agresearch
āta mātai, mātai whetū

G36

2023 RĪPOTA Ā-TAU

# Annual Report

RĀRANGI TAKE

# Contents

NGĀ AROTAKENGA O TE HEAMANA ME TE TUMUAKI WHAKAHAERE

# Chair and Chief Executive's review

AgResearch produced a strong year of science delivery for the Aotearoa New Zealand agriculture sector in Financial Year 2023 (FY23) while weathering challenging economic conditions. The Aotearoa New Zealand research sector, like many others, was not immune to the mounting cost pressures being felt across the country.

In this annual report we are reporting a small profit of $1.62 million, achieved largely because of the one-off sale of surplus Internet Protocol addresses. Our operating loss was $2.67m for FY23 on total revenue of $177.8m.

The Board informed our shareholding minister earlier this year that while we remain on sound financial footing, we do not expect to forecast an operating profit in the foreseeable future. The AgResearch management team is working to find business improvements and efficiencies, and to optimise their operating model, to ensure our financial future is sustainable.

We remain focused on science excellence, and the Board is proud of both the quality and contribution our research has made to New Zealand farming. We're heartened by the regular, positive feedback and appreciation we received from our stakeholders and end-users of our science. Their message to us is that our science is more important to their businesses than at any stage in their existence, and they appreciate our work and evidence as they tackle challenges like climate change, water quality, and animal health and welfare.

So it was particularly gratifying when our Agricultural Greenhouse Gas Inventory Development Team won the Supreme Award at the Science New Zealand Awards in December.

This team, made up of a number of leading researchers in their fields, has significantly lifted the accuracy of measuring and reporting greenhouse gases. They have and continue to produce "excellent and significant science on an important topic for New Zealand", according to the judges. We think of them as an exemplar of what we do here at AgResearch and how we do it.

Their work is an embodiment of how smart science is created. It required long-term investment in both their work and their development as researchers. It required sustained effort, years of research, melding diverse skills and expertise, and foresight as AgResearch recognised the importance and gravity of the looming climate crisis nearly two decades ago.

Our work, such as in emissions inventory work, is often unheralded, unglamorous, and unattractive to commercial partners. We are heartened by funding increases in climate research. But the Board

believes the current research sector funding model is unsustainable, and we are using the current review of the Research, Science, and Innovation space to advocate for change.

We remain determined to increase and share our scientific understanding of the microbiological processes that underpin carbon emissions produced by the pastoral sector and use this to inform and design practical solutions so that farmers can adapt to inevitable changes in the environment.

During the reporting period, we began processes to reimagine our science priorities for the next five years. This work will include our stakeholders. It will help us articulate what we do and what we don't do. Given the difficult economic conditions and impact that static and non-inflation adjusted Crown funding is having on the Crown Research Institute (CRI) sector, and the inevitable impact this is having on our audited financial position, refining the scope of our work will help us to focus on the Government's key priorities.

Te Ara Tika, our plan to honour our commitment to our te Tiriti o Waitangi partners, directly addresses the barriers for our Māori partners while working with a traditional science organisation. We made more progress in FY23 as an organisation toward upskilling our staff and building significant new capacity in our Māori Research and Partnerships Group. You can read more in this report.

We have ambitious, long-term plans to recreate AgResearch into an organisation that brings a unique Māori approach to our science and confidence in te ao Māori.

Our strategy to co-locate our campuses with universities (and, where appropriate, other science partners) is proving extremely successful. The Board, management, and project team are nearing completion of another major milestone. Tuhiraki, our new research centre in Lincoln, was opened on 4 September 2023. This is the beginning of a long-term plan to enhance the benefits of co-location with one of our closest partners, Lincoln University. The building is based on their campus. You can read more about it on page 55. Suffice to say we believe it will help us respond to new areas of growth and demand from our stakeholders.

Finally, we need to acknowledge during the reporting period the devastating impact of Cyclone Gabrielle on the people and communities throughout the North Island, particularly in Te Tai Tokerau Northland, Te Matau-a-Māui Hawke's Bay and the Tairāwhiti Gisborne regions. As farmers move their focus from short-term rehabilitation of pastures and infrastructure repair, they are likely to consider development of new land use strategies. Some of these decisions will require complex decision-making about suitable long-term land use options. AgResearch is working with our fellow CRIs, Our Land and Water National Science Challenge, and other research agencies to support this decision-making using a combination of existing knowledge and new information requirements. Just as AgResearch played a valuable role in supporting the primary sector during the COVID-19 pandemic, our science and people will be similarly involved as the pastoral-based agriculture sector recovers from Cyclone Gabrielle.

Dr Paul Reynolds QSO
Chair
30 June 2023

Dr Sue Bidrose
Chief Executive Officer
30 June 2023

KO WAI MĀTOU

# About Us

AgResearch is one of seven Crown Research Institutes in Aotearoa New Zealand. We use science to enhance the value, productivity and profitability of New Zealand's pastoral, agri-food and agri-technology sector.

Our research contributes to economic growth and beneficial environmental and social outcomes for Aotearoa New Zealand. We do this by utilising our diverse science capability – from farm systems to climate change mitigation and adaptation, to pest control and high value foods.

We have more than

## 666 staff (FTE)

spread throughout Aotearoa New Zealand, working toward **three overarching goals** on behalf of the New Zealand government.

- Help foster and support prosperous land-based enterprises
- Produce research that protects and enhances natural resources in a sustainable way
- Contribute scientific understanding to added-value foods and bio-based products to meet evolving consumer demands.

*Find out more about us online by scanning this code or visiting www.agresearch.co.nz/about-us*

We have research centres and farms across the motu (islands).

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

We strive to be a sustainable business and, by ensuring the effectiveness and efficiency of our work, we aim to continually reinvest in the best science to meet the needs of our sector.

## To achieve this, AgResearch is focusing activities on:

### SCIENCE EXCELLENCE

Driving agri-science to meet the changing needs of the sector and consumers.

### SMART INVESTMENTS

Investing wisely in our people and our science to deliver the right science to meet New Zealand's needs.

### MĀTAURANGA MĀORI

Building our capacity and capability to deliver to Māori agri- business and to enrich our science in a uniquely Aotearoa-based way.

### PARTNERSHIPS

Forming the best teams and co-designing with Māori, industry, farmers, government, other Crown Research Institutes and science organisations to deliver the most impactful outcomes.

TĀ MATOU RAUTAKI

# Our strategy

AgResearch's strategy, *Tā Mātou Rautaki*, is our plan to achieve our long-term aim of leading agri-based science innovation. It describes who we are, how we deliver our science, what our future-focused research will look like and how we will know we are succeeding in our mission.

We have identified four areas of focus to create a thriving culture and generate meaningful and enduring impact. They are interlinked, with success in one being tied to success in another. They are the end-product of a co-design initiative to nurture and sustain science vitality at AgResearch.

They include:

- Science Excellence: Strengthening connections with science vitality and science excellence
- Partnerships: Fostering strong collaboration, including partnerships
- Mātauranga Māori: Fully embedding te ao Māori within our ways of thinking and working
- Smart Investments: Ensuring that we invest appropriately in a talented workforce, fit-for-purpose infrastructure, resources and processes.

Our strategy ensures that we are positioned to support the Government's science and innovation priority areas. These currently include transitioning New Zealand's primary industries into:

Higher value products and exports

Understanding and mitigating the effects of climate change

Maintaining the health of land, water and living systems


Moving to a low-carbon emissions society

Reversing the decline in biodiversity

Maintaining biosecurity, including a focus on pests and weeds.

Clarospec™ uses hyperspectral imaging technology to scan animal carcasses for product quality - meat tenderness, pH levels and intramuscular fat.

*Tā Mātou Rautaki* provides AgResearch with the remit to prepare for a future where policy, consumer, technology, and market drivers (existing and yet to be imagined) will interact and offer opportunities for transformed agri-food systems. To support Aotearoa New Zealand's primary sector path to transformation, we must have the flexibility to leverage and develop new ideas. We are compelled to scan the horizon and position our research accordingly and, where needed, shift its balance and invest more resources.

All strategies need to be reviewed to ensure they are fit for purpose within the context of current and future challenges. Taking into account the needs of our stakeholders, current and future, and in concert with *Te Ara Tika* (an AgResearch plan that directly addresses the barriers for our ao Māori partners while working with a traditional science organisation like ours), work has begun in 2023 to redefine our strategy and what our main research priorities will be for the next five years. We aim to have a new set of draft strategic research priorities by the end of 2023 to help us refocus our science resources and endeavours. This work also ensures that our people and our organisation will be ready for changes that may result from *Te Ara Paerangi Future Pathways*.

TE ARA TIKA

# The right way

*Te Ara Tika* is a plan to transform our organisation through te ao Māori, and directly addresses the barriers Māori people and organisations experience when working with a traditional science organisation. It signals and strengthens our commitment to our Tiriti o Waitangi partners, is ambitious and long-term, and brings a unique Māori approach to our science.

It aims to create meaningful impact for Māori by:

- Embracing mātauranga Māori as an equal knowledge system
- Being impact-focused and delivering to Māori land, businesses and communities
- Honouring the Treaty relationship our partners have with the Crown
- Co-leading, co-designing and implementing to build the capabilities of our partners and ourselves
- Aligning our values to the values of our partners.

*Te Ara Tika's* mataora (life cycle) and whanaketanga (evolution) is guided by an implementation plan with specific objectives to deliver stronger outcomes to Māori within an ao Māori context.

A key principle of *Te Ara Tika* is our research and relationship with Māori, within an ao Māori context. Our research must be co-led and co-designed. This is reflected in our commitment to Māori and our Treaty partners through building partnerships and capability; aspirations and responsibilities that are embedded in our mātauranga Māori focus area.

We will continue to embed mana whenua relationships in AgResearch's research centres. An example of this is the cultural narrative embedded within Tuhiraki, our new build in Lincoln. This is a physical manifestation of our relationship with Ngāi Tahu which demonstrates our commitment to and transformation through our deepened understanding of te ao Māori.

Āta mātai, mātai whetū.
Being in pursuit of far horizons
while firmly grounded.
(whakatauākī nā Tom Roa)

TE MAHERE MATAHIKO

# Digital Blueprint

We have developed *Te Mahere Matahiko*, a Digital Blueprint, to support our AgResearch strategy by outlining the digital transformation we plan to make over the next decade and beyond.

*Te Mahere Matahiko* aims to create a digital culture founded on manaakitanga (care to others in our domain) and kotahitanga (unity and collective benefit). It focuses on facilitating and supporting digital tools that are accessible and welcoming to all and which celebrate our rangapū mahitahi (partnerships). *Te Mahere Matahiko* will also challenge our science and scientists to consider new paradigms, methods, and digital tools to improve the delivery of research. Where appropriate, we also actively pursue open science principles and build on our collaborations with other CRIs on cybersecurity and Māori data sovereignty.

We will strive to keep pace with science and technology that allows us to act quickly on:

- New innovations and inventions
- Grow capability in digital research methods and tools
- Establish a flexible eResearch infrastructure with fit-for-purpose components
- Deploy new digital services

These will support efficiency, quality and reproducibility of research and other AgResearch operations, and position AgResearch as a sector leader in the eResearch area.

HE HIRANGA PŪTAIAO

# Science Excellence

Science Excellence is the key thread that binds together everything we do at AgResearch. To ensure this strategic pillar remains fit-for-purpose, we started a key piece of work: a detailed review of our research priorities.

The process, which started midway through FY23 and will run into FY24, is designed to ensure that our science and services are focused on and aligned to what our shareholders require and need. It will also ensure that our Core Purpose is augmented by a clear articulation of what we will (and won't) do over the next five years.

The review is both large and necessary.

Aotearoa New Zealand's economy is dependent on the pastoral, agri-food, and agri-technology sectors and our work contributes to the success of our nation. The research, science, and innovation sector has not been immune to the significant financial pressures being felt in our current economic climate and AgResearch does not expect to budget an operating profit in the foreseeable future.

We are striving to be a financially sustainable organisation that fully accounts for the cost of undertaking science and to be in the best position to ensure high quality, excellent science is delivered. So we need to review our science to also ensure we are investing our non-inflation adjusted annual Crown contribution as carefully and wisely as possible.

Earlier this year, our Minister provided us with greater flexibility in terms of the scope of science we deliver using Strategic Science Investment Funding (SSIF), and this flexibility will provide a platform to provide science excellence.

In FY23 we used our SSIF to:

- Deliver key outcomes for Aotearoa New Zealand and our stakeholders, as outlined in AgResearch's *Statement of Core Purpose*
- Reinforce the delivery of the AgResearch Science Objectives within our strategy *Tā Mātou Rautaki*
- Continue our Open Access science journey by storing data effectively and in a way that is searchable and findable to a wide group of stakeholders (for more, please see our Smart Investments section)
- Develop and strengthen relationships with Māori partners and staff competence in te ao Māori (for more, please see our Mātauranga Māori section, page 40).

Science excellence criteria are traditionally defined by scholarly achievement. At AgResearch, we consider science excellence to be more than traditional scholarly output. To signal our commitment to this approach, we were the first Aotearoa New Zealand research organisation to sign up to the San Francisco Declaration on Research Assessment (DORA). We have embraced its principles and are building a culture of creativity, collaboration, and inclusiveness through a refresh of our career descriptor framework. Our science team leaders, working with science group managers, our Insights Team and others, provide direction, oversight and monitoring as part of assessing our delivery of impact. They worked collaboratively with internal and external stakeholders to identify, plan for, deliver, and ensure end-user uptake of current and future science opportunities through a fit-for-purpose portfolio of projects, programmes, and integrated initiatives. This is delivered via national and international scientific collaborations and internally co-ordinating science projects across multiple Science Plan Objectives.

Our Discovery Fund was focused on science excellence, curiosity-driven projects, and capability development. Early to mid-career researchers were invited to apply by our Senior and Principal Scientists. Team leaders facilitated an internal selection process that fostered collaboration and creativity. A total of 65 applicants were received. Of these, 30 proposals were funded, and the quality was exceptional, suggesting that team leader evaluation and mentoring by senior staff improved the submissions. Vision Mātauranga was also assessed, with two applications receiving good scores. They will have a great opportunity to develop this aspect further when projects begin.

In FY23, we recognised excellence by awarding annual prizes funded by SSIF. Traditionally, the AgResearch Science Prize has rewarded outstanding achievement in research quality, i.e. our foremost publication in the last five years. We have diversified this prize. We have added a foremost field-weighted publication, to recognise publications that have a large impact in their specific field. An Impact

CHIEF SCIENTIST

## Dr. Axel Heiser

Axel's time is split between research as Principal Scientist and serving as Chief Scientist. As Chief Scientist he is a member of the Senior Leadership Team and represents/advocates for our scientists and science both internally and externally. His own research is about providing solutions for animal health issues through understanding the immunology of animals, e.g., by developing novel diagnostics and vaccines. He is also involved in research about how food strengthens people's immune system.

*You can contact Dr Heiser via our website by scanning this code.*

Prize has been implemented to recognise the achievement of outstanding scientific output(s) that deliver and/or contribute to sector impact(s). The Student Prize recognises excellence among students working on research projects within AgResearch (and you can read about the winners in our staff accolades section on pages 14 to 24).

AgResearch appointed a Chief Scientist in late 2022. Axel Heiser is a member of the Senior Leadership Team (SLT) and chair of our Science Council. He played a vital role in one of the cornerstones of our science excellence pillar, thought leadership. Axel will also help shape our future strategy, our science priorities, and have a leading hand in delivery.

Our International Science Advisory Panel (SAP) remains an important voice in our evolution and continues to be a key influencer on science. The panel is made up of Emily Parker (Victoria University), Henning Steinfield (Food and Agriculture Organisation of the United Nations), Rickey Yada (University of British Columbia), Bronwyn Harch (Australia), and Laurens Klerkx (Universidad de Talca, Chile).

SAP completed an extensive review of our science in March 2023 and noted we are making a 'step change' in our approach to research, particularly the way we have embraced matauranga Māori knowledge systems and kaupapa-based research.

Other key influences on our science excellence include our Emeritus Scientist cohort, providing their collective experience and wisdom, and our Science Council which, on behalf of AgResearch staff, provides a 'bottom up' science voice to our SLT. Both groups embody what successful science looks like.

GOVERNANCE

## Science Advisory Panel

From left: Ricky Yada, Henning Steinfield, Bronwyn Harch, Laurens Klerkx and Emily Parker.


# Science Highlights

AgResearch achieved several notable achievements during the year, which highlighted our commitment to science excellence.

## Science Aotearoa New Zealand Supreme Award Winners

We finished the year on a high when our Agricultural Greenhouse Gas Inventory Development Team won the Supreme Award at the Science New Zealand Awards (for the second year in a row). The prestigious awards are open to entries from Aotearoa New Zealand's seven crown research institutes and Callaghan Innovation. The team – led by senior scientists Cecile de Klein, Tony van der Weerden, Jiafa Luo, Stefan Muetzel, and Arjan Jonker – were able to show that estimates of nitrous oxide and methane emissions from Aotearoa New Zealand farms should be significantly adjusted, compared with previous calculations using former standard methods from the Intergovernmental Panel on Climate Change (IPCC).

With the support of partners, our scientists guided the development of what is known as country-specific emission factors to improve the accuracy of estimates. The New Zealand-specific emission factors developed by the team were incorporated into the Ministry for Primary Industries' national agricultural inventory, which is now considered one of the best inventories in the world. Our climate change research has the specific aim of reducing methane and nitrous oxide emissions from pastoral farm systems. We do this by designing low carbon-emitting and high-carbon sequestration systems, plus developing adaptive animal breeds, forage cultivars, and farm systems. We also create strategies and tools to prevent incursions and manage pests and diseases, including next-generation biocontrol agents.

New Zealand has adopted a science-based framework against which farm system methane and nitrous oxide mitigation options are assessed to ensure that they are effective in reducing emissions, protect New Zealand's competitive position and have no unintended consequences. We develop forages and animals with attributes that meet the requirements of future diverse production systems. We also develop value webs by matching animals and forages to minimise environmental impact and maximise product value.

## A net carbon zero dairy farm

We continue to work closely with our sector partners. Stewart Ledgard led research in a joint project between Fonterra and Nestlé to test how to achieve a net carbon zero dairy farm. The test farm is the Kavanagh dairy farm in Hawera (owned by Fonterra). The AgResearch Life Cycle Assessment (LCA) team is determining the current greenhouse gas emissions and carbon footprint of milk. They are also guiding farm system changes to get to net carbon zero, including doing scenario evaluations of multiple future farm system and management changes. The work by the AgResearch team is funded by Fonterra.

Kavanagh Farm, Hawera

## Getting to the root of the problem

AgResearch has developed research to investigate the benefits of Biological Nitrification Inhibition (BNI) in Aotearoa New Zealand farming. Brent Barrett and Saman Bowatte have identified Japanese research that shows how nitrous oxide emissions from wheat farming can be reduced by plant breeding. This could work in Aotearoa. BNI is the natural ability of certain plant species to release nitrification inhibitors from their roots. The research used plant specimens, such as ryegrass, and mixed them with ammonia oxidising bacteria, one of the main protagonists in the nitrification process. Several specimens showed natural biological nitrification inhibition properties.

The Global Research Alliance (GRA) has agreed to fund more research to progress some of the work on temperate grass species. AgResearch and Massey University were recently provided with $200,000 by the Centre for Climate Action on Agricultural Emissions to research the BNI effects of plantain. The results so far have been shared with our stakeholders (DairyNZ and Fonterra).

## Low methane emitting animals

The latest round of results from our widely acclaimed research into animals bred to emit less methane has now proven that breeding stock produce high quality meat, too. This is a pleasing result. Questions remained about whether sheep bred with this low methane trait might mean sacrifices for health and other traits, including meat quality. However, AgResearch senior scientist Suzanne Rowe has found carcass quality was maintained. Other results suggest that breeding for low methane is unlikely to affect internal parasite levels (as demonstrated by faecal egg counts), the fertility of adult ewes and the survival of lamb litters. When it comes to wool, low methane breeding was favourable to fleece weight. It was also favourable to the body weight achieved by the animal for slaughter and its body condition.

The science, which has helped put Aotearoa New Zealand on the map as a leader in ruminant methane emissions research, is now enabling sheep breeders in New Zealand to breed for this low methane trait. Similar research is now underway to achieve something comparable in cattle. This builds on what has been achieved in sheep.

## Deer research 50 years strong

Deer Industry New Zealand

AgResearch celebrated the important milestone of 50 years of deer research in Aotearoa New Zealand during first quarter of FY23. We hosted an event attended by our industry partners at our Invermay campus, where much of the research has been done and continues today. Our deer research has resulted in huge advances in understanding deer nutrition, health, behaviour, and genetics. It has led to the development of products such as venison, velvet, and milk, which are exported around the world. Several farmers and deer industry leaders attended the event and heard from scientists past and present about our work, past and present.

Deer on Invermay Farm

# Soil Armour

AgResearch's Soil Armour research is providing farmers with an evidence-based alternative to wintering cows on crops.

A team of AgResearch scientists, led by Invermay soil scientist Ross Monaghan, is investigating whether a pasture-based alternative, supplemented with hay or baleage, will reduce nitrate leaching and paddock pugging (mud).

Both are harmful to soil health, water catchments, and an animal's welfare. Funded by the Sustainable Land Management and Climate Change Fund, the research programme is taking place on dairy farms in Otago and Southland.

While the goals of the project are multi-faceted, one of the primary aims is to determine whether dairy cattle can be grazed on winter pastures without the pastures being churned into mud.

It will also explore whether bale litter helps the overall health of both the soil and an animal in Aotearoa New Zealand farming conditions. Bale litter is hay that animals use for bedding and insulation in colder winter months. This helps maintain their body temperature and energy which would otherwise be wasted on keeping warm.

Experimental sites are already live on dairy farms near Balclutha (Otago) and near Wendonside (northern Southland). Monaghan says the experiment was the first of its kind in New Zealand.

He says alternatives to a crop-based wintering systems could help farms comply with new winter cropping regulations that are due to come into effect. Although the project needs three winters to account for climate variabilities, the initial results look encouraging, with Soil Armour management practices resulting in less mud in trial plots and cleaner and happier grazing cows.

The research will analyse and account for pasture-based wintering systems needing more land to be effective (a major concern for some farmers). In winter, a cow will often eat about 10 sqm of a crop such as swedes or kale per day. The equivalent daily area requirement for some pasture-based approaches is about 50 percent greater than this.

Although more land is needed in a pasture wintering system, Monaghan is investigating what gains might be made by managing land and pastures in a set rotation. Research has already revealed that winter forage crops leak four to five times more nitrogen per hectare than pasture. Monaghan said the Soil Armour research would try and strike a balance between farming sustainably and maintaining business viability.

*Scan this code to watch a video explaining more about Soil Armour.*


*Soil Armour featured at the 2022 National Fieldays*

*Above is a typical example of pasture after being kale grazed. Below is a typical example of pasture after being bale grazed.*

*Dr Ross Monaghan*

# Protein packed research favours red meat

Results from ground-breaking New Zealand research have shown that red meat is a better source of protein than a processed plant-based alternative.

Findings from a human clinical trial, undertaken for the Pasture Advantage research programme, found that meat delivers more of the essential protein building blocks compared to a plant-based alternative.

The four-stage multidisciplinary project is exploring the health and wellbeing benefits of eating pasture-raised beef and lamb as part of a balanced diet, compared to grain-finished beef or a plant-based alternative. The research is a collaboration between researchers at AgResearch, the University of Auckland, Massey University, and the Riddet Institute.

In this first of two clinical trials, thirty participants aged 20-34 years were fed breakfast on four different days. Their blood, digestive symptoms, and mood were monitored for four hours immediately following the meal. Breakfast was a burrito that contained a single serving of a different protein each day: pasture-raised beef, grain-finished beef, lamb, and a plant-based alternative. These were served in random order to each participant across the four days.

Dr Andrea Braakhuis from the University of Auckland heads up the team of nutrition scientists responsible for the study.

“We measured the nutrients in the blood of the participants and saw a significant difference in the type and amounts of amino acids that come from the digestion of the protein of red meat compared to the protein of the processed meat alternative,” says Dr Braakhuis.

"Amino acids from red meat were of greater biological value and better absorbed by the body."

Dr Braakhuis says these clinical outcomes reflect the results of laboratory experiments carried out on the same foods by Massey University (led by Dr Lovedeep Kaur). Red meat was better digested in the laboratory simulator conditions than the plant-based alternative.

"Our project is showing that red meat is probably a better source of protein for the body than highly processed plant-based products promoted as meat alternatives."

AgResearch senior scientist Dr Scott Knowles says: "The new generation of plant-based meat analogues are formulated to mimic the taste and basic nutrient composition of meat. But very little is known yet about their nutritional quality and health benefits."

"Plant-based alternatives are produced very differently from pasture-raised livestock and they're marketed as having advantages in environmental footprint and sustainability. Those credentials are still being scrutinised. However, we know for certain that New Zealand farmers are producing a highly nutritious food in one of the most efficient production systems in the world."

A second clinical trial, nearing completion, is looking at the longer-term impacts of eating a diet that includes moderate amounts of red meat.

The research is funded by the industry partners Meat Industry Association of New Zealand Innovation Ltd, Beef + Lamb New Zealand Ltd, the High-Value Nutrition National Science Challenge, and the Ministry of Business, Innovation and Employment.

*Dr Scott Knowles*

# Better climate does not mean sacrificing quality

Newly published results of long-running research suggest that farmed animals bred for less impact on the climate are as healthy and produce meat quality which is just as good, if not better.

Aotearoa New Zealand has been a world leader in the development of breeding sheep that emit less methane. The progress stems from more than a decade of research by AgResearch scientists supported by the industry, through the Pastoral Greenhouse Gas Research Consortium (PGgRc) and Beef + Lamb New Zealand Genetics, and the government via the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC). This research proves that some sheep naturally emit less methane as a product of their digestion, and that this trait can be bred for and passed down through generations.

*Scan this code to find out more about our low emission animal research.*

*A sheep inside one of the Ag:PAC chambers designed to measure the methane emitted from animals*

However, questions have remained about whether this low methane trait means sacrifices for the health or quality of the animals, including meat quality derived for export around the world. AgResearch senior scientist Suzanne Rowe says the research, which has been published in a series of academic journals, provides a valuable insight into the implications of breeding for lower methane.

"What we have found is that breeding for lower methane, and the physiological changes we see in these lower emitting animals, do not negatively affect meat quality or those things meat producers are looking for in the animal carcass. The story has some complex biology behind it as we saw that low-emitting animals have different eating behaviours, tending to be grazers rather than gorgers – eating more feed than their high-emitting counterparts, even though the high emitters had bigger stomachs.

*Dr Suzanne Rowe*

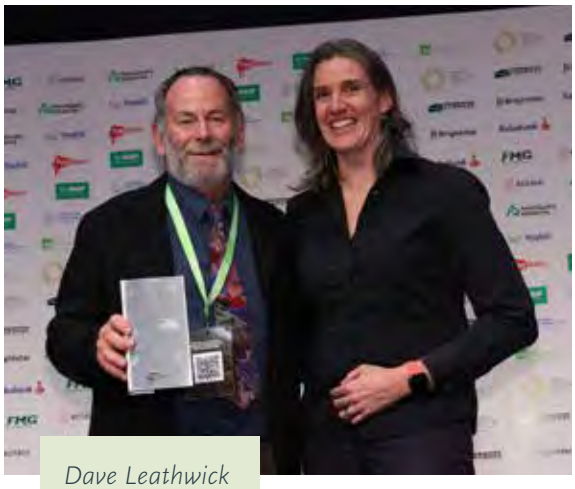
"We think the low-emitting animals may, in fact, have even greater economic value through decreased fat and increased meat yields. This is critical because farmers need to know that if they are committing to breeding their animals for lower methane, that they are not going to go backwards in their productivity and earnings. This knowledge provides greater incentive to make changes on farms that contribute to New Zealand's methane reduction goals, and to climate change globally."

Research relating to the health of the sheep also suggests that breeding for low methane is unlikely to affect issues such as internal parasites (as demonstrated by faecal egg counts), the fertility of adult ewes and the survival of lamb litters. When it comes to wool, low methane breeding was favourable to fleece weight. It was also favourable to the weight achieved by the animal before slaughter and its body condition.

# Celebrating success

AgResearch achieved several notable achievements during the year, which highlighted our commitment to science excellence.

*Louise Hennessy*



*Dave Leathwick*

## Primary Industries Awards

All three AgResearch finalists won their award categories at this awards ceremony; Louise Hennessy (Ngāti Maniapoto) received the Emerging Leader Award for her work associated with science delivery and communication for the Aotearoa New Zealand primary sector.

The AgResearch Endophyte Discovery Team received the Science and Research Award for their world-leading research, development, and commercialisation of novel Epichloë strains in pastures.

Dave Leathwick received the Champion Award for his work focused on understanding the selection and development of anthelmintic (drug) resistance in nematode parasites of grazing livestock. This includes sheep, goats, cattle, deer, and horses.

## McDiarmid Medal

Our Plant Biotechnology Team, comprising Greg Bryan, Nick Roberts, and Somrutai Winichaykul, was presented the MacDiarmid Medal by Royal Society Te Apārangi for research on enhanced photosynthesis. This technology has the potential to increase nutrient and energy density of forages and crops, improving productivity and animal performance whilst reducing environmental impacts of agriculture. The team developed a technology to produce and store oil in the green tissue of plants via the transfer of two genes. This not only increased leaf fatty acid content, but also enhanced photosynthesis by up to 24%. This technology has applications for all crops, and work is already underway in four key areas: forages, oilseeds, grains, and specialty/industrial crops. If successfully applied, it could simultaneously alleviate global hunger and slow climate change.

*The Plant Biotechnology Team (from left: Nick Roberts, Greg Bryan, Somrutai Winichaykul)*

## Beef+LambNZ Awards

The Alliance Significant Contribution Award was won by David Stevens at the Beef+LambNZ Awards. The farm systems scientist, who has background in agronomy, was initially involved in plant breeding but this changed in the early 1990s when farmers found that what they were producing was no longer fit for market. Farmers needed forages that would deliver in terms of animal performance and David and his colleagues began doing animal production trials alongside agronomic trials. This morphed into farm systems work. He has been instrumental in creating the foundation of modern sheep and beef farming systems which had delivered prosperity to many farmers.

At the same event the Datamars Livestock Technology Award was won by software decision support-tool Farmax Ltd, partly owned by AgResearch. Widely used by New Zealand's pastoral farmers to help balance financial, environmental and production goals, Farmax encourages a holistic approach to farm planning.

*David Stevens*


*Ken Dodds*

## Jones Medal

Ken Dodds was awarded the Jones Medal by the Royal Society Te Apārangi for his work developing and applying statistical methods for genetic data analysis that enable the use of low-cost genotyping in primary industries and ecology. The Jones Medal is awarded biennially for lifetime achievement in pure or applied mathematics or statistics by a person with substantial connections to Aotearoa New Zealand. Ken is highly respected for leadership in statistics and bioinformatics and is internationally recognised for developing, adapting, and implementing tools for livestock breeding.

*Aswathi Soni*

## KiwiNet success

Aswathi Soni from our Food Systems Integrity team was awarded the Kiwinet Emerging Innovator Award. This supports scientists who want to develop their commercialisation and entrepreneurship expertise and become the future innovators of Aotearoa New Zealand. The programme provides funding ($10k) and mentoring to help build industry connections and demonstrate a proof-of-principle for an invention. Aswathi's invention uses spore pouches and a chemical marker (M2) to identify differentially heated regions by CiMPAS, a new microwave-based food processing technology.

*Paul Middlewood*

## Food, Fibre and Agritech Challenge

Paul Middlewood, a Research Engineer with the Bioproduct and Fibre Technology team, was the winner of the Sustainability Award at the Food, Fibre and Agritech Challenge 2023. His award was one of several presented at the completion of the eight-week pre-accelerator initiative that aims to equip individuals and teams with a venture idea, research, or non-commercialised product to develop viable solutions for the sector. Paul was accepted onto the accelerator to help development of Keratinite, a natural binder that can replace the formaldehyde-based resins in particleboards.

## New Zealand Institute of Agricultural and Horticultural Science recognition.

Robyn Dynes, a strategy leader and farming systems senior scientist, was the recipient of the New Zealand Institute of Agricultural and Horticultural Science (NZIAHS) Sir Arthur Ward Award. This recognised her passion for farming and outstanding skills in translating research findings into farming practices. She has forged a formidable reputation for the flow-on influence of her research, and a plethora of requests from agribusinesses, industry bodies and farmers to present and share her knowledge on boards and groups as well as at conferences, field days, workshops and forums. Being well-known for challenging farmers' views on greenhouse gas emissions, Robyn is a trusted and respected member of several policy and policy groups where she translates science so decisions can be evidence-led.

Mark Hurst received the Significant Achievement Award from the Canterbury branch of the NZIAHS. The award is to the person or group which has made the most significant recent contributions to the advancement of Canterbury Agriculture/ Horticulture. Mark's work has focused on insect pathogens, primarily Serratia species and Yersinia entomophaga, as biopesticides against New Zealand significant pests of agricultural and horticultural crops. This research has encompassed the full breadth of research activities, ranging from basic molecular/structural biology through to the efficacy of biopesticide formulations in the field.

*Robyn Dynes*

*Mark Hurst*

*Tanushree Gupta*

## Basil Jarvis Prize

Tanushree Gupta was awarded the Basil Jarvis Prize at the Applied Microbiology Awards held in London in November.

The prestigious award, presented at London's Science Museum, goes to a microbiologist who has made a "significant contribution to the field of food safety, food fermentations and food security". Tanushree is a researcher in the Food System Integrity team based at the Hopkirk Research Institute. She works on a diverse range of projects, including intervention to reduce microbial contamination in the food chain, and exploring novel and natural compounds to enhance the shelf life and safety of food. One such example is identifying natural bacterial metabolites that can be used as food preservatives or antimicrobials and how to commercialise them. Tanushree is also working with CRISPR/Cas system to develop assays for enhanced detection of food borne pathogens in food. The Basil Jarvis Prize is named after the distinguished former researcher in the field of food microbiology and past President of Applied Microbiology International.

*David Everett*

## Staff appointment to FSANZ

David Everett from our Food Chemistry and Structure team, Smart Foods and Bioproducts, was appointed as a Fellow of Food Standards Australia New Zealand. FSANZ is a network of 24 experts who provide objective expert advice and critical reviews of food standards and regulation applications, proposals, and other risk assessment activities to further develop academic networks.

# By the numbers

**111** Client reports

**8** Research farms

Stored data

MB GB TB PB

**1.5 Petabytes**

**$177.8m**

**Total revenue**

Glasshouses

**27**

Grasslands 11
Invermay 5
Ruakura 10
Lincoln 1

**184**

Grasslands 41
Invermay 56
Ruakura 29
Lincoln 58

Laboratories

**424**

**Scientists (FTE)**

**70,000**

stored seed samples from **100** different countries

**178** Live patents

**570** Research projects

NGĀ HONONGA

# Partnerships

AgResearch takes pride in the growth of its partnerships and connections within Aotearoa New Zealand and abroad in the past year. These have continued to add to the value and impact of our science at a time when multiple challenges face the agriculture sector.

As Aotearoa New Zealand grapples with the challenge of climate change, strong partnerships across sectors are seen as critical to addressing agricultural greenhouse gas emissions, which make up roughly half of Aotearoa's total emissions.

Central to New Zealand's response to agricultural greenhouse gases has been the ongoing He Waka Eke Noa – Primary Sector Climate Action Partnership, which brings together industry, Māori and government to reduce emissions and build resilience. AgResearch scientists have provided important scientific input and advice through the process as agricultural emissions pricing has been proposed and debated.

In parallel, a highlight this year has been the formal launch of the Biological Emissions Reduction Science and Mātauranga Plan by a partnership that has included AgResearch's senior leaders and scientists alongside representatives for industry, Māori, and government. The plan outlines a pathway to get new emissions mitigation tools, technologies, and practices into the hands of farmers sooner to reduce agricultural emissions, with a focus on reduction of methane and nitrous oxide emissions.

Key actions from the Biological Emissions Reduction Science and Mātauranga Plan were included in both the government's first Emissions Reduction Plan and the government investment to accelerate development of high-impact technologies and practices to reduce agricultural greenhouse gas emissions, including the establishment of the new Centre for Climate Action on Agricultural Emissions (CCAAE).

The CCAAE has been established to accelerate the research, development, and commercialisation of tools and technology to reduce emissions. Its key components include the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) and the Centre for Climate Action Joint Venture which has branded itself as AgriZeroNZ (incorporating ANZCO Foods, Fonterra, Rabobank, Ravensdown, Silver Fern Farms, Synlait, and the government as a 50% shareholder).

Early investments by the government through the CCAAE, alongside AgriZeroNZ, have included significant investment to build on the current research programme into methane vaccines that AgResearch is leading the science on. Another investment in partnership with AgResearch and Massey University will see a new facility established in Palmerston North for measuring methane from individual cows, complementing the cattle respiration chambers AgResearch already operates at its Grasslands campus with NZAGRC.

AgResearch has continued building on its more direct partnerships with the food and fibre industries, including important collaborations such as reducing nitrogen loss from waterways with the use of feeds such as plantain; work with the red meat industry on meat quality; and safety and testing of tools such as Fonterra's Kowbucha or DSM's Bovaer feed additives for methane reduction in the context of New Zealand's farm systems.

Partnering with and supported by NZAGRC and the Pastoral Greenhouse Gas Research Consortium, AgResearch scientists have continued to advance their understanding of the mechanisms of agricultural emissions and further develop potential tools to reduce emissions such as alternative feeds, livestock genetics, feed additives/inhibitors, and a methane vaccine.

Through collaboration with the Global Research Alliance on Agricultural Greenhouse Gas Emissions, we have grown our connections with research providers worldwide. Highlights include our world-leading low methane breeding research being seized on around the globe, and our New Zealand-designed and built portable accumulation chambers now in use in other parts of the world, such as the United Kingdom, for measuring and ranking sheep for methane output.

Our highly regarded Life Cycle Assessment team continued to make meaningful contributions to the science supporting Aotearoa New Zealand industries this year, with research commissioned by Beef + Lamb New Zealand and the Meat Industry Association of New Zealand on the carbon footprint of New Zealand beef and sheep meat. The Life Cycle Assessment team also demonstrated its flexibility in producing research commissioned by Seafood New Zealand on the carbon footprint of wild-caught fish harvested and processed at sea by New Zealand's deepwater fishers.

The addition of several new staff to AgResearch's Māori Research and Partnerships Group this year has enabled the group to build on its work building stronger ties with Māori farmers and landowners, organisations, iwi, and hapū throughout Aotearoa.

RESEARCH

## Life Cycle Analysis

AgResearch's world-class Life Cycle Assessment team plays a pivotal role: by delivering research to prove the efficiency and sustainability of food production in New Zealand, and how it stacks up against the rest of the world.

*Learn more about what we are doing in this area on our website by scanning this code.*

This includes formalising a new partnership with the Pūhoro STEMM Academy. This partnership will support rangatahi Māori to pursue and excel in science, technology, engineering, mathematics, and mātauranga (STEMM) subject-based careers. It will include scholarships and a pathway into work experience through AgResearch's Te Puāwaitanga internship programme.

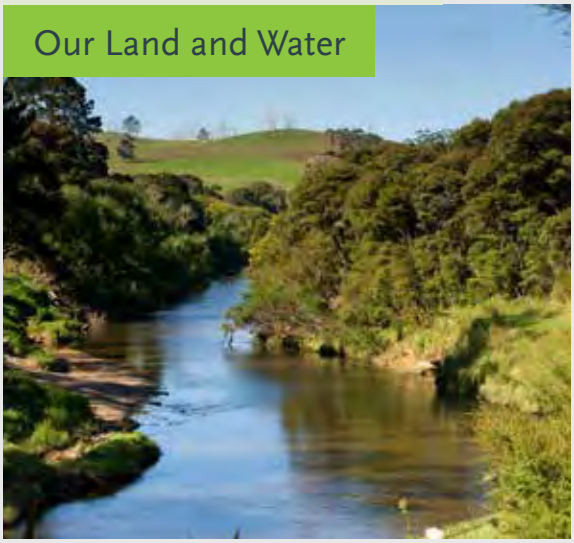
AgResearch enjoys close ties with other Crown Research Institutes across a range of programmes and projects. Aside from delivering on the science, we have collectively – through the umbrella body of Science New Zealand – provided thought leadership on important national conversations such as the use of genetic modification and gene editing in Aotearoa New Zealand. We have also continued to grow our relationships with universities such as Massey and Lincoln, where we share facilities or work closely together on joint research projects.

In the biosecurity space, AgResearch scientists are leading important projects to help keep Aotearoa New Zealand safe, working alongside other Crown Research Institutes through the B3 (Better Border Biosecurity) alliance. Among the B3 projects is one in which we are seeking to empower te ao Māori responses to biosecurity threats to taonga species, native ecosystems, and communities.

Partnerships with National Science Challenges have also been of mutual benefit and have enhanced the science output of Crown Research Institutes. For AgResearch, work alongside the Our Land and Water National Science Challenge (which we host) has advanced important programmes such as Land Use Opportunities: Whitiwhiti Ora, which helps land stewards assess diverse land use opportunities and make decisions with confidence that both the whenua and its people will prosper; and Revitalise Te Taiao, which is place-based research to develop evidence-based examples of how agribusinesses and communities can make enduring changes in land use, management, value chains, and market focus to revitalise te taiao (nature).

NATIONAL SCIENCE CHALLENGE

## Our Land and Water



Our Land and Water is one of 11 National Science Challenges funded by MBIE and is hosted by AgResearch. The Challenge has 14 research parties including all of Aotearoa New Zealand's CRI's and the majority of the country's universities.

*Learn more about what we are doing in this area on our website by scanning this code.*

# Red meat carbon footprint: from the cradle to the farm gate

An AgResearch science programme focused on the full life-cycle carbon footprint of Aotearoa New Zealand's beef and sheep meat has found that it sits at the lower end of published estimates among producers globally, despite our distance from markets.

This research is jointly funded by the Ministry for Primary Industries, Beef + Lamb New Zealand, and the Meat Industry Association.

This Life Cycle Assessment (LCA) study calculated the cradle-to-grave (i.e. full life-cycle) carbon footprint of beef and sheep meat produced in Aotearoa New Zealand and exported to different markets. The carbon footprint for the cradle-to-farm gate (raising of the animals) represented 90-95 percent of the cradle-to-grave carbon footprint for both beef and sheep. The meat processing stage contributed 2-4 percent of the carbon footprint, while post-processing was 2-6 percent. This standard LCA study showed that Aotearoa New

Zealand beef and sheep meat products have a full life-cycle carbon footprint at the lower end of other published estimates globally, despite the emissions generated from transport and freight to overseas markets.

The main driver for the on-farm stage for the final carbon footprint is the emission of methane from the digestion of feed by livestock. Given the relevance of this gas, the study also explored the use of a different metric that accounts for the short-lived nature of methane in the atmosphere (GWP), as compared with the conventional metric for LCAs (GWP100). The estimated footprint values using GWP were much lower, especially for sheep, where the national flock has decreased over the last 20 years.

AgResearch scientist Andre Mazzetto says: "Accurately measuring and reporting the carbon footprint of products has never been more critical, especially for New Zealand products such as beef and sheep meat that are exported over considerable distances. Thus, it is important to understand the extent of greenhouse gas emissions throughout the various stages of the life cycle of these products".

Andre Mazzetto

mia Meat Industry Association

beef+lamb new zealand

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

# Partnership to clean up waterways

AgResearch and our partners have been researching how catch crops can improve on-farm water quality.

Catch Crops for Cleaner Freshwater is a joint project between AgResearch, Plant and Food Research, DairyNZ, FAR, Beef + Lamb NZ, Southern Dairy Hub, Environment Canterbury, and Environment Southland.

Funded by the Ministry for Primary Industries' Sustainable Land Management and Climate Change – Freshwater Mitigation programme, it is designed to reduce nitrate leaching and contaminant runoff from farms after intensive winter grazing of livestock on winter forage crops.

The research has been conducted on plots and at farm-scale and will provide policy makers with advice and farmers with another tool in their kit to improve water quality on their properties. Catch crops are an environmentally friendly way to produce dry-matter, making them a win for freshwater management and keeping condition on animals.

A catch crop is a short-term crop established between two main crops or as part of a pasture renewal programme, primarily to take up nitrogen and reduce nitrate leaching.

Catch crops come in a variety of options to suit different soils, climates, and farm systems.

The most common options are cereals because they are generally winter active and can establish under cold conditions. For example, oats, ryecorn, and triticale make good catch crops. Italian ryegrass can also be used and is well suited to being sown with a cereal like oats.

While catch crops are not new and have been used in arable systems for centuries, the novel use for them in Aotearoa New Zealand recently is following a winter grazed forage crop to reduce the fallow period. This means they are typically sown during the coldest times of the year (winter) in the key winter forage cropping regions (e.g. Canterbury and Southland).

Research shows that sowing oats immediately after grazing has the greatest impact on reducing nitrogen losses. With every month that sowing is delayed, there is a notable reduction in their effectiveness.

At paddock scale, oat crops capture up to 100 kg N/ha by the end of the leaching period – this is nitrogen that might otherwise be lost.

While our research has found catch crops to be beneficial to some farm systems, they are not a silver bullet solution.

For example, not every farm is suited to cultivating an oat crop and taking it through to green-chop silage (the ideal harvest timing to maximise both yield and quality; typically 8–10 t DM/ha, at approx. 11 MJME/kg DM), as they can delay the sowing of subsequent winter forage crops. However, the research has found that this is balanced out as, overall, a paddock will grow more total feed over a 12-month period.

*Scan this code for live updates on the project from their Facebook page.*

Left: For optimum results, oats are sowed using a Spader Drill on a trial site in Southland. Right: Anna Taylor (AgResearch, left) and Brendon Malcolm (Plant and Food Research, right) check water leaching results in the lysimeter at the Southern Dairy Hub.

# Reduced winter cropping partnership


A research partnership involving AgResearch and Pāmu has been trialling different methods of grazing animals over winter to maintain returns and improve environmental farm performance.

The trials on a Te Anau station showed that with the right planning and preparation it is possible to replace forage crops like brassicas with a mainly all-grass diet and net a raft of benefits.

Work took place on Mararoa Station and involved 60% of the station's 13,900 breeding ewes.

The station team worked in partnership for eight months to provide the correct conditions for stock to thrive in a one-year trial.

The preparation period was necessary to make gradual adjustments to farm management and stock management, and required changes to whole-farm practices which were then implemented throughout the one-year trial.

The changes included:

- Involving the full farm team in planning, and upskilling for monitoring and allocation over the 18 months lead-up
- Altering stock policies such as controlling ewe feed intake over the summer using larger flocks than normal practice
- Feeding supplements early to release pasture to grow in autumn
- Using nitrogen fertiliser in autumn to fill potential feed deficits
- Reduced feed allocation residual targets throughout year – ranging from 1000 – 1200 kg DM/ha down from 1500 kg DM/ha
- Using a hands-on body condition scoring as opposed to a visual screening
- Altering the grazing plan to match feed growth rates and farm operations (such as winter shearing).

AgResearch's Dr David Stevens said evidence from other scientific studies helped instil confidence that the changes would result in less soil damage, less nutrient run-off, and improved nutrient distribution across the farm. The demand for feed was matched with supply in the spring flush, meaning animal condition was maintained in late pregnancy resulting in higher body condition and increased ewe and lamb survival rates. The farm returned six percent higher earnings before interest, taxes, depreciation, and amortisation (or $29/ha).

Other benefits of all-grass wintering compared to winter crop feeding were:

- Lambing percentage 4.5% higher
- Ewe deaths 1.2% lower
- Feed utilisation higher
- Stock health higher (improved foot health noted)

This experiment showed that modern breeding stock, which are heavier than only a few decades ago, can thrive on a grass diet in the winter, a method of farming which was once the norm. The experiment concluded that changes to farm practices and planning lead to high performing stock and a reduction in the environmental impact of intensive grazing. between two main crops or as part of a pasture renewal programme, primarily to take up nitrogen and reduce nitrate leaching.

*Scan this code for more information about the project online*

Above: Mararoa Station staff complete sampling for the trial. Below: Mararoa Station.

David Stevens

# Mātauranga Māori

AgResearch built strong momentum in our strategic focus area of mātauranga Māori during the financial year on our path towards transforming ourselves through te ao Māori.

Our Te Ara Tika strategy directly addresses the barriers Māori people and organisations experience when working with a traditional science organisation. Our people ultimately breathe life into the strategy. But much of the momentum has been created by our recently established Māori Research and Partnership Group (MRPG) who have been rapidly improving AgResearch's understanding of Māori knowledge systems and our capability in kaupapa Māori research (research that is co-created, co-developed, and co-led, or which is led independently by our partners to ensure that it is directly relevant to the needs of Māori businesses, land development, and communities).

We are investing in MRPG resources and capability to signal our commitment to Te Ara Tika. Group director, Ariana Estoras, recruited six new team members in FY23 to meet increased demand from within AgResearch. The capabilities of the research team now cover kaupapa Māori research, mātauranga Māori expertise, policy and governance research of Māori resource management, hapū-led research, social science, tangata whenua-led biosecurity, and biodiversity-related research. Their networks cover hapū, iwi, Māori community interest groups, and Māori enterprises specialising in agriculture, personal health, and food and beverages.

The Group has developed team values and principles to evaluate how AgResearch has historically managed partnerships with Māori. They trialled and updated an impact measurement rubric in February 2023 and have used it with a range of Māori partners. We plan to use it to evaluate all of our Māori partners across a three-year period. We will incorporate the rubric into monitoring and evaluation of existing projects and into early-stage project co-design. This will inform future investment to build capability and capacity of the current and future group, and where we will prioritise partnership with Māori partners and science capabilities.

We increased our financial investment in the transition. Our Enabling Māori Strategic Science Investment Fund (SSIF) programme was allocated $4.4m in FY23. This was an increase from $2.2m in FY22 and represents about 10% of our total SSIF budget. The allocation will increase to $5m in FY24.

SSIF remains a critical lever for the Māori research team to initiate and advance Māori research programmes, build and resource existing and new strategic research partnerships, and co-develop compelling multi-year research proposals for specific Māori research funding across Government. The SSIF programme will also be directed toward our building capacity programme in Science and strategic partnerships.

New members of the Māori Research and Partnerships team were welcomed to AgResearch at a Powhiri held at our Ruakura campus.

AgResearch has established strategically important partners to complement and strengthen our rangatahi (youth) pathways. This includes strategic investment to further solidify Pūhoro STEMM academy as a critical first step in the rangatahi pathway into research and science. The second strategic partnership is with the Māori Education Trust, where AgResearch offers scholarships for undergraduate and postgraduate studies related to agriculture, agrifood, and/or kaupapa Māori areas.

The two organisations will help us build on the success of Te Puāwaitanga, our summer internship programme, which is helping to maintain a pipeline of Māori engaged in science.

The meaning behind the name Te Puāwaitanga is 'to flourish' or 'come to fruition'. Te Puāwaitanga interns co-design research projects. They are also placed in an existing project to build their skills and confidence while undertaking research that incorporates te ao Māori and mātauranga Māori into agricultural science.

Through our Enabling Māori SSIF allocation, we have invested in a programme to upskill and reskill our people to enable more Māori-led, Māori-centred and kaupapa Māori research. This includes funding support for two Hunga Rangahau (Māori Researchers) to begin postgraduate studies, the completion of postgraduate studies by the Māori Research Leader, and one Pou Rangahau Mātāmua. They are doing a Masters of Indigenous Studies through Te Whare Wānanga o Awanuiārangi.

We are also supporting another Pou Rangahau Mātāmua to complete doctorate studies in Indigenous Governance and a Pae Tūhono to complete their Masters studies in Indigenous Partnership.

AgResearch has set up a Community of Practice (CoP) so researchers can share experiences of working with Māori partners. The CoP has grown to over 80 researchers and scientists (called Ngā Manu Kai Miro). The CoP runs according to the maramataka, meaning that in certain moon phases it may not be an appropriate time to gather or to discuss particular topics. Each gathering observes tikanga, beginning with mihi and starting and ending with karakia.  AgResearch also leads the Revitalising Te Taiao Our Land and Water programme, which aims to use both mātauranga Māori and Western science to inform environmental restoration. There are three pilot trials in Taranaki, Wānaka, and Paeroa. AgriSea, who are based in Paeroa, lead one of the pilots called Rere ki Uta, Rere ki Tai. The trial involves ten dairy farms: five Māori-owned and five non-Māori owned. Farmers are experimenting with a natural seaweed fertiliser to enhance the mana and mauri of the soil.

We are co-developing a pan-CRI and Tiriti-led approach to Wai 262-related activities, the protection of indigenous intellectual property, and CRI biological collections, data, and information. Collective expertise was also harnessed through the cross-CRI Māori Researchers Group to provide an ao Māori perspective on integrated farm planning for the Ministry of Primary Industries (MPI). This group has also been approached for advice from Māori agri-business investment programmes within MPI, Te Puni Kokiri, and from Māori land collectives. The next step is for the group to formalise terms of reference. We also drew on expertise in a pan-CRI team, which finalised the terms of reference for developing Māori data sovereignty principles in consultation with Te Ara Pūtaiao (Crown Research Institute Māori Leadership Group).

## AgResearch has a range of partners in the Māori agri-business world.

Our research with Te Pū Oranga Whenua has been focused on helping them to understand that soil mapping is a key part of land-use planning and upskilling staff to independently undertake GIS mapping of whenua.

We will also continue to invest in our relationship with Waikato-Tainui. This builds from a memorandum of understanding in areas of mutual interest to lift capability and enhance environmental outcomes, especially water quality. We will research non-chemical animal remedies through indigenous flora as a component to the holistic kaitiaki farm plan model with the Kohimarama Research collaboration (Ngā Uri o te Ngahere Trust, Pakihiroa Farms, and Tauhara North 2 Trust). These partners are providing access to 185,000 hectares of Māori-owned land in four regions across the North Island.

We partner with Ngāti Pāhauwera Development Trust, Paroa Trust, Grandad's Beef, Ora Innovation Group Ltd, and Ngaporo Waimarino Forest Trust.

We are partnering with Poutama, an independent charitable trust established to provide business development services to Māori through our Kotahitanga agreement. This will maximise the skills, networks, and capabilities within the orbit of both organisations to help whenua-based (land-based) and Māori food and beverage businesses flourish.

Another key partner, Wakatū Incorporated, has a strong market presence in the food and beverage industry and exports to over 25 countries. We have many areas of mutual interest, both commercial and scientific, and will utilise SSIF to co-develop research areas and explore new product development. This agreement also extends our geographical reach and relationship-building with iwi. Wakatū shareholders descend from original landowners in Te Tauihu (Nelson, Tasman, and Golden Bay regions) and whakapapa to four iwi: Ngāti Koata, Ngāti Rārua, Ngāti Tama, and Te Ātiawa.


*Above: Our partnerships see us working with Māori across the motu.*

# Thought leadership

Mātauranga Māori adds to the toolbox to tackle the big issues for agriculture and other sectors, rather than something that threatens the science status quo, says the head of AgResearch's Māori Research and Partnerships Group, Ariana Estoras.

Ariana is central to AgResearch's vision to have the knowledge system of mātauranga Māori on an equal footing with Western science and in existing structures that have helped support positive change in farming practices and food production in Aotearoa over the decades. The move also helps embed Te Ara Tika into AgResearch's everyday work. This is a national plan to embrace te ao Māori values and tikanga-based principles to better respond to Māori needs and better deliver to Māori aspirations.

"What we are striving for is an approach where we are adding knowledge and impact to the important science we have always done, so that we can respond with Māori to their needs and aspirations, but also help provide better solutions to farmers and all of society in Aotearoa," says Ariana, who herself comes from a background in science.

"Unfortunately, some have viewed mātauranga Māori as somehow diluting or being out of step with the science we've always done in Aotearoa. Some of this seems to be based on a lack of understanding and, therefore, an inability to see the value we can create. Our approach is centred around the strength of having more than one knowledge system contributing to solutions for some of the most complex challenges facing our communities. One way of looking at it is having the benefit of a 'wise old head' who has gathered knowledge not just from formal settings but also from life experience learning and interacting with farming and the natural world."

She says it is encouraging to see the increasing recognition across the science and research sectors of the value Māori people, resources, and knowledge can bring. In agriculture, this means growing connections between the scientists and Māori farmers and landowners who bring huge collective wisdom and a hunger for positive change in line with actively living in balance with the natural environment.

"The environmental challenges for farmers and Aotearoa as a whole are obviously front and centre right now, and I have no doubt that this is an area where mātauranga Māori can enhance what the science already has to offer where it comes to best use of productive land, water quality, and reducing the climate change impact."

# Helping to maintain and protect soils

AgResearch is working with Ngāi Tahu Farming on an important research project to maintain the life sustaining capacity of their taonga soils.

The mahi is part of a MPI Sustainable Food and Fibre Futures project called 'Te Whenua Hou Te Whenua Whitiora', and includes a number of partners.

MPI, Ngāi Tūāhuriri, and Ngāi Tahu Farming have contracted AgResearch, DairyNZ, Manaaki Whenua Landcare, the Agribusiness Group, and Soil Connection as providers for the whole-farm trial.

Over the next seven years it will verify regenerative farming practices with scientific metrics, including the impacts of regenerative agriculture practices on farm workers. Ngāi Tahu Farming farms two adjacent properties in North Canterbury which were converted from pine to pasture in 2016, to either a dairy farm or dairy support block. The dairy support block is now undergoing conversion to a dairy farm.

To get things started AgResearch completed farm soil health baseline testing.

A total of 14 paddocks were sampled across the two farms. The results found that the two properties, despite their proximity, have differing soil properties – soil fertility and soil organic matter. It was an important finding for the integrity of the experiment. Because of the differences, which reflect six years of different management prior to the study commencing, a like-for-like comparison between the two will no longer be possible. The scientists will need to apply statistical analysis in relation to baseline values for each of the two farms separately. They will compare the relative data and its trajectory from the extensive monitoring activities that are planned to track the performance of the two farming systems.

Next season, AgResearch will continue to monitor changes in soil properties as well as begin investigating impacts on animal welfare, milk quality, and meat quality.

# Smart Investments

Our people are our most important resource and are, therefore, our key investment priority. Smart Investments at AgResearch includes a range of business activities designed to keep our people engaged and well cared for so they can perform at their best and support them to embrace new ways of working through investment in new facilities, technology, and equipment.

## Equity, Diversity, and Inclusion

We are building a high-trust, transparent, and inclusive culture where our people feel welcome and can bring their whole selves to work. Our Mana Taurite (Equity Diversity, and Inclusion strategy) integrates our Kia Toipoto Action Plan to ensure we are a fair and equitable employer. Our initiatives have included improving recruitment practices using diverse and representative recruitment panels, offering unconscious bias training for hiring managers (through DiversityWorks), and offering remuneration consistency for men and women in like-for-like roles.

In consultation with the Public Services Association (PSA) and our people, we redesigned our remuneration framework, career descriptors, and promotions approaches to ensure bias does not influence starting salaries or pay for employees in the same or similar roles and helps improve gender and ethnic representation in our workforce and leadership teams. We also have committed to paying our people no less than the living wage.

## Gender Pay Gap

AgResearch participates in 'Mind the Gap', Aotearoa New Zealand's first pay gap registry and has made steady progress toward closing the gender pay gap.

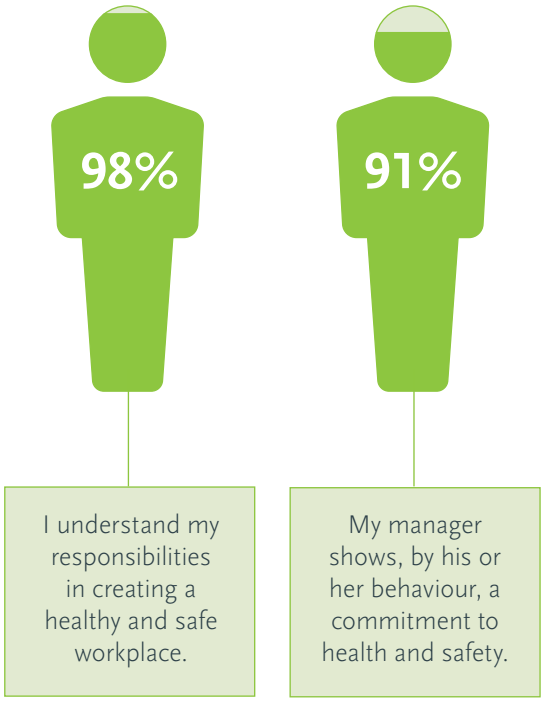
Our workforce is 55 percent female. Our male employees are, on average, older and stay longer at AgResearch so the shape of our workforce has contributed to a more pronounced gender pay gap. However, since 2020 we have reduced the pay gap by 3.6 percent, now at 14.3 percent.

The percentage is calculated using the methodology provided by Statistics New Zealand and endorsed by Mind the Gap. The registry encourages all organisations to commit to external pay gap reporting for genders, Māori, Pacific peoples, disability communities, and other ethnicities in Aotearoa.

*We share our Gender Pay Gap information on our website. Scan here for more information.*

## Te Pae Mahutonga (Health & Safety)

Our underlying health, safety and wellbeing philosophy is to make its management simple and flexible, and to position our people at the centre of everything we do. Through our no-blame approach and continuous improvement to health and safety, our people proactively report incidents, hazards, and safety observations. The lag indicators statistics, such as our lost-time-injury-frequency rate, and Our Voice survey results show that our people perceive all aspects of health and safety positively.




Our Toi Ora Framework (Health, Safety and Wellbeing) is based on the four dimensions of wellbeing developed by Sir Mason Durie in 1984 (initially to provide a Māori perspective on health). The framework has been well received by our people. It prompts them to take care of all aspects of their life to support their overall wellbeing, including managing psychosocial and psychological demands in the workplace. The four dimensions are taha tinana (physical wellbeing), taha hinengaro (mental wellbeing), taha wairua (spiritual wellbeing) and taha whānau (family wellbeing). They are all necessary for strength and symmetry. The framework aligns well with our holistic equity, diversity, and inclusion approach, and managing psychosocial risks is an ongoing focus for AgResearch.

## Cultural Competency Framework

AgResearch has a mātauranga Māori and cultural competency learning programme which is refreshed annually to ensure the capability needs of our people are met. We offer seven formal development opportunities to build awareness, knowledge, skill, and confidence in te ao Māori and our obligations under te Tiriti. AgResearch's mātauranga Māori and cultural competency learning programme has been designed in consultation with our Urungi Māori (Māori Strategy Director).

Over 400 members of our workforce have now completed beginner reo Māori and tikanga lessons through Education Perfect. For each course, employee progress is evaluated with a before-and-after assessment and is reported via the facilitator after each course. We are still exploring ways that we can assess the increased use of te reo Māori in our workplace as a result. Māori-centred and kaupapa Māori research is providing AgResearch with an opportunity to grow and enrich our science in a uniquely Aotearoa-based way.

in FY21 + in FY22

**250 + 166**

employees completed beginner reo Māori and tikanga lessons through

ep Education Perfect

## Strategic workforce planning

Our people managers have completed an in-depth review of our talent to ensure our identified top talent is being leveraged and their career development is actively supported. Work also commenced on improving data quality and accessibility of information about the capabilities and capacity within our science cohort. This work will be used in detailed workforce plans aligned with our science priority areas. It also provides visibility to other parts of the organisation for project planning or business development purposes.

## Change management

A significant change management focus for FY23 related to our new building in Lincoln. We relocated into the facility (Tuhiraki) in late 2023. To prepare ourselves for the shift, a Project Team delivered all-campus updates on the facility's gifted names, building progress, confirmed floor plans, and processes for non-office decluttering and decanting. Staff were provided with a useful guide that provided the meaning behind the new names and helpful resources to encourage correct pronunciation.

We designed and delivered workshops on information management to help our people prepare for the transition to the new facility by reducing their paper material.

## Impact, planning and evaluation

Crown Research Institutes are embedding connectedness across finance departments, human resources, communications, and IT. A good example of CRI collaboration has emerged in the research outcomes and impact space. The Impact, Planning, and Evaluation Network (iPEN) pools expertise across CRIs to benefit our capability and culture. iPEN also contributed original research and thinking to MBIE and Te Ara Paerangi – Future Pathways review. During FY23, efforts focused on better understanding impact pathways, and how outcomes and impact happen.

There was nearly a four-fold increase in uptake of iPEN opportunities. AgResearch staff attended 303 webinars and 39 interactive online learning courses (attracting 188 different people, up from 49 in FY22).

Drawing on our collective experiences, iPEN identified pathways to impact and how to enable these. iPEN is also working to inform how positive research outcomes and impact are maximised at the system level.

Several change management workshops were held at the Lincoln Event Centre to provide staff with an opportunity to craft how we will work in Tuhiraki, our new Lincoln building.

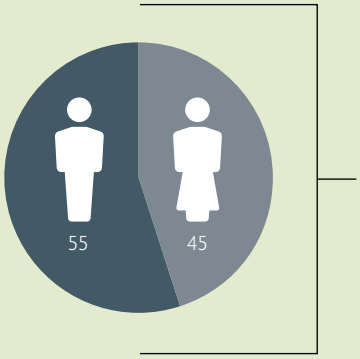
# The following provides a snap shot of our

*Reporting is for AgResearch only, it excludes Farmax and Grasslanz as at 30 June 2023.*

As at June 2022, AgResearch had 852 permanent, fixed-term and casual employees, studentships and contractors.

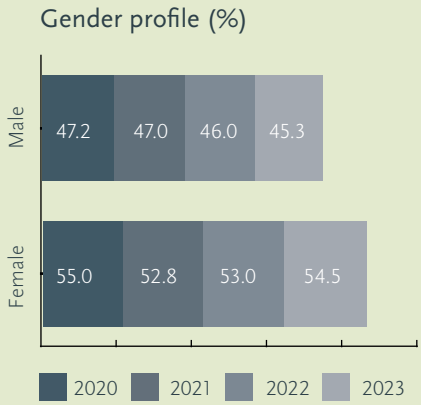
**852**

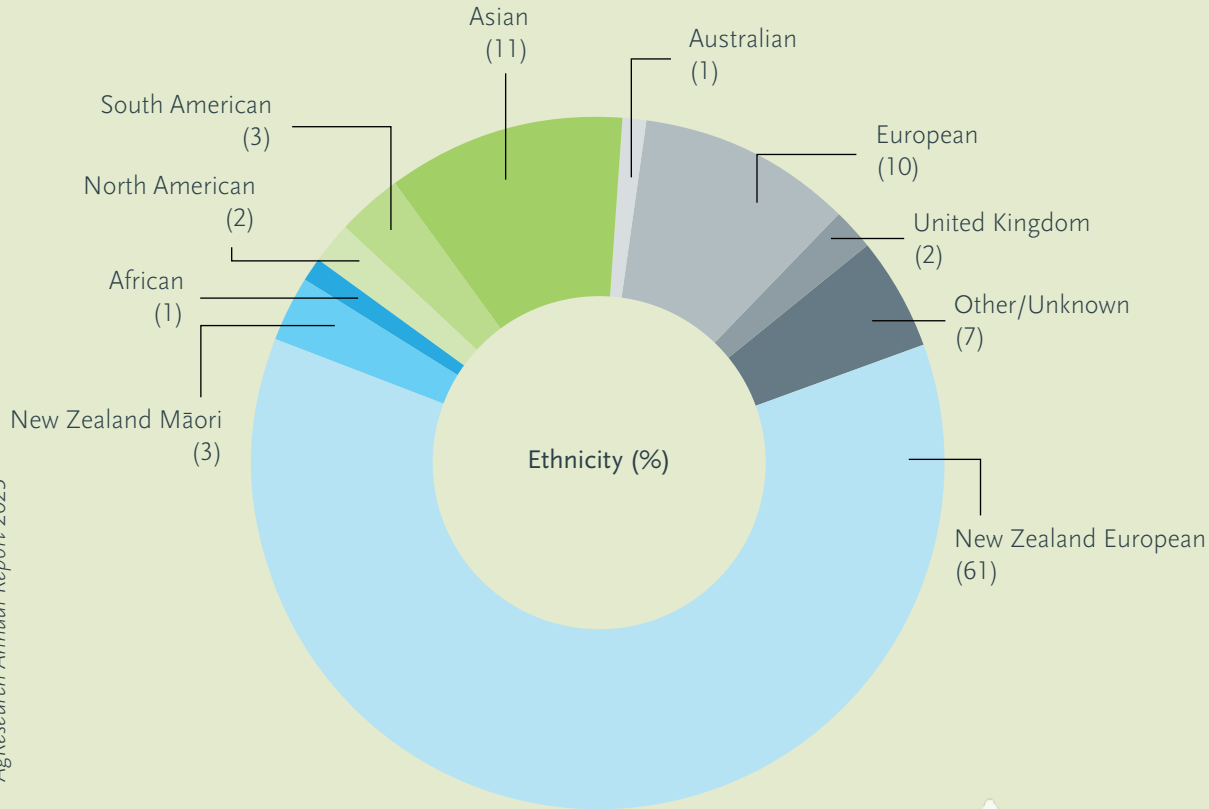
Our people are diverse, originating from all corners of the globe. 55 percent are female, 45 percent are male.




**Senior Leadership Team Gender profile (%)**

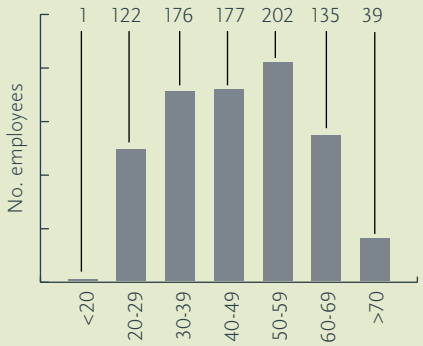
Our Senior Leadership Team is comprised of 45% females and 55% males.



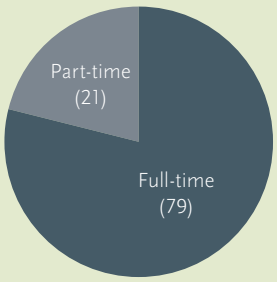



# people as at June 2022.

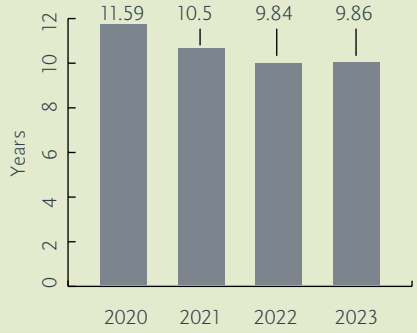
### Age Profile



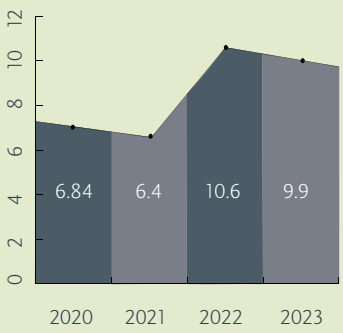

### Employment Type (%)




### Average Tenure



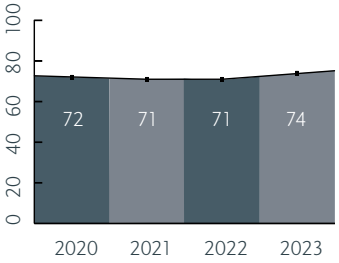

### Employment Turnover (%)



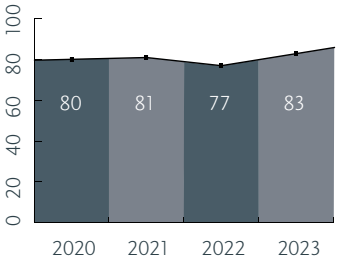

## Our Voice

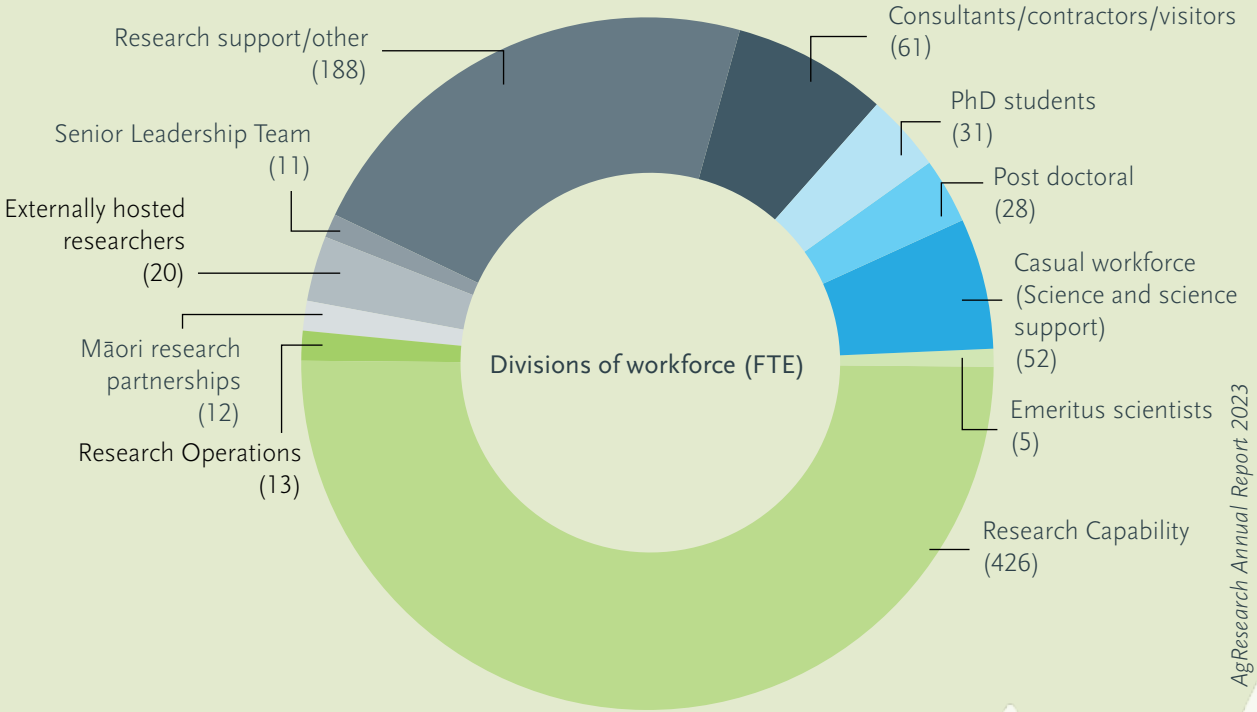
*Our employee engagement survey was open for participation in March.*

### Engagement Index (%)




### Participation Rate(%)



# Early Career Group

Formed in 2021, AgResearch's Early Career Group is an inclusive community for those near the beginning of their careers – researchers, support staff, and students at all levels. It allows people to share ideas and expertise, provide career support, create opportunities for professional and personal development, career progression, and networking amongst Science New Zealand members.

The 'early career' designation is not specifically defined by factors such as age, level of educational training, or work experience. 'Early career' encompasses anyone who is early on in their current career trajectory or who has recently changed their career path.

Now well-established, the group has grown from 80 to 140 members over the past two years. It has established pou (workstreams), an early career grant, representation on working groups across the organisation, advocacy work, and influence across the CRIs.

The group focuses their attention on four pou:

- Internal advocacy
- External advocacy
- Student and casual workforce advocacy
- Learning and development.

As part of their advocacy work, they successfully increased PhD and MSc stipends, made positive changes to PhD student parental leave, and worked tirelessly in the promotion of alternative pathways within science.

With support from the wider organisation, they have also established and awarded 17 early career grants for early career researchers to undertake professional development activities. This includes things such as fees for attending conferences, workshops, university paper fees, professional memberships, and travel costs to attend development activities. Successful applicants must demonstrate the relevance of the proposed development opportunity and the benefit of this activity to the applicant and/or AgResearch. This grant is funded by AgResearch.

Early career group members are represented across AgResearch on working groups, initiatives, and committees. These include Equity, Diversity, and Inclusion; Science Vitality; Sustainability; eResearch Platform; Career Descriptors; Culture; AgResearch website development; Digital Blueprint Advisory Panel; and Campus Vitality. They also organised an early career group submission in response to Te Ara Paerangi – Future Pathways green paper.

With development as another key focus, the group offers workshops and opportunities for members to learn te reo Māori, te Tiriti o Waitangi, design thinking, timesheeting 101, grant writing, budget and project management, mentoring, leadership, mindfulness, 'science speed dating', outreach and communication, and career pathways. They also create opportunities to kōrero with people from different parts of our organisation, including the Communications and Marketing team, Māori Research and Partnerships Group, Partnerships and Programmes, and the Chief Executive.

AgResearch and GNS's early career groups were instrumental in galvanising the formation of career groups at other Crown Research Institutes and Callaghan Innovation. They helped to establish an early career group under Science New Zealand. The role of this pan-CRI member group is to facilitate connections between groups and early career staff, co-ordinate pan-system advocacy, and serve as a reference group for Science New Zealand to consult on matters that are particularly relevant to early career staff or where a specific early career perspective is valuable. The AgResearch representatives are Nina Butowski and Louise Hennessy. Louise is also a co-chair of Te Apārangi Royal Society's Early Career Forum Committee.

AgResearch's Early Career Group is currently co-chaired by Louise Hennessy and Sandeep Kumar. Founding members are: Katie Hewitt, Laura Hunter, Zach Ngow, Louise Hennessy (Ruakura); Melissa Hempstead, Alice Lake, Mallory Ross, Sandeep Gupta, Nik Palevich, Kiliana Bekelaar, Taryn Miller (Palmerston North); Caitlin Hyde, Chrystal O'Connor, Catherine Maidment (Lincoln); Kathryn McRae, Alex Coulton (Invermay); with Nic Peretini and Jess Wholey in support roles.

Opportunities available to members in previous years have included forums where Early Career Researchers have been able to engage with experienced scientists, such as Siouxsie Wiles.


# Investing in mass spectrometry

AgResearch successfully installed and commissioned a state-of-the-art mass spectrometry instrument in November 2022.

The mass spectrometer, called a timsTOF Pro 2 and operated by our proteomics platform (Proteins and Metabolites team) located at our Lincoln research centre, has greatly enhanced the speed and accuracy of protein and peptide identification, characterisation, and relative quantification. This is crucial capability across the value chain from farm to fork. For example, proteomics is used to help find bioactive peptides in food, which can help to understand how diet influences people's health. But it can also be used to analyse how the soil microbiome has an impact on animal and plant products.

The instrument has a special feature, called 'ion mobility', which enables an additional separation of molecules based on their bulkiness. Acquiring data in 4D instead of 3D significantly boosts the number of identifications, as now data are also captured for lower abundant peptides and a multitude of peptide modifications.

Science Team Leader and Proteomics Platform Leader Evelyne Maes says installation of the highly sensitive instrument in FY23 involved extensive planning and multiple teams from across the organisation, including site services as a dedicated lab had to be established. AgResearch has a formal partnership with the New Zealand eScience Infrastructure (NeSI) to provide the services required to support and grow our data science capability. The mass spectrometer produces vast quantities of data. The collaboration with NeSI has enabled us to collect and ensure rapid, accurate analysis of its findings.

"It's incredibly fast in generating a wealth of proteomics data and allows us to see so much; not just the tip of the iceberg; we can see the entire iceberg," Evelyne says.

For example, separating the peptides of a complex quality control sample takes 90 minutes on our older mass spectrometers but only needs 10 minutes to get a similar result on our new instrument.

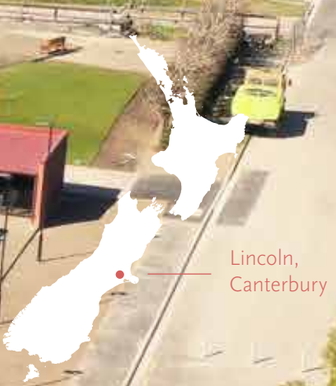
"That means we can analyse more complex samples (e.g. soil or microbiome), samples of multi-species origin (metaproteomics), or perform more in-depth analysis (deep proteome profiling), which is crucial if we want to link proteomics data with other datasets in a systems biology context."

*Scan this code to learn more about our Proteomics services*

SMART INVESTMENTS

Introducing

# TUHIRAKI




The opening of Tuhiraki – a name gifted to us by Te Taumutu Rūnanga – is a significant milestone in AgResearch's history.

Drawn from the Rākaihautū tradition, the name Tuhiraki references the work carried out by Rākaihautū and his kō to explore, name and claim the landscape. Symbolically it also references the knowledge Rākaihautū released into the ao mārama, the natural world. Tuhiraki brings with it the notion of "reaching towards the heavens," of "writing it in the heavens" and of "raising the heavens". This resonates with our whakataukī 'āta mātai, mātai whetū' which underpins the work of AgResearch.

The 7,600 square metre building is a fit-for-future scientific research facility built on land adjacent to Lincoln University.

It will be our corporate headquarters and support collaboration with other research organisations in Aoteaora New Zealand and overseas. It replaces our current Lincoln facilities which are outdated, earthquake-damaged, and spread across three sites. This development reflects AgResearch's ongoing significant role in New Zealand's economic and social advancement, and the Government's significant confidence in the organisation.

## 2021

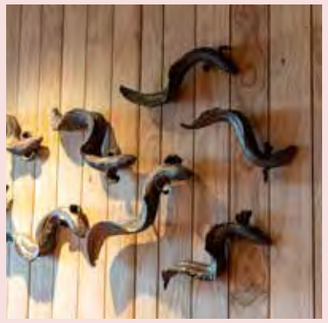
Naylor Love was appointed main contractor for the project and construction of Tuhiraki began in October 2021.

## 2019

Beginning in 2019, a cross-section of our people participated in design workshops. They provided their specialist and expert feedback and advice on what workspaces work or don't work and what is required to achieve success in their roles.

## 2022

Since June 2022, we have conducted weekly staff visits throughout the construction phase. These tours provided staff with a unique opportunity to see up close progress of the laboratory and workplace wings. Almost 200 people took the opportunity to join these tours and feedback was overwhelmingly positive.



## 2023

Approximately 135 science and support staff moved into the workplace wing in September. The laboratory wing remains on programme for completion a little later due to the complexities of the build. It will be completed in November, and we anticipate all our lab-based people and equipment will be moved in before the end of 2023.

## 2024

On adjacent leased land, the new glasshouses, shadehouse and insectaries, which are located next to the staff carpark, are scheduled for completion in mid-2024.

The form of the build is distinctive with two wings of contrasting construction methodologies. The 2,763m2 workplace wing has a timber structure and lightweight cladding, is naturally ventilated and is an open plan workspace. It also has woollen carpet and insulation in line with wider construction guidelines for an improved environmental footprint (and consistent with our specialty in wool and fibre research). Tuhiraki contains a self-service café, 237 work desks, and multiple meeting rooms and quiet spaces for meetings, general seating, and science write-up.

The 3,928m2 laboratory wing is primarily constructed with concrete and steel, contains both non-PC and PC2 laboratories, is fully air conditioned and promotes the concept of ‘access over ownership’. It contains a mix of multi-purpose multi-user, single purpose multi-user, and single purpose single-user lab spaces.

The balance of the floor space, 909m2, accommodates a plant room above the laboratory wing. It contains all plant required to service both the laboratory and workplace wings. The plant room has been designed in such a way as to minimise the visual impact of what is usually an aesthetically challenging area.



We have collaborated closely with Te Taumutu Rūnanga to develop and implement a meaningful cultural narrative incorporating physical and social elements. It's anticipated that our move to Tuhiraki will increase the quality and quantity of collaborative science projects and improve our productivity and efficiency. It also marks a big cultural change for the organisation. Preparing staff for this change has been an important work stream of the wider project.

# Carbon emissions reduction planning

AgResearch made more pleasing progress in our emission reduction programme in FY23.

In June our Board approved emissions reduction targets that align us with the Paris Climate agreement to limit warming to 1.5°C. These targets are for 2030 and require a 42 percent reduction across energy use (fossil fuel and electricity) with a further 42 percent reduction from two thirds of business travel and staff commuting.

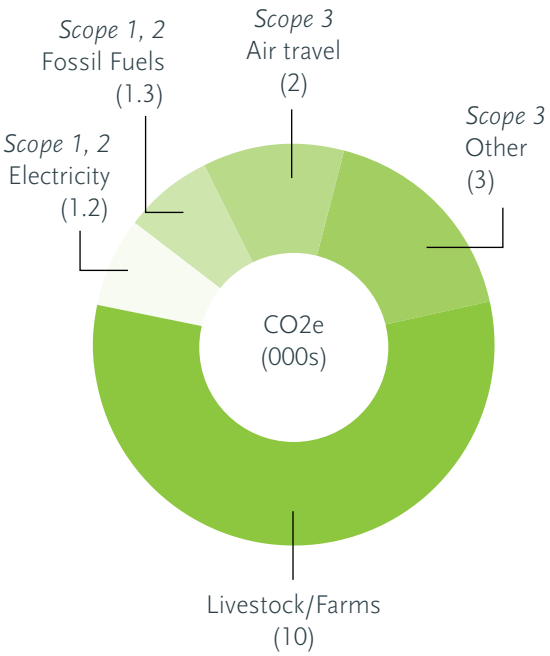
These targets (relative to our baseline level set in 2018/19) now serve as an important milestone in our organisation's carbon emissions reduction strategy.

In December 2020, the Government launched the Carbon Neutral Government Programme (CNGP) which aims to align the public sector to the Paris Climate agreement, reduce emissions, and limit warming to 1.5°C. Our Minister has advised we follow the CNGP and reduce our emissions.

We have chosen Toitū Envirocare (wholly owned by Manaaki Whenua Landcare) to have our emissions independently certified. Toitū has emerged as a leading organisation in the emissions space and has a scientific ethos guiding their process. Previously, our emissions had been calculated using different methods. As per international standards (and the Paris Climate agreement), we selected the 2018/19 baseline year because it was not impacted by COVID-19. Establishing a credible baseline is an essential precursor to developing a meaningful emissions reduction programme.

## Key highlights for the year

AgResearch had a total of 17,582 tonnes of carbon dioxide equivalent in our baseline year (set and disclosed in FY23). We are targeting future emissions reductions from the decommissioning of the old Lincoln facilities and the conversion of the vehicle fleet to electric.



# Bacterial metabolite work wins Basil Jarvis Prize

AgResearch's Tanushree Gupta's work identifying natural bacterial metabolites that can be used as food preservatives or antimicrobials with commercial potential have helped her win a prestigious award.

At first, she thought it was a scam.

An email from an unknown sender from what appeared to be from an overseas location claiming Tanushree Gupta was a finalist for a prestigious award.

The AgResearch microbiologist had only recently returned from a long overdue catch-up with family in India and was recovering from jet lag and a travel bug.

"I was still sick and not really thinking straight. I read that e-mail and I just closed it off thinking this must be a scam. Then when I just got my mind sorted... ...I did some investigating."

The email address checked out and was followed by another a few days later saying, not only was she a finalist, she'd won the Basil Jarvis Prize at the Applied Microbiology Awards.

"I couldn't believe it and needed to look at [Applied Microbiology International's] Facebook and LinkedIn pages and through a few people profiles before I'd let myself think maybe it was legitimate."

Tanu broke the news to her team leader, Gale Brightwell, and they discovered the award came with an all-expenses paid trip to the ceremony in London. Within a few days of thinking she was being scammed, Tanu was rubbing shoulders with the best microbiologists in the world at the Science Museum in swanky south Kensington.

She'd entered with no specific hope other than bringing her work to the attention of people who might be interested in funding it.

"We spend a lot of time in proposal writing and not getting anything. This time there were a lot of happy tears because people were noticing our work. The event was full of great scientists, and I had so many

great conversations which I have continued after the event over LinkedIn. Most importantly, I was proud of representing AgResearch and New Zealand there."

Tanu Gupta makes her acceptance speech in south Kensington, London.

Tanu stresses the word 'our'. The award, she says, reflected the work her team does.

"The method development for which I won the award took almost a year with constant work, including weekends. It was during that time that I found my niche in the team. My PhD students played an important part. The method was a core part of their research.

"Dr Amila Nawarathna helped find natural antimicrobials from anaerobic bacteria and Alexis Risson helped identify spoilage and pathogenic spore forming bacteria in sheep milk. My team leader, Gale Brightwell, also encouraged me to pursue these crazy ideas."

The award confirmed Tanu's rising star status in the world of microbiology, and how her work has advanced the understanding of microbiologists across the world.

## What was the problem that Tanu solved?

A few years ago, Tanu and her team became aware of the short comings in some of the internationally accepted and published bacterial testing regimes they were using, particularly in a dairy environment, which provided an opportunity to come up with some answers to a complex problem.

"We started to recognise that not all the recognised processing conditions for killing or stopping the growth of spore forming bacteria were working as well as they might. When bacteria are in the form of spores, they are highly robust and resilient to environmental conditions, including processing technologies and heat. This was a problem in a New Zealand context because we wanted to look at what and where are higher numbers or a prevalence of these spore-forming bacteria on a dairy farm.

"We'd take samples from feed, soil, silage, maze, grass, or whatever feed was fed to the animals, including swabs from milking cups and raw milk as well. From that I had that whole continuum, from one end to the other, with the aim to grow bacteria from those samples on a specific media, see the morphology of the bacteria, and then do the phenotypic analysis to find out what these bacteria are.

"We used the lab manual and methods used in papers.

"We used media with egg yolk to isolate Clostridium species and incubated bacteria using other specific media aerobically to kill off the Bacillus.

"But we couldn't get a clear demarcation even when using the method to get the growth of anaerobic bacteria under anaerobic conditions.

"Some of the bacteria were able to change their metabolism and grow in the absence of oxygen as well. They were growing anaerobically. Some of them were proliferating so happily that they were all over the media and I could not identify or isolate species."

Tanu's food and medical microbiology research, coupled with hands-on lab experience, inspired her to create a new method to differentiate bacteria.

The 'textbook' method to distinguish anaerobes and aerobic bacteria wasn't effective in a New Zealand farm context. Bacteria (bacillus) were surviving the two-day incubation period. Samples of what were assumed to be Clostridium bacteria were in fact a mixture of the two.

"We started to realise that what the manual suggested may not be always right. You have to work it around according to your own situation.

"And this raised the question that perhaps a natural anti-bacterial might be involved at some stage in the method. That a specific group of anaerobic species were able to produce some secondary metabolites as part of their metabolism.

"We started isolating those anaerobic species and then whole genome sequencing them. We grew them individually or together. We tested the efficacy against different food pathogens and against different food spoilage microorganisms, fungus as well. Through a lot of hard work, we found the specific anaerobic bacteria that were untouched, that had the ability to produce antibacterial and antifungal metabolites thanks to our new method."

Tanu said publishing their findings helped change the understanding of how bacteria interact and has opened up research into new applications of antibacterial and antifungal metabolites. More work needs to be done. But there are several obvious applications in packaging and preventing food spoilage.

# Rongoā: from plant to insect to person

AgResearch PhD student, Chrystal O'Connor, is investigating edible insects, feeding them rongoā rakau (medicinal plants) to determine whether their medicinal values are transferred from the plant to the caterpillar, and then potentially to people eating the insects.

Chrystal is applying mātauranga Māori and tikanga to all stages of her research, including how the plants are collected, euthanasia of caterpillars, and storage of samples. She hopes that her research helps to rejuvenate mātauranga around consumption of insects, a common practice for her Māori ancestors.

Chrystal grew up between Tauwhare, Ōhaupō, and Cambridge, often on a dairy farm. She went to Cambridge High School, then moved to Palmerston North for her undergraduate degree. After her second year studying Animal Science, she got a Māori summer internship with AgResearch (now Te Puāwaitanga).

She says it was that summer which "gave me the introduction to science and research and what a project was, and I was like, 'wow, this is really cool'. I love science because it can shape and grow with you."

Her internship led to a Masters' with AgResearch, and now a PhD. Finding a project which Chrystal is passionate about was a product of the pandemic and a bit of luck.

Her PhD, part of the Joint Postgraduate School (JPS) 2050 Food Transitions programme, is a collaboration between Lincoln University, the University of Canterbury, Plant and Food, Manaaki Whenua Landcare Research, and AgResearch. JPS supports research working toward more sustainable food production by the year 2050.

Chrystal is using proteomics to look for bioactive peptides – the added food value which could be gained from eating insects. Bioactive peptides have a positive impact on humans because of their health-promoting properties. For example, antihypertensive peptides can help lower blood pressure.

An initial survey consulted Māori to identify culturally significant plants and insects, as well as identifying insects which should not be eaten, according to tikanga. The results indicated a "surprisingly high" number of people who said they would eat insects in either whole or processed form.

Huhu grubs were identified as the most commonly eaten insect. Many respondents also indicated an interest in learning more about rongoā rakau.

For the trials, Chrystal chose to use kawakawa as the caterpillar diet, because of its status as a significant and widely used rongoā rakau. She explains that from an ao Māori perspective it was important that the caterpillars' natural behaviour was not forcibly changed for the trial. The caterpillar species chosen are naturally occurring on kawakawa plants.

When collecting kawakawa, the tikanga protocols from Chrystal's iwi begin before entering the ngahere (forest). She explains the importance of visiting a forest with right-minded intentions, depending on the purpose of the collection. For example, if plants are being gathered for rongoā purposes, you may have a certain person in mind. When collecting kawakawa leaves, it is important to take only what is needed and return any surplus.

It is customary to recite a karakia (blessing) before collecting rongoā rakau. "For Maori, rongoā isn't just about the medicinal value from the kawakawa; it's both spiritual and medicinal."

When working with the caterpillar samples, one of Chrystal's whanaunga (cousins) wrote a karakia to be used before the caterpillars are euthanised, to release the insects' mauri (life force). This particular karakia "acknowledges the whakapapa of the caterpillar, the essence it can provide, and then releasing it, so then it can be used by others."

Because she is working with taonga species (species sacred to Māori), it was important that lab samples were labelled uniquely so other researchers were aware of the added cultural significance of this work.

The application of tikanga in her research has "been a real learning journey" and she has "reached out to a lot of people" to gather information and advice on how to treat taonga species in this setting.

The storage of her samples is based on the whakapapa (genealogy) of the species. While it would not be tika (right) to store rongoā rakau next to animal faeces, for example, kawakawa and manuka could be stored together because they whakapapa to the same rehua (star). This is different to most other rakau which whakapapa to Tāne-mahuta (god of the forests and birds).

So far, no one has tasted any of the insects. Chrystal says she wants to run the caterpillars through a flavour profile "because so many people ask me, can I just eat one?!"

She is about to start the proteomics work "which will reveal more about the nutritional compounds... if that shows good things then we'd start looking at making it a food product!"

Chrystal hopes that her research can revive traditional mātauranga around insects as a valuable food source.

*Chrystal's PhD is supported by AgResearch and Lincoln University with co-supervision by Jessica Gathercole and Mark McNeill (from AgResearch) and the university's Jim Morton and Mike Bowie.*

SCIENCE AREA

## Kaupapa Māori-centred

Kaupapa Māori-centred research that weaves mātauranga Māori and science together for te taiao and Māori communities to thrive.

*Learn more about what we are doing in this area on our website by scanning this code.*

# Mentoring new researchers

Dr Gale Brightwell is a Principal Scientist at AgResearch. As one of our leading researchers she mentors our next generation of scientists.

Gale Brightwell once held what, on the surface, appeared to be the perfect job.

Working for the British Defence Force was, Gale says, the "only place I've ever worked where money was never a problem."

"The work was interesting, and yes, I did need to sign the Official Secrets Act. But in the end, I had to leave, on principle."

She could not shake the feeling of working on something that she didn't believe in, and that realisation played a significant part in her future career choices, including eventually coming to New Zealand.

Gale worked at Porton Down for the Ministry of Defence at the time New Labour and Tony Blair had swept to power in what was a period of renewal and cool Britannia. By this stage in her career, Gale, a senior scientist, had acquired the molecular expertise for the Defence Force to ask her to sign the Official Secrets Act.

The general initial optimism about the direction Britain was heading was replaced with disquiet for many, including Gale who now picks up the story.

"I worked on two kinds of projects. One was to identify potential targets for vaccines in, I suppose, what could be termed as bio-weapon type organisms, like anthrax and other dangerous pathogens. The other one was finding detection methods for the British Army and allies that could be used in active operations. We were, I believe, one of the first units that really started to work on the light cycler technologies and getting them validated and robust enough to be used in the field.

"It was around the time of the second Iraq war and there was a lot of stuff going off in politics at the time that didn't sit right with me. I left and went to work at a hospital.

"Values for me are really important and, you know, to get that buzz from the science, I need to believe in what I'm doing. I suppose it's an integrity thing, isn't it? And when it starts getting eroded by strange politics, it takes away from what you're doing and why you're doing it."

Gale was born in Derby and after leaving school she got a job as a medical laboratory technician in the Derbyshire Royal Infirmary, the first step on her science journey.

A change of scene saw Gale help set up a histology laboratory for the pharmaceutical company, SmithKline Beechams in Surrey where she worked as a research associate.

Life in academia was good. Gale tasted early success, too.

In just her third year at university, a summary of a project she participated in was published in Nature Biotechnology. Having her name in such a prestigious journal whet her appetite for post-graduate research.

A stint at Bristol University's Medical School working on Wilm's Tumour was followed by a trip to Australia where she "landed on her feet there working on melanoma research" at the newly formed and prestigious Centre for Molecular and Cellular Biology, University of Queensland.

Gale visited New Zealand for the first time on her reluctant way home to Britain and a new job at Porton Down with the Ministry of Defence. This was a period of cleansing in the Human Genetics Division at the University of Southampton working on Fragile X for the highly respected Professor Pat Jacobs OBE who was the first to find evidence that the Y chromosome is male determining in mammals. Gale then finally made the big move to Aotearoa New Zealand in 2004.

"I had the experience in molecular biology that everyone was looking for at the time. I took the job at Ruakura in the food safety team as I could just see or sense that the team really needed someone to bring in some new ideas and new technology and was actually a really good place for me to fit where I could bring value. It just felt right."

Gale enjoyed the work.

"They were very, very industry focused, very applied, which was something that was quite new to me, and [they were] doing some exciting stuff.

"I was learning a lot about people, management, about teams, and my own development. I felt that I was, you know, growing personally as well as a scientist."

Gale and the rest of her team were transferred to Palmerston North in 2010.

"We moved into the Hopkirk [Facililty], which I really, really love. I think it's one of the nicest places I've ever worked. Not all of the team transferred. I think in the end about 80% did and some came later. It was a disruptive time and took a while to recover as a team.

"But I think everything's kind of really come together. I think we have produced 45 publications in the last three years. It's just, you know, reflective of how hard we have worked as a team and how well. The team is awesome, and we wouldn't have had the successes we have enjoyed over the last few years without them pulling together. Thank you, team; I appreciate each and every one of you."

Gale says she is looking forward to the responsibility of mentoring researchers that comes with being a Principal Scientist.

SCIENCE AREA

## Food

Fusing science expertise and consumer insights with innovation to understand and design high-value protein-based foods, novel agri-food products, ingredients, processes and solutions.

*Learn more about what we are doing in this area on our website by scanning this code.*

# Promoted to Principal Scientist

When Neil Wedlock was a boy growing up in Northern Ireland, his father converted a corner of their garden shed into his first 'laboratory', where a budding, curious mind, conducted 'experiments' using a home chemistry set. Surrounded by garden tools and the like, Neil's life-long love of science began.

"I was a curious child. I read a lot. Typically, in my pile of books from a visit to the local library, along with Enid Blyton novels, there would always be a few technical books and manuals because I was fascinated with how things worked."

Neil is one of three freshly minted Principal Scientists at AgResearch. The promotion is a high point in a 33-year career in research, which has gone from humble beginnings in Belfast, from garden shed to some of the most technically challenging research in New Zealand – the creation of a methane vaccine for ruminant livestock.

Neil says science still gives him the same excitement it did when he made his first scientific discoveries in his dad's shed.

"Doing science doesn't really feel like a job. This is one of the reasons I enjoy it so much."

Neil was enrolled at Palmerston North Boys' High soon after his parents emigrated from Northern Ireland in 1972. He did well in school and went to Massey University where he studied science. His early breakthrough, an epiphany of sorts, came one summer when still an undergraduate.

"I had holiday jobs where I worked in a bakery, and in a shop, but I didn't find them inspiring. Then, I had a couple of summer holiday jobs at the then DSIR, based at Grasslands in Palmerston North. I remember working in the Rhizobium lab run by Drs Barry Scott and Clive Ronson. I worked on a project with Dr Jim Patel isolating phage from Rhizobium loti and at the time, I thought, this is fantastic. I remember the feeling of enjoying going to work. It was interesting and I enjoyed the challenge of the work. And I thought, I can do this. I was their technical help but, at the time, I thought I could do what they were doing, designing experiments and conducting research. They inspired me to do science."

He completed an MSc in Microbiology at Massey University and then a PhD, followed by work abroad.

But that summer work experience at the DSIR stuck with him.

"It showed me that you can do something for a living that is interesting. That's almost like a hobby and you get paid for it. I like to find out new things and run experiments, and I enjoy the excitement of seeing the results and getting work published. That's one of the things I really enjoy, getting our science published. I was excited when my very first paper was published and still get a buzz when seeing recent papers appear in print."

Neil joined the Infectious Diseases group at AgResearch as a molecular biologist/immunologist in 1994.

"When I joined, I worked in the bovine tuberculosis immunology team for Dr Bryce Buddle. His leadership had a huge impact on me, and I look back with many great memories of my time working with him. He was a wonderful leader who sought to bring out the best in people and encouraged people to work to their strengths while seeking to develop."

Neil worked on the development of vaccines and diagnostics for the control of infectious diseases such as ovine pneumonia, mastitis, and mycobacterial diseases, bovine tuberculosis and Johne's disease.

He is currently the leader of the NZAGRC-RGP funded programme to develop a vaccine to reduce methane production in ruminants. The methane vaccine team's work is acknowledged as some of the most technically challenging and vital to the future of Aotearoa New Zealand farming. It is a truly interdisciplinary team, with scientists and technicians from the Infectious Diseases, Rumen Microbiology, Animal Nutrition and Physiology teams, with complementary skills in immunology, vaccinology, microbiology, molecular biology, structural biology, and bioinformatics. Neil's particular interest is in understanding antibody/protein interactions and antibody binding to methanogen cells to aid design and optimise vaccine antigens.

The team's work is being closely followed both here in New Zealand and by international collaborators.

"There's been considerable interest in investing more money and accelerating the programme and in pursuing international partnerships. You've got to have science credibility to attract good collaborations and international scientists to work with you. Getting papers published (despite commercial restrictions) has been great for our team as it builds morale and is especially important for the early career scientists. To that end, we have recently published some of the more fundamental aspects of our work, sharing methodologies to capture methanogens from the rumen using antibody coated magnetic beads and gaining an insight into antibody interactions with specific parts (epitopes) of methanogen proteins."

SCIENCE AREA

## Climate Change: Animal Science

With ruminants being a major source of greenhouse gases, our scientists seek ways to mitigate emissions, as well as develop animals that are better adapted to high temperature environments.

*Learn more about what we are doing in this area on our website by scanning this code.*

# Kairangahau: Oriwa Tamahou

Social scientist, Oriwa Tamahou, is sharing her knowledge with scientists and farmers to help them work better with Māori partners and use mātauranga Māori (indigenous knowledge) to help their land prosper.

Oriwa, a technician in our Māori Partnerships team, facilitates meetings with a community of researchers at AgResearch according to the maramataka (Māori lunar calendar) to share knowledge of tikanga and te ao Māori. Oriwa also contributes to soil revitalisation trials and help farmers understand and incorporate mātauranga Māori to heal damaged whenua.

Oriwa was born and raised in Rotorua, where she attended Rotorua Girls' High School. Her tūrangawaewae (place to stand and call home) is Maungapōhatu, Ruataahuna, and Te Urewera.

She graduated from Waikato University with a Bachelor of Social Sciences and is currently completing her master's degree at Te Whare Wānanga o Awanuiārangi. She describes social science as "a lot of reading, researching, and getting to know who you're working with."

Oriwa then applied for close to 50 internships, both nationally and internationally, and AgResearch was one that got back to her straight away.

Before her interview for a place in Te Puāwaitanga (AgResearch's Māori internship programme), Oriwa did some background research. She found plenty of science information but very little evidence of AgResearch's work within te ao Māori.

Oriwa got in touch with Louise Hennessy (Te Puāwaitanga programme co-ordinator) who "told me her backstory around how she started on the internship and she's been here for 10 years, and just to try it out."

Oriwa took Louise's advice and hasn't looked back.

The internship project, which Oriwa had shaped and structured with a kaupapa Māori approach, involved interviewing AgResearch's current or past Māori partners to understand their perspective on the working relationship. She found herself becoming more and more relevant within the organisation, finding that AgResearch had been and continues to be on a journey to committing to their role as Tiriti partners alongside Māori.

"From that, I produced a report that gave some recommendations for AgResearch staff to use internally, to help them in this space with working with Māori."

One of her key findings was that from a Māori perspective, the whanaungatanga (relationship

building) stage of a project is often rushed. Western project timelines rarely allow for the time it takes to build valuable relationships, with longevity in mind.

"The building and maintaining of relationships are the most important thing to consider when working with partners, whether Māori or not. The relationships you hold can lead to further, future endeavours.

"It is obvious when a researcher has built a strong relationship with Māori because they may be invited to other events run by these partners. It is in these settings that Māori may be willing to share mātauranga Māori that is typically held close to the chest."

After her internship in the summer of 2022, she was offered a full-time role in the Māori Research and Partnerships Group.

She is currently working on several projects, including Revitalise Te Taiao, a programme within the Our Land and Water National Science Challenge; a biosecurity project led by Māori which looks to empower hapū to be aware of potential biothreats and how to respond, according to hapū visions; the Māori research strategic plan within AgResearch; and the T-Platform, which is an internal group that supports transformative and transdisciplinary approaches adopted by our researchers.

One of the recommendations from her internship report was the need to set up an internal community within AgResearch so researchers can share experiences of working with Māori partners. As a result, she now runs a Community of Practice (CoP) which has grown to include over 80 researchers and scientists (called Ngā Manu Kai Miro).

Oriwa uses whakataukī to explain the kōrerorero (meaning) of the CoP name.

Ko te manu e kai ana i te miro, nōna te ngahere.
Ko te manu e kai ana i te mātauranga, nōna te ao –
The bird who feasts on the miro berry, theirs is the forest. The bird who feasts on knowledge, theirs is the world.

The CoP runs according to the maramataka, meaning that in certain moon phases it may not be an appropriate time to gather or to discuss particular topics. Each gathering observes tikanga, beginning with mihi (introductions) and starting and ending with karakia (blessings).

"I run the sessions by the different maramataka, the different moon phases, and I encourage the group to go out and find their own resources from the regions they reside in. There's been a couple of guest speakers, both external and internal speakers. And they're usually non-Māori scientists or researchers who share what went well, what didn't go so well, and what they learned from the different Māori entities that they're working with."

Another project Oriwa is involved in is Revitalise Te Taiao, which aims to use both mātauranga Māori and Western science to inform environmental restoration. There are three pilot trials in Taranaki, Wānaka, and Paeroa.

AgriSea, who are based in Paeroa, lead one of the pilots, called Rere ki Uta, Rere ki Tai. The trial involves ten dairy farms: five Māori-owned and five non-Māori owned. Farmers are experimenting with a natural seaweed fertiliser, AgriSea, to enhance the mana and mauri of the soil.

SCIENCE AREA

## Mātauranga Māori

We embrace mātauranga Māori by building understanding between science and Māori knowledge systems to enrich our science in a uniquely Aotearoa New Zealand way.

*Learn more about what we are doing in this area on our website by scanning this code.*

TE KAWANATANGA
Ā-RANGATŌPU

# Corporate Governance

# Our Board

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.

## 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 Chair of Waka Kotahi and Deputy Chair of Manaaki Whenua–Landcare Research.

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. I currently serve on the boards of Te Manawataki o Te Papa (Chair); AgResearch (Deputy Chair); Port Nelson and Origin Capital Partners. Previous governance appointments include Quotable Value. 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. I am a Chartered Member of the Institute of Directors and a member of Global Women.

## Jackie Lloyd
*Director, Chair–People and Culture Committee*

Jackie Lloyd is currently Chair of Naylor Love Enterprises Ltd, a director of CentrePort Limited, a board member of Te Papa Tongarewa and a trustee of the Lion Foundation. Previous governance appointments include New Zealand Post, Kiwi Group Holdings Limited, New Zealand Cricket and chair of Wellington Museums Trust. She is President and a Chartered Fellow of the Institute of Directors and a member of Global Women, Chapter Zero and the National Association of Women in Construction.

## 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 ceased his directorship on 30 June 2023.

## 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. These include Contact Energy, Te Waharoa Investments, Water Governance Board, Miro Berries, The Tindall Foundation, and The Prince's 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 Bachelors in Law.

## Mary-Anne Macleod
*Director*

Mary-Anne is a professional director and provides strategic advice, principally to local and central government agencies. She is currently on the boards of NIWA, the Environmental Protection Authority, DairyNZ, University of Waikato Council and Fire and Emergency New Zealand and has previously served on the boards of Bay Venues Limited and Quayside Holdings Ltd. She was the Chief Executive of the Bay of Plenty Regional Council for seven years. She has a Master of Science (Hons) in Earth Sciences and Geography.

## Jessie Chan MNZM
*Director*

Jessie joined the AgResearch Board on 1 June 2023. She has an Honours Degree in Animal Science and has worked in a range of primary sector management positions over a twenty-year period including Central Government, Local Government, non-profit and commercial organisations. She is currently a director of Oritain Global Ltd, NZPork, and the Centre for Climate Action Joint Venture. Jessie has completed the Fonterra Governance Development Programme and the Te Hono Bootcamp at Stanford University. She was awarded a Member of the NZ Order of Merit in 2022 for services to dairy and agriculture. She also received the Women in Governance Award for Inspiring Governance Leader in 2021, and Dairy Woman of the Year in 2017.

## Charles Taituha
*Board observer*

Charles has held many different roles within the farming industry from milking cows to working for Wrightson in the King Country. Charles's passion is to inspire others "who don't come from a traditional farming background or follow the traditional pathways into the industry" and "to uplift Māori participation in the sector, at all levels".

## 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 fulfill 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.

Jessie Chan was appointed to the Board in June 2023. She joins Mary-Anne MacLeod, Dr Louise Cullen, Jackie Lloyd, Rukumoana Schaafhausen, Kim Wallace and Board Chair Dr Paul Reynolds. Lain Jagger ceased as a director on 30 June 2023.

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

## 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 |
|---|---|---|
| Dr Paul Reynolds (Chair) | 8 | 3 |
| Kim Wallace (Deputy Chair, Chair–Audit and Risk Committee) | 9 | 5 |
| Jackie Lloyd (Chair–People and Culture Committee) | 9 | - |
| Dr Louise Cullen | 9 | - |
| Rukumoana Schaafhausen | 8 | - |
| Lain Jager | 9 | 4 |
| Mary-Anne Macleod | 9 | 5 |
| Jessie Chan | 1 | - |
| Number of meetings held | **10** | **5** |

# Statuatory 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 2023.

## Dividends

No dividends were declared during the year to 30 June 2023.

## Director Fees

| Board of Directors | 2023 | 2022 |
|---|---|---|
| Dr Paul Reynolds (Chair) | 73,315 | 73,315 |
| Kim Wallace | 50,286 | 50,286 |
| Jackie Lloyd | 40,944 | 40,944 |
| Dr Louise Cullen | 35,943 | 35,943 |
| Rukumoana Schaafhausen | 35,943 | 35,943 |
| Lain Jager | 35,943 | 35,943 |
| Mary-Anne Macleod | 35,943 | 14,976 |
| Jessie Chan | 2,995 | - |
| | $ 311,315 | $ 287,352 |

| Grasslanz Technology Limited | | |
|---|---|---|
| Robert John Hay (Chair) | 10,000 | 20,000 |
| Ian Boddy | 7,500 | 5,000 |
| Ian Boddy (Chair) | 12,500 | - |
| Elizabeth Gisela Harrison | 15,000 | - |
| Accrual reversal from FY22 | (1,875) | - |
| | $43,125 | $ 25,000 |
| Total | $ 354,440 | $ 312,353 |

## 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 2023 are set out in the table below. 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.

## AgResearch Interest List Financial Year '23

| Board of Directors | Director of | Trustee of | Shareholder of |
|---|---|---|---|
| REYNOLDS, Paul (Chair) | Landcare Research New Zealand Limited (Deputy Chair)<br>Waka Kotahi(Chair) | | |
| CHAN, Jessie | Centre for Climate Action Joint Venture<br>Gold Stream Farming Limited<br>Jenodam Investments Limited<br>NZPork<br>Oritain Global Limited<br>Riverstone Farming Limited | | Gold Stream Farming Limited<br>Jenodam Investments Limited<br>Oritain Global Limited<br>Riverstone Farming Limited |
| CULLEN, Louise | Acorn Goats Limited<br>Balachraggan Farms Limited<br>Capra Farming Limited<br>Cookson Trust Farms Limited<br>Tatua Co-operative Dairy Company Limited<br>Waikato Valley Cricket Association | Acorn Trust Limited | Ballance Agri-Nutrients Limited<br>Dairy Goat Co-operative (NZ) Limited<br>Fonterra Co-operative Group<br>Livestock Improvement Corporation Limited<br>Ravensdown Limited<br>Tatua Co-operative Dairy Company Limited |
| JAGER, Lain | Alphagen NZ Limited<br>Ārepa Holdings Limited<br>Avocado Oil New Zealand Limited<br>DMS Limited<br>Eastern Gold Limited<br>Hautupua GP Limited<br>Miro Limited<br>Nibblish GP Limited<br>NZ Natural Fibres<br>Olive Hill Limited<br>Origin Capital Partners Management Limited<br>Redwoods Outdoor Activities NZ Limited<br>RubsiCO Board<br>Spring Sheep Dairy NZ Management Limited<br>TreeQuest NZ Limited<br>Willows Rd Gold Limited | The Jager Family Trust | Nibblish GP Limited<br>Olive Hill Limited<br>Origin Capital Partners Management Limited<br>SLC Limited Partnership<br>Willows Rd Orchard |

| Board of Directors | Director of | Trustee of | Shareholder of |
|---|---|---|---|
| LLOYD, Jackie | CenterPort Limited<br>Museum of New Zealand Te Papa Tongarewa<br>National Council of the Institute of Directors in New Zealand Incorporated (President)<br>Naylor Love Limited (Chair) | Lion Foundation Limited | |
| MACLEOD, Mary-Anne | DairyNZ Inc<br>Fire and Emergency NZ Limited<br>Environmental Protection Authority Limited<br>MacMacleod Limited<br>Mirimo - Wellington Science City Governance Group<br>National Institute of Water and Atmospheric Research Limited | Araneacattus Family Trust | |
| SCHAAFHAUSEN, Rukumoana | Alvarium Investments (NZ) Limited<br>Contact Energy Limited<br>Department of Internal Affairs Strategic Advisory Committee<br>Equippers Church Trust<br>Kiwi Group Capital Limited<br>KGS Limited<br>Minstry of Housing and Urban Development's Strategjc Advisory Committee<br>Te Wharaoa Investments GP Limited<br>Water Governance Board, Waikato District Council | The Prince's Trust<br>The Tindall Foundation | Schaafhausen Inc Limited |
| TAITUHA, Charles (Board Observer) | CTT Holdings Limited t/a Te Tuara Agri | CTT Family Trust<br>Gladys May Cribb Whanau Trust<br>Hapimana Trust<br>Te Kukuwai o Kahuwera | CTT Family Trust |
| WALLACE, Kim | Kim Wallace Consulting Limited<br>Origin Capital Partners Management Limited (Audit Chair)<br>Port Nelson Limited (Finance and Risk Committee Chair)<br>Te Manawataki o Te Papa Limited (Chair)<br>Seahorse Beach Investments Limited | | Kim Wallace Limited<br>Seahorse Beach Investments Limited |

# Our Senior Leadership Team

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.

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
*Information Technology Director*

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

Chris Koroheke
*Urungi, Māori Strategy Director*

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.

Ariana Estoras
*Māori Research and Partnerships Director*

Ariana hails from Ngāti Uekaha and Ngāti Maniapoto. She has a master's degree in biochemistry. Her vision is to have the knowledge system of mātauranga Māori on an equal footing with western science and "build Māori capacity and beneficial Māori-centred research".

Dr Sara Edwards
*Research Operations Director*

Sara focuses on project delivery and how our portfolio of projects is strategically aligned to delivering AgResearch's Science Plan. Sara's background is in genetics and she has held leadership roles within AgResearch as Science Team Leader for Reproduction and as acting Science Group Leader for Animal Science.

Dr Marie Bradley
*Strategy and Communications Director*

Marie has a background in molecular biology and is an experienced government policy and strategy sector manager. Marie once worked for Plant and Food Research, MBIE, and held various operational and strategy roles at the Foundation for Research, Science and Technology.

Dr Dave Houlbrooke
*Research Capability Director*

Dave oversees and leads AgResearch's science capability in our four Science Groups – both personnel and science-based infrastructure and equipment. Dave's background is in Environmental Sciences including farm management practices for mitigating contaminant losses and treatment of dairy effluent and soil physical management.

Dr Axel Heiser
*Chief Scientist*

Axel's time is split between research as Principal Scientist and serving as Chief Scientist. As Chief Scientist, Axel is a member of the Senior Leadership Team and represents and advocates for AgResearch scientists and science internally and externally. Axel's own research is about providing solutions for animal health issues through understanding the immunology of animals, e.g., by developing novel diagnostics and vaccines. Axel is also involved in research about how food strengthens people's immune system.

# Statuatory reporting - Company

*For the year ended 30 June 2023*

## Remuneration greater than $100,000

During the year to 30 June 2023, 250 staff received remuneration of or exceeding $100,000 per annum, as shown in the table below.

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 | 38 | $ 210,000 to $ 219,999 | 1 |
| $ 110,000 to $ 119,999 | 45 | $ 220,000 to $ 229,999 | 1 |
| $ 120,000 to $ 129,999 | 37 | $ 230,000 to $ 239,999 | 2 |
| $ 130,000 to $ 139,999 | 29 | $ 250,000 to $ 259,999 | 1 |
| $ 140,000 to $ 149,999 | 34 | $ 260,000 to $ 269,999 | 2 |
| $ 150,000 to $ 159,999 | 19 | $ 270,000 to $ 279,999 | 1 |
| $ 160,000 to $ 169,999 | 12 | $ 280,000 to $ 289,999 | 1 |
| $ 170,000 to $ 179,999 | 7 | $ 310,000 to $ 319,999 | 2 |
| $ 180,000 to $ 189,999 | 8 | $ 380,000 to $ 389,999 | 1 |
| $ 190,000 to $ 199,999 | 3 | $ 410,000 to $ 419,999 | 1 |
| $ 200,000 to $ 209,999 | 4 | $ 550,000 to $ 559,999 | 1 |
| | | | 250 |

## Termination payments

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

| | 2023 | 2022 |
|---|---|---|
| Total amount paid | $ 335,491 | $407,677 |
| Number of employees | 8 | 11 |

## 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

## Donations

Donations paid during the year ended 30 June 2023 were $420.

## 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

AgResearch's 2022/2023–2026/2027 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 2022/2023–2026/2027 SCI.

| Science excellence | | FY23 Target | FY23 Result | FY22 Result | FY21 Result |
|---|---|---|---|---|---|
| **Strong collaboration, creativity and connectivity** | | | | | |
| Strong creative collaboration | People have easy access to colleagues to explore ideas or receive feedback | >70% favourable | 75% | Not reported | Not reported |
| | Increased engagement with open innovation across research levels | Achieved | Achieved | Not reported | Not reported |
| Collaborative peer-reviewed research outputs | Co-authorship with collaborators | >80% of journal papers | 83% | 91% | 87% |
| | Impact of scientific publications (mean citation score) * | 2.7 ** | 4.1 | 5.07 | 4.0 |
| **Contributing to research impact** | | | | | |
| Support Open Science | Draft and implement Open Access policy | Achieved | Achieved | Not reported | Not reported |
| | Launch new Output Management System to enable Green Open Access | Achieved | Achieved | Not reported | Not reported |
| Drive and demonstrate research impact | Continue to grow impact-enabling capability and culture | Achieved | Achieved | Achieved | Not reported |
| | Increase independent evidence-based research impact analyses | 15 | 9 | 12 | Not reported |
| | Commercial reports per scientist FTE * | 1.0 | 1.1 *** | 1.11 | 1.2 |

* KPIs for FY21-23 have been updated to reflect the reporting parameters outlined by MBIE.

** By signing DORA, AgResearch made a public commitment to valuing the scientific content of a paper over and above any publication metrics or journal indices. The Metrics Toolkit (https://www.metrics-toolkit.org/metrics/citations_articles/) advises, "Citation counts should never be interpreted as a direct measure of research quality." We request that MBIE reconsiders its requirement to report this metric in light of this information.

*** This figure is based on an estmate of FY23 publication outputs.

## Partnerships

| | | FY23 Target | FY23 Result | FY22 Actual | FY21 Actual |
|---|---|---|---|---|---|
| **Influence and meet stakeholder and partner needs** | | | | | |
| Shape stakeholder and partner strategy | Understanding of, and contribution to, stakeholder/ partner strategy | >70% favourable | Not available | 86% | Not reported |
| Strong relationships with stakeholders and partners | Preference to work with AgResearch | >70% | Not available | 67% | Not reported |
| **Partnerships and collaborations for a future science agenda** | | | | | |
| Continue to build global science collaboration and reputation | Refresh our strategic research relationships | Achieved | In progress | Not reported | Not reported |
| Influenced by international experts | Continue to consult and act on the advice of our International Science Advisory Panel | Achieved | Achieved | Not reported | Achieved |
| Strong investment in our research | Revenue per FTE from all sources * | $ 254.0k | $ 266.2k | $ 242.3k | $ 265.0k |
| | Revenue per FTE from industry * | $ 133.8k | $ 135.1k | $ 95.0k | $ 95.3k |

## Mātauranga Māori

| | | FY23 Target | FY23 Result | FY22 Actual | FY21 Actual |
|---|---|---|---|---|---|
| **Adopt a Tiriti-led approach** | | | | | |
| Build trusted relationships with clear expectations | Create a common vision with partners from government, industry, science and Māori | Achieved | Achieved | Not reported | Not reported |
| Our research and enabling services contribute to Māori-centred and kaupapa Māori solutions | Preference to work rating by our Māori partners | >60% | Not available | 62% | Not reported |
| Invest directly in our Māori partners to co-lead research direction and agenda | Increase Enabling Māori Strategic Science Investment Fund (SSIF) allocation | $ 4.4m | $ 4.8m | $ 2.2m | Not reported |
| **Continue to develop te ao Māori capability and capacity** | | | | | |
| Build pipeline of Māori engaged in science | Continue Te Puawaitanga internship programme | Achieved | Achieved | Achieved | Not reported |
| | Invest SSIF to build capability of research Māori research and advisory staff and Māori partners | Achieved | Achieved | Not reported | Not reported |
| Developing our people's capabilities and confidence with Te Ao Māori | Strong participation in our kaupapa Māori cultural development programme | >50% | 58% | Not reported | Not reported |
| AgResearch is empowering appropriately resourced Māori partners to achieve their social, environmental, cultural and economic aspirations through four Kaupapa Māori research projects by 2027 | Initiate co-led co-design activities with Māori partners | Achieved | Achieved | Achieved | Not reported |

| Smart investments | | FY23 Target | FY23 Actual | FY22 Actual | FY21 Actual |
|---|---|---|---|---|---|
| **Our People** | | | | | |
| Staff wellbeing actively promoted and supported | Implementation of our Toi Ora Framework to enhance our people's wellbeing | Achieved | Achieved | Not reported | Not reported |
| Strong health and safety culture | Wide recording of safety observations | 200 | >200 | Not reported | Not reported |
| | No notifiable injuries and <2 notifiable events | 0, <2 | 0, 0 | 0, 0 | Achieved |
| | My Manager shows by his or her behaviour a commitment to Health and Safety | >90% | 91% | 89% | |
| Employee experience | Strong Engagement Index | >70% | 74% | 71% | 71% |
| | Strong staff participation in staff engagement survey across each team | >70% | 83% | 77% | |
| Workforce stability and retention | Stable annual people turnover | <10% | 9.9% | 9.6% | |
| Fair and equitable recruitment and reward | Recruitment and remuneration policies and practices refreshed | Achieved | Achieved | Not reported | Not reported |
| | Gender pay gap reduced | <13.9% | 14.3% | Not reported | Not reported |
| | Commitment to pay gap reporting in our Annual Report | Achieved | Achieved | No reported | Not reported |
| Recognise and reward the wider range of skills and knowledge that enable science excellence | Co-design and implement refreshed Career Descriptor framework | Achieved | In progress | Not reported | Not reported |
| **Sustainability** | | | | | |
| Develop and implement sustainability strategy | Develop and implement emissions reduction plan | Achieved | In progress | Not reported | Not reported |
| **Infrastructure** | | | | | |
| Building infrastructure supporting creativity, collaboration, and delivery | Structure and external cladding on the new Lincoln workplace and laboratory buildings are complete | Achieved | Achieved | Not reported | Not reported |
| Enact our digital transformation | Progress implementation as outlined in Te Mahere Matihiko (the Digital Blueprint) | Achieved | Achieved | Not reported | Not reported |
| Investment in infrastructure for the future | Refresh capital investment driven by 5-year horizon Science Capex Plan | Achieved | Achieved | Not reported | Not reported |

PŪRONGO PŪTEA

# Financials

# Financial performance indicators

*For the year ended 30 June 2023*

| Cash flow | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|
| Net cash flow from operating activities $k | **3,445** | (948) | 16,107 |
| Net cash flow from investing activities $k | **(55,440)** | (84,097) | (27,948) |
| Net cash flow from financing activities $k | **27,734** | 28,168 | 13,167 |
| Total net cash flow $k | **(24,261)** | (56,877) | 1,326 |
| Effect of exchange rate changes $k | **(39)** | - | - |
| Cash at the beginning of the year $k | **97,168** | 108,532 | 95,842 |
| Cash at the end of the year $k | **72,907** | 51,655 | 97,168 |

| | | | |
|---|---|---|---|
| Operating margin % | **7.3%** | 9.6% | 7.4% |
| Operating margin per FTE $k | **19.1** | 24.2 | 17.7 |
| Revenue growth % | **13.6%** | 5.9% | (5.9%) |
| Quick ratio | **3.7** | 2.5 | 5.0 |
| Interest coverage | **15.9** | 23.1 | 14.5 |
| Operating margin volatility % | **76.2%** | 70.4% | 76.3% |
| Forecasting risk % | **2.9%** | 0.0% | 3.3% |
| Adjusted return on equity % | **0.8%** | 0.0% | (0.8%) |
| Capital renewal | **3.9** | - | 2.0 |
| Equity ratio % | **72.8%** | 72.2% | 70.2% |

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 2023*

| in thousands of New Zealand dollars | Note | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|---|
| **Revenue** | | | | |
| Ministry of Business, Innovation and Employment | | | | |
| Strategic science funding | 1 | **44,963** | 44,963 | 44,963 |
| Our Land and Water National Challenge | 1 | **7,491** | 6,945 | 12,830 |
| Other | 1 | **11,083** | 10,355 | 14,614 |
| Commercial | 1 | **90,216** | 93,708 | 61,360 |
| Farm produce | 1 | **4,411** | 5,486 | 5,175 |
| Other revenue | 1 | **19,614** | 16,477 | 17,593 |
| Total operating revenue | | **177,778** | 177,934 | 156,535 |
| | | | | |
| Operating expenditure | 2 | **(180,454)** | (176,353) | (156,141) |
| Other gains/(losses) | 3 | **5,129** | (800) | (101) |
| Finance costs | 4 | **(797)** | (733) | (802) |
| Share of deficit of associates | 5 | **(433)** | - | (897) |
| Surplus/(deficit) before tax | | **1,223** | 48 | (1,406) |
| Tax expense/(benefit) | 6 | **(403)** | - | (165) |
| Net surplus/(deficit) after tax for the year | | **1,626** | 48 | (1,241) |
| | | | | |
| **Other comprehensive income** | | | | |
| *Items that will not be reclassified subsequently to surplus or deficit:* | | | | |
| Revaluation of properties | 8 | **6,430** | - | 20,909 |
| Income tax relating to components of other comprehensive income | 6 | **(1,461)** | - | (3,519) |
| **Other comprehensive income for the year net of tax** | | **4,969** | - | 17,390 |
| | | | | |
| **Total comprehensive income for the year net of tax** | | **6,595** | 48 | 16,149 |
| | | | | |
| **Net surplus/(deficit) is attributable to:** | | | | |
| **Equity holders of the parent** | | **1,626** | 48 | (1,241) |
| | | | | |
| **Total comprehensive income is attributable to:** | | | | |
| **Equity holders of the parent** | | **6,595** | 48 | 16,149 |

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 2023*

| in thousands of New Zealand dollars | Note | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|---|
| **Current assets** | | | | |
| Cash and cash equivalents | | **10,907** | 8,965 | 17,168 |
| Short term investments | | **62,000** | 42,690 | 80,000 |
| Trade and other receivables | 10 | **37,497** | 36,022 | 29,799 |
| Prepayments | | **3,646** | 4,351 | 3,575 |
| Loan receivable | 13 | **-** | - | 2,038 |
| Biological assets - livestock | 12 | **3,773** | 4,106 | 4,058 |
| Inventory | | **1,608** | 1,152 | 1,021 |
| Property held for sale | | **-** | - | 75 |
| Current tax | 6 | **27** | 1,094 | 139 |
| **Total current assets** | | **119,458** | 98,380 | 137,873 |
| | | | | |
| **Non-current assets** | | | | |
| Future tax benefit | 6 | **804** | - | - |
| Investments in associates and joint ventures | 5 | **5,443** | 5,726 | 5,347 |
| Other investments | 16 | **4,487** | 2,205 | 2,205 |
| Property, plant and equipment | 8 | **311,654** | 290,911 | 254,743 |
| Biological assets - forestry | 15 | **1,398** | 1,275 | 1,275 |
| Intangible assets | 9 | **2,098** | 1,826 | 2,179 |
| Right-of-use assets | 14 | **21,424** | 19,802 | 22,196 |
| **Total non-current assets** | | **347,308** | 321,745 | 287,945 |
| | | | | |
| **Total assets** | | **466,766** | 420,125 | 425,818 |
| | | | | |
| **Less:** | | | | |
| **Current liabilities** | | | | |
| Trade and other payables | 11 | **75,276** | 60,609 | 72,890 |
| Employee entitlements | 19 | **6,850** | 7,583 | 6,380 |
| Lease liabilities | 17 | **1,883** | 3,174 | 2,164 |
| Other current liabilities | | **-** | - | 137 |
| **Total current liabilities** | | **84,009** | 71,366 | 81,571 |

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

| in thousands of New Zealand dollars | Note | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|---|
| Non-current liabilities | | | | |
| Deferred tax | 6 | **18,549** | 13,133 | 16,368 |
| Lease liabilities | 17 | **20,880** | 19,297 | 21,085 |
| Other non-current liabilities | 20 | **328** | 329 | 387 |
| Total non-current liabilities | | **39,757** | 32,759 | 37,840 |
| | | | | |
| Total liabilities | | **123,766** | 104,125 | 119,411 |
| | | | | |
| Net assets | | **343,000** | 316,000 | 306,406 |
| | | | | |
| Equity | | | | |
| Share capital | 7 | **92,268** | 92,268 | 62,268 |
| Revaluation reserves | 7 | **118,917** | 96,067 | 113,948 |
| Retained earnings | | **131,815** | 127,665 | 130,189 |
| Total equity | | **343,000** | 316,000 | 306,406 |

Dr Paul Reynolds
Chair
4 September 2023

Kim Wallace
Deputy Chair
4 September 2023

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 2023*

| in thousands of New Zealand dollars | Note | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|---|
| **Cash received from operating activities** | | | | |
| Receipts from customers | | **163,985** | 168,554 | 162,589 |
| Interest received | | **2,735** | 580 | 1,212 |
| Dividends received | | **139** | - | 114 |
| **Total cash received from operating activities** | | **166,859** | 169,134 | 163,915 |
| | | | | |
| **Cash disbursed on operating activities** | | | | |
| Payments to employees | | **72,669** | 73,451 | 69,561 |
| Payments to suppliers | | **90,377** | 98,511 | 74,372 |
| Restructuring | | **-** | - | 124 |
| Income tax paid | | **(429)** | (2,613) | 2,963 |
| Interest paid | | **797** | 733 | 788 |
| **Total cash disbursed on operating activities** | | **163,414** | 170,082 | 147,808 |
| | | | | |
| **Net cash flow from operating activities** | 22 | **3,445** | (948) | 16,107 |
| | | | | |
| **Cash received from investing activities** | | | | |
| Disposal of property, plant and equipment | | **86** | - | 25 |
| Disposal of investments and intangible assets | | **5,213** | - | 2 |
| **Total cash received from investing activities** | | **5,299** | - | 27 |
| | | | | |
| **Cash disbursed on investing activities** | | | | |
| Investment in property, plant and equipment | | **60,209** | 82,727 | 26,346 |
| Purchase of other investments and intangible assets | | **500** | 570 | 1,629 |
| Partner contribution to research consortiums | | **30** | 800 | - |
| **Total cash disbursed on investing activities** | | **60,739** | 84,097 | 27,975 |
| | | | | |
| **Net cash flow from investing activities** | | **(55,440)** | (84,097) | (27,948) |
| | | | | |
| **Cash received from financing activities** | | | | |
| Capital drawdown | 7 | **30,000** | 30,000 | 15,000 |
| **Total cash received from financing activities** | | **30,000** | 30,000 | 15,000 |
| | | | | |
| **Cash disbursed on financing activities** | | | | |
| Loan to associates/joint ventures | | **140** | - | - |
| Repayment of the lease liabilities | | **2,126** | 1,832 | 1,833 |
| **Total cash disbursed on financing activities** | | **2,266** | 1,832 | 1,833 |
| | | | | |
| **Net cash flow from financing activities** | | **27,734** | 28,168 | 13,167 |
| | | | | |
| **Total net cash flow** | | **(24,261)** | (56,877) | 1,326 |
| Cash at beginning of year | | **97,168** | 108,532 | 95,842 |
| **Cash at end of year** | | **72,907** | 51,655 | 97,168 |

## Consolidated statement of changes in equity

*For the year ended 30 June 2023*

| in thousands of New Zealand dollars | Note | Share capital | Revaluation reserves, property, plant and equipment | Retained earnings | Total equity |
|---|---|---|---|---|---|
| Balance at 1 July 2021 | | 47,268 | 96,558 | 131,430 | 275,256 |
| Issue of new shares | 7 | 15,000 | - | - | 15,000 |
| Profit/(loss) after tax for the year | | - | - | (1,241) | (1,241) |
| Revaluation of properties | 8 | - | 20,909 | - | 20,909 |
| Income tax relating to components of other comprehensive income | 6 | - | (3,519) | - | (3,519) |
| Total comprehensive income | | 15,000 | 17,390 | (1,241) | 31,149 |
| | | | | | |
| Balance at 30 June 2022 | | 62,268 | 113,948 | 130,189 | 306,406 |
| | | | | | |
| Balance at 1 July 2022 | | 62,268 | 113,948 | 130,189 | 306,406 |
| Issue of new shares | 7 | 30,000 | - | - | 30,000 |
| Profit/(loss) after tax for the year | | - | - | 1,626 | 1,626 |
| Revaluation of properties | 8 | - | 6,430 | - | 6,430 |
| Income tax relating to components of other comprehensive income | 6 | - | (1,461) | - | (1,461) |
| Total comprehensive income | | 30,000 | 4,969 | 1,626 | 36,594 |
| | | | | | |
| Balance at 30 June 2023 | | 92,268 | 118,917 | 131,815 | 343,000 |

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

# Statement of accounting practices

*For the year ended 30 June 2023*

## Reporting entity

AgResearch Limited is a Crown Research Institute, its principal activity is research and development in the pastoral sector of New Zealand. The consolidated financial statements of AgResearch Limited and its subsidiaries, associates and joint arrangement interests (together referred to as "the Group") have been prepared in accordance with the requirements of the Companies Act 1993, the Financial Reporting Act 2013, the Crown Research Institutes Act 1992, the Crown Entities Act 2004 and the Public Finance Act 1989.

## Basis of preparation

The financial statements have been prepared in accordance with New Zealand Generally Accepted Accounting Principles (GAAP). 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 financial statements are presented in New Zealand dollars rounded to the nearest thousand. The financial statements were authorised for issue by the directors on 4 September 2023.

Estimates and judgements which are considered material to understand the performance of AgResearch are found in the following notes:

- Revenue: Note 1
- Property, plant and equipment: Note 8

## Basis of consolidation

The financial statements of members of the Group are prepared for the same reporting period as AgResearch Limited, using consistent accounting policies.

In preparing The Group's financial statements, intra-group balances, and any unrealised income and expenses arising from intra-group transactions, are eliminated. Unrealised gains arising from transactions with equity accounted investees are eliminated against the investment to the extent of AgResearch's interest in the investee. Unrealised losses are eliminated in the same way as unrealised gains, but only to the extent that there is no evidence of impairment.

## 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.

## 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.

## 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.

## The Group as 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.

## Budget figures

The unaudited 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 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. There were no changes to accounting policies in the 2023 year.

## 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.

## Comparatives

Where necessary, comparative figures have been adjusted to confirm current disclosures and reclassification of balances.  This has not resulted in any adjustment to net assets or retained earnings.

# Notes to and forming part of the consolidated financial statements

*For the year ended 30 June 2023*

## 1 Revenue

### 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 intellectual property 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 effort (i.e., cost of 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. Under these contracts, the Group provides hosting services (i.e., coordinating the selection of third parties and managing the delivery of the contract). The Group determined that it does not control the service, and it does not obtain benefits from the services performed, therefore it is an agent in these contracts.

- Government grants

  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*. The Fund is recognised as revenue 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.

- 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. These contracts are typically determined to have one single performance obligation that is integrated and 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.

Commercial 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 liability for the difference. There is not considered to be a significant financing component in 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

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

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Other revenue | | |
| Interest | 3,203 | 1,184 |
| Dividends | 139 | 114 |
| Royalties | 11,754 | 12,399 |
| Operating lease income | 4,518 | 3,896 |
| | 19,614 | 17,593 |

## 2 Operating expenditure

| in thousands of New Zealand dollars | Note | 2023 | 2022 |
|---|---|---|---|
| **Employee related** | | | |
| Salary and wages | | **71,570** | 67,128 |
| Superannuation contribution | | **2,002** | 1,870 |
| | | | |
| **Operational** | | | |
| Amortisation and impairment of intangible assets | 9 | **286** | 498 |
| Depreciation | 8 | **11,664** | 11,498 |
| Depreciation of right-of-use assets | 14 | **2,412** | 2,226 |
| Short-term and low-value lease expenses | | **264** | 220 |
| Other operating expenses | | **27,699** | 22,299 |
| Science third party sub-contracts | | **39,689** | 26,414 |
| Site and property expenses | | **7,898** | 6,943 |
| Supplies | | **13,612** | 14,162 |
| | | | |
| **Financial and administration** | | | |
| Auditor's remuneration - for services as auditor * | | **381** | 356 |
| Bad debts | | **1** | 34 |
| Change in provision for expected credit loss | | **(8)** | 6 |
| Directors' fees | | **354** | 314 |
| Donations | | **-** | 2 |
| Financial and legal expenses | | **2,630** | 2,171 |
| | | **180,454** | 156,141 |

* The total audit fee for FY23 is $381k; this comprises of AgResearch audit fee of $337k, Office of the Auditor-General Audit Standards and Quality Support Charge contribution of $35k (2022: $27k), audit remuneration related to other subsidiaries of $5k (2022: $4.9k) and prior period Deloitte fees of $3.8k (2022:$7.8k). The total FY23 audit fee does not include the accrual of the technology disbursement charge of 2% of $6.7k

## 3 Other gains/(losses)

| in thousands of New Zealand dollars | Note | 2023 | 2022 |
|---|---|---|---|
| Net gain/(loss) from foreign currency exchange | | **39** | 8 |
| Net gain/(loss) on sale of property, plant and equipment | | **(37)** | 8 |
| Net gain (loss) on sale of non-current assets held for sale | | **-** | (30) |
| Net gain (loss) on sale of subsidiaries | | **-** | 169 |
| Net gain (loss) on sale of intangible assets | | **5,211** | - |
| Net gain (loss) on sale of software | | **(48)** | (204) |
| Change in fair value of other investments | | **-** | (355) |
| Change in fair value of forestry | 15 | **123** | 33 |
| Change in fair value of livestock | 12 | **(98)** | 548 |
| (Impairment) / write ups of property, plant and equipment | 8 and 9 | **(139)** | (212) |
| Land compensation | | **-** | 12 |
| Impairment of investments | 16 | **78** | (78) |
| | | **5,129** | (101) |

## 4 Finance cost

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Interest expense on lease liabilities | **775** | 796 |
| Other interest expense | **22** | 6 |
| | **797** | 802 |

## 5 Investments in associates and joint ventures

Associates are those entities in which the Group has significant influence, but not control, over the financial and operating policies. Joint ventures are those arrangements in which the Group has contractually agreed joint control and has rights to the net assets of the venture rather than having rights to assets and obligations for its liabilities. Associates and joint ventures are accounted for using the equity method (equity accounted investees).

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.

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.

| Associate company | Balance Date | % of ownership interest and voting power held by the group 2023 | 2022 | Principal activity |
|---|---|---|---|---|
| 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 |

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.

### Summarised financial information for associates and joint ventures

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Share of profit/(loss) from continuing operations and total comprehensive income | **(433)** | (897) |
| Share of total comprehensive income | **(433)** | (897) |
| | | |
| Aggregate carrying amount of the Group and company's interest in the associate investments | **5,428** | 5,330 |
| Aggregate carrying amount of the Group and company's interest in the joint ventures | **15** | 17 |
| | **5,443** | 5,347 |

## 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; or
- Arises from the initial accounting for a business combination, in which case it is taken into account in the determination of goodwill or excess.

Tax expense comprises:

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Current tax expense | 194 | 485 |
| Adjustments recognised in relation to the current tax of prior years | (511) | (296) |
| Deferred tax expense relating to the origination and reversal of temporary differences | (697) | (664) |
| Adjustments recognised in relation to deferred tax of prior years | 611 | 309 |
| **Total tax expense/(benefit)** | **(403)** | (165) |

The total charge for the year can be reconciled to the accounting profit as follows:

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Gain (loss) from continuing operations | 1,223 | (1,406) |
| Income tax expense calculated at 28% | 343 | (394) |
| Origination and reversal of temporary differences | 236 | 235 |
| Effect of income that is non-assessable | (1,141) | 162 |
| Effect of foreign taxes paid | 18 | - |
| Associates' results reported net of tax | 41 | (182) |
| | (503) | (179) |
| Adjustments recognised in the current year in relation to the current and deferred tax of prior years | 100 | 14 |
| **Income tax expense/(benefit) recognised in profit or loss** | **(403)** | (165) |

Current tax assets and liabilities

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| **Current tax assets** | | |
| Tax refund/receivable | 27 | 139 |
| | 27 | 139 |

Deferred tax assets/(liabilities) arise from the following:

| in thousands of New Zealand dollars | Opening balance | Charged to surplus | Charged to other comprehensive income | Closing balance |
|---|---|---|---|---|
| 2023 | | | | |
| Temporary differences | | | | |
| Biological assets | (803) | 84 | - | (719) |
| Property, plant and equipment | (17,866) | (190) | (1,461) | (19,517) |
| Intangible assets | 772 | (8) | - | 764 |
| Provisions | 1,415 | (492) | - | 923 |
| | (16,482) | (606) | (1,461) | (18,549) |
| Unused tax losses and credits | | | | |
| Tax losses | 114 | 690 | - | 804 |
| | (16,368) | 84 | (1,461) | (17,745) |
| 2022 | | | | |
| Temporary differences | | | | |
| Biological assets | (667) | (136) | - | (803) |
| Property, plant and equipment | (14,899) | 552 | (3,519) | (17,866) |
| Intangible assets | 683 | 89 | - | 772 |
| Provisions | 1,296 | 119 | - | 1,415 |
| | (13,587) | 624 | (3,519) | (16,482) |
| Unused tax losses and credits | | | | |
| Tax losses | 304 | (190) | - | 114 |
| | (13,283) | 434 | (3,519) | (16,368) |

Income tax recognised directly in other comprehensive income:

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Revaluation of properties | (1,461) | (3,519) |
| Total income tax recognised directly in other comprehensive income | (1,461) | (3,519) |

## 7 Equity

### Share capital

Capital consists of 92,268,000 fully paid ordinary shares of $1.00 each (2022): 62,268,000 fully paid ordinary shares. The increase in share capital this year relates to the second of two capital contributions from the Crown amounting to $30m; comprising 30,000,000 ordinary shares of $1.00 each. (2022: $15m, comprising 15,000,000 ordinary shares of $1.00 each). The purpose of the $45m capital contribution is to provide funding to progress the build of the new scientific research facility and corporate headquarters for AgResearch in Lincoln.

### 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 three 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 1.5-15 years.

### Fair value measurement of the Group's land, land improvements and buildings

The Group's land and buildings are stated at their "Fair Value" as defined in NZ IFRS 13, being the price that would be received on sale of the asset, less any subsequent depreciation and impairments.

The 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 and farm assets have been classified by Colliers International as non-specialised assets and have, therefore, been assigned a market-based value.

The Group acquired 1.49 hectares of land from Lincoln University on the corner of Springs Road and Ellesmere Junction Road for $1.00 in 2020. Due to restrictions in place over this land, management has determined this to be its fair value.

| in thousands of New Zealand dollars | Land and Land Improvements[1] | Buildings[1] | Leasehold Improvements[2] | Plant & Equipment[2] | Vehicles[2] | Capital Work-in Progress[2] | Total |
|---|---|---|---|---|---|---|---|
| **2023** | | | | | | | |
| Balance at beginning of year | 76,602 | 124,760 | 166 | 19,284 | 241 | 33,690 | 254,743 |
| Additions | 526 | 914 | 33 | 7,600 | 25 | 53,320 | 62,418 |
| Disposals | (18) | (4) | - | (108) | (4) | - | (134) |
| Revaluation | 1,087 | 5,343 | - | - | - | - | 6,430 |
| Impairments | (185) | 46 | - | - | - | - | (139) |
| Depreciation | (794) | (5,256) | (20) | (5,539) | (55) | - | (11,664) |
| Transfer from Capital Work-in-Progress | - | 225 | - | 2,619 | - | (2,844) | - |
| **Balance at end of year** | 77,219 | 126,028 | 179 | 23,856 | 207 | 84,165 | 311,654 |
| | | | | | | | |
| Cost or valuation | 77,241 | 126,312 | 740 | 73,063 | 661 | 84,165 | 362,182 |
| Accumulated depreciation | (22) | (284) | (561) | (49,207) | (454) | - | (50,528) |
| **Balance at end of year** | 77,219 | 126,028 | 179 | 23,856 | 207 | 84,165 | 311,654 |
| | | | | | | | |
| **2022** | | | | | | | |
| Balance at beginning of year | 69,101 | 116,343 | 166 | 21,691 | 207 | 9,038 | 216,546 |
| Additions | 273 | 797 | 13 | 3,275 | 80 | 24,652 | 29,090 |
| Disposals (including transfer to leased assets) | - | (34) | - | (58) | - | - | (92) |
| Revaluations | 8,342 | 12,567 | - | - | - | - | 20,909 |
| Impairments | (342) | 130 | - | - | - | - | (212) |
| Depreciation | (772) | (5,043) | (13) | (5,624) | (46) | - | (11,498) |
| **Balance at end of year** | 76,602 | 124,760 | 166 | 19,284 | 241 | 33,690 | 254,743 |
| | | | | | | | |
| Cost or valuation | 76,620 | 125,006 | 708 | 117,929 | 751 | 33,690 | 354,704 |
| Accumulated depreciation | (18) | (246) | (542) | (98,645) | (510) | - | (99,961) |
| **Balance at end of year** | 76,602 | 124,760 | 166 | 19,284 | 241 | 33,690 | 254,743 |

[1] Assets are stated at their Fair Value
[2] Assets are stated at their cost

The Group's assets[1] were revalued during the year resulting in a net increase of assets of $6,291k (2022: $20,697k)

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Through the asset revaluation reserve | **6,430** | 20,909 |
| Through the profit and loss | **(139)** | (212) |
| | **6,291** | **20,697** |

[1] Assets are stated at their Fair Value

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 | 2023 | 2022 |
|---|---|---|
| Land and land improvements | **22,490** | 22,299 |
| Buildings | **85,886** | 86,747 |

## 9 Intangible assets

### Purchased intangible assets

Purchased intangible assets such as intellectual property, patents, access rights, 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 2.5 and 20 years. The estimated useful life and amortisation method is reviewed at the end of each annual reporting period. Emission trading units are recorded at cost and are not amortised as they are considered to have an unlimited useful life.

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.

Access rights relate to an agreement between the Group and Massey University whereby the Group has access to the Dairy Research Farm and associated research facilities in the Manawatu for a period of 20 years from 1 July 2020. This is aligned with both parties desire to encourage synergies and closer collaborative working between their respective agricultural and dairy research activities with a view to enhancing the value each organisation can add to New Zealand through research, science and technology.

### 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).

### 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 | Emission Trading Units | Access Rights | Total |
|---|---|---|---|---|
| **2023** | | | | |
| Balance at beginning of year | **338** | **41** | **1,800** | **2,179** |
| Additions | **253** | **-** | **-** | **253** |
| Disposal | **(48)** | **-** | **-** | **(48)** |
| Amortisation | **(186)** | **-** | **(100)** | **(286)** |
| **Balance at end of year** | **357** | **41** | **1,700** | **2,098** |
| | | | | |
| Cost | **1,469** | **41** | **2,000** | **3,510** |
| Accumulated depreciation | **(1,112)** | **-** | **(300)** | **(1,412)** |
| **Balance at end of year** | **357** | **41** | **1,700** | **2,098** |
| | | | | |
| **2022** | | | | |
| Balance at beginning of year | 1,565 | 47 | - | 1,612 |
| Additions | 101 | - | 2,000 | 2,101 |
| Disposal arising from sale of subsidiary | (832) | - | - | (832) |
| Impairment | (204) | - | - | (204) |
| Amortisation | (292) | (6) | (200) | (498) |
| **Balance at end of year** | 338 | 41 | 1,800 | 2,179 |
| | | | | |
| Cost | 8,883 | 1,631 | 2,000 | 12,514 |
| Accumulated depreciation | (8,545) | (1,590) | (200) | (10,335) |
| **Balance at end of year** | 338 | 41 | 1,800 | 2,179 |

## 10 Trade and other receivables

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Trade receivables not past due | **11,447** | 14,138 |
| Past due 1 - 30 days | **11,344** | 4,360 |
| Past due more than 30 days | **2,807** | 1,737 |
| Less provision for impairment in receivables | **(4)** | (12) |
| **Net trade receivables** | **25,594** | 20,223 |
| | | |
| Accrued income and other receivables | **11,809** | 9,518 |
| Receivables from associates | **94** | 58 |
| **Total trade and other receivables** | **37,497** | 29,799 |

The fair value of trade and other receivables is approximately equal to their carrying value. Terms of trade vary according to individual customer contracts. As at 30 June 2023, trade receivables of $2,807k (2022: $1,737k) were past due. These relate to a number of independent customers for whom there is no recent history of defaults.

A provision for the impairment of receivables is established using simplified expected credit losses model which uses a lifetime expected loss allowance for all trade receivables.

## 11 Trade and other payables

Trade payables and other 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.

A provision is recognised when the Group has a legal or constructive obligation as a result of a past event, it is probable that an outflow of economic benefits will be required to settle the obligation, and the provision can be reliably measured.

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.

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Trade payables | **22,256** | 16,681 |
| Income in advance | **52,822** | 55,135 |
| Provisions | **198** | 1,074 |
| **Total payables** | **75,276** | 72,890 |

### Financial risk management strategies

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

## 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.

### 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.

| in thousands of New Zealand dollars | Sheep | Beef cattle | Dairy cattle | Deer | Total |
|---|---|---|---|---|---|
| **2023** | | | | | |
| **Reconciliation of changes in the carrying value** | | | | | |
| Balance at beginning of year | **1,129** | **757** | **1,649** | **524** | **4,058** |
| Increases due to acquisitions | **345** | **531** | **46** | **-** | **922** |
| Decreases due to sales | **(1,079)** | **(791)** | **(302)** | **(209)** | **(2,381)** |
| Net increase due to births, growth and deaths | **743** | **40** | **308** | **181** | **1,272** |
| Changes in fair value less estimated point-of-sale costs | **(33)** | **19** | **(95)** | **11** | **(98)** |
| **Balance at end of year** | **1,105** | **556** | **1,606** | **507** | **3,773** |
| | | | | | |
| ***Quantity of livestock at end of year*** | **7,133** | **651** | **1,062** | **921** | |
| | | | | | |
| **2022** | | | | | |
| **Reconciliation of changes in the carrying value** | | | | | |
| Balance at beginning of year | 1,121 | 916 | 1,445 | 350 | 3,832 |
| Increases due to acquisitions | 189 | 273 | 9 | - | 471 |
| Decreases due to sales | (898) | (851) | (285) | (103) | (2,137) |
| Net increase due to births, growth and deaths | 687 | 266 | 265 | 127 | 1,345 |
| Changes in fair value less estimated point-of-sale costs | 30 | 153 | 215 | 150 | 548 |
| **Balance at end of year** | 1,129 | 757 | 1,649 | 524 | 4,058 |
| | | | | | |
| ***Quantity of livestock at end of year*** | 7,190 | 863 | 1,009 | 1,069 | |

## 13 Loan receivable

There is no loan receivable for the 2023 financial year (2022: $2,038k). The loan receivable in the 2022 financial statements represented the consideration payable by Farm IQ Systems Limited for the purchase of Farmax (a previously held subsidiary of AgResearch Limited) on 1 September 2021 plus 6% interest for the 10 month period to 30 June 2022. At 28 September 2022, AgResearch Limited converted the loan receivable to 7,650,305 shares in Farm IQ Systems Limited.

## 14 Right-of-use assets

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.

Right of use assets are initially measured at cost. This comprises the initial amount of the lease liability adjusted for any lease payments made at or before the commencement date, plus any initial direct costs incurred, less any lease incentives received. The right of use asset is depreciated on a straight-line basis over the lease term.

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

| in thousands of New Zealand dollars | Property | Plant and equipment | Vehicles | Total |
|---|---|---|---|---|
| **2023** | | | | |
| **Cost** | | | | |
| Balance at beginning of year | 27,797 | - | 654 | 28,451 |
| Additions | 1,384 | - | 256 | 1,640 |
| Disposals | (346) | - | (40) | (386) |
| **Balance at end of year** | 28,835 | - | 870 | 29,705 |
| | | | | |
| **Accumulated depreciation** | | | | |
| Balance at beginning of year | (5,884) | - | (371) | (6,255) |
| Depreciation | (2,204) | - | (208) | (2,412) |
| Disposals | 346 | - | 40 | 386 |
| **Balance at end of year** | (7,742) | - | (539) | (8,281) |
| | | | | |
| **Carrying amount** | | | | |
| **Balance at end of year** | 21,093 | - | 331 | 21,424 |
| | | | | |
| *Average lease term (years)* | 10 | - | 1 | |
| | | | | |
| **2022** | | | | |
| **Cost** | | | | |
| Balance at beginning of year | 27,449 | 24 | 635 | 28,108 |
| Additions | 633 | - | 112 | 745 |
| Disposals | (285) | (24) | (93) | (402) |
| **Balance at end of year** | 27,797 | - | 654 | 28,451 |
| | | | | |
| **Accumulated depreciation** | | | | |
| Balance at beginning of year | (3,946) | (13) | (304) | (4,263) |
| Depreciation | (2,062) | (4) | (160) | (2,226) |
| Disposals | 124 | 17 | 93 | 234 |
| **Balance at end of year** | (5,884) | - | (371) | (6,255) |
| | | | | |
| **Carrying amount** | | | | |
| **Balance at end of year** | 21,913 | - | 283 | 22,196 |
| | | | | |
| *Average lease term (years)* | 11 | 1 | 2 | |

## 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. There was no income generated from forestry in the 2023 financial year. In the 2022 financial year, 4.2 ha of forestry was logged and sold generating income less costs to sell of $55k.

### 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.

Compensation units are recognised based on their cost.

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

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| **Reconciliation of changes in the carrying value** | | |
| Balance at beginning of year | **1,275** | 1,327 |
| Decreases due to harvesting and sale of forestry | **-** | (85) |
| Changes in fair value less estimated point-of-sale costs | **123** | 33 |
| **Balance at end of year** | **1,398** | 1,275 |
| | | |
| ***Area (ha) of forest at end of year*** | **115** | 115 |

### Forestry valuations

Forestry was valued by Alan Bell & Associates as at 30 June 2023. The value of forestry at 30 June 2023 was $1,398k (2022: $1,275k).

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 (2022: 8.5%)
- An assumed 3% compounding rate on standard costs (2022: 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 prices published by the Ministry of Primary Industries.

### Emissions units

The Group held 18,975 ETS units as at 30 June 2023. There is no change to the ETS units during the 2023 financial year (2022: 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 | 2023 | 2022 |
|---|---|---|
| Fonterra Co-operative Group Limited | **1,541** | 1,367 |
| Farm IQ Systems Limited | **2,066** | - |
| Other investments | **880** | 838 |
| Total | **4,487** | 2,205 |

### Valuation of other investments

- 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.
- The investment in Farm IQ Systems Limited is presented at fair value using the market approach under NZ IFRS13, *Fair Value Measurement*; specifically utilising an equity transaction that took place in May 2023 between Farm IQ Systems Limited and its major shareholder, Landcorp Farming Limited who purchased 2,867,600 shares. The methodology and inputs used in determining the fair value of Farm IQ Systems Limited contains judgement, in particular, that the implicit share price of Landcorp's recent purchase of equity of Farm IQ Systems Limited as a reference point in deriving the fair value represents the price that would be applicable between market participants.

### Impairment on other investments

During the year, the gains/(losses) of other investments was recognised as follows:

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Other (gains)/losses on other investments | **(78)** | 78 |
| Total | **(78)** | 78 |

## 17 Lease liabilities

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.

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. It is remeasured when there is a change in future lease payments, or if the Group changes its assessment of whether it will exercise an extension or termination option.

The total cash outflow for leases amounts to NZ $2,901k (2022: $2,438k).

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Current | **1,883** | 2,164 |
| Non-current | **20,880** | 21,085 |
| **Total** | **22,763** | 23,249 |

| Amounts payable under leases | 2023 | 2022 |
|---|---|---|
| Within one year | **1,883** | 2,164 |
| Later than one year but not later than five years | **5,815** | 5,654 |
| Later than five years | **15,065** | 15,431 |
| **Total** | **22,763** | 23,249 |

## 18 Goodwill

Goodwill was derecognised in the 2022 financial year. The opening balance of goodwill in the 2022 financial year relates to the purchase of Farmax Limited, incorporated as a 100% subsidiary in June 2018. This subsidiary was sold to Farm IQ Systems Ltd on 1 September 2021.

The movement of goodwill is shown below:

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Opening balance | - | 907 |
| Derecognised on disposal of a subsidiary | - | **(907)** |
| **Closing balance** | - | - |

## 19 Employee entitlements

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Annual leave | **4,688** | 4,577 |
| Payroll accruals | **2,162** | 1,803 |
| **Balance at end of year** | **6,850** | 6,380 |

Provision is made for entitlements owing to employees in respect of wages and salaries, annual leave, and alternative days leave. Provisions are recognised when it is probable they will be settled and can be measured reliably.

In the current year, the employee entitlements provision includes $115k to remediate former staff for historic payroll matters in relation to compliance with the Holidays Act 2003 (2022: $157k).

## 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 | 2023 | 2022 |
|---|---|---|
| Key money received in advance | **387** | 447 |
| Key money referable to lease in current period | **(59)** | (60) |
| **Total Other non-current liabilities** | **328** | 387 |

## 21 Investments in subsidiaries

Subsidiaries are entities controlled by the Group.

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.

Grasslanz Technology Limited is a direct subsidiary of Celentis Limited. AgResearch (USA) Limited and Grasslanz Technology Australia Pty 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.

| | | % of ownership interest and voting power held by the Group | | |
|---|---|---|---|---|
| Subsidiary companies | Balance date | 2023 | 2022 | 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 |
| Grasslanz Technology Australia Pty Limited | 30 June | 100 | 100 | Cultivar development and management in the Australia |
| 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 |

## 22 Reconciliation of surplus after tax with net cashflow from operating activities

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| Surplus after tax | 1,626 | (1,241) |
| | | |
| Non-cash Items | | |
| Depreciation | 11,664 | 11,498 |
| Intangible assets amortisation | 286 | 498 |
| Depreciation of right-of-use | 2,412 | 2,226 |
| Net (gain)/loss on sale of property, plant and equipment | 37 | (8) |
| Net (gain)/loss on sale of subsidiary | - | (169) |
| Share of deficit of associates | 433 | 897 |
| Investment write down/revaluation | (78) | 78 |
| Change in fair value of forestry | (123) | (33) |
| Change in fair value of livestock | 98 | (548) |
| Change in fair value of other investments | - | 355 |
| Net (gain)/loss on sale of intangible assets | (5,211) | - |
| Net (gain)/loss on sale of software | 48 | 204 |
| Property, plant and equipment and software impairment/(write up) | 139 | 212 |
| Net (gain)/loss from foreign currency exchange | (39) | (8) |
| Bad and doubtful debt provision | (7) | 40 |
| Other non-cash items | (62) | 30 |
| | | |
| Movements in working capital | | |
| Change in current taxation | 112 | (2,695) |
| Change in deferred tax | (86) | (433) |
| (Increase)/decrease in inventory | (587) | 54 |
| (Increase)/decrease in livestock | 187 | 322 |
| (Increase)/decrease in receivables | (7,654) | 13,681 |
| (Increase)/decrease in prepayments | (70) | 441 |
| (Increase)/decrease in other current assets | 77 | (2) |
| Increase/(decrease) in provisions | (764) | (252) |
| Increase/(decrease) in payables | 3,483 | (6,193) |
| | | |
| Items classified as investing activities | | |
| Increase/(decrease) in property, plant & equipment, intangible assets and investment accruals | (2,476) | (2,902) |
| Other land compensation | - | 55 |
| | | |
| Net cash flow from operating activities | 3,445 | 16,107 |

## 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 | 2023 | 2022 |
|---|---|---|
| **Non-cancellable operating lease receivables** | | |
| Receivable no later than 1 year | **2,573** | 2,260 |
| Receivable later than 1 year and not longer than 5 years | **2,197** | 4,452 |
| Receivable later than 5 years | **403** | 318 |
| **Total non-cancellable operating leases** | **5,173** | 7,030 |

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 23 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:

| Subsidiary companies | Balance date | % of ownership interest and voting power held by the Group 2023 | 2022 | 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 | 2023 | 2022 | 2023 | 2022 |
| **Research, development and other services** | | | | |
| *Transactions between AgResearch and related parties:* | | | | |
| Subsidiaries | **3,711** | 4,298 | **10** | 13 |
| Associates and joint ventures | **278** | 1,474 | **94** | 58 |
| Joint operations | **1,602** | 497 | **-** | - |
| | | | | |
| *Transactions between the Group and related parties:* | | | | |
| Entities of which key management personnel are associated * | **4,162** | 8,947 | **140** | 2,411 |

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

| | Purchase of services | | Due to | |
|---|---|---|---|---|
| in thousands of New Zealand dollars | 2023 | 2022 | 2023 | 2022 |
| Research, development and other services | | | | |
| *Transactions between AgResearch and related parties:* | | | | |
| Subsidiaries | **395** | 150 | - | - |
| Associates and joint ventures | **450** | 250 | **1** | - |
| | | | | |
| *Transactions between the Group and related parties:* | | | | |
| Entities of which key management personnel are associated * | **46,292** | 5,065 | **9** | 3 |

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:

| | Sale of services | | Purchase of services | | Due from/(Due to) | |
|---|---|---|---|---|---|---|
| in thousands of New Zealand dollars | 2023 | 2022 | 2023 | 2022 | 2023 | 2022 |
| AsureQuality Limited | **81** | - | **118** | - | **2** | - |
| Capra Farming Limited | - | - | **4** | - | - | - |
| Contact Energy Limited | - | - | **17** | 2 | - | - |
| CTT Holdings Limited | - | - | **13** | - | **(3)** | - |
| DairyNZ Limited* | **750** | 2,390 | **1,149** | 1,339 | **138** | 1,946 |
| FoodHQ Innovation Limited | - | - | **65** | - | - | - |
| Grasslands Innovation Limited | **619** | 1,275 | - | - | - | - |
| House of Science NZ Charitable Trust* | - | - | - | 28 | - | - |
| Landcare Research New Zealand Ltd | **894** | 624 | **3,849** | 2,788 | **(6)** | (2) |
| Naylor Love Canterbury Limited | - | - | **40,962** | - | - | - |
| NIWA Vessel Management Limited* | **287** | 328 | - | 289 | - | 247 |
| NZ Post | - | - | - | 69 | - | (2) |
| OSPRI New Zealand | **1,531** | - | - | - | - | - |
| Overseer Limited** | - | 37 | - | 250 | - | - |
| PGGRC | - | 1,315 | - | - | - | - |
| Science New Zealand (Acri) | - | - | **113** | 100 | - | - |
| Spring Sheep Dairy NZ Limited Partnership* | - | 211 | - | - | - | 193 |
| Te Waharoa Investments Limited* | - | 26 | - | - | - | 12 |
| **Total** | **4,162** | 6,206 | **46,290** | 4,865 | **131** | 2,394 |

* Entity was not related to the Group during FY23
** Key Management personnel are no longer associated with these entities

### 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 | 2023 | 2022 |
|---|---|---|
| Chief Executive Officer | 555 | 550 |
| Directors' fees | 354 | 313 |
| Salaries and other short-term employee benefits | 2,613 | 2,820 |
| Termination payments | - | 277 |
| Total | 3,522 | 3,960 |

## 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 the Treasury policy which:

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

The Group has no significant concentrations of credit risk. The maximum exposure to credit risk is represented by the carrying value of each financial asset in the statement of financial position.

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 $83k (2022: $53k). It is estimated that a 10% increase in the New Zealand dollar would reduce profit and equity by $68k (2022: $43k).

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 through:

- Monitoring cash flow forecasts (both operational and anticipated non-recurring items) and aligning investment decisions with these
- Compliance with the Treasury policy, which sets a liquidity buffer for unforeseen cash flows
- Monthly review by senior management
- 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 |
|---|---|---|---|---|
| **2023** | | | | |
| Trade and other payables | - | 22,256 | - | 22,256 |
| **2022** | | | | |
| Trade and other payables | - | 16,681 | - | 16,681 |

### 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.

| 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 |
|---|---|---|---|---|---|---|
| **2023** | | | | | | |
| **Financial assets** | | | | | | |
| Cash and cash equivalents * | | **10,907** | **-** | **-** | **10,907** | **10,907** |
| Trade and other receivables | 10 | **37,497** | **-** | **-** | **37,497** | **37,497** |
| Non-listed equity investments ** | | **-** | **2,707** | **-** | **2,707** | **2,707** |
| Listed equity investments ** | | **-** | **1,780** | **-** | **1,780** | **1,780** |
| | | **48,404** | **4,487** | **-** | **52,891** | **52,891** |
| **Financial liabilities** | | | | | | |
| Trade and other payables | 11 | **-** | **-** | **22,256** | **22,256** | **22,256** |
| | | **-** | **-** | **22,256** | **22,256** | **22,256** |
| **2022** | | | | | | |
| **Financial assets** | | | | | | |
| Cash and cash equivalents | | 97,168 | - | - | 97,168 | 97,168 |
| Trade and other receivables | 10 | 29,799 | - | - | 29,799 | 29,799 |
| Non-listed equity investments * | | - | 587 | - | 587 | 587 |
| Listed equity investments * | | - | 1,618 | - | 1,618 | 1,618 |
| | | 129,005 | 2,205 | - | 131,210 | 131,210 |
| **Financial liabilities** | | | | | | |
| Trade and other payables | 11 | - | - | 16,681 | 16,681 | 16,681 |
| | | - | - | 16,681 | 16,681 | 16,681 |

* Cash and cash equivalents includes $1,911k (2022: $1,199k), 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 $62m (2022: $80m).

** Equity investments consist of Fonterra shares $1,541k (2022: $1,367k), Farm IQ Systems Limited investment of $2,066 (2022: $nil) and other investments of $880k (2022: $838k) as per Note 16. The level classification determined is based on the fair value within these investments.

### Fair value of financial assets and financial liabilities

## 28 Contingencies and commitments

| in thousands of New Zealand dollars | 2023 | 2022 |
|---|---|---|
| **Capital commitments** | | |
| Lincoln Campus building capital commitments | **20,135** | 49,387 |
| Other asset purchases committed to and contracted for at balance date | **3,493** | 6,849 |
| **Total capital commitments** | **23,628** | 56,236 |

### 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.

## 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

There were no significant events and transactions that occurred subsequent to 30 June 2023.

Deloitte.

## Independent Auditor's Report

**To The Readers of Agresearch Limited's Group Financial Statements for The Year Ended 30 June 2023**

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 89 to 125, that comprise the consolidated statement of financial position as at 30 June 2023, the consolidated statement of comprehensive income, consolidated statement of changes in equity and the consolidated statement of cash flows for the year ended on that date 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 2023; 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 4 September 2023. 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.

Deloitte.

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.

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.

Deloitte.

- 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 1 to 88, 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

4 September 2023

# Directory

Senior Leadership Team
Dr Sue Bidrose
Chief Executive Officer

Stuart Hall
Deputy Chief Executive, Commercial Partnerships

Tony Hickmott
Director Finance and Business Performance

Fleur Evans
Director People and Culture

Greg Rossiter
Director Information Technology

Chris Koroheke
Urungi, Director Māori Strategy

Ariana Estoras
Director Māori Research and Partnerships

Dr Sara Edwards
Director Research Operations

Dr Marie Bradley
Director Strategy and Communications

Dr Dave Houlbrooke
Director Research Capability

Dr Axel Heiser
Chief Scientist

Board of Directors
Dr Paul Reynolds QSO
Chair

Kim Wallace
Deputy Chair
Chair – Audit and Risk Committee

Jackie Lloyd
Chair – People and Culture Committee

Rukumoana Schaafhausen
Director

Dr Louise Cullen
Director

Lain Jager
Director
Directorship ceased on 30 June 2023

Mary-Anne Macleod
Director

Jessie Chan
Director
Appointed 1 June 2023

Information
Auditors
Deloitte Limited on behalf of the Auditor-General

Bankers
ANZ Bank New Zealand Limited

Science New Zealand

# SCIENCE WORKING FOR AOTEAROA NEW ZEALAND

The Crown Research Institutes (CRIs) proudly work, individually and collectively, to create a more prosperous, sustainable and innovative Aotearoa New Zealand.

agresearch
*āta mātai, mātai whetū*

ESR
Science for Communities
He Pūtaiao, He Tāngata

GNS SCIENCE
TE PŪ AO

Manaaki Whenua
Landcare Research

NIWA
Taihoro Nukurangi

Plant & Food™ Research
Rangahau Ahumāra Kai

SCION™
FORESTS ▪ PRODUCTS ▪ INNOVATION

**4,400**
SMART AND PASSIONATE PEOPLE

**54**
SITES ACROSS AOTEAROA NEW ZEALAND

**6,000**
SCIENCE PROJECTS EACH YEAR

**40**
NATIONALLY SIGNIFICANT DATABASES & COLLECTIONS

WWW.SCIENCENEWZEALAND.ORG

AgResearch Limited
NZBN: 9429 038 966 224

Corporate Office
Lincoln Research Centre
1365 Springs Road
Lincoln 7674
Private Bag 4749
Christchurch 8140
T +64 3 321 8800

Ruakura Research Centre
10 Bisley Road
Hamilton 3214
Private Bag 3123
Hamilton 3240
T +64 7 856 2836

Grasslands Research Centre
Hopkirk Research Institute
Te Ohu Rangahau Kai
Tennent Drive
Palmerston North 4410
Private Bag 11008
Palmerston North 4442
T +64 6 356 8019

Invermay Agricultural Centre
176 Puddle Alley
Mosgield 9092
Private Bag 50034
Mosgiel 9053
T +64 3 489 3809

www.agresearch.co.nz