in the transaction price to the extent that it is highly probable that a significant reversal of revenue will not occur when any uncertainty is subsequently resolved.

Under the terms of the written contracts, the Group is contractually restricted from redirecting research outcomes to another customer and has an enforceable right to payment for work done. Therefore NZ IFRS 15.35(c) is satisfied and the Group recognises revenue in relation to contracting services over time.

Contract assets are initially recognised at fair value. They are subsequently adjusted for credit impairment loss.

The Group becomes entitled to invoice customers for research services based on achieving a series of performance-related milestones. The Group will previously have recognised a contract asset for any work performed. Any amount previously recognised as a contract asset is reclassified to trade receivables at the point at which it is invoiced to the customer. If the milestone payment exceeds the revenue recognised to date under the cost-to-complete method then the Group recognises a contract liability for the difference. There is not considered to be a significant financing component in commercial contracts with customers as the period between the recognition of revenue under the cost-to-cost method and the milestone payment is always less than one year.

Farm produce

Revenue from the sale of goods is recognised when the Group has transferred the control of the goods to the buyers.

Other revenue - royalties

Royalty revenue is recognised on an accrual basis in accordance with the substance of the relevant agreement and usage volumes provided by licensees.

Other revenue - dividend and interest revenue

Dividend revenue from investments is recognised in the financial period in which the right to receive payment is established. Interest revenue is recognised on a time-proportionate basis that takes into account the effective yield on the financial asset.

COVID-19 impact on revenue

The effect of the COVID-19 continues to have an impact on the Group. Although there is no impact on SSIF, commercial revenue from some science research projects were permanently lost and some others will have delays to FY22 and beyond. This is due to:

- Commercial customers facing significant uncertainty in the short-to-medium term, which impacts research and development spending commitment
- Global supply chain disruption and consumer COVID-19 responses generating significant market volatility
- International revenue significantly impacted by the border closure.

During FY21 a further $13.57m of the CRRF from MBIE was received to replace the revenue lost due to COVID-19 and support the Group to maintain its national science capability and continue capital investment programmes, which will support the health and primary sectors and New Zealand's COVID-19 recovery path. There are no conditions or obligations associated the grant, therefore it is recognised in profit and loss in the current financial year.

in thousands of New Zealand dollars	2021	2020
Other revenue		
Interest	**1,029**	1,159
Dividends	**35**	4
Royalties	**11,177**	11,322
Operating lease income	**3,421**	3,332
	15,662	15,817

2 Operating expenditure

in thousands of New Zealand dollars	Note	2021	2020
Employee related			
Salary and wages		**68,371**	71,581
Superannuation contribution		**1,861**	1,863
Operational			
Amortisation and impairment of intangible assets	9	**561**	501
Depreciation	8	**11,322**	10,244
Depreciation of right-of-use assets	14	**2,460**	2,634
Short-term and low-value lease expenses		**148**	245
Other operating expenses		**23,738**	21,305
Science third party sub-contracts		**20,083**	17,158
Site and property expenses		**6,434**	5,931
Supplies		**15,593**	14,698
Financial and administration			
Auditor's remuneration - for services as auditor *		**279**	273
Audit fee - additional fee in relation to prior year audit		**-**	65
Bad debts		**1**	5
Change in provision for expected credit loss		**(2)**	(1)
Directors' fees		**353**	284
Donations		**2**	4
Financial and legal expenses		**2,584**	2,475
		153,788	149,265

* The audit fee includes Office of the Auditor-General overhead contribution of $22,200 (30 June 2020: $21,800) and audit remuneration to other firms, related to other subsidiaries of $4,568 (2020: $4,526).

3 Other gains/(losses)

in thousands of New Zealand dollars	Note	2021	2020
Net gain (loss) from foreign currency exchange		**(114)**	9
Net gain (loss) on sale of property, plant and equipment		**213**	(77)
Net gain (loss) on distribution of other investments		**8**	625
Change in fair value of other investments		**103**	11
Change in fair value of derivative financial instruments		**11**	(16)
Change in fair value of forestry	15	**82**	87
Change in fair value of livestock	12	**19**	(487)
(Impairment) / write ups of property, plant and equipment	8	**(778)**	(1,216)
Land compensation		**14,027**	-
Insurance proceeds		**4,650**	-
Impairment of investments	16	**(76)**	(152)
Change in fair value of other assets and liabilities		**-**	170
		18,145	(1,046)

During the year, the Group signed an agreement with New Zealand Transport Agency (NZTA) to transfer a portion of the land at its Ballantrae Hill Country Research Station to NZTA under the Public Works Act 1981. NZTA agreed to pay $14.2m in total to the Group as compensation. $14m is the compensation for the detrimental impact on the Group's ability to fully use the land for research purposes and the remaining $0.2m is for the value of the land transferred.

In June 2021 the Group reached a settlement in relation to an insurance claim for earthquake damage to AgResearch's Lincoln campus. This amount has been recognised in the current financial year on the basis that settlement had been reached before year end and it was therefore deemed virtually certain that the proceeds could be reliably measured.

4 Finance cost

in thousands of New Zealand dollars	Note	2021	2020
Interest expense on lease liabilities		**860**	947
Other interest expense		**14**	15
		874	962

5 Investments in associates and joint ventures

An associate is an entity over which the Group has the capacity to exercise significant influence through participation in the financial and operating policy decisions of the investee but does not control or have joint control over those policies.

The Consolidated Financial Statements incorporate the Group's interests in associates using the equity method, except when the investment, or a portion thereof, is classified as held for sale, in which case it is accounted for in accordance with NZ IFRS 5.

Under the equity method, an investment in an associate is initially recognised in the consolidated statement of financial position at cost and adjusted thereafter to recognise the Group's share of the profit or loss and other comprehensive income of the associate. When the Group's share of losses of an associate exceeds the Group's interest in that associate, the Group discontinues recognising its share of further losses. Additional losses are recognised only to the extent that the Group has incurred legal or constructive obligations or made payments on behalf of the associate.

An investment in an associate is accounted for using the equity method from the date on which the investee becomes an associate. On acquisition of the investment in an associate, any excess of the cost of the investment over the Group's share of the net fair value of the identifiable assets and liabilities of the investee is recognised as goodwill, which is included within the carrying amount of the investment. The goodwill is assessed annually for impairment as part of the investment. Whenever there is an indication that the goodwill may be impaired, any impairment is recognised immediately in the profit and loss and is not subsequently reversed.

Any excess of the Group's share of the net fair value of the identifiable assets and liabilities over the cost of the investment, after reassessment, is recognised in the profit and loss in the period in which the investment is acquired.

The Group recognises its share of an associate's post-acquisition net profit or loss for the year in its profit and loss. The Group's share of an associate's profit or loss is adjusted to align the accounting policies of the investee with that of the Group. The Group recognises its share of other post-acquisition movements in reserves within equity. Dividends received from associates are recognised directly against the carrying value of the investment. In the consolidated statement of financial position the investment and the reserves are increased by the Group's share of the post-acquisition retained surplus and other post-acquisition reserves of the associates. In assessing the Group's share of earnings of associates, the Group's share of any unrealised surpluses between the Group and investee is eliminated.

The Group discontinues the use of the equity method from the date an investment ceases to be an associate, or when the investment is classified as held for sale. When the Group retains an interest in the former associate and the retained interest is a financial asset, the Group measures the retained interest at fair value at that date. The difference between the carrying amount of the associate at the date the equity method was discontinued, and the fair value of any retained interest and any proceeds from disposing of a part interest in the associate is included in the determination of the gain or loss on disposal of the associate. In addition, the Group accounts for all amounts previously recognised in other comprehensive income in relation to that associate on the same basis as would be required if that associate had directly disposed of the related assets or liabilities. Therefore, if a gain or loss previously recognised in other comprehensive income by that associate would be reclassified to profit or loss on the disposal of the related assets or liabilities, the Group reclassifies the gain or loss from equity to profit or loss (as a reclassification adjustment) when the equity method is discontinued.

When the Group reduces its ownership interest in an associate but

continues to use the equity method, it may reclassify previously recognised gains or losses. It does so if that gain or loss would be reclassified to the profit and loss on the disposal of the related assets or liabilities. Where it does, the proportion of the gain or loss that had previously been recognised in other comprehensive income relating to that reduction in ownership interest is taken to the profit and loss.

When a Group entity transacts with an associate of the Group, profits and losses resulting from the transactions with the associate are recognised in the Consolidated Financial Statements only to the extent of interests in the associate that are not related to the Group.

Summarised financial information for associates and joint ventures

in thousands of New Zealand dollars	2021	2020
Share of profit/(loss) from continuing operations and total comprehensive income	**(1,591)**	(1,020)
Share of total comprehensive income	**(1,591)**	(1,020)
Aggregate carrying amount of the Group and company's interest in the associate investments	**5,284**	5,246
Aggregate carrying amount of the Group and company's interest in the joint ventures	**423**	789
	5,707	6,035

All associates are incorporated in New Zealand. There are no restrictions on the ability of any associate to pay dividends, repay loans or otherwise transfer funds to the investor company.

All associates are private entities and there is no quoted market price available for the investments.

		% of ownership interest and voting power held by the group		
Associate company	Balance Date	2021	2020	Principal activity
Velvet Antler Research New Zealand Limited	30 Sept	50	50	Managing investments in velvet antler research and commercialising the intellectual property
DEEResearch Limited	30 June	50	50	Research and development relevant to deer farming and processing for deer products (except deer velvet)
Biopolymer Network Limited	30 June	43	43	Research and development of high performance bio-based products
Pastoral Greenhouse Gas Research Consortium held via (AgResearch [PPGR Consortia] Limited)	30 June	22	22	To undertake research into greenhouse gases produced by ruminants and exploit any resulting intellectual property
Encoate Holdings Limited	30 June	50	50	To research and develop bacteria and probiotics stabilisation technologies
Overseer Limited	30 June	50	50	Operating entity set up to sub-license the Overseer model to end users
Southern Dairy Hub Limited Partnership	31 May	37.5	37.5	Promotion and development of dairy industry good activities
SDH GP Limited	31 May	37.5	37.5	General partner

6 Taxation

Current tax

Current tax is calculated by reference to the amount of income taxes payable or recoverable in respect of the taxable profit or tax loss for the period. It is calculated using tax rates and tax laws that have been enacted or substantively enacted by reporting date. Current tax for current and prior periods is recognised as a liability (or asset) to the extent that it is unpaid (or refundable).

Deferred tax

Deferred tax is accounted for using the comprehensive balance sheet liability method in respect of temporary differences arising from differences between the carrying amount of assets and liabilities in the financial statements and the corresponding tax base of those items.

In principle, deferred tax liabilities are recognised for all taxable temporary differences. Deferred tax assets are recognised to the extent that it is probable that sufficient taxable amounts will be available, against which deductible temporary differences or unused tax offsets (e.g., losses) can be utilised. However, deferred tax assets and liabilities are not recognised if the temporary differences giving rise to them arise from the initial recognition of assets and liabilities (other than as a result of a business combination), which affects neither taxable income nor accounting profit. Furthermore, a deferred tax liability is not recognised in relation to taxable temporary differences arising from goodwill.

Deferred tax liabilities are recognised for taxable temporary differences arising on investments in subsidiaries, associates and joint ventures except where the Group is able to control the reversal of the temporary differences and it is probable that the temporary differences will not reverse in the foreseeable future. Deferred tax assets arising from deductible temporary differences associated with these interests are only recognised to the extent that it is probable that there will be sufficient taxable profits against which to utilise the benefits of the temporary differences and they are expected to reverse in the foreseeable future.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply to the period(s) when the assets and liabilities giving rise to them are realised or settled, based on tax rates (and tax laws) that have been enacted or substantively enacted by reporting date. The measurement of deferred tax liabilities and assets reflects the tax consequences that would follow from the manner in which the Group expects, at the reporting date, to recover or settle the carrying amount of its assets and liabilities.

Deferred tax assets and liabilities are offset when they relate to the income taxes levied by the same taxation authority and the Group intends to settle its current tax assets and liabilities on a net tax basis.

Current and deferred tax for the Period

Current and deferred tax is recognised as an expense or income in the profit and loss, except when:

- It relates to items recognised in equity, in which case the deferred tax or current tax is also recognised directly in equity
- It arises from the initial accounting for a business combination, in which case it is taken into account in the determination of goodwill or excess.

Foreign tax liabilities and assets

Exchange differences on deferred foreign tax liabilities or assets recognised in the profit and loss for the period are classified as deferred tax expense or income.

Foreign deferred tax assets that result from operating losses in respect of subsidiaries, associates, joint venture entities or interests in joint venture operations are recognised, except where the timing of the reversal of the temporary difference is controlled by the Group and it is probable that the temporary difference will not reverse in the future.

in thousands of New Zealand dollars	2021	2020
Tax expense comprises:		
Current tax expense	**3,670**	3,084
Adjustments recognised in relation to the current tax of prior years	**(412)**	(365)
Deferred tax expense relating to the origination and reversal of temporary differences	**418**	(5,250)
Adjustments recognised in relation to deferred tax of prior years	**148**	328
Total tax expense/(benefit)	**3,824**	(2,203)

in thousands of New Zealand dollars	2021	2020
Current Tax Liabilities		
Income tax payable	**(2,556)**	(2,638)
Net current tax liability/(asset)	**(2,556)**	(2,638)

in thousands of New Zealand dollars	2021	2020
The total charge for the year can be reconciled to the accounting profit as follows:		
Gain (loss) from continuing operations	**28,307**	3,780
Income tax expense calculated at 28% (2020: 28%)	**7,926**	1,058
Effect of revenue that is exempt from tax	**(9,234)**	(3,874)
Effect of reintroduction of tax depreciation of buildings	**-**	(3,582)
Origination and reversal of temporary differences	**1,269**	-
Effect of expenses that are not deductible	**4,230**	3,657
Effect of impairment (reversals)/losses that are not (assessable)/deductible	**5**	462
Associates' results reported net of tax	**(107)**	(68)
	4,089	**(2,347)**
Adjustments recognised in the current year in relation to the current and deferred tax of prior years	**(265)**	144
Income tax expense/(benefit) recognised in profit or loss	**3,824**	(2,203)

in thousands of New Zealand dollars	Opening balance	Charged to surplus	Charged to other comprehensive income	Acquisitions disposals	Closing balance
Deferred tax assets/(liabilities) arise from the following:					
2021					
Temporary differences					
Biological assets	(741)	74	-	-	**(667)**
Property, plant and equipment	(12,820)	(938)	(1,141)	-	**(14,899)**
Intangible assets	585	98	-	-	**683**
Financial assets	(29)	29	-	-	**-**
Provisions	1,389	(93)	-	-	**1,296**
	(11,616)	**(830)**	**(1,141)**	**-**	**(13,587)**
Unused tax losses and credits					
Tax losses	37	267	-	-	**304**
	(11,579)	**(563)**	**(1,141)**	**-**	**(13,283)**
2020					
Temporary differences					
Biological assets	(807)	66	-	-	(741)
Property, plant and equipment	(18,210)	5,559	(169)	-	(12,820)
Intangible assets	1,060	(475)	-	-	585
Financial assets	(29)	-	-	-	(29)
Provisions	1,618	(229)	-	-	1,389
	(16,368)	4,921	(169)	-	(11,616)
Unused tax losses and credits					
Tax losses	-	37	-	-	37
	(16,368)	4,958	(169)	-	(11,579)

in thousands of New Zealand dollars	2021	2020
Income tax recognised directly in other comprehensive income		
Revaluation of properties	(1,141)	(169)
Total income tax recognised directly in other comprehensive income	**(1,141)**	(169)

In March 2020, as part of the COVID-19 Economic Response Package, the Government reintroduced tax depreciation deductions on industrial and commercial buildings with effect from 1 July 2020. This amendment increases the tax base for these buildings, resulting in a reduced difference between the carrying value and tax base and, therefore, a reduction in the Group's deferred tax liability. The impact of these changes was recognised as a $3.6m tax benefit (reduction in tax expense) in 2020.

7 Equity

Share capital

Capital consists of 47,268,000 fully paid ordinary shares of $1.00 each (2020: 47,268,000 fully paid ordinary shares).

Reserves

The asset revaluation reserve arises on the revaluation of land, land improvements and buildings. Where revalued assets are sold, the portion of the asset revaluation reserve relating to that asset and which is therefore effectively realised, is transferred directly to retained earnings.

8 Property, plant and equipment

The Group has the following classes of property, plant and equipment:

- Land and land improvements - campus/farms
- Buildings - campus/farms
- Leasehold improvements
- Plant and equipment
- Vehicles
- Capital work in progress

Fair value measurement

Land, land improvements and buildings are measured at fair value. Fair value is determined on the basis of an independent valuation prepared by external valuation experts (using either market value or optimised depreciated replacement cost), less any subsequent accumulated depreciation and subsequent accumulated impairment losses. Land, land improvements and buildings are revalued at least every thee years or whenever there has been an indicator of a significant movement in the fair value. The fair values are recognised in the consolidated financial statements of the Group and are reviewed at the end of each reporting period to ensure that the carrying value of land, land improvements and buildings is not materially different from their fair values.

Any revaluation increase arising on the revaluation of land, land improvements and buildings is accumulated in the asset revaluation reserve, except to the extent that it reverses a revaluation decrease for the same asset previously recognised as an expense in profit and loss, in which case the increase is credited to profit and loss to the extent of the decrease previously charged. A decrease in carrying amount on the revaluation of land, land improvements and buildings is charged as an expense in profit and loss to the extent that it exceeds the balance, if any, held in the asset revaluation reserve relating to a previous revaluation of that asset.

All other assets are recorded at cost less accumulated depreciation and accumulated impairment.

Capital work in progress is recorded at cost.

Assets measured at fair value are classified as level 3 assets in the fair value hierarchy.

Depreciation is provided for on a straight-line basis on all tangible property, plant and equipment, other than freehold land and capital work in progress, at depreciation rates calculated to allocate the assets' cost or other revalued amount over their estimated useful lives. Leasehold improvements are depreciated over the period of the lease or estimated useful life, whichever is the shorter, using the straight-line method. The estimated useful lives, residual values and depreciation method are reviewed at the end of each annual reporting period.

Depreciation on revalued buildings is charged to the profit and loss. On the subsequent sale or retirement of a revalued property, the attributable revaluation surplus remaining in the asset revaluation reserve, net of any related deferred taxes, is transferred directly to retained earnings.

The following estimated useful lives are used in the calculation of depreciation:

- Land improvements 5-50 years
- Buildings (including farms) 5-80 years
- Leasehold improvements 3-40 years
- Vehicles 3-10 years
- Plant and equipment
    - Dairy plant and equipment 5-25 years
    - Computer hardware 3-5 years
    - Other plant and equipment 3-15 years

in thousands of New Zealand dollars	Land and land Improvements	Buildings	Leasehold improvements	Plant and equipment	Vehicles	Capital work-in progress	Total
2021							
Balance at beginning of year	64,486	120,324	190	20,829	242	4,721	**210,792**
Additions	498	234	-	6,143	8	4,342	**11,225**
Disposals	(62)	(6)	-	(110)	-	-	**(178)**
Transfers	-	(156)	-	181	-	(25)	**-**
Reinstated through current year proft and loss	75	-	-	-	-	-	**75**
Revaluation	4,928	1,885	(6)	-	-	-	**6,807**
Impairments	(108)	(667)	(3)	-	-	-	**(778)**
Reclassified as 'assets held for sale'	(75)	-	-	-	-	-	**(75)**
Depreciation	(641)	(5,271)	(15)	(5,352)	(43)	-	**(11,322)**
Balance at end of year	**69,101**	**116,343**	**166**	**21,691**	**207**	**9,038**	**216,546**
Cost or valuation	69,275	116,869	695	114,882	700	9,038	**311,459**
Accumulated depreciation	(174)	(526)	(529)	(93,191)	(493)	-	**(94,913)**
Balance at end of year	**69,101**	**116,343**	**166**	**21,691**	**207**	**9,038**	**216,546**
2020							
Balance at beginning of year	68,904	78,963	197	21,017	116	35,766	204,963
Additions	138	12,481	10	5,474	170	1,565	19,838
Disposals (incldуing transfer to leased assets)	-	-	-	(558)	-	-	(558)
Transfers	-	32,395	-	215	-	(32,610)	-
Revaluations	(2,743)	751	-	-	-	-	(1,992)
Impairments	(1,092)	(124)	-	-	-	-	(1,216)
Depreciation	(721)	(4,143)	(17)	(5,319)	(44)	-	(10,244)
Balance at end of year	64,486	120,324	190	20,829	242	4,721	210,792
Cost or valuation	65,517	131,552	720	109,818	725	4,721	313,053
Accumulated depreciation	(1,031)	(11,228)	(530)	(88,989)	(484)	-	(102,262)
Balance at end of year	64,486	120,324	190	20,829	242	4,721	210,792

A total increase of assets of $6,029k (2020: $3,208k decrease) was reflected:

in thousands of New Zealand dollars	2021	2020
Through the asset revaluation reserve, being a reversal of prior year revaluations.	**6,807**	(1,992)
Through the profit and loss	**(778)**	(1,216)
	6,029	**(3,208)**

Had the Group's land and buildings (other than land and buildings classified as held for sale or included in a disposal group) been measured on a historical cost basis, their carrying amount would have been as follows:

in thousands of New Zealand dollars	2021	2020
Land and land improvements	**21,851**	22,481
Buildings	**88,336**	90,848

Fair value measurement of the Group's land and buildings

The Group's land and buildings are stated at their revalued amounts, being the fair value at the date of revaluation, less any subsequent depreciation and impairments.

In the current year, land and buildings associated with campus assets were revalued. Included within the categories noted above were $27m of land and land improvements and $111m of buildings related to campus assets. The remaining balances within these categories relate to farm assets, which were last subject to revaluation in the year ended 30 June 2020. Management have assessed that the carrying value of these assets is materially consistent with their fair value.

The Group's campus assets valuation was performed by independent valuers Colliers Limited under the requirements of NZ IAS 16 Property, Plant and Equipment. These valuations were performed using either market value or optimised depreciated replacement cost. For non-specialised assets where there is a comparable market for the same or a similar asset, value is determined by one or more of the following:

- Direct comparison
- Income
- Cost approach

Assets that have a specialised use for the Group have been valued at optimised depreciated replacement cost. These assets include site improvements such as roads, fences and buildings. Optimised depreciated replacement cost is a method of valuation based on an estimate of the current gross replacement cost of an asset less allowances for physical deterioration and optimisation for obsolescence and surplus capacity. The Group's campus assets have been classified by Colliers International as non-specialised assets and have, therefore, been assigned a market-based value.

During the year, the Group acquired land from Lincoln University for $1. Due to restrictions in place over this land, management has determined this to be its fair value.

9 Intangible assets

Purchased intangible assets

Purchased intangible assets such as intellectual property, patents, trademarks and licences are recorded at cost less accumulated amortisation and accumulated impairment losses. Amortisation is charged over their estimated useful lives, which varies between five and 15 years. The estimated useful life and amortisation method is reviewed at the end of each annual reporting period.

Acquired computer software licences are capitalised on the basis of the costs incurred to acquire and bring to use the specific software. These costs are amortised over their estimated useful lives (between three and five years on a straight line basis). Costs associated with maintaining computer software programmes are recognised as an expense as incurred.

Internally generated intangible assets– research and development expenditure

Research expenditure is expensed in the period incurred.

The cost of an internally generated intangible asset represents expenditure incurred in the development phase of the asset only.

Development expenditure is expensed in the period incurred unless all of the following conditions have been demonstrated:

- The intention to complete the intangible asset and use or sell it
- How the asset created will generate future economic benefits
- The ability to measure reliably the expenditure attributable to the intangible asset during its development
- The availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset.

Internally generated intangible assets that satisfy the asset recognition criteria above are amortised on a straight-line basis over future periods from which benefits are expected to accrue. These future periods are between five and seven years.

Computer software development costs that are directly associated with the production of identifiable and unique software products controlled by the Group, and that will probably generate economic benefits exceeding costs beyond one year, are recognised as intangible assets. Direct costs include the software development employee costs and an appropriate portion of relevant overheads.

Computer software development costs recognised as assets are amortised over their estimated useful lives (not exceeding five years).

Other intangible assets

Assets with indefinite useful lives are not amortised but are tested at least annually for impairment. Whenever there is an indication of impairment, the asset is recorded at a revalued amount, being fair value less any accumulated impairment losses. Revaluations are for each intangible asset, not for a class of asset.

Disposal of intangible assets

Realised gains and losses arising from disposal of intangible assets are recognised in the profit and loss in the period in which the transaction occurs.

in thousands of New Zealand Dollars	Software	Intellectual property and patents	Total
2021			
Balance at beginning of year	2,396	54	**2,450**
Additions	535	-	**535**
Transfers from work in progress to profit and loss	(812)	-	**(812)**
Amortisation	(554)	(7)	**(561)**
Balance at end of year	**1,565**	**47**	**1,612**
Cost	12,168	1,632	**13,800**
Accumulated depreciation	(10,603)	(1,585)	**(12,188)**
Balance at end of year	**1,565**	**47**	**1,612**
2020			
Balance at beginning of year	1,682	62	1,744
Additions	1,207	-	1,207
Amortisation	(493)	(8)	(501)
Balance at end of year	2,396	54	2,450
Cost	12,446	1,632	14,078
Accumulated depreciation	(10,050)	(1,578)	(11,628)
Balance at end of year	2,396	54	2,450

10 Trade and other receivables

in thousands of New Zealand dollars	2021	2020
Trade receivables	**11,945**	11,739
Accrued income	**26,589**	7,609
Insurance proceeds receivable	**4,650**	-
Receivables from associates	**511**	1,995
Receivables from other related parties	**81**	842
Total receivables	**43,776**	22,185
Less provision for expected credit losses	**9**	10
Net receivables	**43,767**	22,175

The fair value of trade and other receivables is approximately equal to their carrying value.

There were no related party past due receivables at 30 June 2021 (2020: nil).

Terms of trade vary according to individual customer contracts. As at 30 June 2021, trade receivables of $2,072k (2020: $756k) were past due. These relate to a number of independent customers for whom there is no recent history of defaults. The aging analysis of trade receivables is as follows overleaf.

in thousands of New Zealand dollars	Current	<30 days	30-60 days	61-90 days	>91 days	Total
2021						
Expected credit loss rate	0.08%	0.02%	0.03%	0.12%	0.87%	
Estimated total gross carrying amount at default	2,284	8,181	988	647	437	**12,537**
Expected credit loss	2	2	0	1	4	**9**
2020						
Expected credit loss rate	0.01%	0.08%	0.10%	0.13%	1.63%	
Estimated total gross carrying amount at default	13,025	795	82	206	468	**14,576**
Expected credit loss	1	1	-	-	8	**10**

in thousands of New Zealand dollars	2021	Total
Movement in the provision for doubtful debts		
Balance at beginning of year	**10**	10
Additional provisions made / (reversed during the year)	**(1)**	-
Balance at end of year	**9**	10

The Group measures the provision for ECL using the simplified approach to measuring ECL, which uses a lifetime expected loss allowance for all trade receivables. The Group determines lifetime expected credit losses for groups of trade receivables with shared credit risk characteristics. Groupings are based on customer, trading terms and ageing.

An ECL rate is determined based on the historic credit loss rates for the Group, adjusted for other current observable data that may materially impact the Group's future credit risk. This other observable data includes specific factors in relation to each debtor or general economic conditions of the industry in which the debtors operate.

11 Trade and other payables

Trade payables and other accounts payable are recognised when the Group becomes obliged to make future payments resulting from the purchase of goods and services. Trade and other payables are subsequently measured at amortised cost using the effective interest method. This represents their fair value given the short-term nature of the liability.

in thousands of New Zealand dollars	2021	2020
Trade payables	14,817	12,741
Goods and services tax (GST)	1,521	3,134
Income in advance	62,302	25,429
Accrued salaries and wages	1,602	1,018
Total payables	**80,242**	42,322

The fair value of trade payables is approximately equal to their carrying value as all amounts are expected to be settled within 90 days. No interest is charged on trade payables.

Financial risk management strategies

The Group has financial risk management policies in place to ensure that all payables are paid within the credit timeframe.

12 Biological assets–livestock

Livestock are valued at their fair value less estimated point-of-sale costs by reference to the most relevant active market. An allowance is made for a reduction in the value of certain livestock held for research trials. Changes in the valuation of livestock are recognised through profit and loss.

in thousands of New Zealand dollars	Sheep	Beef cattle	Dairy cattle	Deer	Total
2021					
Reconciliation of changes in the carrying value					
Balance at beginning of year	1,070	957	1,531	375	**3,933**
Increases due to acquisitions	70	511	26	-	**607**
Decreases due to sales	(922)	(1,060)	(280)	(127)	**(2,389)**
Net increase due to births, growth and deaths	776	514	250	122	**1,662**
Changes in fair value less estimated point-of-sale costs	127	(6)	(82)	(20)	**19**
Balance at end of year	**1,121**	**916**	**1,445**	**350**	**3,832**
Quantity of livestock at end of year	*7,264*	*1,132*	*1,019*	*977*	
2020					
Reconciliation of changes in the carrying value					
Balance at beginning of year	1,367	862	1,416	545	4,190
Increases due to acquisitions	216	396	59	-	671
Decreases due to sales	(1,160)	(694)	(285)	(185)	(2,324)
Net increase due to births, growth and deaths	804	525	322	232	1,883
Changes in fair value less estimated point-of-sale costs	(157)	(132)	19	(217)	(487)
Balance at end of year	1,070	957	1,531	375	3,933
Quantity of livestock at end of year	7,669	1,127	1,038	1,034	

Livestock valuation method

Livestock was valued by PGG Wrightson Limited by reference to market evidence of recent transactions for similar livestock, taking into account the age, breed, type, condition and location of the animals.

Financial risk management strategies

The Group is exposed to financial risks relating to the damage to livestock from climatic changes, diseases and other natural forces. The Group has processes in place aimed at monitoring and mitigating those risks, including pest and disease monitoring and management strategies.

13 Lease receivables–current

in thousands of New Zealand dollars	2021	2020
Current lease receivables (recoverable within 12 months)	-	196

The lease receivable balance represents a finance lease arrangement of science equipment made by AgResearch for a customer's research programme. It was considered as a finance lease due to the specialised nature of the leased equipment. The finance lease arrangement was in place on 1 July 2019 and ended on 30 June 2021. It did not include variable payments. The effective interest rate contracted was 3.7% per annum.

Amounts recieved under finance leases

in thousands of New Zealand dollars	2021	2020
Undiscounted lease payments within one year	-	200
Less: unearned finance income	-	(4)
Net investment in the lease	-	196

14 Right-of-use assets

in thousands of New Zealand dollars	Property	Plant and equipment	Vehicles	Total
2021				
Cost				
At 1 July 2020	28,975	275	538	**29,788**
Additions	609	24	188	**821**
Disposals	(2,135)	(275)	(91)	**(2,501)**
At 30 June 2021	**27,449**	**24**	**635**	**28,108**
Accumulated depreciation				
At 1 July 2020	(2,236)	(183)	(215)	**(2,634)**
Depreciation	(2,176)	(106)	(178)	**(2,460)**
Disposals	466	276	89	**831**
At 30 June 2021	**(3,946)**	**(13)**	**(304)**	**(4,263)**
Carrying amount				
At 30 June 2021	**23,503**	**11**	**331**	**23,845**
Average lease term (years)	*9*	*1*	*2*	

in thousands of New Zealand dollars	Property	Plant and equipment	Vehicles	Total
2020				
Cost				
At 1 July 2019	28,973	243	416	**29,632**
Additions	2	32	122	**156**
At 30 June 2020	**28,975**	**275**	**538**	**29,788**
Accumulated depreciation				
At 1 July 2019	-	-	-	**-**
Depreciation	(2,236)	(183)	(215)	**(2,634)**
At 30 June 2020	(2,236)	(183)	(215)	(2,634)
Carrying amount				
At 30 June 2020	26,739	92	323	27,154
Average lease term (years)	*10*	*1*	*2*	

The Group leases several assets including land and buildings, IT and science equipment and vehicles. Extension options are included in a number of property leases. In determining the lease term, management has considered all facts and circumstances that create an economic incentive to exercise an extension option. Extension options are only included in the lease term if the lease is reasonably certain to be extended.

15 Biological assets–forestry

Forests are recorded at their fair value less point-of-sale costs on an annual basis using anticipated harvesting timing and yield and an applicable discount rate. Changes in the valuation of forests are accounted for through profit or loss.

Emissions trading scheme

Forestry land is subject to the provisions of the New Zealand Emissions Trading Scheme (ETS). Should the land be deforested (the land is changed from forestry to some other purpose), a deforestation liability will arise.

The Group has radiata pine tree crops at Ballantrae, Invermay and Woolford.

Compensation units are recognised based on their cost.

in thousands of New Zealand dollars	2021	2020
Reconciliation of changes in the carrying value		
Balance at beginning of year	1,245	1,157
Changes in fair value less estimated point-of-sale costs	82	88
Balance at end of year	1,327	1,245
Area (ha) of forest at end of year	*119*	*119*

Forestry valuations

Forestry was valued by Alan Bell & Associates as at 30 June 2021. The value of forestry at 30 June 2021 was $1,327k (2020: $1,245k).

The methodology used is "stand-based" in line with forestry management practices and harvesting. Where transactions have occurred for similar tree crops, value is based on those transactions.

Where there have been no such transactions, value is based on:

- Estimates of future costs and returns for mature crops
- Standard investment costs for young crops
- A mixture of the above for intermediate crops.

Additional inputs to the value arrived at are:

- Anticipated harvest timing and yield
- A 8.5% real discount rate on pre-tax cash flows (2020: 8.5%)
- An assumed 3% compounding rate on standard costs (2020: 3%)
- Current market prices and long-term trends in log prices. Log prices used are based on current market prices and 12-quarter rolling average price published by the Ministry of Primary Industries.

Emission units

The Group held 18,975 ETS units as at 30 June 2021. There is no change to the ETS units during the 2021 financial year (2020: no change). All ETS units are carried at their original cost.

Financial risk management strategies

The Group is exposed to financial risks arising from changes in timber prices. The Group is a long-term forestry investor and does not expect timber prices to decline significantly in the foreseeable future. It has, therefore, not taken any measures to manage the risks of a decline in timber prices.

Land value and contingency

In the event that the forest areas are harvested, a deforestation liability equivalent to the decrease in carbon will be incurred. This liability is not recognised on the balance sheet as there is no current intention of changing the land use subject to the ETS.

16 Other investments

in thousands of New Zealand dollars	2021	2020
Fonterra Co-operative Group Limited	**1,772**	1,775
BioPacific Ventures	**-**	10
Other investments	**866**	874
Total	**2,638**	2,659

Valuation of other investments

- During the financial year a final distribution was received from BioPacific Ventures. No further distributions are expected.
- Fonterra shares are valued using the quoted market price on the NZX market.
- All other investments are valued using the quoted market price on the NZX listed market, NZX unlisted market or the share prices set by the individual entities as appropriate.

Impairment of other investments

During the year, the impairment of other investments was recognised as follows:

in thousands of New Zealand dollars	2021	2020
BioPacific Ventures Fund	**11**	-
Other	**65**	152
Total	**76**	152

17 Lease liabilities

in thousands of New Zealand dollars	2021	2020
Current	**1,711**	2,099
Non-current	**22,792**	25,449
Total	**24,503**	27,548

Amounts payable under leases	2021	2020
Within one year	**1,711**	2,099
Later than one year but not later than five years	**5,955**	6,310
Later than five years	**16,837**	19,140
Total	**24,503**	27,549

The total cash outflow for leases amounts to NZ $2,877k (2020: $3,086k).

18 Goodwill

The movement of goodwill for 2021 is shown below:

in thousands of New Zealand dollars	2021	2020
Opening balance	907	907
Closing balance	**907**	**907**

Farmax Limited was incorporated as a 100% subsidiary in June 2018. There is no impairment of goodwill during the year ended 30 June 2021 (2020: nil).

19 Provisions

Provisions are recognised when:

- The Group has a present legal or constructive obligation as a result of past events
- It is more likely than not that an outflow of resources will be required to settle the obligation
- The amount has been reliably estimated.

All provisions are recorded at the best estimate of the expenditure required to settle the obligation at balance date. Where the effect is material, the expected expenditures are discounted to their present value using pre-tax discount rates.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, the receivable is recognised as an asset if it is virtually certain that reimbursement will be received and the amount of the receivable can be measured reliably.

All provisions except for long-term employee entitlements are expected to be paid within the following financial year.

Restructuring provisions

The restructuring provision represents the direct costs of restructuring, which is not associated with the ongoing activities of the Group and includes termination benefits.

Employee entitlements

Employee entitlements represent annual leave, alternative days leave, sick leave, long-service leave and performance pay.

in thousands of New Zealand dollars	Restructuring	Employee entitlements	ACC	Other	Total
2021					
Balance at beginning of year	557	5,243	252	150	**6,202**
Provisions made during the year	230	5,436	417	147	**6,230**
Provisions used during the year	(687)	(4,209)	(232)	-	**(5,128)**
Provisions reversed during the year	-	(1,173)	(229)	-	**(1,402)**
Balance at end of year	**100**	**5,297**	**208**	**297**	**5,902**
Represented by:					
Current liabilities	100	5,275	208	297	**5,880**
Non-current liabilities	-	22	-	-	**22**
Total provisions	**100**	**5,297**	**208**	**297**	**5,902**
2020					
Balance at beginning of year	115	4,830	269	227	5,441
Provisions made during the year	1,581	6,433	357	150	8,521
Provisions used during the year	(1,139)	(5,790)	(107)	-	(7,036)
Provisions reversed during the year	-	(230)	(267)	(227)	(724)
Balance at end of year	557	5,243	252	150	6,202
Represented by:					
Current liabilities	557	5,221	252	150	6,180
Non-current liabilities	-	22	-	-	22
Total provisions	557	5,243	252	150	6,202

In the current year, the employee entitlements provision includes $494k to remediate former staff for historic payroll issues in relation to compliance with the Holidays Act 2003 (2020: nil).

ACC provision

The Group decided not to renew its Accredited Employer Programme contract with the Accident Compensation Corporation (ACC) on 31 March 2020. From 1 April 2020, ACC has been responsible for managing any new work-related injury claims for our employees where the injury occurred after 31 March 2020. For any injuries that occurred, or were lodged prior to the 31 March 2020, the Group continues to work with the third-party administrator (Wellnz) to manage these claims for the remaining duration of the claims management period. The provision comprises three components as at 30 June 2021: estimated ACC standard levy, claims stop loss limit and claims management cost.

20 Other non-current liabilities

Key money

In 2015, AgResearch Limited sold a building and entered into a sub-lease of the land on which the building is located. The lessee has paid an upfront lump sum as key money in relation to the lease. The key money is being recognised as income over the term of the lease (including renewal periods).

in thousands of New Zealand dollars	2021	2020
Key money received in advance	**506**	566
Key money referable to lease in current period	**(59)**	(60)
	447	506
Deferred share acquisition costs	**-**	30
	447	536

21 Investments in subsidiaries

Subsidiaries are entities controlled by the Group.

The results of any subsidiaries that become, or cease to be, part of the Group during the year are consolidated from the date that control commenced or until the date that control ceased.

The interests of any non-controlling shareholders are stated in proportion of the fair values of the identifiable assets and liabilities recognised on acquisition plus their share of post-acquisition surpluses.

Subsidiary companies	Balance date	% of ownership interest and voting power held by the Group 2021	2020	Principal activity
Celentis Limited	30 June	100	100	Holding company
Grasslanz Technology Limited	30 June	100	100	Cultivar development and management
AgResearch (USA) Limited	30 June	100	100	Cultivar development and management in the USA
AgResearch (Pastoral Genomics Consortia) Limited	30 June	100	100	Holding company
AgResearch (PPGR Consortia) Limited	30 June	100	100	Holding company
Covita Limited	30 June	100	100	Holding company
Phytagro New Zealand Limited	30 June	100	100	Holding company
Farmax Limited	30 June	100	100	Development and distribution of farm management software

Grasslanz Technology Limited is a direct subsidiary of Celentis Limited. AgResearch (USA) Limited is a direct subsidiary of Grasslanz Technology Limited. All other subsidiary companies are direct subsidiaries of AgResearch Limited.

All subsidiary companies are incorporated in New Zealand.

22 Reconciliation of surplus after tax with net cash flow from operating activities

in thousands of New Zealand dollars	2021	2020
Surplus after tax	**24,483**	5,983
Non-cash items		
Depreciation	**11,322**	10,244
Intangible assets amortisation	**561**	501
Depreciation of right-of-use	**2,460**	2,634
Net (gain)/loss on sale of property, plant and equipment	**(213)**	77
Share of deficit of associates	**1,591**	1,020
Investment write down/revaluation	**76**	152
Change in fair value of forestry	**(82)**	(87)
Change in fair value of livestock	**(19)**	487
Change in fair value of other investments	**(111)**	(637)
Property, plant and equipment impairment/(write up)	**778**	1,216
Net (gain)/loss from foreign currency exchange	**114**	(10)
Change in fair value of derivative financial instruments	**(11)**	16
Bad debt provision	**-**	4
Other non-cash items	**(119)**	(368)

in thousands of New Zealand dollars	2021	2020
Movements in working capital		
Change in current taxation	**(82)**	1,920
Change in deferred tax	**563**	(4,958)
(Increase)/decrease in inventory	**68**	(115)
(Increase)/decrease in livestock	**120**	(229)
(Increase)/decrease in receivables	**(17,061)**	9,592
(Increase)/decrease in prepayments	**(2,766)**	(290)
(Increase)/decrease in other current assets	**200**	250
Increase/(decrease) in provisions	**(301)**	763
Increase/(decrease) in payables	**37,928**	3,139
Increase in insurance proceeds receivable	**(4,650)**	-
Items classified as investing activities		
Increase/(decrease) in property, plant and equipment, intangible assets and investment accruals	**2,136**	3,080
Other land compensation	**(14,027)**	-
Net cash flow from operating activities	**42,958**	34,384

23 Heritage assets

Heritage assets are those assets that are held for the duration of their physical lives because of their unique cultural, historical, geographical, scientific and or environmental attributes. The Group has identified a germplasm collection as a heritage asset with no acquisition cost. The nature of this heritage asset, and its significance to the science the Group undertakes, makes it necessary to disclose it. The Directors believe there is no practical basis upon which to reliably measure the fair value of this collection. Details of the collection are outlined below:

Asset	Description
Margot Forde Germplasm Centre	New Zealand's national genebank of grassland plants and Australia's genebank for perennial grasses and legumes

24 Operating lease arrangements

The Group as a lessor

in thousands of New Zealand dollars	2021	2020
Non-cancellable operating lease receivables		
Receivable no later than 1 year	2,325	2,491
Receivable later than 1 year and not longer than 5 years	2,602	2,900
Receivable later than 5 years	944	924
Total non-cancellable operating leases	**5,871**	**6,315**

Operating lease receivables relate to land and buildings leased on the four campuses owned by AgResearch Limited. The lease terms are between one month and 22 years, with one lease having an option to extend for a further five terms, each of five years. Lease income is recognised in profit or loss on the straight-line basis over the lease terms. Management constantly manage the risks associated with any rights retained in the leased assets. The following approaches have been taken to reduce the risks associated:

- All leases have the provisions for periodic rent reviews to market rates
- The lessees are liable for any damage or loss to the leased properties caused by careless or abnormal use
- No lessees have an option to purchase the property at the expiry of the lease period.

25 Joint operation investments

Joint operations are joint arrangements between the Group and another party in which there is a contractual agreement to undertake a specific business project and in which the joint parties are severally liable in respect of costs and liabilities of the project and share in any resulting output. The Group's share of the assets, liabilities, revenues and expenses of joint operations are incorporated into the Group financial statements on a line-by-line basis using the proportionate method. Where the Group transacts with its jointly controlled entities, unrealised profits and losses are eliminated to the extent of the Group's interest in the joint operation.

Details of the Group's material joint operations at the end of the year are as follows:

		% of ownership interest and voting power held by the Group		
Subsidiary companies	Balance date	2021	2020	Principal activity
Grasslands Innovation Limited	30 June	30	30	To identify, develop and exploit product opportunities in proprietary forage cultivars and other forage technologies

The 30% interest in Grasslands Innovation Limited is held via Grasslanz Technology Limited, a wholly-owned subsidiary of AgResearch Limited. Grasslands Innovation Limited is incorporated in New Zealand. Grasslands Innovation Limited is considered a joint operation by virtue of the contractual arrangements that specify the parties' rights to the economic inputs and outputs of the joint arrangement and retention of ownership rights to pre-existing IP contributed by the parties.

26 Transactions with related parties

The ultimate shareholder of the Group is the Crown. The Group undertakes many transactions with other Crown entities, state-owned enterprises and government departments, which are carried out on a commercial and arms-length basis. A summary of other related party transactions is detailed below.

Trading transactions with related parties

	Sale of services		Due from	
in thousands of New Zealand dollars	2021	2020	2021	2020
Research, development and other services				
Transactions between AgResearch and related parties:				
Subsidiaries	**3,725**	3,954	**120**	28
Associates and joint ventures	**6,313**	7,875	**511**	1,995
Joint operations	**396**	377	**-**	685
Transactions between the Group and related parties:				
Entities of which key management personnel are associated *	**8,539**	6,331	**535**	842

Revenue from MBIE are disclosed in the Consolidated Statement of Comprehensive Income.

	Purchase of services		Due to	
in thousands of New Zealand dollars	2021	2020	2021	2020
Research, development and other services				
Transactions between AgResearch and related parties:				
Subsidiaries	**64**	360	**3**	-
Associates and joint ventures	**-**	15	**-**	-
Joint operations	**-**	123	**-**	-
Transactions between the Group and related parties:				
Entities of which key management personnel are associated *	**2,948**	1,641	**170**	102

The amounts outstanding are unsecured, on normal trade terms and will be settled in cash. No guarantees have been given or received. No expense has been recognised in the period for bad or doubtful debts in respect of the amounts owed by related parties.

* Trading transactions with entities of which key management personnel are associated include:

in thousands of New Zealand dollars	Sale of services		Purchase of services		Due to	
	2021	2020	2021	2020	2021	2020
Biopolymer Network Limited	-	50	-	-	-	-
BLINC Innovation Ltd**	-	88	-	-	-	-
Enviro-Mark Solutions Limited T/A Toitu Envirocare	-	-	21	-	-	-
Grasslands Innovation Limited	1,092	1,502	122	123	-	685
Landcare Research New Zealand Ltd	1,175	1,030	1,254	1,308	(69)	52
Nufarm NZ Ltd**	-	27	-	-	-	4
LUAGRJF Limited Partnership**	-	17	-	-	-	-
Riddet Institute	36	32	-	-	-	-
Science New Zealand (Acri)	-	-	137	86	(18)	-
Museum of New Zealand	-	-	6	46	-	-
NZ Post	-	-	62	78	(2)	(1)
Overseer Limited	334	-	-	-	-	-
PGGRC	5,902	3,585	-	-	454	-
Contact Energy Limited*	-	-	1,298	-	-	-
Total	8,539	6,331	2,948	1,641	365	740

* Entity was not related to the Group during FY20

** Key management personnel are no longer associated with these entitites

Please note an earlier version of this report included an error in the table above which has been corrected.

Equity interest in related parties

Details of the percentage of interests held in related parties are disclosed in Notes 5 and 21 to the Consolidated Financial Statements.

Key management remuneration reporting

The compensation of the Directors and executives, being the key management personnel of the Group, comprised:

in thousands of New Zealand dollars	2021	2020
Directors' fees	353	284
Salaries and other short-term employee benefits	3,080	3,625
Termination payments	27	355
Total	3,460	4,264

27 Financial instruments

Financial instruments carried in the Consolidated Statement of Financial Position include cash and cash equivalents, investments, derivative financial instruments, receivables and trade creditors. The particular recognition methods adopted are disclosed in the accounting policies where relevant.

Financial risk management

The Group has exposure to the following risks from its use of financial instruments:

- credit risk
- market risk
- liquidity risk

The Group has a Treasury Policy, which it applies to actively manage these risks (refer below).

Credit risk

The financial instruments that potentially subject the Group to credit risk are cash, short-term deposits, forward-rate agreements and accounts receivable.

Credit risk is managed through Treasury policy that:

- Places restrictions on the level of investment with any one counterparty
- Restricts the counterparties that may be used to A Grade registered banks and the New Zealand Government
- Sets parameters within which short-term investments must be made.

Trade receivables consist of a large number of customers spread across diverse sectors and geographical areas. On-going credit evaluation is performed on the financial condition of the trade receivables. Credit assessments are undertaken to determine the credit quality of the customer, taking into account their financial position, past experience and other relevant factors. Individual risk limits are granted in accordance with the internal credit policy and authorised via appropriate personnel as defined by the Group's delegation of authority manual.

The carrying amount of financial assets recorded in the financial statements, net of any allowances for losses, represents the maximum exposure to AgResearch of any credit risk.

AgResearch does not have any significant credit risk exposure to any single counter party. The credit risk on liquid funds and derivative financial instruments is limited because the counter parties are banks with high credit ratings assigned by international credit rating agencies.

AgResearch has not changed its overall strategy regarding the management of risk during the financial year.

Market risk

Currency risk

Revenues and expenses in foreign currency are translated to New Zealand dollars at the exchange rates in effect at the time of the transaction or at rates approximating them. Assets and liabilities are converted to New Zealand dollars at the rates of exchange ruling at balance date.

Currency risk in respect of the Group's transactions is managed in accordance with the Group's Treasury policy and includes the use of forward foreign exchange contracts.

It is estimated that a 10% decrease in the New Zealand dollar would increase profit and equity by $37k (2020: $77k). It is estimated that a 10% increase in the New Zealand dollar would reduce profit and equity by $30k (2020: $63k).

Cash flow risk

For those currency exposures less certain in their timing and extent, such as future sales and purchases, it is the Group's policy to manage the risk on a group wide basis. Under the Treasury policy the purchased cover is up to 100% depending on how far out the anticipated exposure is (to a maximum of 12 months).

The Group uses foreign currency forward exchange contracts, within the above Treasury policy limits, to manage these exposures.

There has been no change during the year to the Group's exposure to currency risks or the manner in which it measures the risks.

Interest rate risk

The Group has no borrowings and is, therefore, not exposed to interest rate risk other than in relation to its investments, which are not material.

Liquidity risk

Liquidity risk represents the Group's ability to meet its financial obligations on time. The Group generates sufficient cash flows from its operating activities to make timely payments.

Liquidity risk is managed:

- By monitoring cash flow forecasts (both operational and anticipated non-recurring items) and aligning investment decisions with these
- Through compliance with the Treasury policy, which sets a liquidity buffer for unforeseen cash flows
- Through monthly review by senior management
- Through regular oversight by the Audit and Risk Committee.

There has been no change during the year to the Group's exposure to liquidity risks or the manner in which it manages and measures the risks.

Maturity analysis–financial liabilities

in thousands of New Zealand dollars	On demand	Less than 1 year	Between 1 year and 5 years	Total
2021				
Trade and other payables	-	16,419	-	**16,419**
		16,419	**-**	**16,419**
2020	-			
Trade and other payables	-	13,759	-	13,759
Derivative financial instruments	-	11	-	11
	-	13,770	-	13,770

Fair value

Cash and cash equivalents, trade receivables, other receivables and payables

The carrying amounts of financial assets and financial liabilities recorded at cost in the financial statements approximate their fair value.

Investments

Investments, except for 'other investments', which are valued at fair value, are carried at cost. It is not practical to estimate the fair values of unlisted associates.

Derivative financial instruments

Foreign currency contracts are shown at fair value.

Fair value of financial assets and financial liabilities

in thousands of New Zealand dollars	Note	Loans and receivables	Fair value through profit and loss	Financial liabilities at amortised cost	Carrying amount	Fair value
2021						
Financial assets						
Cash and cash equivalents*		95,842	-	-	**95,842**	95,842
Trade and other receivables	**10**	43,767	-	-	**43,767**	43,767
Non-listed equity investments **		-	823	-	**823**	823
Listed equity investments **			1,815	-	**1,815**	1,815
		139,609	**2,638**	**-**	**142,247**	**142,247**
Financial liabilities						
Trade and other payables	**11**	-	-	16,419	**16,419**	16,419
Derivative financial instruments		-	-	-	**-**	-
		-	**-**	**16,419**	**16,419**	**16,419**
2020						
Financial assets						
Cash and cash equivalents *		55,007	-	-	55,007	55,007
Trade and other receivables	**10**	22,175	-	-	22,175	22,175
Lease receivable	**13**	196	-	-	196	196
Non-listed equity investments **		-	858	-	858	858
Listed equity investments **			1,801	-	1,801	1,801
		77,378	2,659	-	80,037	80,037
Financial liabilities						
Trade and other payables	**11**	-	-	13,759	13,759	13,759
Derivative financial instruments		-	11	-	11	11
		-	11	13,759	13,770	13,770

* Cash and cash equivalents includes $214k (2020: $830k), which belongs to NZ Agricultural Greenhouse Gas Trust. This fully offsets with the balance owing to NZ Agricultural Greenhouse Gas Trust in trade and other payables. Cash also includes short-term deposits with maturity dates no greater than 12 months of $82m (2020: $30.5m).

** Equity investments consist of Fonterra shares $1,772k (2020: $1,775k) and other investments of $866k (2020: $874k) as per Note 16. The level classification determined is based on the fair value within these investments.

28 Contingencies and commitments

in thousands of New Zealand dollars	2021	2020
Capital commitments		
Asset purchases committed to and contracted for at balance date	3,334	5,743
Funding commitments to associates	288	1,550
Total capital commitments	3,622	7,293

Litigation and other contingent liabilities

There are no known significant contingent liabilities or pending litigation.

Contingent assets

There are no known significant contingent assets in the current year. The contingent asset related to insurance claim as disclosed in the prior year has been settled in full post-year end and was recorded in the balance sheet at 30 June 2021.

29 Capital management

The Group's capital is its equity, which is made up of:

- Share capital
- Asset revaluation reserve
- Retained earnings

The Crown Research Institutes Act 1992 requires AgResearch Limited to maintain its financial viability in order to undertake research for the benefit of New Zealand.

The Group manages its capital to ensure that entities in the Group will operate in a financially responsible manner, be financially viable and continue as a going concern. The Group is not subject to any externally imposed capital requirements.

The Group's policies in respect of capital management and allocation are reviewed regularly by the Board of Directors.

There have been no material changes in the Group's management of capital during the year.

30 Significant events after balance date

The Group has received notice of termination for its Tramway Lease with Tainui Group Holdings with an effective date as from 31 July 2021. This lease was accounted for under IFRS16 for the 2021 financial year but, as the notice was received before year end, this has been adjusted for in the financial statements. This has resulted in a reduction in the lease liability and right-of use asset balances of $1,668k at year end.

On Tuesday, 17 August 2021 COVID-19 cases were detected in the community in New Zealand and the Government implemented further temporary lockdown pandemic restrictions in New Zealand. The impact of these restrictions and the ongoing impacts of COVID-19 continue to be monitored by the Group. The potential impact on year ending 30 June 2022 is not able to be quantified at this stage.

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Independent Auditor's Report

To the readers of AgResearch Limited's group financial statements for the year ended 30 June 2021

The Auditor-General is the auditor of AgResearch Limited Group (the Group). The Auditor-General has appointed me, Anthony Smith, using the staff and resources of Deloitte Limited, to carry out the audit of the financial statements of the Group on his behalf.

Opinion

We have audited the financial statements of the Group on pages 73 to 117, that comprise the consolidated statement of financial position as at 30 June 2021, the consolidated statement of comprehensive income, consolidated statement of changes in equity and consolidated statement of cash flows for the year ended on that and the notes to the financial statements that include accounting policies and other explanatory information.

In our opinion, the financial statements of the Group:

- present fairly, in all material respects:
    - its financial position as at 30 June 2021; and
    - its financial performance and cash flows for the year then ended; and
- comply with generally accepted accounting practice in New Zealand in accordance with New Zealand equivalents to International Financial Reporting Standards.

Our audit was completed on 30 August 2021. This is the date at which our opinion is expressed.

The basis for our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and our responsibilities relating to the financial statements, we comment on other information, and we explain our independence.

Basis for our opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the Professional and Ethical Standards and the International Standards on Auditing (New Zealand) issued by the New Zealand Auditing and Assurance Standards Board. Our responsibilities under those standards are further described in the Responsibilities of the auditor section of our report.

We have fulfilled our responsibilities in accordance with the Auditor-General's Auditing Standards.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of the Board of Directors for the financial statements

The Board of Directors is responsible on behalf of the Group for preparing financial statements that are fairly presented and that comply with generally accepted accounting practice in New Zealand.

The Board of Directors is responsible for such internal control as it determines is necessary to enable it to prepare financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board of Directors is responsible on behalf of the Group for assessing the Group's ability to continue as a going concern. The Board of Directors is also responsible for disclosing, as applicable, matters related to going concern and using the going concern basis of accounting, unless the Board of Directors has to cease operations, or has no realistic alternative but to do so.

The Board of Directors' responsibilities arise from the Crown Research Institutes Act 1992.

Responsibilities of the auditor for the audit of the financial statements

Our objectives are 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 our opinion.

Reasonable assurance is a high level of assurance, but it is not a guarantee that an audit carried out in accordance with the Auditor-General's Auditing Standards will always detect a material misstatement when it exists. Misstatements are differences or omissions of amounts or disclosures and can arise from fraud or error. Misstatements are considered material if, individually or in the aggregate, they could reasonably be expected to influence the decisions of readers taken on the basis of these financial statements.
For the budget information reported in the financial statements, our procedures were limited to checking that the information agreed to the Group's statement of corporate intent.

Deloitte.

We did not evaluate the security and controls over the electronic publication of the financial statements.

As part of an audit in accordance with the Auditor-General's Auditing Standards, we exercise professional judgement and maintain professional scepticism throughout the audit. Also:

- We 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 our 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.

- We 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 Group's internal control.

- We evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Board of Directors.

- We conclude on the appropriateness of the use of the going concern basis of accounting by the Board of Directors and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.

- We 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.

- We obtain sufficient appropriate audit evidence regarding the financial statements of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the Group audit. We remain solely responsible for our audit opinion.

We communicate with the Board of Directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Our responsibilities arise from the Public Audit Act 2001.

Other Information

The Board of Directors is responsible for the other information. The other information comprises the information included on pages 2 to 72, but does not include the financial statements, and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not express any form of audit opinion or assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information. In doing so, we consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on our work, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Independence

We are independent of the Group in accordance with the independence requirements of the Auditor-General's Auditing Standards, which incorporate the independence requirements of Professional and Ethical Standard 1: *International Code of Ethics for Assurance Practitioners* issued by the New Zealand Auditing and Assurance Standards Board.

Other than the audit, we have no relationship with, or interests in, the Group.

Anthony Smith
Partner
for Deloitte Limited
On behalf of the Auditor-General
Christchurch, New Zealand

Directory

Executive Management Team

Dr Sue Bidrose
Chief Executive Officer

Stuart Hall
Deputy Chief Executive: Commercial Partnerships

Jo Brady
Communications and Marketing Director

Fleur Evans
People and Culture Director

Tony Hickmott
Finance and Business Performance Director

Greg Rossiter
Technology and Digital Services Director

Dr Trevor Stuthridge
Research Director

Board of Directors

Dr Paul Reynolds QSO
Chair

Kim Wallace
Deputy Chair
Chair – Audit and Risk Committee

Jackie Lloyd
Chair – People and Culture Committee

Colin Armer
Director

Dr Louise Cullen
Director

Lain Jager
Director

Rukumoana Schaafhausen
Director

Information

Auditors
Deloitte on behalf of the Auditor-General

Bankers
ANZ Bank New Zealand Limited
Westpac Banking Corporation


Science
New Zealand
Science working for New Zealand
The eight members of Science New Zealand proudly work individually and collectively alongside the rest of government to create a more prosperous, sustainable and innovative New Zealand.
4,000+
smart and passionate people
50+
sites nationwide
6,000+
science projects every year
40+
nationally significant databases and collections
sciencenewzealand.org
CallaghanInnovation
New Zealand's Innovation Agency
Manaaki Whenua
Landcare Research
agresearch
āta mātai, mātai whetū
NIWA
Taihoro Nukurangi
GNS SCIENCE
TE PŪ AO
SCION
Plant & Food Research
Rangahau Ahumāra Kai
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