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# Annual Report 2018







# Driving prosperity by transforming agriculture

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# About us

Agriculture is one of New Zealand's largest export income earners, and AgResearch plays a key role in delivering new knowledge and technologies to support the sector.

Facilitating the smallest rural project to the largest overseas research project, we produce science and technology projects for the benefit of the agricultural sector and New Zealand.

We collaborate with research providers and end-users around the world, and together we develop biosecurity, land, soil and freshwater management systems, methods of climate change adaption and mitigation, and agricultural by-products for the textile, food and beverages sector.

Our understanding of plant and endophyte technologies, such as metabolomics and epigenetics, leads the supply chain and supports the development of a new generation of livestock and plant-derived products.

Land use and management are studied in relation to environmental impacts and climate change. Improving dairy, beef, lamb and deer production systems is addressed by innovative research on soil and water management, while reducing negative impacts on the quality of soil, water, atmosphere and ecosystems.

Our biocontrol and biosecurity work is on the sustainable management of pests and weeds for the benefit of New Zealand's pastoral sector and associated environments.

Research includes the development of new biopesticides and technologies, and we play a role in making sure our national borders are well protected.





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# AgResearch tohu

AgResearch's aspirations are highlighted through our corporate whakataukī, āta mātai, mātai whetū. This year we commissioned the creation of a visual depiction of this message, to enable us to speak to our purpose using other channels.

Created by Ngāi Tahu designer Piri Cowie, this contemporary tohu is made up of two components: Te Ao, an ink-painted circle symbolic of Te Ao our Earth and speaking of our interconnection with the environment; and He Tangata, a human figure inspired by Ngāi Tahu whānui rock art.

This design is a reminder of looking to our past and learning from the work of our ancestors as a way of moving forward into the future. Within the design Piri Cowie has left some open spaces. These mā (white,

clear areas) are often seen within rock art drawings and may be read as the wairua (spirit) or mauri (energy) of a person. The placement of the figure within the circle is important as the arms and legs are extending out of the circle. This tohu speaks of reaching out, pushing boundaries and seeking new mātauranga – knowledge.

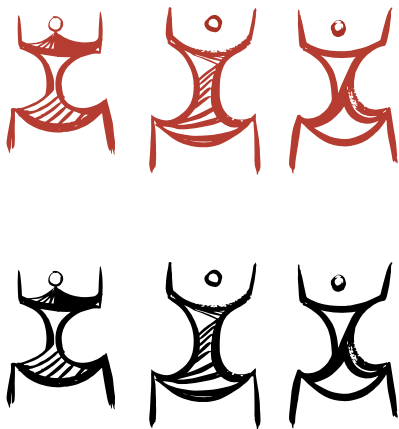
In this design the figure always sits on top of the world with arms extending outwards. The two tohu of Te Ao and He Tangata must never be separated.



**Āta mātai, mātai whetū**

*Being in pursuit of far horizons while firmly grounded*

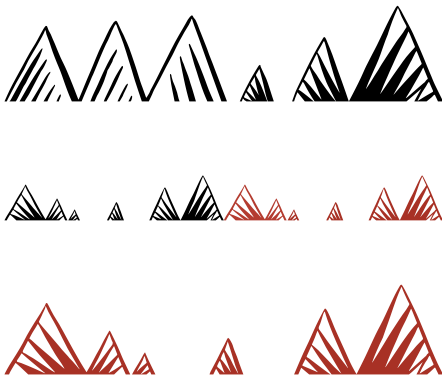
Our core tohu is supported by additional tohu designs that represent the diversity of AgResearch.



### Ngā Tāngata

The tohu Ngā Tāngata acknowledges the many ancestors that have been here before us. We are part of the continuum of creativity, innovation and legacy of our ancestors. It is symbolic of kaitiakitanga (guardianship) and wellbeing.

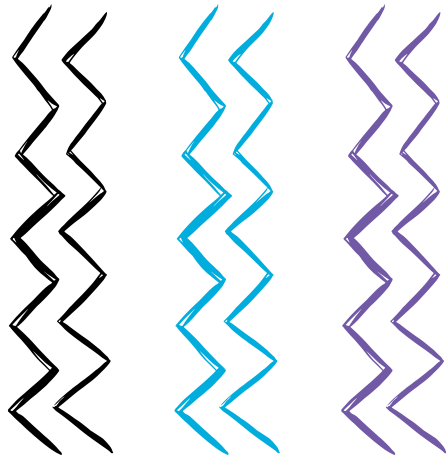
These figures are inspired by our Ngāi Tahu whānui rock art. The colour palette offered here references the colours of the whenua (land) and people.



### Niho Taniwha

This tohu is inspired by the tukutuku and taniko pattern Niho Taniwha, a pattern that represents mythology and is often used to symbolise a leader, strong orator or teacher.

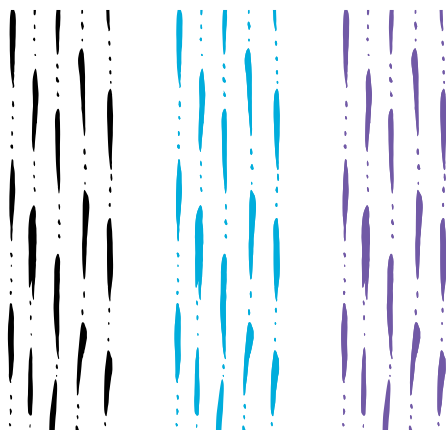
The design references the whenua (land) and many moutere (islands) within Aotearoa, and Te Waipounamu.



### Aramoana

This tohu Aramoana speaks of ocean currents. It is an acknowledgement to the fearlessness and strategic planning of our Māori ancestors who voyaged across vast oceans.

It is a tohu that speaks of journeying, bringing people together and seeking new horizons. The colour palette offered here references the colours of our oceans.



### Turuturu

This tohu Turuturu is inspired by the tukutuku designs of Roimata Toroa and Turuturu – raindrops.

This tohu is symbolic of the high importance and significance of water.





# Chair and Chief Executive's review

AgResearch continues to play a vital role in driving national and regional prosperity by transforming agriculture in New Zealand. Our scientists are leaders in innovative science, research and thought leadership across our work programmes of forage science, animal science, environmental and farming systems science, and food and bio-based products.

Our role as the lead Crown Research Institute (CRI) within the pastoral agriculture sector sees us working closely with our sector partners to deliver innovation into their operations and with government officials across a range of interconnected activities that link to core policy initiatives.

In the latter category are the Ministry of Business, Innovation and Employment (MBIE) review of national farm systems and environment investment, the Biological Emissions Reference Group, the Prime Minister's Chief Science Advisor's report on Overseer and Greenhouse Gas accounting, and the Productivity Commission. Also, the work we do in the area of climate change mitigation and adaptation fed into the discussions held by the Interim Climate

Change Committee as it grapples with the future make-up of the Emissions Trading Scheme and how agriculture fits into that picture.

AgResearch had another year of significant science advancements guided by our new Science Plan (see page 21), our Science Advisory Panel and increasingly underpinned by our national and international collaborations.

We developed our new Science Plan in consultation with our stakeholders to ensure our research is focused on delivering the thought-leadership and innovation to drive prosperity by transforming agriculture. It reflects a whole-of-value-chain, customer-centred approach that acknowledges the challenges and opportunities across global, national, regional and local scales.

A highlight of our work this year was the success of the AgResearch-led global scientific project on rumen microbiomes which resulted in the generation of a reference catalogue of over 500 rumen microbial genomes. Prior to this, just 15 rumen microbial genomes were available to the scientific community. The project represents a major scientific advancement and means that the data can be translated into useful interventions, including identifying targets for vaccines and inhibitors to reduce livestock methane emissions and improve productivity. The data has been made publicly available and will be a globally significant resource.

At the other end of our research breadth, we published preliminary findings of a milk composition study that identifies potential benefits for young women with lactose intolerance. The study was the first in the world to compare people's immediate digestive response to conventional and A2 protein milks. We have also progressed our investment toward creating new platforms to leverage 'Digital Agriculture' for the betterment of farming systems and surrounding environments. These include real-time animal tracking to

improve farmer decisions around farm nutrient use and exploring how digital technologies can deliver targeted advice to end-users (see page 37).

To further improve the flow of science (ours and other's) into useful tools, this year we acquired full ownership in Farmax, whose software is used by farmers and their advisors to analyse, monitor and review farm operations to determine the production and economic outcomes of various managerial options.

Our commitment to being customer centric saw us contribute to the launch of Ballance's Mitigator, a support tool underpinned by our science to aid landowners in their operational planning in order to farm more sustainably without losing focus on productivity and profits. Similarly, our relationship and mahi with Te Tumu Paeroa continues to develop around an integrated kaupapa for Te Tumu Paeroa's Poutama Framework and AgResearch's AgInform technology. This collaborative model will help decision-makers of Māori free-hold land to identify pathways for taking back direct and active management of their whenua within ecological boundaries and cultural values.

*Jeff Grant — Chair, AgResearch*





**Tom Richardson** — Chief Executive, AgResearch

This year has also seen significant advancements in our major construction programmes. Construction on our Food Science Facility with Massey University, is well advanced at Food HQ and will be completed in late 2019, and we have completed the early enabling works for the major facility build with Lincoln University.

As these construction programmes roll on, the work with our people across all four campuses also continues. At the close of the year, over 70 roles have relocated to a new campus location. AgResearch ends the financial year ahead of budget. Contributing to our financial success this year has been improved commercial science revenue growth and prudent cost control measures. While this is a pleasing result in the circumstances, the financial challenges that resulted from the previous year's funding changes has meant that we have reported an operating loss after tax of \$1m. Our financial position remains strong with cash reserves of \$46m available to fund our


campus redevelopment programme and other investment plans. Our equity position at year-end is \$249m.

Chairman Jeff Grant departed our board as at 30 June 2018 for a key role with the New Zealand meat industry in London as it navigates the changes Brexit will deliver. Before leaving, Jeff noted the tremendous effort and dedication of the staff over a wide range of science disciplines that continue to seek solutions and new innovation for the agriculture sector of New Zealand. He also acknowledged the contribution of retiring Director Tania Simpson, who served the Board across a range of roles since 2011, and thanked the Board and senior management team for their ongoing commitment.

While there are some challenges for AgResearch as it seeks to build a new environment for our science to operate in, both Board and management are well suited to succeed.

**Jeff Grant**  
Chair, AgResearch

**Tom Richardson**  
Chief Executive, AgResearch



We developed our new Science Plan in consultation with our stakeholders to ensure our research is focused on delivering the thought-leadership and innovation to drive prosperity by transforming agriculture.

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# Celebrating our people

## People successes

### Jaspreet Singh

Jaspreet Singh from the Plant-fungal Interactions team at Grasslands was the recipient of two



significant awards, providing him with the opportunity to study and learn in Canada.

As winner of the Queen Elizabeth II Technician's Study Award, an annual award run through MBIE, Jaspreet spent two months studying a novel approach to genetic modification called CRISPR (Clustered Regularly Interspaced Short Palindromic Repeat) at the Centre for Structural & Functional Genomics of Concordia University.

Jaspreet was also awarded the Bill Kain Science Award at the Plant Science Central conference.

### Rich McDowell

Rich McDowell, Principal Scientist at AgResearch, Chief Scientist for the Our Land and Water National Science Challenge, and Professor at Lincoln University, was elected as a Fellow of the Royal Society of New Zealand, an honour that recognises true international distinction in research and scholarship.

The Royal Society's nomination summary highlights his ground-breaking research (and more than 400 well-cited publications) and exemplary national and international leadership in relation to the quantification, impact and management of contaminant loss from land to freshwater (especially phosphorus). His work informs and underpins policy both within

New Zealand – through industry guidelines, Regional Council limits and New Zealand's National Policy Statement on Freshwater Management – and overseas.





The achievements of an organisation are the results of the combined effort of each individual.

### Evelyne Maes

Evelyne Maes, a Senior Scientist with the Proteins and Biomaterials team, travelled to Japan in March to take part in a week-long



HOPE meeting organised by the Japan Society for the Promotion of Science. The title “HOPE” signifies the promise held for young scientists and optimism for a bright science and technology future in the Asia-Pacific and Africa region.

HOPE meetings give opportunities for doctoral students and young researchers selected from countries/areas in the region to engage in interdisciplinary discussions with Nobel laureates and other distinguished scientists.

Evelyne was also awarded the International Early Career Award at the Lorne Proteomics Conference in 2018.

### Liz Wedderburn

Assistant Research Director Liz Wedderburn was appointed to MBIE’s Science Board, which is



responsible for making independent decisions to allocate funding appropriated for research, science and technology and related activities. This includes funding for the National Science Challenges.

Her appointment is a great recognition of her strategic perspective, her ability to take wide-ranging issues into account, her significant achievements in science, her knowledge of research methods and processes and her proven track record in working in and with diverse teams.

### Tony Conner

Forage Science Group Leader Tony Conner was elected as Vice President (Biological and Life Sciences) for the Royal Society.



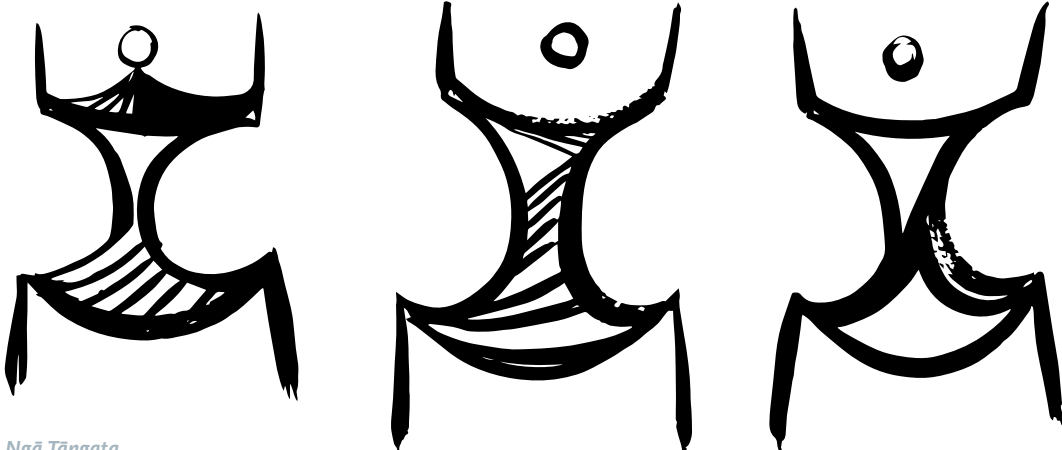
### Harry Clark and Andy Reisinger

New Zealand Agricultural Greenhouse Gas Research Centre Director Harry Clark was appointed to the Interim Climate Change

Committee (ICCC) and Deputy Director Andy Reisinger appointed to the ICCC Secretariat. The ICCC has been established as the precursor to the establishment of the more permanent Climate Change Commission (CCC) and a major role of the ICCC will be to investigate entry of agriculture into the Emissions Trading Scheme until the full Commission is established under the Zero Carbon Act, in late 2019.



The ICCC will also consider the transition to 100% renewable electricity generation by 2035. The Interim Committee's advice and recommendations will be passed on to the CCC to follow through on.



Ngā Tāngata

## Val Snow

Val Snow, a Senior Scientist with our Modelling team, was presented with the Biennial Medal by the International Environmental Modelling and Software Society (IEMSS). The award recognised her outstanding, insightful and rigorous contributions to environmental modelling and software, and her unselfish dedication to promoting the aims of the society.



## Estelle Dominati – Science New Zealand Early Career Researcher Award

As an AgResearch PhD student and Rutherford post-doctoral scholar, Estelle Dominati developed a concise and elegant framework to describe, quantify and value the natural capital stocks and provision of services that underpin

New Zealand's primary industries and natural environment. The linking of Mātauranga Māori to the natural capital ecosystem services framework to create a culturally based natural resource management process is the focus of her current research.



Her research has been published in international science journals and is regarded as leading edge. For example, Dominati et al. (2010) [Ecological Economics 69: 1858-1868 (Impact Factor 4.17)] had received 200 citations in Scopus by September 2017, which puts it in the 99th percentile of papers by citation numbers and a field-weighted citation impact of 10.23 (i.e. cited close to ten times more than the average paper in the field).

## John McEwan – Science New Zealand Individual Lifetime Achievement Award

John McEwan has been a major force behind many initiatives aimed at improving the genetic merit of livestock, particularly sheep, and in

other species in New Zealand, Australia and globally. He has been a lead person in several international consortia, is highly respected amongst his colleagues both nationally and internationally and has published more than 280 publications.



Currently, he is part of a project to develop a new genotyping and genomic evaluation technology for use in ryegrass, white clover and a variety of aquaculture species.

John also received an Honorary Life Membership with the New Zealand Society of Animal Production (NZSAP).

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# Celebrating our people

## Team awards

### AgResearch/DairyNZ Pastoral21 team

The AgResearch/DairyNZ Pastoral21 team was awarded the Agricultural Science Award at the the Kudos Hamilton Science Excellence Awards in late 2017.

These awards celebrate the success of Waikato scientists in New Zealand and on the world stage. The P21 programme was aimed at lifting farm profits while reducing environmental impacts and involved trial farms across New Zealand.



### AR37 team – Science New Zealand Team Award

A significant number of our people from across different science teams were involved in the development of the AR37 endophyte. Their success was recognised when they won the Team Award at the Science New Zealand National Awards.

AR37 provides ryegrass with better insect protection advantages and plant persistence than those delivered by standard endophytes but has few adverse effects on animal health.



### Clover Root Weevil

The AgResearch Clover Root Weevil Biocontrol team (comprising Scott Hardwick, Stephen Goldson, Craig Phillips, Mark McNeill, Barbara Barratt, Colin Ferguson, Diane Barton, Pip Gerard, Tina Eden and Derrick Wilson) was awarded the 2017 PGG Wrightson Significant Achievement Award in Agriculture/Horticulture by the New Zealand Institute of Agricultural and Horticultural Science.



Talent is the multiplier. The more energy and attention you invest in it, the greater the yield.





# Our story

There has been no time in recent decades in which the role of research will prove more critical than now.

AgResearch must use its considerable scientific capability to realise opportunities and counter the challenges that threaten New Zealand's economy and regional prosperity.

Our two focus areas of research are in creating smart, sustainable farming systems, and the most sought-after food and bio products. These are intrinsically linked – without the right systems we cannot help create quality agri-based products, and we know that the consumer also wants to be sure that their choice of product comes without an environmental cost.

Our capabilities are vast, from seeds to pest control, high-value foods and farming systems. Now, more than ever, systems thinking is an integral part of our research and development approach.

Our agricultural systems research focuses on creating more profitable and sustainable farms

and agribusinesses and provides the capacity to understand complex, interconnected agricultural issues.

Our food research and development creates the knowledge and tools to develop high-value foods and ingredients from pastoral-based industries, tailored to market and consumer preferences for quality, human health and wellbeing.

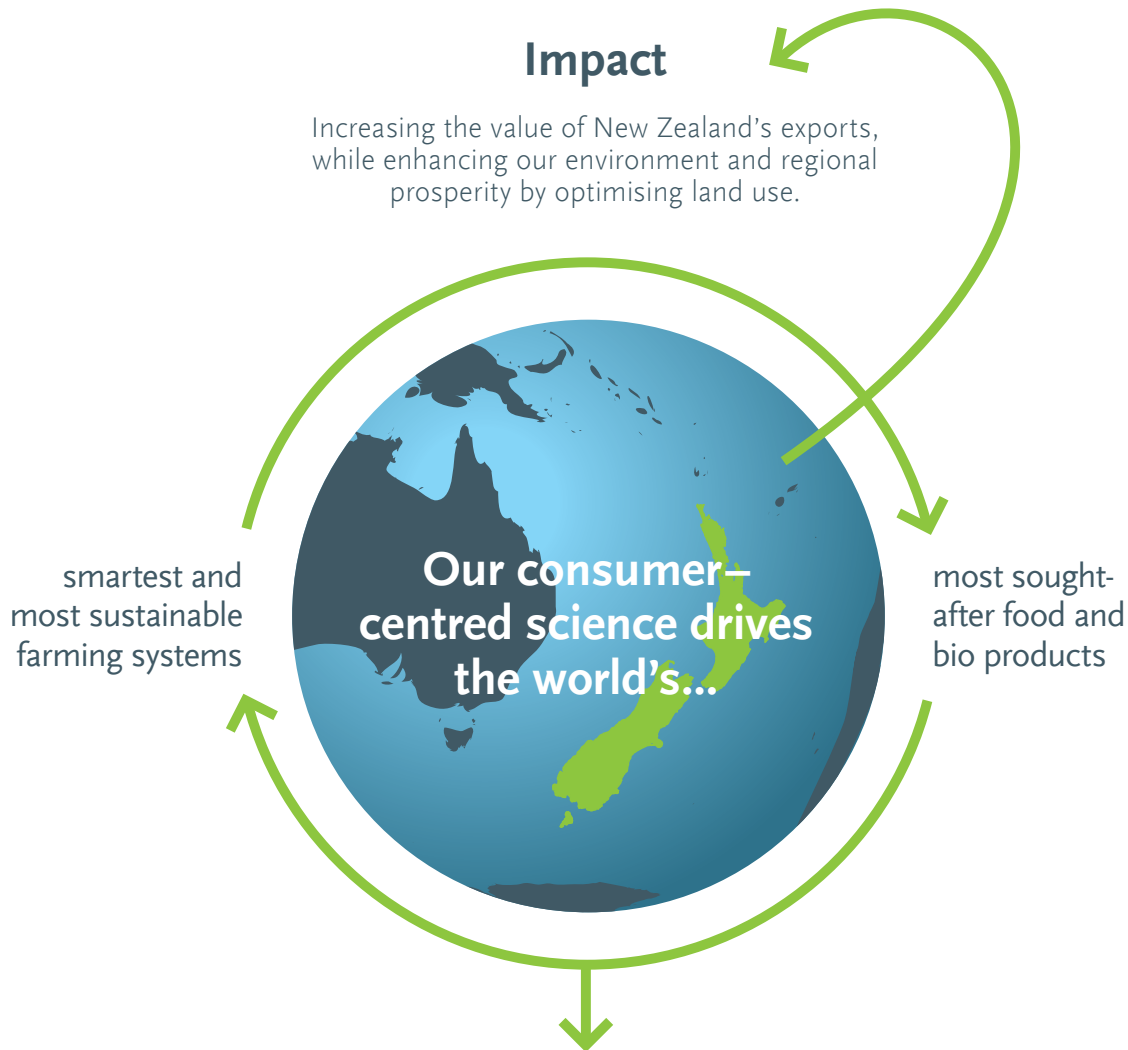
The evolution of consumers' preference and new technologies are creating new opportunities for New Zealand. We are seeing leading businesses investing much more aggressively in areas like animal welfare, novel farm systems, technologies that greatly enhance environmental sustainability and new food products.

At AgResearch, we have evolved our focus to ensure our research is supporting and enabling those preferences, and therefore the economic success of New Zealand's exporters.

# Driving prosperity by transforming agriculture

## Impact

Increasing the value of New Zealand's exports, while enhancing our environment and regional prosperity by optimising land use.



## Our Value Proposition

Partner to identify the innovation that is needed, and use the collective expertise to create value for New Zealand.





# Our Science Plan

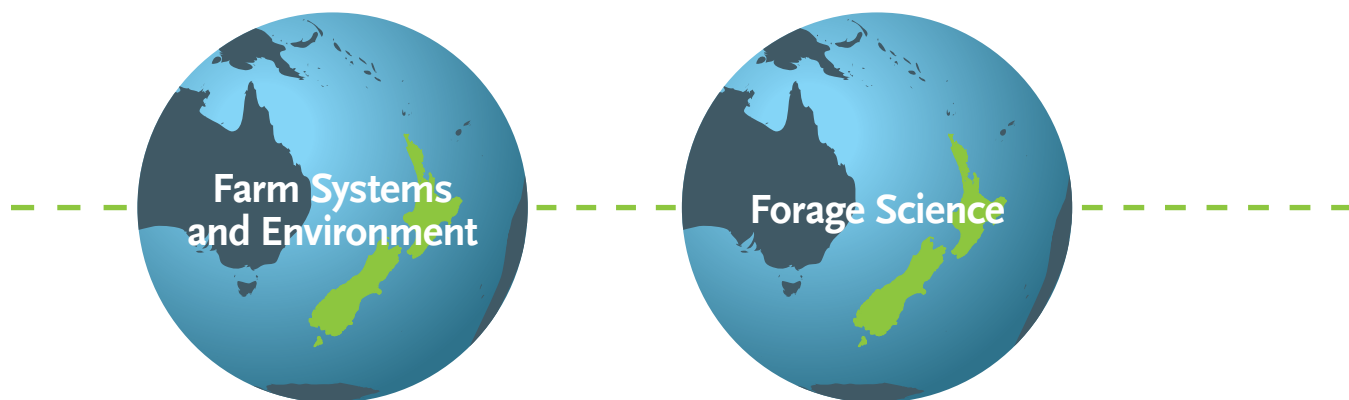
Our Science Plan has been overhauled this year with an aim of breaking down the siloed approach within research, to providing an outcomes and objectives-focused framework. This exists to help prioritise and integrate all science undertaken by AgResearch.



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# Our expertise

Our capability spans the agricultural value chain, and our focus on integrated systems means all aspects of our research can be linked.



- Water quality
- Climate change
- Environmental science
- Smarter farming systems
- Digital agriculture
- Adoption and practice change
- Kaitiakitanga farm systems

- Soil biology
- Biocontrol and security
- Plant breeding
- Endophyte technology



**smartest and most sustainable farming systems**





## Animal Science

- Genomics
- Animal nutrition
- Animal health
- Animal welfare and behaviour
- Reproduction
- Greenhouse gas mitigation and adaptation



## Food and Bio-based Products

- Food science
- Textiles science
- Material science
- Validation of product attributes
- Food nutrition and human wellbeing

most sought-after food and bio products

# Our research

Across the chain from soil to palate

The following stories highlight the impact our consumer-centred science has on the world's smartest and most sustainable farming systems.

smartest and  
most sustainable  
farming systems





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## Nematodes – hardy and harmful

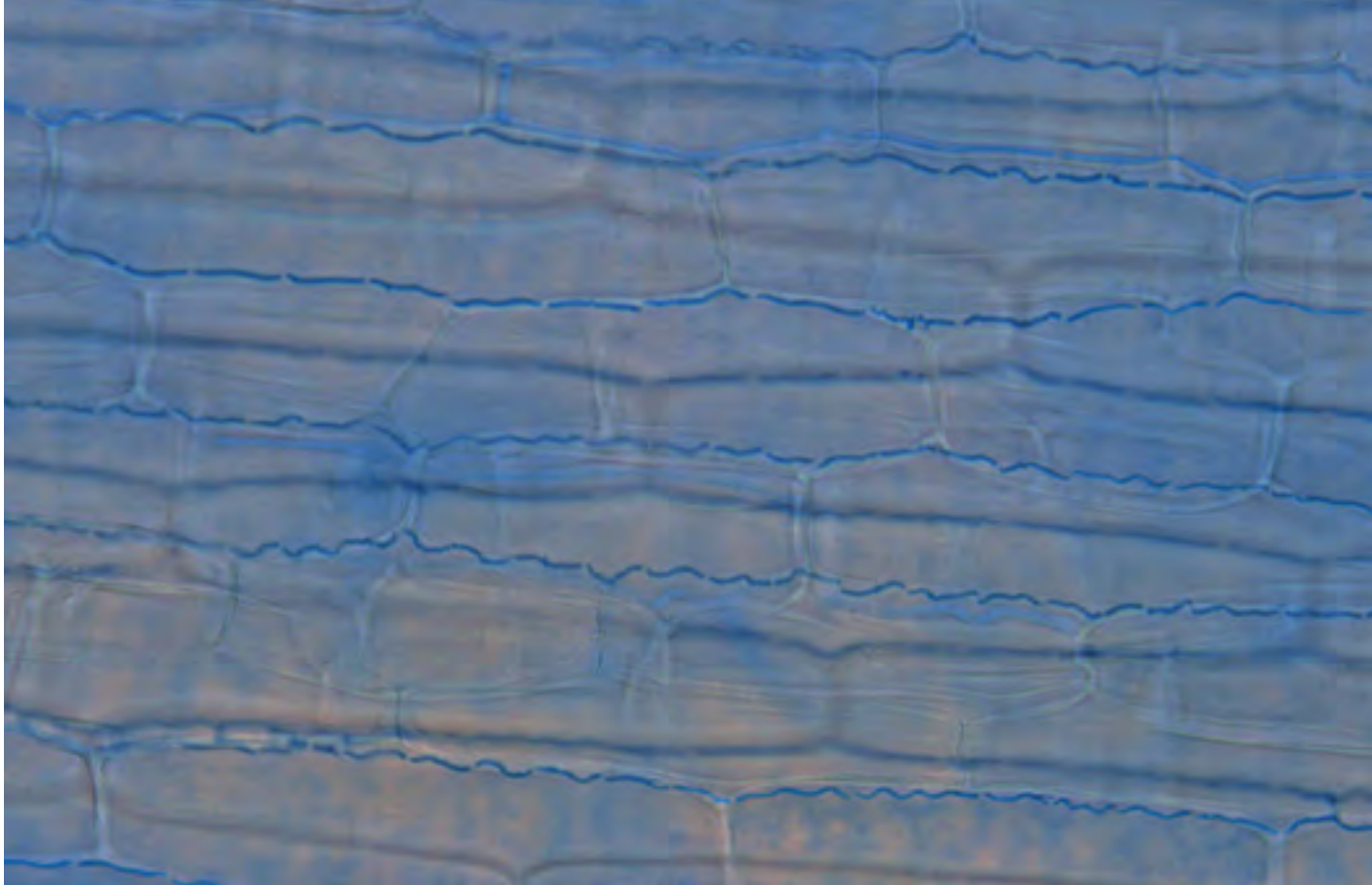


Tiny creatures in soil that attack plants have shown the ability to survive for at least three years stored in dry conditions, giving new insights into the biosecurity threats posed by passenger travel and trade between countries. The findings of this AgResearch study also add to the discussions about how best to detect these creatures, called nematodes, before they cross borders and potentially reduce yields of important crops and pasture. Nematodes are very small worm-like organisms. They can be extremely hardy and can have both beneficial and detrimental impacts. The harmful ones, the plant-parasitic nematodes (PPNs), are species that attack plants, reducing their growth and survival rate.

Our study, funded via the Better Border Biosecurity collaboration, saw soil collected from a native forest and an organic orchard was stored separately in cupboards at room temperature for a period of 36 months. Samples were then taken at regular intervals to see if any

nematodes could be recovered from the soil and, if they could, whether they were able to infect plant hosts. The findings suggest that lesion nematodes were able to successfully invade the roots of ryegrass even after 36 months, and also able to produce offspring at 13 months.

This means that given the right conditions, PPNS in soil, which is carried on sea freight, footwear or used machinery, and protected from sun or extreme heat, will survive if they end up near a suitable host plant. For quarantine officials around the world, this result is an important find, as it reinforces the risk that soil, even when it looks sterile, may contain unwanted nematodes, which continue to be undetected until paired with a suitable host plant. In the context of biosecurity, it may then be pertinent for the development of a generic test for plant-parasitic nematodes – based around a molecular-based bioassay – to enhance the probability of detection of PPNS and, therefore, prevent unwanted incursions from beyond the border.



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## Advancing our work with endophytes



Fungi that live within grasses have already been harnessed by AgResearch scientists to save the New Zealand economy billions of dollars. Now there is scope for researchers to apply the learning of this successful long-term programme to other endophyte species that can have benefits for a range of important crops, such as wheat.

Our researchers say that microbial endophytes are gaining importance as options for the control of pests and diseases in many crops of economic significance. That presents an opportunity to extend the substantial knowledge and understanding gained from working with the *Epichloë* endophytes in grasses to deliver new endophyte options in those other crops for the benefit of New Zealand.

The original work is based on the endophyte AR37, which was discovered by AgResearch scientists and released in 2006 for use in ryegrass. It proved a key to success in reducing the impact of a range of pests, and consequently improving animal growth on farms. *Epichloë* endophytes occur naturally in some grasses,

such as those used to feed livestock on New Zealand farms. While some types of endophyte can be harmful to livestock, selected endophytes introduced to varieties of grass offer benefits such as deterring insect pests from feeding on the grasses, while minimising any negative health effects. It is these opportunities that have attracted scientists like those at AgResearch, a world leader in this area of research. The focus over the last 35 years has been on selecting endophyte strains that can improve the productivity of pastures, while also improving livestock health.

Our work in this area has identified and commercialised endophyte strains of such benefit that they are now critical components of pastures in New Zealand. The benefits are undoubtedly in the billions of dollars over time. These include increased farm productivity, reduced costs for animal health, and reduced pasture losses to pests and costs to control those pests. New endophyte strains alone contribute about \$200m every year to the New Zealand economy.



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## The fight against weeds



The true cost of weeds to New Zealand's agricultural economy is likely to be far higher than previous research would suggest. In partnership with Scion scientists and economists from Lincoln University's Agribusiness and Economics Research Unit, we reviewed all existing material and can now estimate a cost of \$1.658b a year.

The research on weed costs done previously used differing approaches, and the numbers were sometimes outdated or contained guesswork, so this estimate may still be at the lower end. In addition, the estimate of \$1.658b only covers the few weed species – 10 of the 187 pasture weeds, some arable land weeds and forestry weeds – that have been the subject of research into their impacts.

The focus has largely been on the loss of production. The substantial costs of weed control, such as the use of herbicides, were not always considered. Given all of these limitations, the true cost of the weeds to the agricultural sector is likely to be much higher than the \$1.658b estimate. Our study looked at the economic impact of some of the more

widespread and destructive weed species such as gorse, broom, yellow bristle grass and Californian thistle. We also developed a dynamic approach for estimating the potential costs of weeds that have not yet realised their potential range in New Zealand, taking account of possible rates of spread, maximum geographic extent and changes in consumer prices for agricultural products.

This dynamic approach applied to the Giant Buttercup weed in dairy pastures indicates that this weed alone would cost the dairy industry \$592m per year in lost milk solids revenue if it were to spread across its entire range over the next 20 years.

New Zealand has one of the highest levels of invasion by introduced plant species in the world, and there has always been a shortage of information when it comes to their economic costs on productive land. Knowing more about these costs is important to developing cost-effective ways to tackle weeds, and in quantifying the benefits of research aimed at keeping us ahead of the game.







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## Exploring new feed options using GM technology



An important milestone was reached this year in AgResearch's development of a new-generation grass that could prove a game changer for agriculture.

With funding from the Government and industry partners, the genetically modified high metabolisable energy (HME) ryegrass has been shown in AgResearch's laboratories to grow up to 50% faster than conventional ryegrass, to be able to store more energy for better animal growth and to be more resistant to drought. In addition, it produces up to 23% less methane (the largest single contributor to New Zealand's greenhouse gas emissions) from livestock.

Modelling also predicts less nitrogen will be excreted into the environment by animals feeding on the ryegrass, and consequently less nitrate leaching and lower emissions of another greenhouse gas, nitrous oxide, will occur.

Development of the HME ryegrass has now progressed in the mid-west of the United States, where genetically modified organisms can be field tested.

This followed a successful preliminary growing trial last year to confirm conditions were suitable. As the preliminary trial lasted only two months, its findings have limited statistical merit. However, we did see the transplanted ryegrass acting as it had in the greenhouses in New Zealand.

The full trial will measure the photosynthesis, plant growth and the markers that lead to increased growth rates. While the growth has previously been studied in glasshouses in pots and as plants spaced out in the field, this will be the first opportunity to assess the growth characteristics in a pasture-like situation where plants compete with each other.

The trial timeframe will allow us to determine if increased growth is consistent across the summer and autumn, and we will simulate grazing by cutting plants back every three to four weeks.

Animal feeding trials are planned to take place in two years, for which we will need regulatory approvals. The information we get over the next two years will help us with our application for those feeding trials.

While New Zealand has not yet approved the release of genetically modified crops, trials like this are important to keep New Zealand's options open. They provide strong scientific

evidence on any benefits or risks that policy-makers can later draw on.

The Royal Commission on Genetic Modification stated "it would be unwise to turn our backs on the potential advantages on offer". It also talked about the need to proceed with caution, minimising and managing risks – which is how we are approaching this work with the ryegrass. Future advantages could be significant, with modelling to date showing the HME ryegrass could boost farm revenues by as much as \$900 per hectare, while providing a tool for farmers to manage nitrogen run-off and greenhouse gas emissions.

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## Feed options to mitigate climate change



Using an alternative plant type like plantain in grazed pastures could help lower a farm's greenhouse gas emissions, our scientists have discovered. With funding from the New Zealand Agricultural Greenhouse Gas Research Centre, this research set out to compare emissions of the potent greenhouse gas, nitrous oxide, from soils containing different types of forage – perennial ryegrass, white clover, plantain and lucerne – over different seasons at a dairy farm in Waikato.

Agricultural soils, and the urine deposited by grazing animals, are the main source of nitrous oxide emissions globally and are a major contributor to greenhouse gas emissions resulting from human influence.

A significant finding from this study was that in autumn and winter, nitrous oxide emissions were 39–74% less where plantain was planted, compared with perennial ryegrass. Lucerne also saw lower emissions compared with the ryegrass

in winter and autumn, but smaller reductions than shown for the plantain. In summer, we found emissions from the plantain and lucerne were actually higher than the ryegrass, which is something that needs to be explored further.

Previous studies have shown plantain can reduce the amount of nitrogen excreted in the animals' urine. However, in this latest study the same urine type (from animals fed ryegrass and white clover) was applied to all of the plant types tested. So other factors may be involved; one of them may be that plantain releases biological nitrification inhibitors into the soil that reduce the nitrous oxide emissions.

What this research tells us is that incorporating plantain into grazed pastures could be one way of reducing emissions. However, we need to do further work to examine the process by which the emissions are reduced, and how this is impacted by different conditions across the different seasons.





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## Sensor systems to understand environmental impacts



AgResearch has developed world-leading sensors to better understand how nitrogen is being excreted by cows, and therefore how best to tackle the impacts on the environment. The urine sensors, which have been a work in progress since 2010, are attached to grazing dairy cows and take detailed measurements every time the cow urinates. As well as volume and frequency, these measurements crucially include the concentration of nitrogen in the urine that can potentially leach into soil and waterways, and can cause damage such as algal blooms.

A recent Colmar Brunton poll found pollution of lakes and rivers to be one of the top two concerns for New Zealanders, but there is now promising research underway to address the challenges for water quality such as nitrogen leaching. The benefit of the urine sensors is a much greater understanding of the behaviour of the cows, which can help develop techniques to mitigate the nitrogen leaching from farms. While other sensors exist around

the world to provide data from livestock, these sensors are unique in their ability to record nitrogen concentrations each time the cow urinates during grazing and we can learn, for example, how different species of pasture affect the amount of nitrogen excreted in urine. The sensors weigh about 1.5kg, and attach to the cow by a harness connected to a lightweight cow cover.

They record the data through the use of multiple instruments (temperature, pressure and refractive index), with data stored in a data logger that can be remotely accessed via a wireless network system. The sensors have already been used in both the United Kingdom and Australia. The operation of the sensors is complex, and this year we have been working towards offering the sensors to other researchers around the world to allow them to use the technology to make similar gains. AgResearch will have the expertise to support those researchers to use the technology and maximise the benefits from it.

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## Animal welfare and behaviours



Our research exploring the moods and personalities of farm animals is being seen as an opportunity to better understand and enhance their welfare. This study looks at how animals respond in new and different situations and is helping expand the knowledge of livestock behaviour, at a time of growing consumer demand for strong welfare standards.

The work is being supported by DairyNZ as part of its ongoing focus on enhancing animal care for cows. Because we cannot directly measure how individual animals are feeling, we need to find indirect measures. Once we have those measures, we can use them to better understand how personality also contributes to an animal's welfare. It is important that these measures can distinguish between different personalities in a range of situations, where animals are feeling either positive or negative.

The first farm animals being studied are goats, as they are easy to work with, adaptable to human contact and there is good evidence for what goats find positive and negative. In the research, we created a positive situation, which for goats is access to large leafy branches, while in contrast the negative situation was exposure to simulated rain. Immediately following these

positive or negative experiences, we tested the goats' responses to different scenarios, including an object that is new to them.

During these scenarios, the scientists collected detailed measurements of the goats' responses, such as heart rate, slow-motion video of facial expressions, and changes in temperature of different body regions with an infra-red camera. We predicted that individual goats would change their response to the scenarios depending on whether they were feeling positive or negative, but that each goat's response would also be in a manner consistent with their personality. So, for example, a goat that has just experienced the rain (negative situation) might be more reluctant to approach a new object, but certain goats will always be bolder than others.

Publishing our results will provide a stepping stone towards understanding and measuring both the personality and mood of individual animals. This can then be used to compare how animals experience different farming situations and to improve the design of production systems. We have already seen impact through our development of the Gumbboot Score, which farmers now use to assess the welfare of their animals sleeping on wet areas.



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# Our research

Across the chain from soil to palate

The following stories highlight the impact our consumer-centred science has on the world's most sought-after food and bio products.

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## Whole carcass options – more than just meat



In this programme a range of research has been funded, enabling our scientists to explore wider uses and benefits from a whole carcass. The breadth of capability within the AgResearch team means this programme has been able to touch on aspects of animal welfare, specifically in the way animals are stunned prior to slaughter, the sources of microbial contamination that exist along the value chain, and the levels of microbial resistance to sanitisers used in a processing plant.

Our research has provided new knowledge around spoilage levels, and provided context for the industry when working with a range of cultural preferences. At the other end of the production chain, our work in this programme has created new identification points for critical reservoirs and vectors of STECs on dairy farms, spectral detection systems for key pathogens and spoilers, and new non-invasive techniques to authenticate food products. This wide-ranging programme highlights the capability within this team, and their innovative thought-leadership for industry – which is a critical ability in this time of

customer-centric production, where the end-user now demands to know how their 'food' was raised and treated, before consumption. When looking at the drivers and opportunities for New Zealand meat exports, we need to look at the whole value chain from farm to market.

This programme will continue to address the future challenges, including how on-farm practices impact microbial loading and product shelf-life and food safety, the effects of climate change on food production, and increased focus on product traceability and authentication.

Also, the challenges of maintaining a consistent supply of high-quality meat and the large amount of commodity beef that comes from the dairy platform give the opportunity to get added value for the New Zealand farmer. We will be better placed to realise this opportunity if we develop new knowledge and technologies that can take advantage of the ever-growing Asian markets and their desire for safe, high-quality meat products that are tailored to their preferences.



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## Fibres in our waterways



As global concern grows about pollution of our oceans and effects on marine life and seafood, to help keep consumers informed AgResearch is studying how different materials break down in the water. Studies indicate that microfibrils (up to 5mm in size) are entering the oceans in large quantities – particularly from clothing and other materials in washing machines, where the tiny fibres can come loose and travel with the water into the drain, and ultimately to ocean outfalls.

More evidence is also required for microfibrils from interior textiles like carpets, bedding and other products that are cleaned less often. In the ocean, smaller microfibrils can be ingested by the marine life and can end up in our seafood, potentially creating health issues as volumes increase. Our scientists say the limited data available suggests wool – being a natural protein fibre – breaks down at a far greater rate in sea water, and therefore presents far less risk to the marine environment than synthetic fibres

like polyester and nylon. To test that, we will be working with another Crown Research Institute, Scion, in an experiment that tests how samples from both woollen clothing and carpets biodegrade in controlled salt-water conditions, compared with samples from the synthetic alternatives.

This initial study took place over a 90-day period, after which the scientists were able to consider how these materials break down and at what rate. The aim is to provide the public with objective information as they make choices about what they buy, as well as inform manufacturers and retailers of the performance of goods like clothing and carpet. There is a growing movement around the world by industry and governments towards more transparency about products and their potential impacts on the environment, and having good-quality research is important for this discussion.

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## Hair-raising findings



As the secret to what makes hair curly or straight has puzzled many, unlocking the answer would have an undoubtable impact on the world's \$85b haircare market.

Our scientists, in conjunction with Japan's Kao Corporation cosmetics company, may have found the answer with research using fine, curly, merino sheep wool. This wool was chosen because human hair is too coarse to enable easy analysis of its cell structure. The chemistry, structure and growth of all hair are essentially the same, so what was learned by using the merino wool could be applied to human hair.

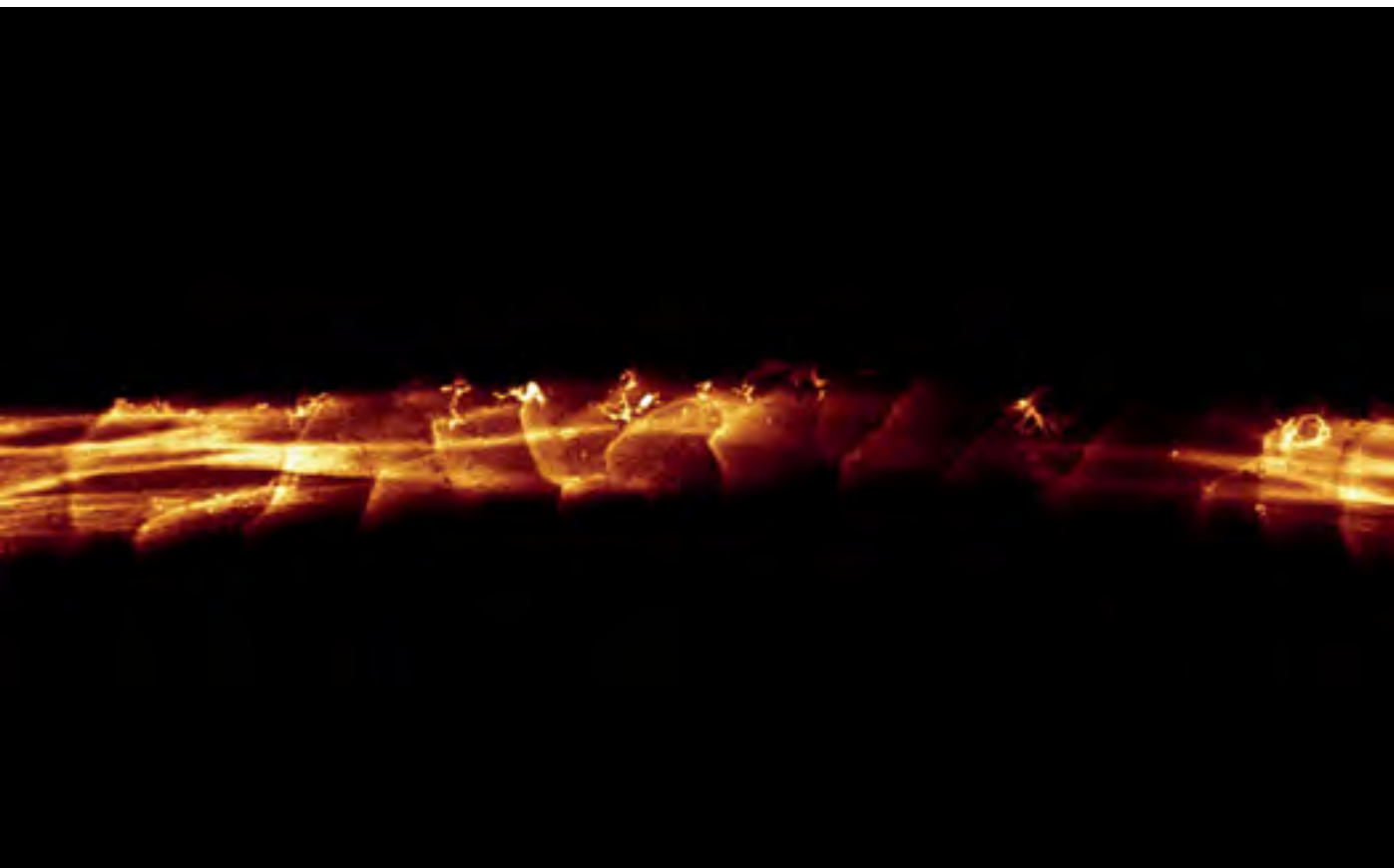
The research used full-length locks from the winter coats of merino sheep from which over seven hundred 0.5cm snippets from the base of individual fibres had to be prepared.

That enabled the scientists to accurately measure the natural curvature programmed in during fibre development, rather than the new curvature that develops later in the sheep's life as its wool is exposed to washing and processing. The fibres were then dried on a vibrating surface to make sure they dried

naturally, without any new kinks or curves developing. Electrostatic force of the tip of fine forceps was used to accurately position each fibre and the team then measured the curvature of each wool snippet, before staining it.

Each fibre was then able to be examined to reveal the curl's cell structure. This painstaking work was time-consuming, involving months of counting and measuring of the cells on both the inside and outside.

The team reported that shorter paracortical cells lined the inside of the curl, while the longer orthocortical cells were located on the outside of the curl. This meant that the curl was produced by the arrangement of the different cell types, rather than by cells dividing more often on one side of the hair follicle to produce more cells on the outside of the curl. This shows how important cell type is, along with cell length, and as all hair chemistry is essentially the same, this finding will also apply to human hair. The development will open new opportunities for the haircare market and potentially the design of novel products.



# Our research

Pan sector

The following stories highlight the impact our consumer-centred science has on the world's smartest and most sustainable farming systems, and most sought-after food and bio products.



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## Digital agriculture



As the world considers the ongoing challenge of producing more food, more sustainably on a planet with scarce resources and a changing climate, we must consider AgResearch's role in finding adoptable solutions. New tools in our armoury are starting to appear: the increasing miniaturisation of technologies, the reducing cost of telecommunications and data storage, the increasing computing power, and the development of artificial intelligence and analytics are converging to offer the possibility that 'digitalisation of agriculture' can offer new solutions to this highly complex challenge. This research programme is therefore about understanding how AgResearch can best drive the digitalisation of agriculture to help our clients achieve their goals; and extends beyond the farm-gate right along the value chain. The research fits within our Agri-Food Production funding platform through which we look to provide outputs that will inform future farming systems, underpin digital and disruptive technologies, and gain efficiencies with respect to time and space.

In the first year we have established a number of 'use cases' ('learning by doing') to understand how technologies can both support our science and support delivery of information and advice to end-users. At our Tokanui Farm, we have started to track animal movements and relate these to time and place of urine deposition, based on the assumption that the grazing animals are the main conduit of nutrient transfers around the farm. We aim to test the hypothesis that real-time animal tracking can assist the farmer in proactive management decisions to improve farm nutrient use efficiency. Also, using Rakaia Island as an example, we are testing the level

of 'granularity' required to optimise irrigation management. Put more simply, we have asked what scale of soil moisture monitoring would give the farmer the best return for their investment. While the two examples above focus on a combination of new science and digital technologies, we have also started to explore how digital technologies can help us deliver advice (i.e. using our existing science knowledge from years of investment in research) to end-users.

Again using a use case approach (in this case AgPest), we have applied a design thinking process to devise a strategy for providing tailored weed control advice to different groups of end-users. The next stage is to build a prototype 'product' incorporating artificial intelligence to deliver advice and, in return, collect more data that can be used to build new knowledge and better advice.

The impacts to date are more inward-facing than outward.

We have established an interdisciplinary research programme that fosters links between science groups that have not worked much together in the past. For example, on-farm systems scientists are working with dairy food scientists to explore links between on-farm management and food quality effects.

We have also established a Collaboration Suite to facilitate interactions between different groups during brainstorming and project planning. This is critical because complex problems that New Zealand faces require interdisciplinary teams to drive solutions.





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## Better Border Biosecurity



The Agri-Food Production Platform has a goal of providing an integrated platform of farm biome genomics, biosecurity and decision-centric farm systems for sustainable livestock production. It is through this platform that AgResearch aligns with New Zealand's Biosecurity 2025 strategy, enabling its scientists to work on minimising the risk of incursions, and develop technologies to detect and mitigate them.

Along with researchers from other Crown Research Institutes, AgResearch is a key member of the Better Border Biosecurity (B3) programme. B3 has been set up to be a world-leading provider of biosecurity research, knowledge and tools that will have wide application in New Zealand and across the world.

Given the reach of this wide-ranging programme, AgResearch is seeing the impact of its work in many areas. The Pest Risk Assessment project is strongly supported by DairyNZ, which is closely

engaged in the work. Together the organisations are developing a comprehensive risk analysis approach that we hope will prove useful to other stakeholders. This work includes a joint evaluation of the potential spread and impact of hazards to ryegrass/clover pasture along with many other forage plants.

We have agreed on methods and results both for ranking insect and weed hazards to ryegrass/clover and for estimating their potential New Zealand distributions. This work is now being extended to biosecurity hazards of additional forage species. A method has also been proposed for estimating rates of pest spread in New Zealand, and work in this area has recently begun.

Our work in this broad biosecurity programme does not just support New Zealand's border safety however, and part of the Sentinel Plants project has been focusing on China as an important trade partner and potential source

of future exotic organisms. This work contributed to a review of biosecurity challenges and opportunities between New Zealand and China, as part of the Belt and Road Initiative – the work that is looking to develop growth along ancient trade routes as well as the more modern routes from China across the South Pacific.

One of the other most impactful outcomes of this programme to date is the collaboration

with the Port of Tauranga Biosecurity Excellence Initiative, which measures and improves biosecurity awareness and support in the Tauranga community. This work saw our team partner with an education trust, House of Science, to develop a biosecurity education kit for primary and intermediate schools. With that kit now being rolled out, our social science team will be measuring the difference it makes to biosecurity awareness and support.



## Resilient Rural Communities



Resilient Rural Communities brings together researchers in the social and physical sciences to investigate adapting to the changing farming conditions in New Zealand, while balancing economic, environmental, social and cultural outcomes. Topics within the project have included farming entrepreneurship, Māori youth in rural communities, resilience indicators and ecosystem services.

Resilient Rural Communities has developed out of an earlier research programme led by AgResearch, called Rural Futures. This seven-year research programme developed and tested innovation tools and processes that integrate social science and farm systems modelling to explore alternative futures. Its aim was to support farmers in taking a more proactive approach to envisioning and creating their own futures.

Early in 2018 the Resilient Rural Communities Research Programme conducted workshops in small rural communities across the North Island: Te Kuiti, Taumarunui, Huntly and Dannevirke.

The purpose of these workshops was to talk with communities about rural resilience; specifically, to hear about their perceptions of resilience, and to test a framework for the measurement of resilience. Findings suggested that the premises underlying the framework were correct.

That is, there are different types of resilience (economic, social, cultural, environmental and institutional), and together these types make up 'overall' resilience. These resilience types also appear to be somewhat substitutable for each other: less of one type may be compensated for by more of another. Findings also showed official statistics were not good measures of community resilience (as they did not match with a community's own ratings); nor were experts' judgements.

We also asked communities to estimate how their town performed on official statistics. Interestingly, community members consistently over-estimated social and economic statistics, like population growth and median income. Nevertheless, they rated their economic resilience to be lowest of all resilience types, and cultural resilience as the highest. This may be due to the strong social capital they described in their communities, which can be drawn upon when required.

These results tell us that community resilience is complex and multi-faceted. It is important for us to better understand this topic, so we can accurately measure, track and hopefully improve the resilience of our small towns. Further research is needed to investigate why these patterns occur, and whether they are consistent across other small New Zealand towns.



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## Māori agribusiness




At AgResearch, we recognise that our partners are distinctive because their whakapapa, values and ownership structures propel Māori businesses towards something different – a supply chain (including the farm and the consumer) that is based on shared principles (namely a ‘shared-principles value chain’) of Whakapapa, Rangatiratanga, Kaitiakitanga, Whanaungatanga and Manaakitanga. This is a novel, uniquely Aotearoa business ethos that aims to move Māori agribusinesses beyond business as usual, while at the same time building opportunity for New Zealand at large.

As AgResearch watches and learns alongside Māori partners who are in the early stages of developing new indigenous fibre and meat values-based supply chains, we have formed three key Māori agribusiness research themes to underpin their research and development (R&D) needs: decision-making, resource use and value chain. Increasing numbers of our Māori agribusiness partners are asking AgResearch to co-develop research and development projects that will help them extend their business operations and interests beyond production into processing and marketing. Not unlike many New Zealand farmers, our partners have identified that they want ownership of product from the paddock

to the plate, to have a direct relationship with their national and international customers and to increase the transparency within the supply chain, thereby spreading the risk and the wealth. But where we at AgResearch add value is recognising that unique to Māori agribusinesses are their aims to produce food and engage with the whenua in a way that is in keeping with cultural values, and that maintains and even restores the health and mauri of their land and waters, and to leverage the value of the ‘Māori story’ from their product.

This is an exciting area of development and we look forward to growing our partnerships and connection with the Māori agribusiness sector. To support this work, we apply for Te Pūnaha Hihiko: Vision Mātauranga Capability Fund investment, which supports the four themes of the Government’s Vision Mātauranga Policy: indigenous innovation; taiao – achieving environmental sustainability; hauora/oranga – improving health and social wellbeing; and mātauranga – exploring indigenous knowledge. The projects funded through the Vision Mātauranga Capability Fund reflect the high calibre of diverse research aimed at creating a healthier, more sustainable and better future for all of New Zealand, which is a natural fit for AgResearch’s work in this sector.



Our Māori agribusiness partners are asking AgResearch to co-develop research and development projects that will help them extend their business operations.

# Our people

At AgResearch, our people are our most important asset. Without our people, there is no science and without our science there is no innovation.

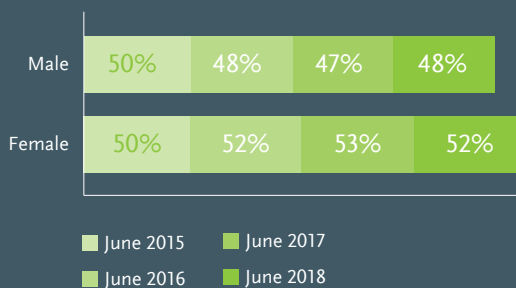
Our team of around 700 people includes scientists, technicians, farm and support staff who are all specialists in their own areas of work. AgResearch views its role as providing a safe and healthy environment for our people, where talent is attracted, developed, nurtured, retained and promoted.

Our Talent Development Programme provides a robust framework for our high-potential people. Our Succession Planning Programme aims to ensure that we have a pipeline of 'match ready' talent that is being developed, and prepared for, better and brighter opportunities.

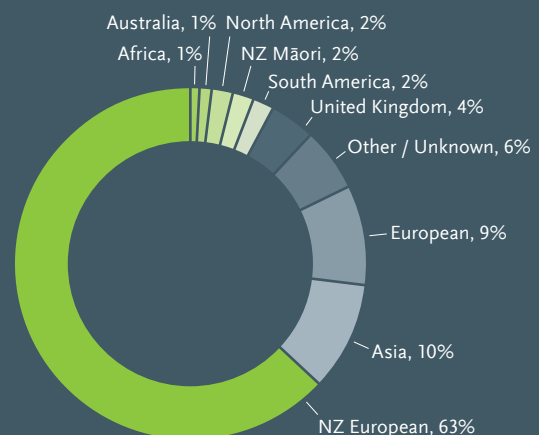
At AgResearch, we care deeply about the concepts of Mātauranga Māori in our work and we collaborate closely with iwi on a variety of exciting and meaningful science projects.

We promote, celebrate and enjoy the diversity found within our own organisation and among our customers and external stakeholders. In FY19 we will be developing an Equal Employment Opportunities Policy that links to our values and that supports our commitment to organisational diversity.

## Gender profile



## Ethnicity profile





## Our values

Our values, which were developed by our people in 2017, have been embedded into our organisation over the past 12 months. They define who we are, who we want to become, and how we interact with each other, and our customers, in order to deliver on our strategic goals and aspirations.

These values are a critical aspect of our organisational culture and positively impact on the strong engagement of our people and our stakeholders. Our values underpin everything we do and are continually integrated into all of our people processes, practices and strategic work to support the delivery of our common purpose across AgResearch.

We recognise our people through the Our Values Award programme with multiple nominations and winners coming from across science and non-science teams three times per year.

We value **Whakarangatira** (Professionalism), **Mahitahi** (Collaboration), **Mātai Whetu** (Quality), **Āta Mātai** (Innovation), **Mātai** (Customer Focus) and **Āta** (Thought Leadership).

## Leadership, engagement, change agility, partnership and collaboration

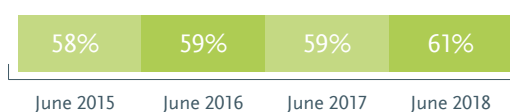
Our culture is one of transformational change and we encourage and support resilience and adaptability in our people. AgResearch has embarked on a significant programme of change with the construction of two new joint facilities in Lincoln and Palmerston North and it is key to our organisational success that we bring our people along with us on this journey. AgResearch is committed to being a good employer and our People Strategy is designed to support this ambition.

### Leadership, accountability and culture

In 2017, 73.4% of our workforce responded to the annual Employee Engagement survey, with the results showing an increase in our Engagement Index from 59% to 61%. We appointed a culture and engagement specialist to develop and deliver plans and programmes that will support our improved performance in this area.

Continued areas of organisational focus are on conveying a strong sense of common purpose, improving trust and confidence in senior leadership and ensuring that our communication is honest and transparent. In the coming year we will be investigating how we can measure our employee engagement more frequently with a new measurement tool.

## Employee engagement



We have refined our Leadership Framework and in FY18 we launched several key leadership initiatives, including an Executive Team Leadership Programme and a phased leadership development programme that is based on leading self, leading others and leading leaders and is delivered by a blend of in-house and external facilitators. We have also invested heavily in our High Potential Talent Programme. Our key objective is to broaden and deepen leadership capability, to strengthen leadership confidence and to improve the impact of our leaders and the results that they deliver. The programme, which is open to all people leaders has been well received. We have also established a mentoring programme, which has seen good uptake, providing opportunities for more junior staff to derive the benefit of the experience and knowledge of their more senior peers as they navigate their own career pathway.

We have a strong focus on building the cultural competency of our people. We are delivering a robust Mātauranga Māori development programme that includes improved understanding of the Treaty of Waitangi, te reo Māori, Vision Mātauranga and Noho Marae.

In preparation for our relocation to our new joint facilities, we have a strong organisational focus on our 'new ways of working'. Using our new and existing spaces to maximise fit-for-purpose work environments and to encourage and support a greater level of collaboration through how our facilities are set up, and how our people use them, is a key strategic goal of our organisation.

This preparatory work includes many different aspects such as paper intelligence, online resource and data management protocols, shared consumables and equipment guidelines and the development of a new co-designed operating model to help us to understand how this will work in practice, with our partners. AgResearch is in the process of designing a change management framework, which will determine how change – both small and large scale – will be executed within the organisation. Based on the Prosci methodology, the framework is intended to ensure that change is managed consistently and with good cadence.

### Recruitment, selection and induction

We continue to promote and demonstrate internal promotion into open vacancies with strong recruitment and selection policies and procedures to ensure a fair and transparent process. We celebrate the cultural diversity of our organisation and are an accredited employer with Immigration New Zealand.

We will continue to work hard to remove any inadvertent prejudice from our recruitment and selection processes and will be delivering 'unconscious bias' workshops to hiring managers to support this in the coming year. Onboarding is recognised as a critical time in our employee's journey with us and this process continues to be refined and improved. It is our goal to make this period of employment

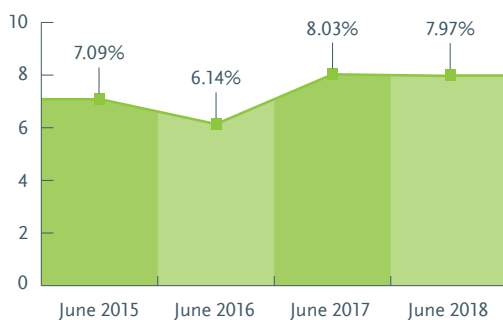
as useful, welcoming and engaging as we can. Our recruitment, selection and Induction processes will be supported by the introduction of a new Human Resource Information System (HRIS) this year. It is hoped that many of our processes in these areas will be automated by its implementation.

### Employee development, promotion and exit

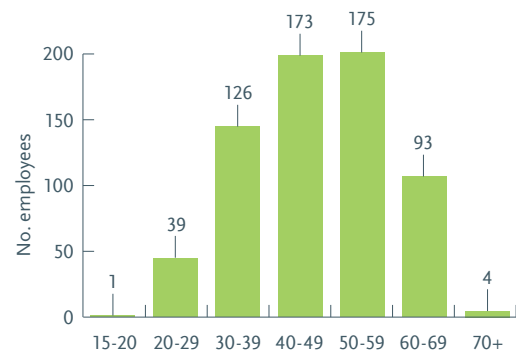
It is expected as part of our annual performance review process that managers, in consultation with their direct reports, set objectives and development goals that align with the organisation's strategy and the employee's own career aspirations. In turn, AgResearch offers a comprehensive learning and development programme that has been designed to support our strategic and cultural goals. Ongoing development conversations between managers and their direct reports are encouraged and promoted. We have a clearly defined process for science promotions, which is aligned to our science career descriptors. In due course we will endeavour to work with science to refresh these descriptors as the strategic direction of our science objectives evolves.

We have recently revised our employee exit process to include an online exit survey and/or face-to-face exit interview. This is a critical opportunity for us to learn about how AgResearch can improve our employee experience.

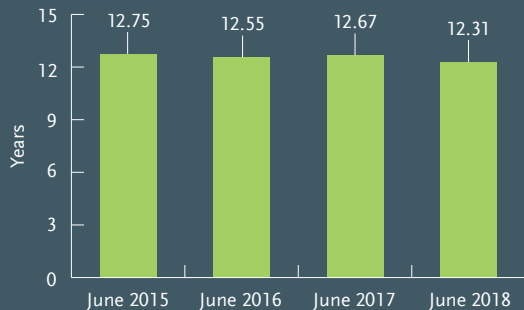
## Employee turnover



## Employee age profile



## Average tenure



### Flexibility and work design

AgResearch prides itself on the flexible working arrangements it offers to its employees to promote good work-life balance and wellness. Of our total workforce, 21% are on part-time or variable hours with working arrangements appropriate to their specific needs and requirements. Technology resources, including phones, tablets and Skype for Business capability, are provided to allow for greater employee mobility. This will continue to be an important focus as we relocate and transition our workforce to different campuses as part of the new joint facility programme. AgResearch also offers generous entitlements, over and above legal requirements, in particular for sick leave and parental leave.

### Remuneration, recognition and conditions

AgResearch has a remuneration policy that is fair and consistent and that takes into account market relativity, internal relativity, ability to pay and performance. This policy ensures that all individuals and groups have equal employment opportunities and fair terms and conditions. We partner with managers to ensure moderation of both performance and remuneration levels. We benchmark our salary medians against the general market sector and also offer annual performance bonuses to recognise exceptional individual contributions.

We are in the process of undertaking a strategic remuneration review in consultation with our union, which we hope to complete by the end of 2018.

### Harassment and bullying prevention

AgResearch is dedicated to a harassment- and bullying-free work environment, as demonstrated in our Code of Conduct and the relevant provisions of our employment agreements. We have a strong Employee Assistance Programme culture across all campuses, with both internal and external representatives, available to offer support and escalation advice.

Our value of Professionalism outlines the expected behaviours in this area at all times. In the coming year we will be looking at additional resources and development that we can deliver to support a greater level of awareness of the prevention for workplace harassment and bullying.

### Safe and healthy environment

Our vision is to be “a safer AgResearch together”. Health and safety is still an all-organisation priority with an expectation that all employees go home safely every day. We deliver numerous initiatives that support this ambition both from a compliance perspective and to support the general wellbeing of our people. We offer generous sick leave provisions, income protection and life insurance cover and we work closely with our managers to ensure that our people take their annual leave entitlements to allow time for rest and recovery.

We have taken the opportunity this year to complete an external audit of work-related stress along with reviewing our own internal wellbeing practices. We will continue to execute the key actions recommended in the audit and review, over the coming year.

### Our future focus

- Joint facilities at Massey and Lincoln Universities
- Our new ways of working
- HRIS implementation
- Leadership development
- Change management excellence
- Campus vitality initiatives
- Process efficiency and improvement
- Talent pipelining for critical roles and key people
- Employee diversity and wellbeing

# Internal research awards

In 2012, AgResearch established the Science Prize to recognise outstanding achievement in research quality and an Impact Prize to recognise the achievement of outstanding scientific outputs. In this sixth year of awarding the prizes, we were very pleased to receive an exceptional group of nominations.

## Science Prize winner

*Rumen microbial community composition varies with diet and host, but a core microbiome is found across a wide geographical range.*  
Published in: *Scientific Reports*, 2015.

This year's Science Prize was won by the team that led a global survey of the microbial diversity in the rumen, funded by the New Zealand Government as part of its support for the Global Research Alliance on Agricultural Greenhouse Gases. The rumen is the modified foregut of animals known as ruminants. Feed is fermented by microbes in the rumen, allowing the animal to extract energy from feed such as grasses that otherwise could not be digested. These microbes are essential for ruminant productivity.

This global study demonstrated that, across a variety of diets and ruminant species (both domesticated and wild), the major groups of rumen microbes around the globe are largely the same. There is variation caused by diet and host species. The dominant microbial groups turn out to be poorly studied and their roles are not well understood.

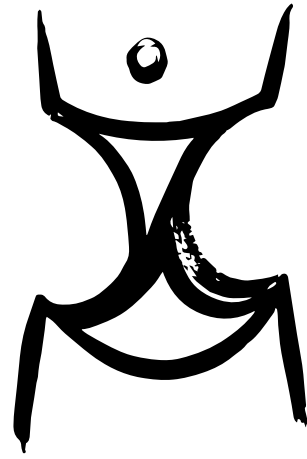
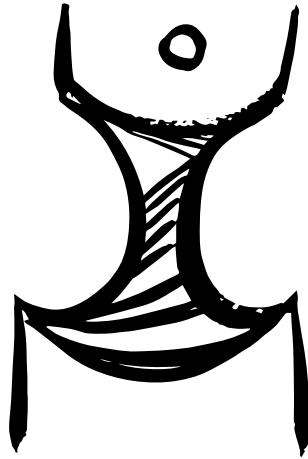
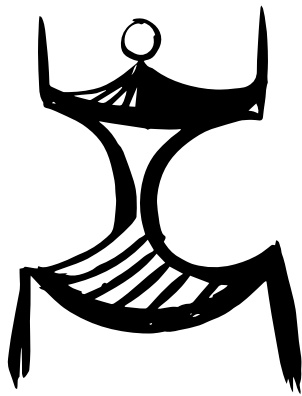
Another important group of rumen microbes are the methanogens, which form methane, a by-product of the fermentation and a

greenhouse gas. The study found the same major methanogen species were found in all ruminants, regardless of host species and diet. This finding has a big implication for methane mitigation: a technology developed in one place will have global application because the same methane-producing microbes are everywhere.

The knowledge generated by this publication provides an encouraging insight for the development of solutions to the methane emission issue at a global scale. It has therefore made a direct contribution toward reducing the environmental impact of livestock.



Peter Janssen, Arjan Jonker, and Faith Palevich. Team members not in photo: Gemma Henderson, Siva Ganesh, Wayne Young and Global Rumen Census Collaborators



*Ngā Tāngata*

## Impact Prize

*Grasslands® Relish red clover cultivar.*

Grasslands® Relish is a new red clover cultivar developed by AgResearch as part of a commercial partnership.

Grasslands Innovation Ltd has funded the breeding programme that developed the new cultivar using exotic germplasm from the Margot Forde Forage Germplasm Centre since 2004.

With first seed sales in 2014, Grasslands® Relish is a major advancement, following step change improvements in persistence and production. While the initial focus was on its use in lamb finishing systems, Grasslands® Relish's improved grazing tolerance increased its use in seed mixes for dairy, deer, and mixed sheep and beef production systems.

With higher growth rates and persistence under grazing than other red clover cultivars, Grasslands® Relish provides a new option for pastoral farmers seeking to optimise profitability. Grasslands® Relish use is expected to continue to grow, especially in seed mixes.



*John Ford (PGG Wrightson Seeds) and Brent Barrett (AgResearch). Team members not in photo: Zulfi Jahufer, Ivan Baird, Zane Webber, Allister Moorhead and Derek Woodfield*

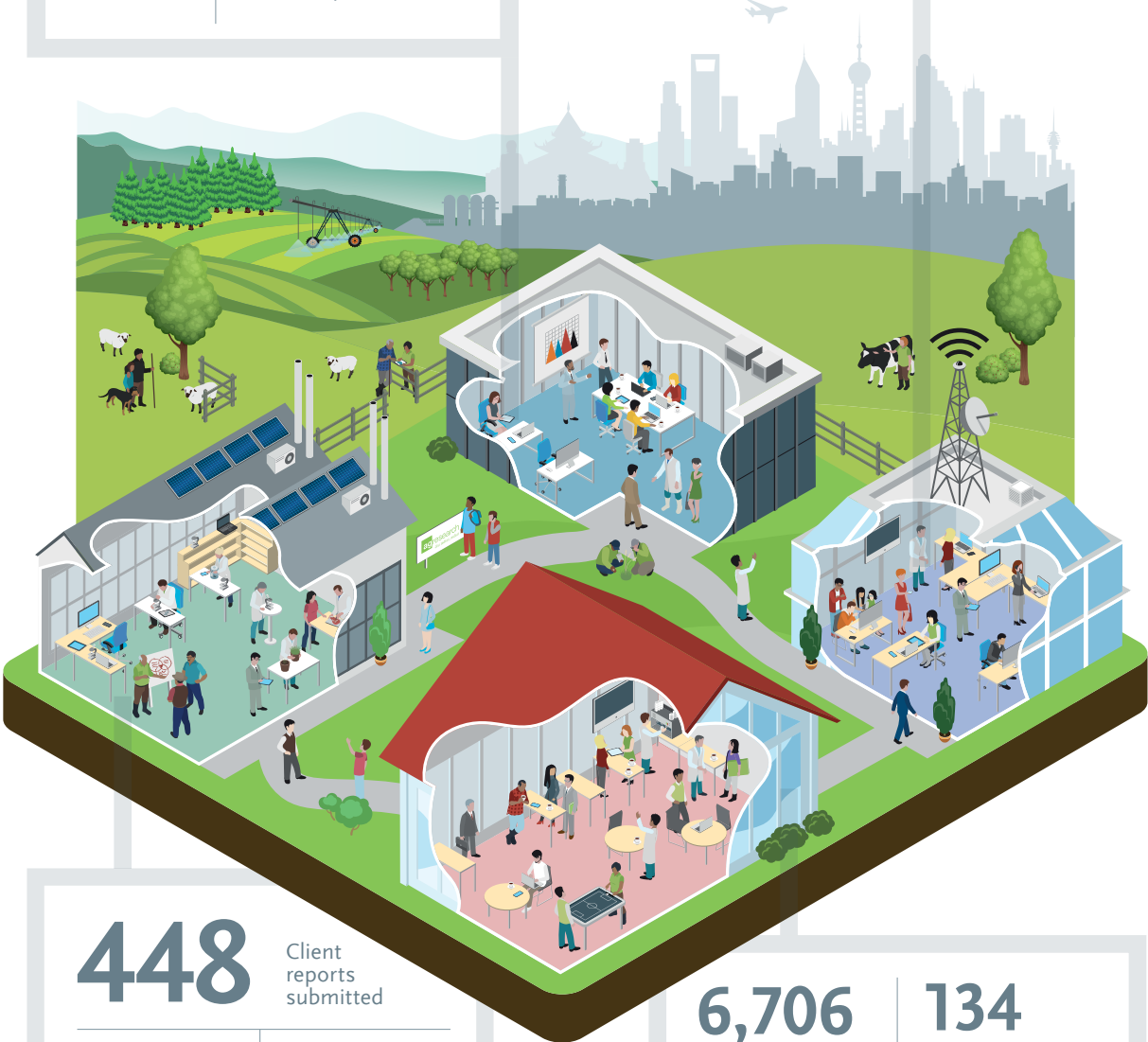


AgResearch's success is measured across various areas of the organisation, from scientific publication levels and staff training and development, to revenue growth and impactful communication. Ultimately our scientific successes in the lab and on-farm, translates to immense benefit for the agricultural sector and therefore wider New Zealand.

# Our highlights

<b>626</b> Total FTE's*	<b>\$229.6k</b> Revenue per FTE*
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<b>7,664</b> LinkedIn followers	<b>4,697</b> Twitter followers
<b>2,414</b> Facebook followers	<b>31</b> Media releases



<b>448</b> Client reports submitted	<b>249</b> Scopus-indexed papers published	<b>1.32</b> Papers published per scientist
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<b>6,706</b> hours of training delivered across the organisation	<b>134</b> training workshops delivered across all campuses
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\*FTEs = Full-time equivalent staff

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# Our international connections

AgResearch partners with organisations around the world to carry out a wide range of research programmes. These span the breadth of AgResearch's scientific capability and reinforce the success of global relationships.

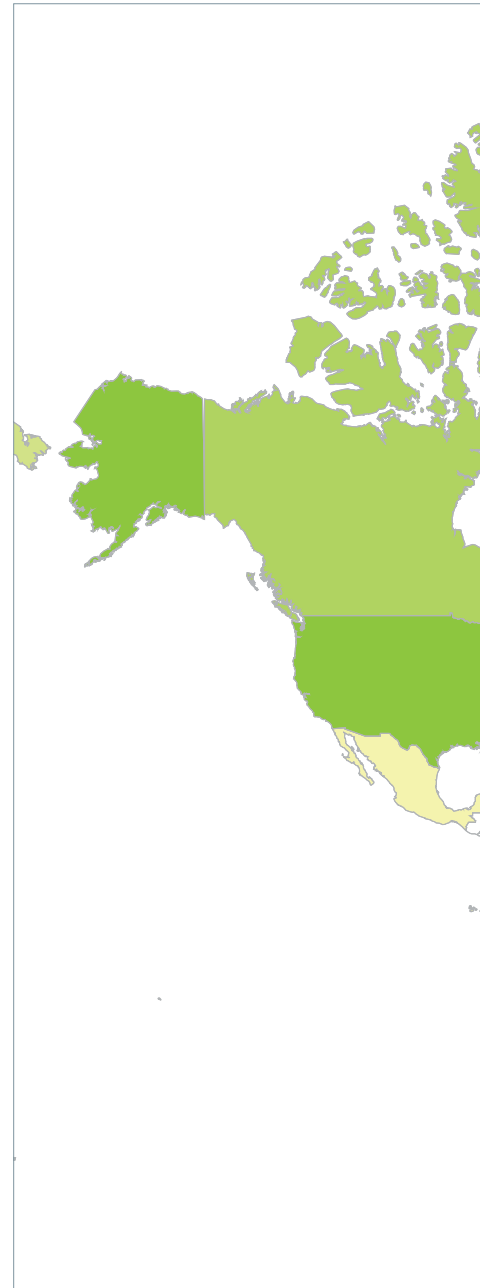
**57**  
Countries

**266**  
Collaborations

**51**  
Collaborations  
with USA

**30**  
Collaborations  
with China

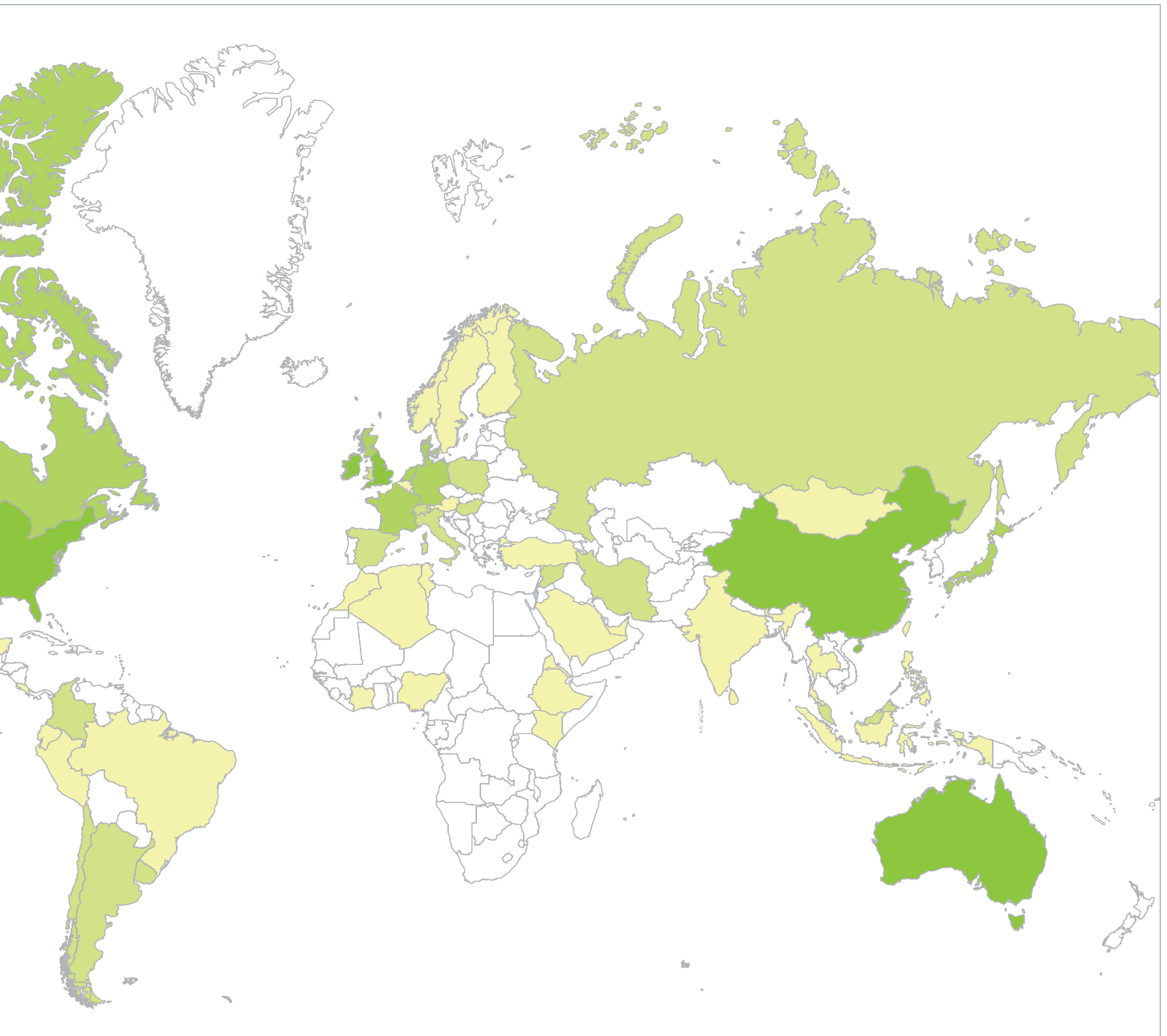
**30**  
Collaborations  
with Australia



## Countries we collaborate with, in alphabetical order:

Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Denmark, Ecuador, England, Eritrea, Ethiopia, Finland, France, Germany, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kenya, Malaysia, Mexico,

Mongolia, Morocco, Netherlands, Nigeria, Norway, Peru, Philippines, Poland, Russia, Saudi Arabia, Scotland, Singapore, Spain, Sri Lanka, Sweden, Switzerland, Syria, Taiwan, Thailand, Tunisia, Turkey, United Arab Emirates, United States of America, Uruguay, Wales



- 10 + collaborations
- 6 – 10 collaborations
- 2 – 5 collaborations
- 1 collaboration

# Outreach

## Telling the AgResearch story

To share the stories of our research, we use channels ranging from mainstream media and social media, to stakeholder-specific gatherings and meetings, to large public-facing events.

Each audience requires a different approach depending on why they are engaging with us. Are they listening or watching by chance, or are they tuning in specifically to learn what AgResearch's research has revealed?

Who is the audience hearing from, and how do they know they are learning from the expert? These are all questions to consider when planning the best way to share the AgResearch story.

In the digital age, having an intuitive, informative and easy-to-read web presence is critical. Our website is used as an information hub by the public, the media and our stakeholders, meaning it is important to make it as appealing and useful as we can. This year we redesigned and relaunched this important channel and we have since seen a significant increase in its use.



Being part of AgResearch means being a walking ambassador for all of our colleagues and their research too, so it is important to look professional when representing the organisation. Our branded wardrobe has been progressively rolled out to our people to ensure their audience is aware of exactly who they represent.



Some of our key relationships with stakeholders are successful because of the time we take to share our expertise. The Breeders' Day held at our Invermay Campus was a great example, and allowed our world-leading researchers to connect with breeders and farmers, and to discuss everything from fertility to genetics to farm systems.



Using media channels is a good way to reach beyond the regular debate and discussions had within rural and science communities to broader communities that fund AgResearch through their taxes; it is also an effective way to influence key stakeholders and seek new funding opportunities. This year has seen continued growth in reaching those broader audiences in New Zealand and overseas, with AgResearch featuring on the ABC, BBC, Ferrari Press Agency and Le Monde.

The National Fielddays at Mystery Creek brings a significant percentage of those involved in the agricultural sector to the Waikato for a week, and presents a good opportunity to share information about our science.



Raising awareness about AgResearch's scientific capability often takes a creative turn outside of the science itself. This year we worked with our Lincoln farm manager, our textiles technicians and one of our super-crafty scientists to create a woollen hat for Neve Te Aroha Ardern Gayford, the Prime Minister's baby. This cute video reached almost 5,000 viewers through our social media accounts.

In partnership with DairyNZ, LIC and Waikato University, we hosted Year 13 students from across the Waikato at an annual Science Day, in order to highlight the career opportunities available in agriculture and science. Ensuring that agriculture has the science talent it needs for continued innovation is vital, and the response from students and teachers alike is always positive.



# Collaboration with other Crown Research Institutes

AgResearch defines collaboration as one of its six organisational values, and that value is demonstrated both internally and externally.

Collaboration with other agencies and industry bodies ensures wide benefits – researchers learn from their peers, funding constraints are eased, and the end-user of the research benefits from the broad application of knowledge and thought leadership. Some of the most significant research

relationships we hold are with the other Crown Research Institutes. These partnerships stretch across a range of disciplines, and have led to many exciting, innovative developments that have had invaluable impacts for New Zealand. Here, we have highlighted just a few.

## Forage for reduced nitrate leaching

This project is aimed at reducing nitrate leaching through research into diverse pasture species and crops for dairy, arable, and sheep and beef farms. It has intensively studied plantain, which had been shown to reduce nitrogen in urine. Plantain also has a dilution effect on cows' urine and has recently been shown to reduce nitrate loss from soil.



## Social Ecological Systems (SES) framework

This AgResearch-led study is investigating environmental decision-making using the SES framework. The framework has been applied to six case studies so far, looking at environmental governance in New Zealand and what factors are required for resource management success. At its completion this collaborative project's findings will have the potential to make a real impact through enhancing the environmental, social, economic and cultural outcomes of environmental decision-making.



## Myrtle rust response

As the myrtle rust response was being developed, AgResearch scientists joined those from other CRIs to take part in facilitated workshops. These were regarded as highly successful with the diverse range of research expertise working together to develop a national approach. The outcome of this collaborative approach was a framework for strategic science activities that took into account short-, medium- and long-term research.



## Bioresource processing alliance

This collaboration also includes Callaghan Innovation and has looked at a range of research with a strong applied science and commercial focus, to maximise returns from secondary resource streams for New Zealand's primary production sector. Since its inception it has progressed its commercial goals well. Its final stage will look at ways to continue the alliance's work in other forms.



## Hybrid UHT product development

Together with commercial milk processor Miraka, we are looking at ways to target Asian markets with hybrid UHT product that incorporates plant and vegetable, or cereal, ingredients. This collaboration is part of the Innovative NZ Hybrid UHT Foods project.



### The cost of weeds

This partnership also involved economists from Lincoln University's Agribusiness and Economics Research Unit. Together the partners reviewed the available published research on the costs of weeds to New Zealand's productive land (for the pastoral, arable and forestry sectors). That review reached a conservative overall estimate of \$1.658b a year.



### Fibres in our water

In the ocean, smaller microfibres can be ingested by the marine life and can end up in our seafood, potentially creating human health issues as volumes of microfibres increase. Our scientists say the limited data available suggests wool – being a natural protein fibre – breaks down at a far greater rate in sea water, and therefore presents far less risk to the marine environment than synthetic fibres like polyester and nylon.



### Assessing cadmium uptake in our agricultural systems


Cadmium (Cd) is a toxic heavy metal within fertilisers that has potential adverse effects on food quality, soil health and the environment. This joint project, along with Lincoln University and the Fertiliser Association of New Zealand, has been undertaken to measure Cd uptake in wheat and potatoes to determine what factors affect uptake, if crops are compliant with food standards, and if current interim soil trigger values are protecting Cd uptake in crops.



### Identifying a new control agent for grass grub

As part of the Next-Generation Biopesticide programme, scientists have isolated an exciting new control agent that shows dual activity against larvae of the endemic New Zealand pasture pests grass grub and manuka beetle. Grass grub is one of New Zealand's most economically damaging pasture pests; in bad years it can cause pasture losses valued at \$1.6b. The key synthetic insecticide registered for use against grass grub will be phased out by 2028, so alternative methods of control are urgently needed.





As global concern grows about pollution of our oceans and effects on marine life and seafood, AgResearch is studying how different materials break down in the water to help keep consumers informed.



# Key performance indicators

for 2017/18, at a glance

	Strategic goal	Objective	Key performance indicators for FY18	Result for FY18
People	Innovative and high-performing workforce.	Staff engagement increased.	Increase Engagement Index from the previous staff survey result by 3%.	In July 2018, our Staff Engagement Index was 65.0, up from 61.0 in 2017.
		We will all have a safe workplace.	Total Medical Treatment Injuries (MTI) and MTI causing lost time <60 per year.	From 1 July 2017 to 30 June 2018, the total number of MTI and MTI causing lost time was 34, down from 38 last year.
			No serious harm accidents.	We did not have any 'serious harm' incidents.
Stakeholders	Comprehensive understanding of the sector, including key and emerging players and their relationships.	Grow our understanding of the sector and the sector's recognition of that understanding.	>90% of surveyed stakeholders rate AgResearch's understanding/contribution to their strategy as good or better.	In 2017, 83% of surveyed stakeholders rated AgResearch's understanding/contribution to their strategy as good or better. At the time of publication, 2018 results are not available.
	Co-owned strategy with key stakeholders.	Grow commercial revenue through closer alignment of stakeholder and AgResearch strategic goals.	Successful engagement with Government, key industry and wider stakeholders to identify the new science that is needed to meet New Zealand's critical challenges around agricultural profitability, enhancement of the environment and mechanisms to fund that, resulting in significant new investment.	After analysis of both the quantitative and qualitative data (key themes) in the 2017 Stakeholder Satisfaction survey, a revised and comprehensive Stakeholder Engagement Plan (SEP) was developed and implemented in the 2018 year. The SEP was developed to meet several key Stakeholder needs; <ul style="list-style-type: none"> <li>• Greater understanding of the breadth of AgResearch capability</li> <li>• A greater need for co-design around key R&amp;D activities</li> <li>• Increased consistency in general engagement</li> <li>• Increased involvement of senior management in direct stakeholder engagement</li> </ul> The SEP implementation was based upon a revised platform for Customer segmentation, with the various segments (4 in total) receiving tailored Engagement Plans.
			Deliver \$32.4m of stakeholder-driven commercial science revenue.  Deliver \$2.48m of international organisation-driven revenue.	We achieved \$34.3m of stakeholder-driven commercial science revenue.  We achieved \$3.3m of international revenue.
Research	R&D solutions that meet sector needs and contribute to Impacts and Outcomes identified in our strategy Statement of Corporate Intent.	Ensure AgResearch has the research portfolio, and capabilities that will meet current and future stakeholder needs and deliver our strategy.	Implement the recommendations from the 2017 Animal Sciences Roadmap.	A number of operational recommendations were developed with the aim of increasing staff engagement and operational efficiency; these have been introduced during FY18. A major recommendation was to conduct a review of our internally-funded Livestock Gene-editing programme. This has been completed, and has resulted in a significant change in direction for FY19.

	Strategic goal	Objective	Key performance indicators for FY18	Result for FY18
Research				The Animal Science Roadmap will now be refreshed on an annual basis, with particular emphasis on delivery to the AgResearch Science Plan.
			Implement AgResearch's 2016 Science Plan.	We have implemented key Science Plan milestones where we consider impacts would be delivered this year. In addition, we have developed a new Science Plan to meet the changes in our sector that will be implemented from FY19.
	High-quality, relevant science.	Deliver relevant, high-quality, reliable R&D outputs that meet stakeholder needs and deliver to our strategy.	> 1.0 Scopus-indexed papers published per scientist.	1.32 Scopus-indexed papers were published per scientist.
Enabling systems	Robust business processes and systems that enable delivery on strategy.	Improve the effectiveness and efficiency of business processes.	Implement Idea to Impact (our new Project Management way of working) to plan and commence benefit realisation.	Our end-to-end integrated Project Management approach (known as 'Idea to Impact') has been rolled out to our pilot teams and Phase 1 teams. The remainder of teams (Phases 2, 3 & 4) are on track for implementation. A benefit realisation review is underway.
	Infrastructure aligned to strategy.	AgResearch infrastructure is fit for purpose.	Develop Future Footprint programme and Lincoln Hub developments to agreed programme milestones and budgets for FY18.	The Food Science Facility and Grasslands Greenhouses projects are progressing to agreed milestones.
				While the Lincoln University AgResearch Joint Facility project is within budget, we have requested tenders for a Build Only contract, as the Early Contractor Involvement contractor's tender exceeded budget and was deemed not acceptable. This has impacted on the programme schedule. Construction completion timelines will be confirmed once the contract negotiations are complete and the contract is awarded in August 2018.
Financial	Sustainable financial performance to enable achievement of strategic goals.	Achieve financial targets.	Operating Profit budget achieved.	Our Operating Loss is \$0.4m compared to a budgeted loss of \$6.8m.
			Net Profit Before Tax budget achieved.	Our Net Loss Before Tax of \$1.8m was better than our budgeted loss of \$11.4m.

# Performance indicators

As at 30 June 2018

AgResearch's 2017–22 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 in [brackets] are from AgResearch's 2017–22 SCI.

## Core Operating Indicators

ID	Indicator	Definition	Measure [target]
G.1	End-user collaboration	Revenue per FTE from commercial sources.	\$83.1k [\$85.9k]
G.2	Research collaboration	Publications with collaborators. (Percentage of publications with (a) only AgResearch authors, (b) other NZ authors, (c) international authors or (d) a combination of NZ and international authors.)  <i>(Data for this indicator is reported for calendar years.)</i>	(a) 11% [20%] (b) 34% [39%] (c) 31% [28%] (d) 24% [21%]
G.3	Technology & knowledge transfer	Commercial reports per scientist FTE.	1.26 [1.0]
G.4	Science quality	Impact of scientific publications. (The average value of two-year citations per document for scientific journals assessed by SCImago, in which AgResearch staff published during the year, weighted by the number of AgResearch publications in each journal.)  <i>(Data for this indicator is reported for calendar years.)</i>	2.9 [2.7]
G.5	Financial indicator	Revenue per FTE, based on average FTEs over the year.	\$229.6k [\$215k]

## AgResearch-specific Indicators of End-user Engagement and Science Relevance

ID	Indicator	Definition	Measure [target]
1.1	Confidence of stakeholders	(a) Percentage of relevant funding partners and other end-users that have a high level of confidence in the CRI's ability to set research priorities, and (b) the percentage of stakeholders who were satisfied with their collaboration or partnership with AgResearch.  <i>(Reported by the biennial 2018 CRI stakeholder survey conducted by MBIE.)</i>	(a) 65% [75%] (b) 71% [85%]
1.2	Revenue from stakeholders	Revenue coming directly from stakeholders. Excludes revenue from central Government; includes co-investment from stakeholders with central Government.	\$36.0m [\$39.1m]

## AgResearch-specific Operating Indicators of Knowledge and Technology Transfer

ID	Indicator	Definition	Measure [target]
2.1	Collection requests	Number of requests and enquiries for access to AgResearch's publicly available collections.	The Margot Forde Forage Germplasm Centre issued 1,792 [2,500] samples from its collection.
2.2	Stakeholder reports	Number of client reports submitted by AgResearch staff.	440 [270]
2.3	Licensing deals	(a) Total revenue, (b) number and (c) percentage of licensing or other deals of AgResearch-derived intellectual property (IP) (including technologies, products and services) with New Zealand and international partners per annum.	(a) The AgResearch group received a total of \$11.0m [\$9.8m] of royalty revenue. (b) (c) ... and executed 0 [6] licensing and other deals.
2.4	Adoption	Percentage of relevant end-users who have adopted knowledge and/or technology from AgResearch.  <i>(Reported by the biennial 2018 CRI stakeholder survey conducted by MBIE.)</i>	88% [95%] of stakeholders had adopted knowledge or technology from AgResearch in the past three years.

## AgResearch-specific Operating Indicators of Delivery to Vision Mātauranga

ID	Indicator	Definition	Measure [target]
3.1	Effective relationships with Māori	Percentage of Māori agribusiness partners and end-users who rate AgResearch as 'good' or better for effective collaboration and partnering in the annual customer relationship survey.  <i>(*2017 results. Five Māori agribusinesses responded to the survey out of the six that were invited. 2018 results are not available as at date of publication).</i>	80%* [80%]
3.2	Revenue from Māori stakeholders	Revenue (direct and leveraged) from Māori agribusiness stakeholders.	\$279k [\$0.32m]

# Performance indicators (continued)

As at 30 June 2018

## AgResearch-specific Operating Indicators of Research Collaborations and Linkages

ID	Indicator	Definition	Measure [target]
4.1	International linkages	(a) Number and (b) percentage of peer-reviewed scientific papers co-authored with an international author.  <i>(Data for this indicator is reported for calendar years.)</i>	AgResearch published 154 [140] Scopus-indexed papers co-authored with at least one international author in the 2017 calendar year. In 2017, papers with international collaborators comprised 55% [50%] of all Scopus-indexed papers published by AgResearch during the calendar year.
4.2	Research collaboration	(a) Number and (b) percentage of joint scientific peer-reviewed publications; and (c) number and (d) percentage of IP outputs with other New Zealand or international research institutions per annum.  <i>(Data for items (a) and (b) is reported for calendar years. Items (c) and (d) count IP that was recorded as "accepted" during the financial year in the Intellectual Property Office New Zealand patent, plant variety right and trademark databases.)</i>	(a) AgResearch published 249 [250] Scopus-indexed papers co-authored with other NZ or international research institutions. (b) This was 89% [85%] of all AgResearch publications. (c) AgResearch produced 0 [1] IP outputs with other organisations during the financial year. (d) This was 0% [10%] of AgResearch's 0 IP outputs.
4.3	Research collaboration – Blinc Innovation – Blinc Innovation (formerly known as Lincoln Hub)	(a) Additive AgResearch revenue referable to Blinc Innovation and (b) other measures under development.	(a) \$413k [\$0.35m] (b) Measures have been developed around potential benefits that will be reported on separately.





# Financial performance indicators

For the year ended 30 June 2018

	Actual 2018	Budget 2018	Actual 2017
Cash flow			
• Net cash flow from operating activities \$k	10,570	3,773	20,080
• Net cash flow from investing activities \$k	(23,329)	(46,247)	(18,115)
• Net cash flow from financing activities \$k	-	-	-
• Total net cash flow \$k	(12,759)	(42,474)	1,965
• Effect of exchange rate changes \$k	32	-	(9)
• Cash at the beginning of the year \$k	59,043	49,537	57,087
• Cash at the end of the year \$k	46,316	7,063	59,043
Operating Margin %	3.0%	(0.3%)	8.7%
Operating Margin per FTE \$k	7.0	(0.6)	20.4
Revenue Growth %	(1.7%)	(2.1%)	0.6%
Quick Ratio	2.8	2.0	3.7
Interest Coverage	151	999	2,528
Operating Margin Volatility %	38.9%	38.6%	34.5%
Forecasting Risk %	1.2%	n/a	0.3%
Adjusted Return on Equity %	(0.3%)	(6.1%)	3.6%
Capital Renewal	2.4	4.3	1.8
Equity Ratio %	81.9%	85.1%	83.7%

## 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 2018

in thousands of New Zealand dollars	Note	Actual 2018	Budget 2018	Actual 2017
<b>Revenue</b>				
Ministry of Business, Innovation and Employment				
• Strategic science funding		<b>38,889</b>	38,889	38,889
• Our Land & Water National Science Challenge		<b>6,623</b>	6,623	6,495
• Other		<b>21,766</b>	19,487	21,874
Commercial		<b>57,155</b>	56,027	59,506
Farm produce		<b>4,632</b>	6,289	5,386
Other revenue	1	<b>16,716</b>	13,932	16,116
<b>Total operating revenue</b>		<b>145,781</b>	141,247	148,266
Operating expenditure	2	<b>(148,017)</b>	(151,842)	(142,546)
Other gains/(losses)	3	<b>1,147</b>	-	1,117
Finance costs		<b>(28)</b>	-	(5)
Share of deficit of associates	4	<b>(719)</b>	(800)	(677)
<b>Surplus/(deficit) before tax</b>		<b>(1,836)</b>	(11,395)	6,155
Tax expense/(benefit)	5	<b>(831)</b>	(2,957)	1,507
<b>Net surplus/(deficit) after tax for the year</b>		<b>(1,005)</b>	(8,438)	4,648
<b>Other comprehensive income</b>				
Items that will not be reclassified subsequently to surplus or deficit:				
Revaluation of properties	7	<b>19,431</b>	8,499	4,134
Items that may be reclassified subsequently to surplus or deficit:				
Changes in fair value of available-for-sale financial assets	5	<b>(280)</b>	-	267
Income tax relating to components of other comprehensive income	5	<b>(5,231)</b>	-	(317)
<b>Other comprehensive income for the year net of tax</b>		<b>13,920</b>	8,499	4,084
<b>Total comprehensive income for the year net of tax</b>		<b>12,915</b>	61	8,732
Net surplus/(deficit) is attributable to:				
<b>Equity holders of the parent</b>		<b>(1,005)</b>	8,438	4,648
Total comprehensive income is attributable to:				
<b>Equity holders of the parent</b>		<b>12,915</b>	61	8,732

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

# Consolidated statement of financial position

As at 30 June 2018

in thousands of New Zealand dollars	Note	Actual 2018	Budget 2018	Actual 2017
<b>Current assets</b>				
Cash and cash equivalents		46,316	7,063	59,043
Trade and other receivables	8	33,613	22,468	29,665
Prepayments		2,067	2,561	2,162
Biological assets - livestock	10	4,611	3,800	4,487
Inventory		1,059	849	1,173
Derivative financial instruments		58	-	-
Property held for sale		763	-	45
Current tax	5	677	2,688	-
<b>Total current assets</b>		<b>89,164</b>	<b>39,429</b>	<b>96,575</b>
<b>Non-current assets</b>				
Investments in associates and joint ventures	4	15,370	5,607	5,607
Other investments	12	3,667	3,409	7,052
Property, plant and equipment	7	193,852	217,738	167,447
Biological assets - forestry	11	965	727	727
Other non-current receivables	13	4,536	4,528	4,341
Goodwill	16	1,043	-	-
Intangible assets		988	542	844
<b>Total non-current assets</b>		<b>220,421</b>	<b>232,551</b>	<b>186,018</b>
<b>Total assets</b>		<b>309,585</b>	<b>271,980</b>	<b>282,593</b>
<b>Less:</b>				
<b>Current liabilities</b>				
Trade and other payables	9	37,454	21,413	27,835
Derivative financial instruments		-	-	67
Finance leases – current		-	-	4
Provisions	14	6,314	4,946	5,103
Current tax	5	-	-	1,461
Other current liabilities		33	477	60
<b>Total current liabilities</b>		<b>43,801</b>	<b>26,836</b>	<b>34,530</b>
<b>Non-current liabilities</b>				
Deferred tax	5	15,905	14,596	11,240
Other non-current liabilities	15	826	631	685
Provisions - non-current	14	34	48	34
<b>Total non-current liabilities</b>		<b>16,765</b>	<b>15,275</b>	<b>11,959</b>
<b>Total liabilities</b>		<b>60,566</b>	<b>42,111</b>	<b>46,489</b>
<b>Net assets</b>		<b>249,019</b>	<b>229,869</b>	<b>236,104</b>
<b>Equity</b>				
Share capital	6	47,268	47,268	47,268
Revaluation reserves	6	102,880	96,081	89,074
Retained earnings		98,871	86,520	99,762
<b>Total equity</b>		<b>249,019</b>	<b>229,869</b>	<b>236,104</b>

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

Dr Paul Reynolds  
Acting Chair  
23 August 2018



Kim Wallace  
Director  
23 August 2018



# Consolidated statement of changes in equity

For the year ended 30 June 2018

in thousands of New Zealand dollars	Note	Share capital	Revaluation reserves, property, plant and equipment	Available- for-sale assets	Retained earnings	Total equity
<b>Balance at 1 July 2016</b>		47,268	84,314	681	95,109	227,372
Surplus after tax for the year		-	-	-	4,648	4,648
Revaluation of properties	<b>7</b>	-	4,134	-	-	4,134
Changes in fair value of available-for-sale financial assets	<b>5</b>	-	-	267	-	267
Transfer of revaluation reserve on sold assets	<b>6</b>	-	-	(5)	5	-
Income tax relating to components of other comprehensive income	<b>5</b>	-	(244)	(73)	-	(317)
<b>Total comprehensive income</b>		-	3,890	189	4,653	8,732
<b>Balance at 30 June 2017</b>		47,268	88,204	870	99,762	236,104
Deficit after tax for the year		-	-	-	(1,005)	<b>(1,005)</b>
Revaluation of properties	<b>7</b>	-	19,431	-	-	<b>19,431</b>
Changes in fair value of available-for-sale financial assets	<b>5</b>	-	-	(280)	-	<b>(280)</b>
Transfer of revaluation reserve on sold assets	<b>6</b>	-	(114)	-	114	-
Income tax relating to components of other comprehensive income	<b>5</b>	-	(5,310)	79	-	<b>(5,231)</b>
<b>Total comprehensive income</b>		-	<b>14,007</b>	<b>(201)</b>	<b>(891)</b>	<b>12,915</b>
<b>Balance at 30 June 2018</b>		<b>47,268</b>	<b>102,211</b>	<b>669</b>	<b>98,871</b>	<b>249,019</b>

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 2018

in thousands of New Zealand dollars	Note	Actual 2018	Budget 2018	Actual 2017
<b>Cash received from operating activities</b>				
Receipts from customers		140,541	144,807	153,949
Interest received		2,253	813	2,089
Dividends received		155	-	164
<b>Total cash received from operating activities</b>		<b>142,949</b>	<b>145,620</b>	<b>156,202</b>
<b>Cash disbursed on operating activities</b>				
Payments to employees		64,230	65,178	62,793
Payments to suppliers		65,177	75,107	72,319
Restructuring		1,048	1,562	757
Income tax paid		1,895	-	248
Interest paid		29	-	5
<b>Total cash disbursed on operating activities</b>		<b>132,379</b>	<b>141,847</b>	<b>136,122</b>
<b>Net cash flow from operating activities</b>	<b>18</b>	<b>10,570</b>	<b>3,773</b>	<b>20,080</b>
<b>Cash received from investing activities</b>				
Disposal of property, plant & equipment and biological assets		135	-	240
Disposal of investments and intangible assets		102	-	1,188
<b>Total cash received from investing activities</b>		<b>237</b>	<b>-</b>	<b>1,428</b>
<b>Cash disbursed on investing activities</b>				
Payment for acquisition of subsidiary net of cash acquired	16	807	-	-
Investment in property, plant & equipment and biological assets		16,563	45,207	9,844
Purchase of other investments and intangible assets		5,221	65	8,723
Partner contribution to research consortiums		975	975	976
<b>Total cash disbursed on investing activities</b>		<b>23,566</b>	<b>46,247</b>	<b>19,543</b>
<b>Net cash flow from investing activities</b>		<b>(23,329)</b>	<b>(46,247)</b>	<b>(18,115)</b>
<b>Total net cash flow</b>		<b>(12,759)</b>	<b>(42,474)</b>	<b>1,965</b>
<b>Cash at beginning of year</b>		<b>59,043</b>	<b>49,537</b>	<b>57,087</b>
Effect of exchange rate changes on the balance of cash held in foreign currencies		32	-	(9)
<b>Cash at end of year</b>		<b>46,316</b>	<b>7,063</b>	<b>59,043</b>

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

# Statement of accounting policies

For the year ended 30 June 2018

## Reporting entity

AgResearch Limited (the Company) is a limited liability company incorporated in New Zealand. Operating as a Crown Research Institute, its principal activity is research and development in the pastoral sector of New Zealand. The financial statements have been prepared in accordance with the requirements of the Companies Act 1993, the Financial Reporting Act 2013, the Crown Research Institutes Act 1992 and the Public Finance Act 1989. The Company, its subsidiaries, associates and joint arrangement interests comprise the Group.

## Statement of compliance

The financial statements have been prepared in accordance with Generally Accepted Accounting Practice in New Zealand (NZ 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 were authorised for issue by the Directors on 23 August 2018.

## Basis of preparation

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

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

The accounting policies set out as follows have been applied in preparing the financial statements for the year ended 30 June 2018 and the comparative information presented for the year ended 30 June 2017.

The Group has chosen not to early adopt the following standards and interpretations that were issued but not yet effective as at 30 June 2018:

- NZ IFRS 9 'Financial Instruments' (effective for accounting periods beginning on or after 1 January 2018) - refer below
- NZ IFRS 15 'Revenue from Contracts with Customers' (effective for accounting periods beginning on or after 1 January 2018) - refer below
- NZ IAS 40 'Transfers of Investment Property' (effective for accounting periods beginning on or after 1 January 2018)
- NZ IFRIC 22 'Foreign Currency Transactions and Advance Consideration' (effective for accounting periods beginning on or after 1 January 2018)

- NZ IFRS 16 'Leases' (effective for accounting periods beginning on or after 1 January 2019)
- NZ IFRIC 23 'Uncertainty over Income Tax Treatments' (effective for accounting periods beginning on or after 1 January 2018).

**NZ IFRS 9 Financial Instruments** addresses the classification, measurement and de-recognition of financial assets and financial liabilities, impairment of financial assets and hedge accounting. The Group will adopt NZ IFRS 9 from 1 July 2018. Management has conducted an assessment of the Group's hedging activities and debt provisioning and no significant changes are expected as a result of the implementation of the standard.

**NZ IFRS 15 Revenue from Contracts with Customers** addresses the recognition and measurement of revenue and is based upon the principle that revenue is recognised when control of a good or service transfers to a customer. The Group will adopt NZ IFRS 15 from 1 July 2018 using the modified retrospective approach. The Group is finalising its assessment of the impact of the new standard on its recognition of revenue and indications are that no material change is expected.

Revenue received from New Zealand's Strategic Science Investment Fund (SSIF) is considered to be a Grant for research purposes and accordingly is accounted for under NZ IAS 20 Accounting for Government Grants and Disclosure of Government assistance. No change is proposed on adoption of NZ IFRS 15.

Commercial research revenue is currently recognised over time by reference to the stage of completion of the contract at the end of the reporting period. For the majority of contracts, IFRS 15's recognition over time principles will apply and little change is expected from the standards adoption. There is a small number of contracts that will see revenue recognised on completion of the contract resulting in revenue recognition being deferred, but the impact of this on the Group's recognised revenue is expected to be minimal.

Royalty revenue recognition is based upon licensees' usage estimates. No change is expected under NZ IFRS 15.

Sales of agricultural produce are recognised when the purchaser takes control of the goods or services being supplied. No change is expected under NZ IFRS 15.

**NZ IFRS 16 Leases** replaces the guidance in NZ IAS 17 and requires a lessee to recognise a lease liability reflecting future lease payments and a right of use asset for most lease contracts. There is an optional exemption for short term leases and leases of low value. The Group will apply NZ IFRS 16 from 1 July 2019.

There are no other standards that are not yet effective and that would be expected to have a material impact on the Group.

### Critical accounting estimates and judgements

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

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

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

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

#### Future Footprint Programme (FFP) related costs

Various costs have been incurred during the year in relation to development projects associated with FFP. The capitalisation of costs relating to the building of the Food Science Facility situated on Massey University's Campus and other works at the Group's Grasslands Campus are based on the stage of the project (i.e. feasibility and scoping, concept design, detailed design and construction).

Costs associated with the building development of the Lincoln University AgResearch Joint Facility will be converted into a shareholding in LUAGRJF Limited Partnership, an entity formed to own and manage the joint facility. Under the shareholders' agreement for the Limited Partnership, the Group's shareholding will be 38.7%.

#### Significant influence

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

- its participation in the Board activities;
- the provision of funding; and
- its undertaking science research for the consortia.

#### Joint operation

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

#### Acquisition of subsidiary

On the 29th June 2018 AgResearch Limited acquired all the issued shares of Farmax Limited that it did not originally own. The assets and liabilities of Farmax

Limited have been consolidated into these financial statements at 30 June 2018 (refer note 16).

Prior to this Farmax was accounted for as an associate. The Group's share of Farmax's profit prior to acquisition has been accounted for as a share of associates profit or loss.

#### Impairment of assets

Before balance date each year, the Directors review investments and other assets for indications of impairment. In particular, consideration is given to whether there are indications that:

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

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

Impairments made appear in note 2 and note 7.

#### Campus land and buildings revaluation

The property, plant and equipment classes 'Campus Land and Buildings' were revalued at 30 June 2018 by Darroch Limited, independent valuers, by reference to market evidence of recent transactions for similar properties. The valuations conform to International Valuation Standards. Some assets cannot be revalued on a market basis and these have been valued using the optimised depreciated replacement cost method. (refer note 7).

#### Revenue recognition

In determining the service revenue to be recognised, the Directors have exercised their judgement in respect of the percentage of completion of contracts.

- In making their judgement, the Directors considered:
- whether total contract revenue could be measured reliably;
  - the probability that economic benefits associated

- with the contract will flow to the Group;
- whether the costs to complete the contract and the stage of contract completion at balance date could be reliably measured; and
- whether the costs attributable to the contract could be clearly identified and measured reliably so that the actual costs incurred could be compared with prior estimates.

Following review of the Group's contracts in progress at year end, the Directors are satisfied that the revenue recognised in the current year is appropriate, in conjunction with the recognition of an appropriate uninvoiced receivable/revenue in advance.

#### Non-current assets held for sale

In determining the non-current assets (and disposal groups) to be classified as held for sale, the Directors have exercised their judgement in applying the Non-Current Assets Held for Sale accounting standard (NZ IFRS 5).

Following review of the Group's non-current assets, the Directors are satisfied that the criteria outlined in the standard have been considered and the classification of assets as "held for sale", or otherwise, in the current year is appropriate.

#### Fair value estimates

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

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

The fair value of financial instruments that are not traded in an active market (for example, over-the-counter derivatives) is determined using valuation techniques. The Group uses a variety of methods and makes assumptions that are based on market conditions existing at each balance date. Other techniques, such as estimated discounted cash flows, are used to determine fair value for the remaining financial instruments. The fair value of forward exchange contracts is determined using forward exchange market rates at the end of the reporting period.

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

#### Budget figures

The budget figures are those approved by the Board, noting that the Board approval is of the statement of comprehensive income, balance sheet and capital expenditure budget. The budget has been prepared using the same accounting policies as for these financial statements.

#### Changes in accounting policies

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 in accounting policies during the period.

#### Significant accounting policies

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

##### A. Basis of consolidation

The consolidated financial statements comprise AgResearch Limited (the Company) and entities controlled by the Company and its subsidiaries. Control is achieved when the Company:

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

The Directors reassess whether or not the Group controls an investee if facts and circumstances indicate that there are changes to one or more of the three elements of control listed above.

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

- the size of the Company's holding of voting rights relative to the size and dispersion of holdings of the other vote holders;
- potential voting rights held by the Company, other vote holders or other parties;
- rights arising from other contractual arrangements; and
- any additional facts and circumstances that indicate that the Company has, or does not have, the current ability to direct the relevant activities at the time that decisions need to be made, including voting patterns at previous shareholders' meetings.

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

Profit or loss and each component of other comprehensive income are attributed to the owners of the Company. Total comprehensive income of subsidiaries is attributed to the owners of the Company. When necessary, adjustments are made to the financial statements of subsidiaries to bring their accounting policies into line with the Group's accounting policies.

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

Consistent accounting policies are employed in the preparation and presentation of the consolidated financial statements.

#### B. Comparatives

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

#### C. Government grants

Government grants are assistance provided by the Government in the form of transfers of resources to the Group in return for past or future compliance with certain conditions relating to the operating activities of the Group. The primary condition is that the Group should undertake research activities as defined under the contractual agreement that awards the funding. The Government grant relating to this funding is recognised as income in the profit or loss on a systematic basis in the period it is received. Sustainable science funding (previously core funding) from the Crown commenced from 1 July 2011 and is recognised in the Profit and Loss in the year it is received.

#### D. Foreign currency

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

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

Exchange differences are recognised in the Profit and Loss in the period in which they arise, except for:

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

#### E. Financial assets

Investments are recognised and derecognised on trade date where the purchase or sale of an investment is under a contract whose terms require delivery of the investment within the timeframe established by the market concerned. Investments are initially measured at fair value, plus transaction costs, except for those financial assets classified as "at fair value through the Profit and Loss", which are initially measured at fair value.

Other financial assets are classified into the following specified categories:

- financial assets at fair value through the Profit and Loss;
- held to maturity investments;
- 'available-for-sale' financial assets; and
- loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition.

##### Financial assets at fair value through the profit and loss

This category has two sub-categories:

- financial assets held for trading; and
- those designated at fair value through the Profit and Loss at inception.

A financial asset is classified in this category if acquired principally for the purpose of selling in the short term or if so designated by management. Derivatives are categorised as held for trading if they are not designated and effective as a hedging instrument.

Financial assets at fair value through the Profit and Loss are recognised initially at fair value. Gains and losses arising from changes in the fair value are included in the Profit and Loss in the period in which they arise. The net gain or loss recognised incorporates any dividend or interest earned on the financial asset.

##### Held to maturity investments

Financial instruments purchased with the intention of being held for the long term or until maturity are recorded at amortised cost using the effective interest rate method less impairment, with revenue



recognised on an effective yield basis. The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset or, where appropriate, a shorter period, to the net carrying amount of the financial asset.

#### **Available-for-sale financial assets**

Available-for-sale financial assets are non-derivatives that are either designated in this category or not classified in any of the other categories.

Certain shares held by the Group are classified as being available-for-sale and are stated at fair value less impairment.

Gains or losses arising from changes in fair value are recognised within "other comprehensive income" in the Profit and Loss and accumulated in the available-for-sale revaluation reserve, with the exception of impairment losses, interest calculated using the effective interest method and foreign exchange gains and losses on monetary assets, which are recognised directly to the profit or loss in the Profit and Loss. Where the investment is disposed of or is impaired, the cumulative gain or loss previously recognised in the available-for-sale revaluation reserve is included in profit or loss for the period.

#### **Portfolio investments**

Portfolio investments are individually valued by the Fund Manager using the International Private Equity and Venture Capital valuation guidelines. The Group recognises revaluation losses on individual investments as they arise. Revaluation gains that are not a reversal of a previously recognised revaluation loss are not recognised until realised.

#### **Loans and receivables**

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. Loans and receivables are stated at amortised cost using the effective interest method less impairment. Interest income is recognised by applying the effective interest rate.

#### **Impairment of financial assets**

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

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

For all other financial assets, including redeemable notes classified as available-for-sale and finance lease receivables, objective evidence of impairment could include:

- significant financial difficulty of the issuer or counterparty; or
- default or delinquency in interest or principal payments; or
- it becoming probable that the borrower will enter bankruptcy or financial re-organisation.

For certain categories of financial assets, such as trade receivables, assets that are assessed not to be impaired individually are assessed for impairment on a collective basis. Objective evidence of impairment for a portfolio of receivables could include the Group's past experience of collecting payments, an increase in the number of delayed payments in the portfolio past the average credit period of 60 days, as well as observable changes in national or local economic conditions that correlate with default on receivables.

For financial assets carried at amortised cost, the amount of the impairment is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the financial asset's original effective rate.

The carrying amount of the financial asset is reduced by the impairment loss directly for all financial assets, with the exception of trade receivables, where the carrying amount is reduced through the use of an allowance account. When a trade receivable is considered uncollectible, it is written off through the Profit and Loss. Subsequent recoveries of amounts previously written off are credited against the allowance account. Changes in the carrying amount of the allowance account are recognised in the Profit and Loss.

With the exception of available-for-sale equity instruments, if in a subsequent period, the amount of the impairment loss decreases and the decrease can be related objectively to an event occurring after the impairment was recognised, the previously recognised impairment loss is reversed through the Profit and Loss to the extent that the carrying amount of the investment at the date the impairment is reversed does not exceed what the amortised cost would have been had the impairment not been recognised.

In respect of available-for-sale equity instruments, impairment losses previously recognised through profit or loss are not reversed through profit or loss. Any increase in fair value subsequent to an impairment loss is recognised in other comprehensive income and accumulated in the available-for-sale reserve.

#### **Assets carried at fair value**

Financial assets accounted for at fair value through profit or loss are not assessed for impairment as their fair value reflects the credit quality of the instrument and changes in the fair value are recognised in profit or loss.

#### F. Inventories

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

#### G. Leased assets

Leases are classified as finance leases whenever the terms of the lease transfer substantially all the risks and rewards of ownership to the lessee. All other leases are classified as operating leases.

##### Group as lessor

Operating lease receipts are included in profit or loss in equal instalments over the lease term.

##### Group as lessee

Operating lease payments are included in profit or loss in equal instalments over the lease term.

Assets held under finance leases are initially recognised as assets of the Group at their fair value at the inception of the lease or, if lower, at the present value of the minimum lease payments. The corresponding liability to the lessor is included in the consolidated statement of financial position as a finance lease obligation.

#### H. Intangible assets

##### Purchased intangible assets

Purchased intangible assets such as intellectual property, patents, trademarks and licences are recorded at cost less accumulated amortisation and accumulated impairment losses. Amortisation is charged over their estimated useful lives, which varies between 5 and 15 years. The estimated useful life and amortisation method is reviewed at the end of each annual reporting period.

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

##### Internally generated intangible assets – research and development expenditure

research expenditure is expensed in the period incurred.

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

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

- the intention to complete the intangible asset and use or sell it;
- how the asset created will generate future economic benefits;
- the ability to measure reliably the expenditure attributable to the intangible asset during its

development; and

- the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset.

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

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

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

##### Other intangible assets

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

##### Disposal of intangible assets

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

#### I. Impairment of assets

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

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

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

revalued amount, in which case the impairment loss is first treated as a revaluation decrease.

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

**J. Employee benefits**

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

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

Provision for employee benefits that are not expected to be settled within 12 months are measured at the present value of the estimated future cash outflows to be made by the Group in respect of services provided by employees up to reporting date and are recorded as non-current liabilities.

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

**Defined contribution plan**

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

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

**K. Goods and services tax (GST)**

The financial statements are prepared on a GST-exclusive basis with the exception of receivables and payables that include GST.

**L. Statement of cash flows**

**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.

**M. Insurance contracts**

The Group is part of the Accident Compensation Corporation's (ACC) Partnership Programme. Under the Partnership Programme, the Group is liable for all its claim costs for a period of four years up to a specified maximum. At the end of the four year period, the Group pays a premium to ACC for the value of residual claims, and the liability for ongoing claims from that point passes back to ACC.

The liability for the ACC Partnership Programme is recognised in the ACC provision and measured as the present value of expected future payments to be made in respect of the employee injuries and claims up to the reporting date using actuarial techniques. Consideration is given to expected future wage and salary levels and experience of employee claims and injuries. Expected future payments are discounted using the Treasury-issued risk-free future rates as at 31 January 2018.

**N. 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. None of the new and amended standards and interpretations had an impact on these financial statements.

# Notes to and forming part of the consolidated financial statements

For the year ended 30 June 2018

## 1. Revenue

### Revenue Recognition

#### Government grants

Revenue received for 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.

#### National Science Challenge funding

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 that contract costs incurred for work performed to date bear to the estimated total contract costs.

#### Sale of goods

Revenue from the sale of goods is recognised when the Group has transferred to the buyer the significant risks and rewards of ownership of the goods.

#### Rendering of services

Revenue from a contract to provide services is recognised by reference to the stage of completion of the contract at the end of the reporting period. The stage of completion is the proportion that contract costs incurred for work performed to date bear to the estimated total contract costs.

#### Royalties

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

#### Dividend and interest revenue

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

in thousands of New Zealand dollars	2018	2017
<b>Other revenue</b>		
Interest	2,118	2,312
Dividends	156	164
Royalties	11,034	10,461
Rent	3,408	3,179
	<b>16,716</b>	<b>16,116</b>

## 2. Operating expenditure

in thousands of New Zealand dollars	Note	2018	2017
<i>Employee related</i>			
Salary and wages		63,986	61,465
Defined contribution plans		1,677	1,638
<i>Operational</i>			
Amortisation of intangible assets		348	360
Depreciation	7	9,301	9,595
Operating lease expenses		2,919	3,025
Other operating expenses		24,637	21,550
Science 3rd party sub-contracts		21,193	23,365
Site and property expenses		6,797	5,806
Supplies		14,116	12,543

## 2. Operating expenditure (continued)

in thousands of New Zealand dollars	Note	2018	2017
Auditor's remuneration - for services as auditor		269	266
Bad debts		1	370
Change in provision for doubtful debts	8	91	(371)
Directors' fees		333	324
Donations		2	-
Financial and legal expenses		2,340	2,550
<i>Impairments and write downs/(write backs)</i>			
Impairment of investments		-	221
Impairment/(write back) of available-for-sale financial assets	12	-	(251)
Impairment of ETS units	11	-	31
Impairment of property, plant and equipment	7	7	59
		<b>148,017</b>	<b>142,546</b>

## 3. Other gains/(losses)

in thousands of New Zealand dollars	Note	2018	2017
Net gain/(loss) from foreign currency exchange		23	(18)
Net gain/(loss) on sale of property, plant and equipment		93	165
Net gain/(loss) on sale of investments		-	275
Change in fair value of derivative financial instruments		126	(26)
Change in fair value of forestry	11	238	103
Change in fair value of livestock	10	398	618
Change in fair value of financial assets designated at fair value		269	-
		<b>1,147</b>	<b>1,117</b>

## 4. Investments in associates and joint ventures

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

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

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

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



#### 4. Investments in associates and joint ventures (continued)

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

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

The Group discontinues the use of the equity method from the date an investment ceases to be an associate, or when the investment is classified as held for sale. When the Group retains an interest in the former associate and the retained interest is a financial asset, the Group measures the retained interest at fair value at that date in accordance with NZ IAS 39. The difference between the carrying amount of the associate at the date the equity method was discontinued, and the fair value of any retained interest and any proceeds from disposing of a part interest in the associate is included in the determination of the gain or loss on disposal of the associate. In addition, the Group accounts for all amounts previously recognised in other comprehensive income in relation to that associate on the same basis as would be required if that associate had directly disposed of the related assets or liabilities. Therefore, if a gain or loss previously recognised in other comprehensive income by that associate would be reclassified to profit or loss on the disposal of the related assets or liabilities, the Group reclassifies the gain or loss from equity to profit or loss (as a reclassification adjustment) when the equity method is discontinued.

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

When a Group entity transacts with an associate of the Group, profits and losses resulting from the transactions with the associate are recognised in the Group's consolidated financial statements only to the extent of interests in the associate that are not related to the Group.

Associate companies	Balance date	% of ownership interest and voting power held by the Group		Principal activity
		2018	2017	
Clone International Pty Limited	30 June	25	25	Cloning high value horses, cattle and sheep
Velvet Antler Research New Zealand Limited	30 September	50	50	Managing investments in velvet antler research and commercialising the intellectual property
DEEResearch Limited	30 June	50	50	Research and development relevant to deer farming and processing for deer products (except deer velvet)
Biopolymer Network Limited	30 June	33	33	Research and development of high-performance bio-based products
Pastoral Greenhouse Gas Research Consortium held via AgResearch [PPGR Consortia] Limited	30 June	22	21	To undertake research into greenhouse gases produced by ruminants and exploit any resulting intellectual property
Farmax Limited*	30 June	-	50	Development and distribution of farm management software
Encoate Holdings Limited	30 June	50	50	To research and develop bacteria and probiotics stabilisation technologies
Blinc Innovation Limited (formerly Lincoln Hub Limited)	31 December	20	20	Deliver agri-sector research and education opportunities to grow a sustainable agri-sector in New Zealand and internationally
Overseer Limited	30 June	50	50	Operating entity set up to sub-license the Overseer model to end-users
LUAGR F Limited Partnership**	31 December	38.7	-	Operating entity set up to develop, own and manage a joint facilities building together with Lincoln University
LUAGR F GP Limited	31 December	38.7	-	General partner
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

\* On 29 June 2018, AgResearch Limited acquired the 50% shareholding it did not already own in Farmax Limited and Farmax has been reclassified as a subsidiary (see notes 16 and 17).

\*\* As a result of the formation of the LUAGR|F Limited Partnership, the Group has reclassified \$3.031m from other investments to investments in associates (refer note 12). At 30 June 2018 the total spend associated with the investment in the Limited Partnership was \$9.682m.

All of the above associates are accounted for in these consolidated financial statements using the equity method.

## 4. Investments in associates and joint ventures (continued)

All associates are incorporated in New Zealand except for Clone International Pty Limited, which is incorporated in Australia. 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

<b>in thousands of New Zealand dollars</b>	<b>2018</b>	<b>2017</b>
Share of profit/(loss) from continuing operations	<b>(719)</b>	(677)
Share of total comprehensive income	<b>(719)</b>	(677)
Aggregate carrying amount of the Group and Company's interest in the associate investments	<b>14,756</b>	5,026
Aggregate carrying amount of the Group and Company's interest in the joint ventures	<b>614</b>	581
	<b>15,370</b>	5,607

## 5. 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 (for example, 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) that 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
- it arises from the initial accounting for a business combination, in which case it is taken into account in the determination of goodwill or excess.

### Foreign tax liabilities and assets

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

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

## 5. Taxation (continued)

in thousands of New Zealand dollars	2018	2017
<b>Tax expense comprises:</b>		
Current tax expense	211	2,039
Adjustments recognised in relation to the current tax of prior years	(453)	398
Deferred tax expense relating to the origination and reversal of temporary differences	(589)	(930)
<b>Total tax expense/(benefit)</b>	<b>(831)</b>	<b>1,507</b>

in thousands of New Zealand dollars	2018	2017
<b>The total charge for the year can be reconciled to the accounting profit as follows:</b>		
Surplus/(deficit) from continuing operations	(1,836)	6,155
Income tax expense/benefit calculated at 28% (2017: 28%)	(514)	1,723
Effect of revenue that is exempt from tax	(400)	(79)
Foreign surplus/(deficit) not recognised for tax	-	(23)
Effect of expenses that are not deductible	128	76
Effect of impairment (reversals)/losses that are not (assessable)/deductible	(90)	(55)
Associates' results reported net of tax	18	30
Non-assessable capital (gain)/loss	27	(95)
	(831)	1,577
Adjustments recognised in the current year in relation to the current and deferred tax of prior years	-	(70)
<b>Income tax expense/(benefit) recognised in profit or loss</b>	<b>(831)</b>	<b>1,507</b>

in thousands of New Zealand dollars	2018	2017
<b>Income tax recognised directly in other comprehensive income</b>		
<b>Deferred tax</b>		
Arising on income and expenses taken directly to equity:		
Property revaluations	(5,310)	(244)
Revaluations of available-for-sale financial assets	79	(73)
<b>Total deferred tax recognised directly in other comprehensive income</b>	<b>(5,231)</b>	<b>(317)</b>

in thousands of New Zealand dollars	2018	2017
<b>Current tax assets and liabilities</b>		
<b>Current tax assets</b>		
Tax refund receivable	714	290
Benefit of current year tax losses	2	-
	716	290
<b>Current tax liabilities/assets</b>		
Income tax payable	39	1,751
Net current tax (liability)/asset	677	(1,461)

## 5. Taxation (continued)

in thousands of New Zealand dollars	Opening balance	Charged to surplus	Charged to other comprehensive income	Acquisitions/ Disposals	Closing balance
<b>Deferred tax assets/(liabilities) arise from the following:</b>					
<b>2018</b>					
<b>Temporary differences</b>					
Biological assets	(421)	(202)	-	-	<b>(623)</b>
Property, plant & equipment	(13,194)	839	(5,310)	-	<b>(17,665)</b>
Intangible assets	1,224	(167)	-	(43)	<b>1,014</b>
Available-for-sale financial assets	(338)	(2)	79	-	<b>(261)</b>
Provisions	1,467	143	-	20	<b>1,630</b>
	<b>(11,262)</b>	<b>611</b>	<b>(5,231)</b>	<b>(23)</b>	<b>(15,905)</b>
<b>Unused tax losses and credits</b>					
Tax losses	22	(22)	-	-	-
	<b>(11,240)</b>	<b>589</b>	<b>(5,231)</b>	<b>(23)</b>	<b>(15,905)</b>
<b>2017</b>					
<b>Temporary differences</b>					
Biological assets	(405)	(16)	-	-	(421)
Property, plant & equipment	(14,243)	1,293	(244)	-	(13,194)
Intangible assets	1,129	95	-	-	1,224
Available-for-sale financial assets	(265)	-	(73)	-	(338)
Provisions	1,591	(124)	-	-	1,467
	<b>(12,193)</b>	<b>1,248</b>	<b>(317)</b>	<b>-</b>	<b>(11,262)</b>
<b>Unused tax losses and credits</b>					
Tax losses	340	(318)	-	-	22
	<b>(11,853)</b>	<b>930</b>	<b>(317)</b>	<b>-</b>	<b>(11,240)</b>

in thousands of New Zealand dollars	Before tax amount	Tax expense	Net of tax amount
<b>Income tax effects relating to each component of other comprehensive income</b>			
<b>2018</b>			
Revaluation of properties	19,431	(5,310)	<b>14,121</b>
Available-for-sale financial assets	(280)	79	<b>(201)</b>
	<b>19,151</b>	<b>(5,231)</b>	<b>13,920</b>
<b>2017</b>			
Revaluation of properties	4,134	(244)	3,890
Available-for-sale financial assets	267	(73)	194
	<b>4,401</b>	<b>(317)</b>	<b>4,084</b>

## 6. Equity

### Share capital

Capital consists of 47,268,000 fully paid ordinary shares of \$1.00 each (2017: 47,268,000 fully paid ordinary shares).

### Reserves

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

An asset is revalued to the lower of its carrying amount or fair value less costs to sell, when it is classified as held for sale. Any impairment loss or gain on this revaluation is recognised in the Profit and Loss.

## 7. Property, plant and equipment

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

- Land – Campus
- Land – Farm
- Land Improvements
- Buildings – Campus
- Buildings – Farm
- Leasehold Improvements
- Vehicles
- Plant and Equipment
- 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 a significant movement in the fair value. The fair values are recognised in the 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. Information about the fair value hierarchy is included in note 26.

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.

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

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

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

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

## 7. Property, plant and equipment (continued)

in thousands of New Zealand dollars	Land & Land Improvements	Buildings	Leasehold Improvements	Plant & Equipment	Vehicles	Total
<b>2018</b>						
Balance at beginning of year	76,688	72,511	237	17,922	89	<b>167,447</b>
Additions	2,382	7,352	-	7,249	82	<b>17,065</b>
Disposals	-	-	-	(20)	-	<b>(20)</b>
Revaluation	2,945	16,486	-	-	-	<b>19,431</b>
Impairments	1	(8)	-	-	-	<b>(7)</b>
Reclassified as 'Assets Held for Sale'	(763)	-	-	-	-	<b>(763)</b>
Depreciation	(708)	(3,727)	(20)	(4,802)	(44)	<b>(9,301)</b>
<b>Balance at end of year</b>	<b>80,545</b>	<b>92,614</b>	<b>217</b>	<b>20,349</b>	<b>127</b>	<b>193,852</b>
Cost or valuation	80,984	96,897	716	100,964	570	<b>280,131</b>
Accumulated depreciation	(439)	(4,283)	(499)	(80,615)	(443)	<b>(86,279)</b>
<b>Balance at end of year</b>	<b>80,545</b>	<b>92,614</b>	<b>217</b>	<b>20,349</b>	<b>127</b>	<b>193,852</b>

in thousands of New Zealand dollars

**2017**

Balance at beginning of year	73,438	72,380	247	16,719	160	162,944
Additions	313	3,461	10	6,337	5	10,126
Disposals	-	-	-	(58)	-	(58)
Revaluations	3,699	435	-	-	-	4,134
Impairments	(46)	(13)	-	-	-	(59)
Reclassified as 'Assets Held for Sale'	-	(45)	-	-	-	(45)
Depreciation	(716)	(3,707)	(20)	(5,076)	(76)	(9,595)
<b>Balance at end of year</b>	<b>76,688</b>	<b>72,511</b>	<b>237</b>	<b>17,922</b>	<b>89</b>	<b>167,447</b>
Cost or valuation	77,760	82,901	716	93,953	559	255,889
Accumulated depreciation	(1,072)	(10,390)	(479)	(76,031)	(470)	(88,442)
<b>Balance at end of year</b>	<b>76,688</b>	<b>72,511</b>	<b>237</b>	<b>17,922</b>	<b>89</b>	<b>167,447</b>

A total write-down of assets of \$1,301k (2017: \$733k) was reflected:

in thousands of New Zealand dollars	2018	2017
Through the asset revaluation reserve, being a reversal of prior year revaluations	<b>921</b>	668
Through the profit and loss account	<b>380</b>	65
	<b>1,301</b>	733

A net revaluation increase of assets of \$19,431k (2017: \$4,134) consisted of:

in thousands of New Zealand dollars	2018	2017
Increases through the asset revaluation reserve	<b>20,352</b>	4,802
Decreases through the asset revaluation reserve, being a reversal of prior year revaluations	<b>(921)</b>	(668)
	<b>19,431</b>	4,134

A net impairment decrease of assets of \$7k (2017: \$59k) consisted of:

in thousands of New Zealand dollars	2018	2017
Impairment through profit and loss	<b>(380)</b>	(65)
Impairment reversal through profit and loss	<b>373</b>	6
	<b>(7)</b>	(59)



## 7. Property, plant and equipment (continued)

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, its carrying amount would have been as follows:

<b>in thousands of New Zealand dollars</b>	<b>2018</b>	2017
Land and land improvements	<b>21,004</b>	21,368
Buildings	<b>46,664</b>	48,274

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

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

Campus land and buildings have been revalued in the current period. These valuations were performed by independent valuers Darroch Limited under the requirements of NZ IAS 16 Property, Plant and Equipment.

Campus land and buildings have been valued using either market value or optimised depreciated replacement cost. For assets where there is an active market for the same or a similar asset, value is determined by one or more of the following:

- direct comparison;
- income; and
- 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 and fences as well as 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.

## 8. Trade and other receivables

<b>in thousands of New Zealand dollars</b>	<b>2018</b>	2017
Trade receivables	<b>32,675</b>	26,661
Receivables from associates	<b>951</b>	2,894
Receivables from other related parties	<b>100</b>	132
Total receivables	<b>33,726</b>	29,687
Less provision for doubtful debts	<b>113</b>	22
<b>Net receivables</b>	<b>33,613</b>	29,665

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

There were no related party past due receivables at 30 June 2018. (2017: \$36k).

Terms of trade vary according to individual customer contracts. Trade receivables are assessed for impairment on an individual basis. The only receivables impaired are provided for within doubtful debts. As at 30 June 2018, trade receivables of \$1,665k (2017: \$3,646k) were past due but not impaired. These relate to a number of independent customers for whom there is no recent history of defaults. The Group does not hold any collateral over these balances. The aging analysis of trade receivables is as follows:

## 8. Trade and other receivables (continued)

in thousands of New Zealand dollars	Gross	Doubtful Debts	Net
<b>2018</b>			
Current	30,260	-	30,260
1 to 2 months	637	-	637
	<b>30,897</b>	<b>-</b>	<b>30,897</b>
Past due			
2 to 3 months	339	-	339
Over 3 months	1,439	(113)	1,326
	<b>1,778</b>	<b>(113)</b>	<b>1,665</b>
<b>Total trade receivables</b>	<b>32,675</b>	<b>(113)</b>	<b>32,562</b>
<b>2017</b>			
Current	21,473	-	21,473
1 to 2 months	1,520	-	1,520
	<b>22,993</b>	<b>-</b>	<b>22,993</b>
Past due			
2 to 3 months	533	-	533
Over 3 months	3,135	(22)	3,113
	<b>3,668</b>	<b>(22)</b>	<b>3,646</b>
<b>Total trade receivables</b>	<b>26,661</b>	<b>(22)</b>	<b>26,639</b>

in thousands of New Zealand dollars	2018	2017
<b>Movement in the provision for doubtful debts</b>		
Balance at beginning of year	<b>22</b>	393
Additional provisions made / reversed during the year	<b>91</b>	-
Receivables written-off during the year	-	(370)
<b>Balance at end of year</b>	<b>113</b>	22

## 9. Trade and other payables

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

in thousands of New Zealand dollars	2018	2017
Trade payables	<b>23,689</b>	17,195
Goods and services tax (GST)	<b>1,527</b>	761
Income in advance	<b>11,618</b>	9,226
Accrued salaries and wages	<b>620</b>	653
<b>Total payables</b>	<b>37,454</b>	27,835

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

### Financial risk management strategies

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

## 10. 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 the Profit and Loss.

in thousands of New Zealand dollars	Sheep	Beef cattle	Dairy cattle	Deer	Total
<b>2018</b>					
<b>Reconciliation of changes in the carrying value</b>					
Balance at beginning of year	1,139	1,482	1,203	663	<b>4,487</b>
Increases due to acquisitions	250	433	235	-	<b>918</b>
Decreases due to sales	(916)	(1,049)	(309)	(231)	<b>(2,505)</b>
Net increase due to births, growth and deaths	554	429	167	163	<b>1,313</b>
Changes in fair value less estimated point-of-sale costs	161	(101)	257	81	<b>398</b>
<b>Balance at end of year</b>	<b>1,188</b>	<b>1,194</b>	<b>1,553</b>	<b>676</b>	<b>4,611</b>
<b>Quantity of livestock at end of year</b>	8,121	1,413	1,071	1,019	
<b>2017</b>					
<b>Reconciliation of changes in the carrying value</b>					
Balance at beginning of year	935	911	1,413	458	3,717
Increases due to acquisitions	417	888	696	28	2,029
Decreases due to sales	(1,058)	(877)	(1,315)	(148)	(3,398)
Net increase due to births, growth and deaths	627	366	334	194	1,521
Changes in fair value less estimated point-of-sale costs	218	194	75	131	618
<b>Balance at end of year</b>	<b>1,139</b>	<b>1,482</b>	<b>1,203</b>	<b>663</b>	<b>4,487</b>
<b>Quantity of livestock at end of year</b>	8,887	1,571	1,038	1,169	

### 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.

## 11. Biological assets – forestry

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

### Emissions Trading Scheme

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

Compensation units are recognised based on their market value on the date received.

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

in thousands of New Zealand dollars	2018	2017
<b>Reconciliation of changes in the carrying value</b>		
Balance at beginning of year	<b>727</b>	1,041
Decreases due to harvesting and sale of forestry	-	(417)
Changes in fair value less estimated point-of-sale costs	<b>238</b>	103
<b>Balance at end of year</b>	<b>965</b>	<b>727</b>
<b>Area (ha) of forest at end of year</b>	<b>110</b>	110

## 11. Biological assets – forestry (continued)

### Forestry valuations

Forestry was valued by Alan Bell & Associates as at 30 June 2018. The value of forestry at 30 June 2018 was \$965k (2017: \$727k). During 2017, the Group disposed of its 50% share of a forestry joint operation with Tainui Group Holdings.

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:

- for mature crops, estimates of future costs and returns;
- for young crops, standard investment costs; and
- for intermediate crops, a mixture of the above.

Additional inputs to the value arrived at are:

- anticipated harvest timing and yield;
- a 9% real discount rate on pre-tax cash flows;
- an assumed 3% compounding rate on standard costs; and
- 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 for Primary Industries.

Details of the fair value hierarchy are included in note 26.

### Emissions units

No ETS units were acquired or disposed of during the year (2017: Nil). During 2017 31,142 units were revalued to \$3.14, to match the price at which the Group has an obligation to sell units attached to a previous land sale transaction. All remaining units on hand are carried at their original cost being \$4.15 per unit.

### 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.

## 12. Other investments

in thousands of New Zealand dollars	2018	2017
Fonterra Co-operative Group Limited	2,717	3,003
BioPacific Ventures	10	10
Lincoln University AgResearch Joint Facility	-	3,031
Other investments	940	1,008
<b>Total</b>	<b>3,667</b>	<b>7,052</b>

### Valuation of other investments

- Investments held through the BioPacific Ventures investment fund are carried at cost, less any impairment arising from revaluations undertaken by the Fund manager.
- Fonterra shares are valued using the quoted market price on the NZX market.
- Livestock Improvement shares are valued using the quoted market price on the NZAX market.
- Silver Fern Farms shares are valued using the quoted market price on the NZX unlisted market.
- Other investments are unlisted equities or co-operatives whose share prices are set by the individual entities.

### Transfers between categories

Following the formation of the LUAGRJF Limited Partnership, the investment in the Lincoln University AgResearch Joint Facility has been reclassified as an investment in an associate. AgResearch Limited has a 38.7% share in the Limited Partnership.

In 2017, as the joint facility partnership had not been formally established, the costs incurred to 30 June 2017 were held as an other investment.

### Impairment of other investments

During the year, the impairment of other investments in prior years was reversed as follows:

in thousands of New Zealand dollars	2018	2017
BioPacific Ventures Fund	-	(249)
Other	-	(2)
<b>Total</b>	<b>-</b>	<b>(251)</b>

### 13. Other non-current receivables

During 2014, the Company entered into an agreement for the sale of land, buildings and other property, plant and equipment at its Flock House site. With the exception of one parcel of land (and associated improvements) - referred to as Property B - delivery of, and payment for, those assets also occurred during that year.

Under the sale and purchase agreement, the parties have agreed to defer settlement of Property B until May 2019. The non-current receivable represents the present value of the sale price of Property B, as set out below:

Under the terms of the sale and purchase agreement the purchaser has acquired possession of the property through a lease subject to a peppercorn rent and has full rights to, and obligations for, the economic benefits and liabilities flowing from use of the land. To minimise the risk of loss to the Company through default by the purchaser, title to the property will be retained until settlement of the amount due.

The purchase price of Property B has been discounted to net present value using the treasury discount rate applicable at 30 June 2014, being 4.55%. There has been no material change during the period to the underlying assumptions used in calculating the discount rate applied.

Under NZ IAS 18 Revenue, the discount will be taken to the Profit and Loss and recognised as interest income over the period of deferral. The interest income recognised in the year ended 30 June 2018 is \$188k (2017: \$188k). The interest income to be recognised in future periods is:

in thousands of New Zealand dollars	2018	2017
Amount receivable under sale & purchase agreement	4,700	4,700
Less discount to net present value	(171)	(359)
<b>Present value of non-current receivable</b>	<b>4,529</b>	<b>4,341</b>
Non-current debtor in respect of shares sold	7	-
<b>Present value of non-current receivable</b>	<b>4,536</b>	<b>4,341</b>
<hr/>		
in thousands of New Zealand dollars	2018	2017
In the first year	171	188
Beyond 1 year	7	171

### 14. Provisions

Provisions are recognised when:

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

Provisions are not recognised for future operating losses.

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

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

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

in thousands of New Zealand dollars	Restructuring	Employee Entitlements	ACC	Onerous Contract	Total
<b>2018</b>					
Balance at beginning of year	165	4,700	272	-	<b>5,137</b>
Provisions made during the year	1,563	5,898	333	830	<b>8,624</b>
Provisions used during the year	(1,048)	(5,840)	(206)	-	<b>(7,094)</b>
Provisions reversed during the year	(103)	(80)	(136)	-	<b>(319)</b>
<b>Balance at end of year</b>	<b>577</b>	<b>4,678</b>	<b>263</b>	<b>830</b>	<b>6,348</b>
<b>Represented by:</b>					
Current liabilities	577	4,678	229	830	<b>6,314</b>
Non-current liabilities	-	-	34	-	<b>34</b>
<b>Total provisions</b>	<b>577</b>	<b>4,678</b>	<b>263</b>	<b>830</b>	<b>6,348</b>

## 14. Provisions (continued)

in thousands of New Zealand dollars	Restructuring	Employee Entitlements	ACC	Onerous Contract	Total
<b>2017</b>					
Balance at beginning of year	421	4,841	293	-	5,555
Provisions made during the year	355	5,818	411	-	6,584
Provisions used during the year	(503)	(5,785)	(198)	-	(6,486)
Provisions reversed during the year	(108)	(174)	(234)	-	(516)
<b>Balance at end of year</b>	<b>165</b>	<b>4,700</b>	<b>272</b>	<b>-</b>	<b>5,137</b>
<b>Represented by:</b>					
Current liabilities	165	4,666	272	-	5,103
Non-current liabilities	-	34	-	-	34
<b>Total provisions</b>	<b>165</b>	<b>4,700</b>	<b>272</b>	<b>-</b>	<b>5,137</b>

### Onerous contracts

A provision for an onerous contract is recognised where the economic benefits expected to be derived from a contract are less than the unavoidable costs of meeting the Group's obligation under the contract. Present obligations arising under onerous contracts are recognised as a provision to the extent that the present obligation exceeds the economic benefits estimated to be received. The amount provided in 2018 as an Onerous Contract relates to costs expected to be incurred in remediating asbestos contamination at the Grasslands Campus.

### Restructuring provision

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

### Employee entitlements

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

### ACC partnership programme

#### Liability valuation

An independent actuarial valuer (AON New Zealand) has calculated the Group's liability as at 30 June 2018. The valuer has attested satisfaction as to the nature, sufficiency and accuracy of the data used to determine the outstanding liability.

For the claim year ended 2018 the Group has chosen a stop loss limit of 175% of risk, which means that the Group will only carry the total cost of claims up to a limit of \$159k. Pre-valuation date claim inflation has been taken as 50% of movements in the Consumer Price Index (CPI) and 50% of the movements in the Average Weekly Earnings (AWE) Index. Post-valuation date claim inflation rates are Treasury-issued future rates as at 31 January 2018. The discount rates are Treasury-issued risk-free future rates as at 31 January 2018.

The value of the liability is not material for the Group's financial statements. Therefore, any changes in assumptions will not have a material impact on the financial statements.

The Group is not exposed to any significant concentrations of insurance risk as work-related injuries are generally the result of an isolated event to an individual employee.

#### Objectives for managing risks

The Group manages its exposure arising from the programme by promoting a safe and healthy working environment by:

- implementing and monitoring health and safety policies;
- induction training on health and safety;
- actively managing workplace injuries to ensure employees return to work as soon as practicable;
- recording and monitoring workplace injuries and near misses to identify risk areas and implementing mitigating actions; and
- identification of workplace hazards and implementation of appropriate safety procedures.

## 15. 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).

### Deferred share purchase settlement

As part of the purchase agreement for the acquisition of the 50% shareholding in Farmax Limited, AgResearch Limited has agreed to pay up to \$200,000 in the event that agreed revenue targets in Farmax Limited are met. The amount payable is based upon revenue receivable in the year ending June 2020.



## 15. Other non-current liabilities (continued)

in thousands of New Zealand dollars	2018	2017
Key money received in advance	685	744
Key money referable to lease in current period	(59)	(59)
	626	685
Deferred share acquisition costs	200	-
	<b>826</b>	685

## 16. Business combination

On 29 June 2018 AgResearch Limited acquired the 50% shareholding it had not previously owned in Farmax Limited. The acquisition is expected to strengthen the science pipeline into Farmax products for the benefit of users.

Details of the purchase consideration, the net assets acquired and uplift in value of AgResearch's original shareholding are as follows:

in thousands of New Zealand dollars	2018
<b>Purchase consideration:</b>	
Cash paid	650
Contingent consideration (note 15)	200
Fair value of previously held equity interest	446
	<b>1,296</b>
<b>The assets and liabilities recognised as a result of the acquisition are as follows:</b>	
Cash overdraft	(157)
Plant and equipment	12
Intangible asset (software)	507
Receivables	156
Payables	(166)
Employee benefit obligations	(76)
Deferred tax liabilities	(23)
Net identifiable assets acquired	253
Goodwill	1,043
	<b>1,296</b>

Goodwill has been calculated at the fair value of consideration transferred \$850k and the fair value of the previously held equity interest of \$446k. No fair value calculation of the separately identifiable intangible assets of Farmax Limited has been performed as individually they are not of a magnitude that would significantly impact the Group's financial statements. As noted above future value is expected to be realised through the use of the Group's science pipeline in the product offerings of Farmax Limited. As the purchase transaction took place at the end of the financial year, management are of the opinion that no impairment testing is required.

## 17. Investments in subsidiaries

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

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

Subsidiary companies	Balance date	% of ownership interest and voting power held by the Group		Principal activity
		2018	2017	
Celentis Limited	30 June	100	100	Holding company
Grasslanz Technology Limited	30 June	100	100	Cultivar development and management
AgResearch (USA) Limited	30 June	100	100	Cultivar development and management in the USA
AgResearch (Pastoral Genomics Consortia) Limited	30 June	100	100	Holding company
AgResearch (PPGR Consortia) Limited	30 June	100	100	Holding company

## 17. Investments in subsidiaries (continued)

Subsidiary companies	Balance date	% of ownership interest and voting power held by the Group		Principal activity
		2018	2017	
AgResearch (Johne's Disease Research Consortium) Limited	30 June	-	100	Holding company
Covita Limited	30 June	100	100	Holding company
Phytagro New Zealand Limited	30 June	100	100	Holding company
Farmax Limited	30 June	100	-	Development and distribution of farm management software

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

AgResearch (Johne's Disease Research Consortium) Limited was wound up on 8 March 2018 and removed from New Zealand Companies Office register.

On 29 June 2018, AgResearch Limited acquired the 50% of shares in Farmax Limited that it did not already own. Farmax has been treated as a subsidiary effective from 29 June (see notes 4 and 16).

All subsidiary companies are incorporated in New Zealand.

## 18. Reconciliation of surplus after tax with net cash flow from operating activities

in thousands of New Zealand dollars	2018	2017
<b>Surplus after tax</b>	<b>(1,005)</b>	4,648
<b>Non-cash items</b>		
Depreciation	9,301	9,595
Intangible assets amortisation and impairment	348	391
Share of deficit of associates	719	677
Change in fair value of forestry	(238)	(103)
Change in fair value of livestock	(398)	(45)
Asset impairment/write-down	7	59
Investment impairment/write-down	(269)	-
Net (gain)/loss from foreign currency exchange	23	(18)
Change in fair value of derivative financial instruments	(126)	26
Other non-cash items	(332)	(240)
<b>Movements in working capital</b>		
Change in current taxation	(2,138)	2,187
Increase/(decrease) in deferred taxation	4,665	(928)
(Increase)/decrease in inventory	114	(324)
(Increase)/decrease in livestock	274	(770)
(Increase)/decrease in receivables	(3,948)	3,059
(Increase)/decrease in prepayments	95	399
(Increase)/decrease in property held for sale	(718)	-
Increase/(decrease) in provisions	1,211	(418)
Increase/(decrease) in payables	9,619	2,051
<b>Items classified as investing activities</b>		
Net (gain)/loss on sale of property, plant and equipment	(93)	(165)
Increase/(decrease) in property, plant & equipment, intangible assets & investment accruals	(6,541)	-
Net (gain)/loss on sale of investments and intangible assets	-	(1)
<b>Net cash flow from operating activities</b>	<b>10,570</b>	20,080

## 19. 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. The nature of this heritage asset, and its significance to the science the Group undertakes, make it necessary to disclose it. The Directors believe there is no practical basis upon which to reliably measure the value of this collection. Details of the collection are outlined below:

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

## 20. Operating lease arrangements

in thousands of New Zealand dollars	2018	2017
<b>Non-cancellable operating lease obligations</b>		
Payable no later than 1 year	3,001	2,733
Payable later than 1 year and not longer than 5 years	5,649	7,615
Payable later than 5 years	1,573	1,246
<b>Total non-cancellable operating leases</b>	<b>10,223</b>	<b>11,594</b>

All significant operating lease commitments relate to land and buildings.

The land lease with Tainui Group Holdings Limited is in perpetuity but with rights of renewal that are executable by AgResearch Limited. The lease has a restriction in respect of the right to occupy in perpetuity, which only continues if AgResearch Limited is using the land primarily for agricultural purposes and/or research and development purposes.

Building leases are for at least 10 years or have rights of renewal which are, in aggregate, for at least that period. All leases have normal provisions for periodic rent reviews to market rates.

Refer to note 2 where the operating lease expense for the year is disclosed.

in thousands of New Zealand dollars	2018	2017
<b>Non-cancellable operating lease receivables</b>		
Receivable no later than 1 year	2,556	2,720
Receivable later than 1 year and not longer than 5 years	5,741	6,209
Receivable later than 5 years	1,989	1,872
<b>Total non-cancellable operating leases</b>	<b>10,286</b>	<b>10,801</b>

Operating lease receivables relate to land and buildings owned and leased by AgResearch Limited. The lease terms are between 1 month and 11 years, with one lease having an option to extend for a further five terms, each of 5 years. With one exception, operating leases have normal provisions for periodic rent reviews to market rates. No lessees have an option to purchase the property at the expiry of the lease period.

## 21. 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:

	Balance date	% of ownership interest and voting power held by the Group		Principal activity
		2018	2017	
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 which 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.

## 22. 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. Other related party transactions are summarised below.

### Trading transactions with related parties

in thousands of New Zealand dollars	Sale of services		Due from	
	2018	2017	2018	2017
<b>Research, development and other services</b>				
<i>Transactions between AgResearch and related parties:</i>				
Subsidiaries	4,016	3,797	1,950	1,036
Associates	8,310	10,402	951	2,894
Jointly controlled entities	346	339	100	132
<i>Transactions between the Group and related parties:</i>				
Entities with which key management personnel are associated *	6,537	8,108	2,827	2,738
in thousands of New Zealand dollars	Purchase of services		Due to	
	2018	2017	2018	2017
<b>Research, development and other services</b>				
<i>Transactions between AgResearch and related parties:</i>				
Subsidiaries	176	116	25	23
Associates	3,296	1,173	-	-
<i>Transactions between the Group and related parties:</i>				
Entities with which key management personnel are associated *	6,300	9,061	172	246

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.

During the year AgResearch Limited made interest payments of \$109k (2017: \$85k) to its subsidiaries on intercompany current accounts. The weighted average interest rate was 3.39% (2017: 3.22%).

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

## 22. Transactions with related parties (continued)

in thousands of New Zealand dollars	Sale of services		Purchase of services		Due from (due to)	
	2018	2017	2018	2017	2018	2017
ANZCO Foods Limited**	36	116	-	91	-	18
Ballance Agri-Nutrients Limited**	-	486	-	-	-	82
CSIRO**	-	7	-	159	-	-
Deer Industry New Zealand	2	9	-	14	-	6
Farmax	7	34	37	35	12	35
Foundation for Arable Research**	-	383	-	21	-	393
Grasslanz Technology Limited	4,009	3,797	138	116	1,913	1,013
Landcare Research New Zealand Limited	-	835	1,538	2,251	32	357
Blinc Innovation Limited (formerly Lincoln Hub Limited)	413	20	203	200	154	-
Lincoln University	119	533	2,247	6,144	-	(34)
LUAGRJF Limited Partnership	89	-	2,135	-	88	-
Macfarlane Rural Business Limited**	-	-	2	5	-	-
Nufarm (NZ) Limited	1	-	-	-	-	-
Overseer Limited	-	532	-	-	-	373
Silver Fern Farms Limited**	-	63	-	8	-	19
Tainui Group Holdings Limited**	-	-	-	17	-	-
TBFree New Zealand Limited	1,861	1,293	-	-	455	230
<b>Total</b>	<b>6,537</b>	<b>8,108</b>	<b>6,300</b>	<b>9,061</b>	<b>2,654</b>	<b>2,492</b>

\*\* 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 4 and 17.

### Key management personnel compensation

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

in thousands of New Zealand dollars	2018	2017
Salaries and other short-term employee benefits	2,581	2,275

## 23. Financial instruments

Financial instruments carried in the 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; and
- liquidity risk.

The Group has a treasury policy which it applies to actively manage these risks (refer below).

### Credit risk

The financial instruments which 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 counterparty;
- restricts the counterparties that may be used to A Grade registered banks and the New Zealand Government; and
- 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.

## 23. Financial instruments (continued)

### 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 \$219k (2017: \$409k). It is estimated that a 10% increase in the New Zealand dollar would reduce profit and equity by \$179k (2017: \$335k).

#### Cash flow hedges

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 95% 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. Generally, the Group generates sufficient cash flows from its operating activities to make timely payments. It does, however, maintain an overdraft facility of \$1m to cover any shortfalls. As at 30 June 2018 there were no funds drawn against the facility (2017: \$Nil).

Liquidity risk is managed:

- by monitoring cash flow forecasts (both operational and anticipated non-recurring items) and aligning investment decisions with these;
- through compliance with the treasury policy, which sets a liquidity buffer for unforeseen cash flows;
- through monthly review by senior management; and
- through regular oversight by the Audit & 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
<b>2018</b>				
Trade and other payables	-	25,836	-	<b>25,836</b>
	-	<b>25,836</b>	-	<b>25,836</b>
<b>2017</b>				
Trade and other payables	-	18,609	-	18,609
Derivative financial instruments	-	67	-	67
Finance leases liability	-	4	-	4
	-	18,680	-	18,680

### 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.



## 23. Financial instruments (continued)

### Fair value of financial assets and financial liabilities

in thousands of New Zealand dollars	Note	Loans and receivables	Available-for-sale	Financial liabilities at amortised cost	Carrying amount	Fair value
<b>2018</b>						
<b>Financial assets</b>						
Cash and cash equivalents		46,316	-	-	46,316	46,316
Trade and other receivables	<b>8</b>	33,613	-	-	33,613	33,613
Other non-current receivables	<b>13</b>	4,536	-	-	4,536	4,536
Derivative financial instruments		-	58	-	58	58
Other investments	<b>12</b>	-	3,667	-	3,667	3,667
		<b>84,465</b>	<b>3,725</b>	<b>-</b>	<b>88,190</b>	<b>88,190</b>
<b>Financial liabilities</b>						
Trade and other payables	<b>9</b>	-	-	25,836	25,836	25,836
		-	-	<b>25,836</b>	<b>25,836</b>	<b>25,836</b>
<b>2017</b>						
<b>Financial assets</b>						
Cash and cash equivalents		59,043	-	-	59,043	59,043
Trade and other receivables	<b>8</b>	29,665	-	-	29,665	29,665
Other non-current receivables	<b>13</b>	4,341	-	-	4,341	4,341
Other investments	<b>12</b>	-	4,021	-	4,021	4,021
		93,049	4,021	-	97,070	97,070
<b>Financial liabilities</b>						
Trade and other payables	<b>9</b>	-	-	18,609	18,609	18,609
Derivative financial instruments		-	67	-	67	67
		-	67	18,609	18,676	18,676

## 24. Contingencies and commitments

in thousands of New Zealand dollars	2018	2017
<b>Capital commitments</b>		
Asset purchases committed to and contracted for at balance date	<b>26,893</b>	6,831
Funding commitments to research consortiums	<b>1,050</b>	1,975
Lincoln University AgResearch Joint Facility	<b>4,710</b>	4,972
<b>Total capital commitments</b>	<b>32,653</b>	13,778

### Other commitments

As at 30 June 2018, a conditional agreement has been entered into in relation to the Food Science Facility. A lead contractor has been appointed, the contributions will be circa \$30m in addition to the already contracted commitments.

### Litigation and other contingent liabilities

There are some structural works required at the Lincoln Campus. The financial effect cannot be reliably estimated at this stage and is dependent upon the assessment findings. Therefore no liability has been recognised as at 30 June 2018.

### Contingent assets

Currently there is a claim with the Company's insurer in respect of damage as a result of the Canterbury earthquake which has been accepted by the insurer. The quantum of the claim is still to be determined.

## 25. Capital management

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

- share capital;
- asset revaluation reserve;
- available-for-sale asset revaluation reserve; and
- 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 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.

## 26. Fair value measurements recognised in the statement of financial position

The following table provides an analysis of items that are measured subsequent to initial recognition at fair value, grouped into Levels 1 to 3 based on the degree to which the fair value is observable:

**Level 1** – fair value measurements are those derived from quoted prices (unadjusted) in active markets for identical assets or liabilities;

**Level 2** – fair value measurements are those derived from inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (i.e. as prices) or indirectly (i.e. derived from prices); and

**Level 3** – fair value measurements are those derived from valuation techniques that include inputs for the asset or liability that are not based on observable market data (unobservable inputs).

in thousands of New Zealand dollars	Note	Level 1	Level 2	Level 3	Total
<b>2018</b>					
Available-for-sale financial assets					
Other investments*	12	2,762	895	10	3,667
<b>Non-financial assets</b>					
Livestock	10	-	4,611	-	4,611
Forestry	11	-	965	-	965
Land and land improvements	7	-	80,545	-	80,545
Buildings	7	-	92,614	-	92,614
<b>Financial assets designated at fair value</b>					
Derivative financial instruments		-	58	-	58
		2,762	179,688	10	182,460
<b>2017</b>					
Available-for-sale financial assets					
Other investments*	12	3,042	969	10	4,021
<b>Non-financial assets</b>					
Livestock	10	-	4,487	-	4,487
Forestry	11	-	727	-	727
Land and land improvements	7	-	76,688	-	76,688
Buildings	7	-	72,511	-	72,511
		3,042	155,382	10	158,434
<b>Financial liabilities designated at fair value</b>					
Derivative financial instruments		-	(67)	-	(67)
		-	(67)	-	(67)

There were no transfers between any levels during the year.

The changing of one or more inputs would not change significantly the fair value of the Level 3 investments.

\* Other investments consist of Fonterra shares \$2,717k (2017: \$3,003k), BioPacific Ventures Fund \$10k (2017:10k) and other investments of \$939k (2017: \$1,008k) as per note 12. The level classification determined is based on the fair value within these investments.

# Auditor's report



## INDEPENDENT AUDITOR'S REPORT

TO THE READERS OF AGRESEARCH LIMITED AND GROUP'S  
FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 2018

The Auditor-General is the auditor of AgResearch Limited and Group (the Group). The Auditor-General has appointed me, Paul Bryden, 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 64 to 97, that comprise the consolidated statement of financial position as at 30 June 2018, the consolidated statement of comprehensive income, consolidated statement of changes in equity and 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 2018; 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 23 August 2018. This is the date at which our opinion is expressed.

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

### Basis for our opinion

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

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

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

### Responsibilities of the Board of Directors for the financial statements

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

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

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

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

### Responsibilities of the auditor for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements, as a whole, are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion.

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

For the budget information reported in the financial statements, our procedures were limited to checking that the information agreed to the Group's statement of corporate intent.

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

# Auditor's report



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

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

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

Our responsibilities arise from the Public Audit Act 2001.

## Other Information

The Board of Directors is responsible for the other information. The other information comprises the information included on pages 2 to 63 and 100 to 106, 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 (Revised): *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.

A handwritten signature in black ink, appearing to read "Paul Bryden".

Paul Bryden  
Partner  
for Deloitte Limited  
On behalf of the Auditor-General  
Christchurch, New Zealand

# Statutory reporting

For the year ended 30 June 2018

## 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 2018.

## Dividends

No dividends were declared during the year to 30 June 2018.

## 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 2018 are set out in the table below. Interests are directorships unless otherwise stated and 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 FY18

	Director of	Officer of	Trustee of	Shareholder of
<b>ARMER, Colin</b>	<ul style="list-style-type: none"> <li>Armer Farms (NI) Limited and its subsidiaries</li> <li>Dairy Holdings Limited and its subsidiaries</li> <li>Dacca Investments Limited</li> <li>CalfCo Limited</li> <li>Hirata Dairies Limited</li> <li>Statemill Farm Limited</li> <li>Armer Farms Limited</li> <li>Icena Investments Limited</li> <li>Armer Group Limited</li> <li>Pasture Conference Limited</li> </ul>			<ul style="list-style-type: none"> <li>Armer Farms (NI) Limited and its subsidiaries</li> <li>Dairy Holdings Limited and its subsidiaries</li> <li>Dacca Investments Limited</li> <li>CalfCo Limited</li> <li>Hirata Dairies Limited</li> <li>Statemill Farm Limited</li> <li>Armer Farms Limited</li> <li>Icena Investments Limited</li> <li>Armer Group Limited</li> <li>Fonterra</li> <li>Westland Milk Products</li> <li>Ballance</li> <li>Ravensdown</li> </ul>
<b>GRANT, Jeff</b> (retired 30 June 2018)	<ul style="list-style-type: none"> <li>Copper Valley Holdings</li> <li>D&amp;G Holdings</li> <li>Finance Now Ltd</li> <li>Lakeland Adventures Wanaka Ltd</li> <li>Milford Sound Development Authority</li> <li>Mt Linton Station</li> <li>NAIT</li> <li>OSPRI New Zealand</li> <li>Southern Institute of Technology</li> </ul>		<ul style="list-style-type: none"> <li>Pfx Trust (Massey and Lincoln University joint venture)</li> <li>Tower Hill Trust</li> </ul>	<ul style="list-style-type: none"> <li>Copper Valley Holdings</li> <li>D&amp;G Holdings</li> <li>Lakeland Adventures Wanaka Ltd</li> <li>Tower Hill Trust</li> </ul>

	Director of	Officer of	Trustee of	Shareholder of
<b>GRANT, Jeff</b> (continued)	<ul style="list-style-type: none"> <li>• Southland Shared Services &amp; CEO's Group</li> <li>• SBS Bank</li> <li>• TBfree Ltd</li> <li>• Predator-free 2050 Limited</li> <li>• The Warehouse Financial Services Ltd</li> <li>• TW Financial Services Operations Ltd</li> <li>• T W Money Ltd</li> </ul>			
<b>LLOYD, Jackie</b>	<ul style="list-style-type: none"> <li>• New Zealand Post Limited (Deputy Chair)</li> <li>• Naylor Love</li> </ul>		<ul style="list-style-type: none"> <li>• Lion Foundation</li> <li>• Wellington Museums Trust (trading as Experience Wellington) (Chair)</li> </ul>	
<b>MACFARLANE, Andrew</b>  (resigned from the Board 29 November 2017)	<ul style="list-style-type: none"> <li>• 201 + 218 Moorhouse Ltd</li> <li>• 500 Victoria Ltd</li> <li>• ANZCO Foods Ltd (ANZCO Beef)</li> <li>• Creighton Properties Ltd</li> <li>• Deebury Pastoral Ltd</li> <li>• Deer Industry NZ (Chair)</li> <li>• Dumbarton Land Company Ltd</li> <li>• Edgewater Resort Hotel Ltd &amp; subsidiaries</li> <li>• Fernside Holdings Ltd &amp; subsidiaries</li> <li>• Kintore Farm Ltd</li> <li>• Lincoln Hospitality Limited</li> <li>• M.R.B. Trustees Ltd</li> <li>• Macfarlane Rural Business Ltd</li> <li>• Midway Moorhouse Limited</li> <li>• Ngāi Tahu Farming</li> <li>• Nor'west on Victoria Ltd</li> <li>• Pencarrow Farm Ltd</li> <li>• Riverbank Farm (Ashburton) Ltd</li> <li>• W H Collins &amp; Co Ltd</li> <li>• Windwhistle Pastoral Ltd</li> </ul>	<ul style="list-style-type: none"> <li>• Lincoln University (Councillor)</li> </ul>		<ul style="list-style-type: none"> <li>• 218 Moorhouse Ltd</li> <li>• 764 Colombo Street Ltd</li> <li>• As a Trustee of Ashcroft Farming Company Ltd.</li> <li>• Deebury Pastoral Ltd</li> <li>• Edgewater Resort Hotel Ltd</li> <li>• Kintore Farm Ltd</li> <li>• Lignotech Developments Ltd</li> <li>• M.R.B Trustees Ltd</li> <li>• Macfarlane Rural Business Ltd</li> <li>• Nor' west on Victoria Ltd</li> <li>• Pencarrow Farm Ltd</li> <li>• Power Centre Moorhouse Ltd</li> <li>• Riverbank Farm (Ashburton) Ltd</li> <li>• Rural Bank House Ltd</li> <li>• Spaxton Stock Water Limited (as trustee)</li> <li>• Waingaro Dairy Ltd (as trustee)</li> <li>• Windwhistle Pastoral Ltd</li> </ul>
<b>REYNOLDS, Paul</b>	<ul style="list-style-type: none"> <li>• Landcare Research Ltd</li> <li>• Our Land and Water National Science Challenge, Chair</li> <li>• Enviro-Mark Solutions Ltd</li> </ul>		<ul style="list-style-type: none"> <li>• The Eastland Community Trust (Chair)</li> <li>• The Sir Peter Blake Trust (Chair)</li> </ul>	



	Director of	Officer of	Trustee of	Shareholder of
<b>SIMPSON, Tania</b> (retired 30 June 2018)	<ul style="list-style-type: none"> <li>Deep South National Science Challenge</li> <li>Global Women</li> <li>Kōwhai Consulting Ltd</li> <li>Oceania Group Ltd</li> <li>Reserve Bank of New Zealand</li> <li>Tainui Group Holdings</li> <li>Ngāi Tahu Tourism</li> </ul>	<ul style="list-style-type: none"> <li>Kōwhai Consulting Ltd</li> <li>Oceania Group Ltd</li> </ul>	<ul style="list-style-type: none"> <li>Kōwhai Trust</li> <li>Simpson-Te Ruki Whānau Trust</li> <li>Te Reo Irirangi o Maniapoto Trust</li> <li>Waitangi National Trust</li> </ul>	<ul style="list-style-type: none"> <li>Kōwhai Consulting Ltd</li> <li>Mighty River Power Ltd</li> <li>Oceania Group Ltd</li> </ul>
<b>STONE, Peter</b>	<ul style="list-style-type: none"> <li>National Centre for Engineering in Agriculture (University of Southern Queensland)</li> </ul>	<ul style="list-style-type: none"> <li>Australian Bureau of Meteorology</li> </ul>		<ul style="list-style-type: none"> <li>Nufarm</li> <li>Argo</li> </ul>
<b>WALLACE, Kim</b>	<ul style="list-style-type: none"> <li>Quotable Value Limited</li> <li>Port Nelson Limited</li> <li>Seahorse Beach Investments Limited</li> <li>Kim Wallace Limited</li> </ul>			<ul style="list-style-type: none"> <li>Seahorse Beach Investments Limited</li> <li>Kim Wallace Limited</li> </ul>
<b>SCHAAFHAUSEN, Rukumoana</b> (appointed 1 July 2018)	<ul style="list-style-type: none"> <li>Waikato-Tainui Te Kauhanganui Incorporated (Chair)</li> <li>Miro Limited Partnership (Chair)</li> </ul>			

### Directors' remuneration

Remuneration and other benefits paid or due and payable to Directors for services as a Director, including membership of Board Committees, during the year were as follows:

Directors	2018	2017
Jeff Grant (Chair)	72,000	44,807
Colin Armer	37,056	-
Jackie Lloyd	37,056	-
Andrew Macfarlane	17,525	36,405
Dr Paul Reynolds	37,056	36,405
Tania Simpson	37,056	36,405
Dr Peter Stone	37,056	36,405
Kim Wallace	39,975	-
Sam Robinson (Chair)	-	70,774
Michelle Alexander	-	41,497
Grasslanz Technology Limited		
Robert John Hay (Chair)	18,333	15,000

### Remuneration greater than \$100,000

During the year ended 30 June 2018, 203 staff received remuneration of or exceeding \$100,000 per annum, as shown in table on right.

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

Remuneration was received by Science (142), Chief Executive's Office, Shared Services, Communications & Marketing and Finance & Business Performance (55) and Subsidiaries (6).

Group	
\$100,000 to \$109,999	39
\$110,000 to \$119,999	42
\$120,000 to \$129,999	33
\$130,000 to \$139,999	24
\$140,000 to \$149,999	15
\$150,000 to \$159,999	10
\$160,000 to \$169,999	10
\$170,000 to \$179,999	4
\$180,000 to \$189,999	3
\$190,000 to \$199,999	7
\$201,000 to \$209,999	5
\$210,000 to \$219,999	3
\$220,000 to \$229,999	1
\$230,000 to \$239,999	1
\$240,000 to \$249,999	1
\$260,000 to \$269,999	1
\$270,000 to \$279,999	1
\$330,000 to \$339,999	1
\$500,000 to \$509,999	1
\$640,000 to \$649,999	1
<b>Total</b>	<b>203</b>

### Termination payments

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

<b>Total amount paid</b>	<b>\$1,048,328</b>
Number of employees	21

### Donations

Donations paid during the year ended 30 June 2018 were \$2k.

### 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

Paul Bryden 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.



# Corporate governance

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

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

## Role of the Board

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

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

The workings of the Board and its code of conduct are governed by the Companies Act 1993, AgResearch's constitution, the Crown Research Institutes Act 1992, the Crown Entities Act 2004, the annual Statement of Corporate Intent and the Board's manual. This manual sets out all the functions and operating procedures of the Board. The policies approved by the Board clearly set out those matters on which only the Board can make decisions. These include dividend payments, solvency certificates,

raising new capital, major borrowings, approval of the annual financial statements, appointment of directors to subsidiaries and associates, major capital expenditure and acquisitions.

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

## Independent professional advice

With the prior approval of the Chair, each Director has the right to seek independent legal and other professional advice at the Company's expense concerning any aspect of the Company's operations or undertakings to assist in fulfilling their duties and responsibilities as directors.

## 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.

The Board in the financial year consisted of the Chair and seven other Directors. Directors are generally appointed for a three-year term and may be reappointed for further terms.

Colin Armer, Jackie Lloyd and Kim Wallace were appointed to the Board on 1 July 2017. Andrew Macfarlane resigned from the Board on 29 November 2017. Jeff Grant and Tania Simpson retired from the Board on 30 June 2018.

## Directors' & Board Committee meetings

The table below sets out the Board and Committee meetings attended by Directors 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 Remuneration Committee.

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

Board of Directors	Board meetings attended	Audit & Risk Committee	Remuneration Committee
Jeff Grant	10	2	4
Andrew Macfarlane	4	2	
Paul Reynolds	10		3
Tania Simpson	9		4
Peter Stone	10	4	
Jackie Lloyd	9		4
Colin Armer	10	3	
Kim Wallace	10	4	
<b>Number of meetings held</b>	<b>10</b>	<b>4</b>	<b>4</b>



# Directory

## Executive Team

**Dr Tom Richardson**  
Chief Executive

**Greg Murison**  
Research Director

**Monique Devereux**  
Communications and  
Marketing Director

**Lee Gardiner**  
People and Culture Director

**Stuart Hall**  
Partnerships and  
Programmes Director  
(Joined August 2017)

**Tony Hickmott**  
Finance and Business  
Performance Director  
(Joined October 2017)

**Chris Koroheke**  
Kaiurangi Ahuwhenua

**Natasha Barnett**  
National Manager – Health,  
Safety and Environment  
(Joined May 2018)

**Andrew McSweeney**  
Shared Services Director  
(Until April 2018)

**Andy Anderson**  
National Manager  
– Health and Safety  
(Until March 2018)

## Board of Directors

**Jeff Grant**  
Chair  
(Retired 30 June 2018)

**Kim Wallace**  
Chair – Audit and Risk

**Colin Armer**  
Director

**Jackie Lloyd**  
Director

**Andrew Macfarlane**  
Director  
(Until November 2017)

**Dr Paul Reynolds**  
Director

**Tania Simpson**  
Director  
(Retired 30 June 2018)

**Dr Peter Stone**  
Director

**Rukumoana Schaafhausen**  
Director  
(appointed 1 July 2018)

## Information

**Auditors**  
Deloitte on behalf of the  
Auditor-General

**Bankers**  
Westpac Banking Corporation

# Science New Zealand

**3,500**

SMART AND  
PASSIONATE  
PEOPLE

**50**

SITES  
ACROSS  
NEW ZEALAND

**6,000**

SCIENCE  
PROJECTS  
EACH YEAR

**40**

NATIONALLY  
SIGNIFICANT  
DATABASES AND  
COLLECTIONS

*Science working for New Zealand*



AgResearch is proud to be a Crown Research Institute. The CRIs are using science to create a more prosperous, sustainable and innovative New Zealand.

[www.sciencenewzealand.org](http://www.sciencenewzealand.org)

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Hopkirk Research Institute**  
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