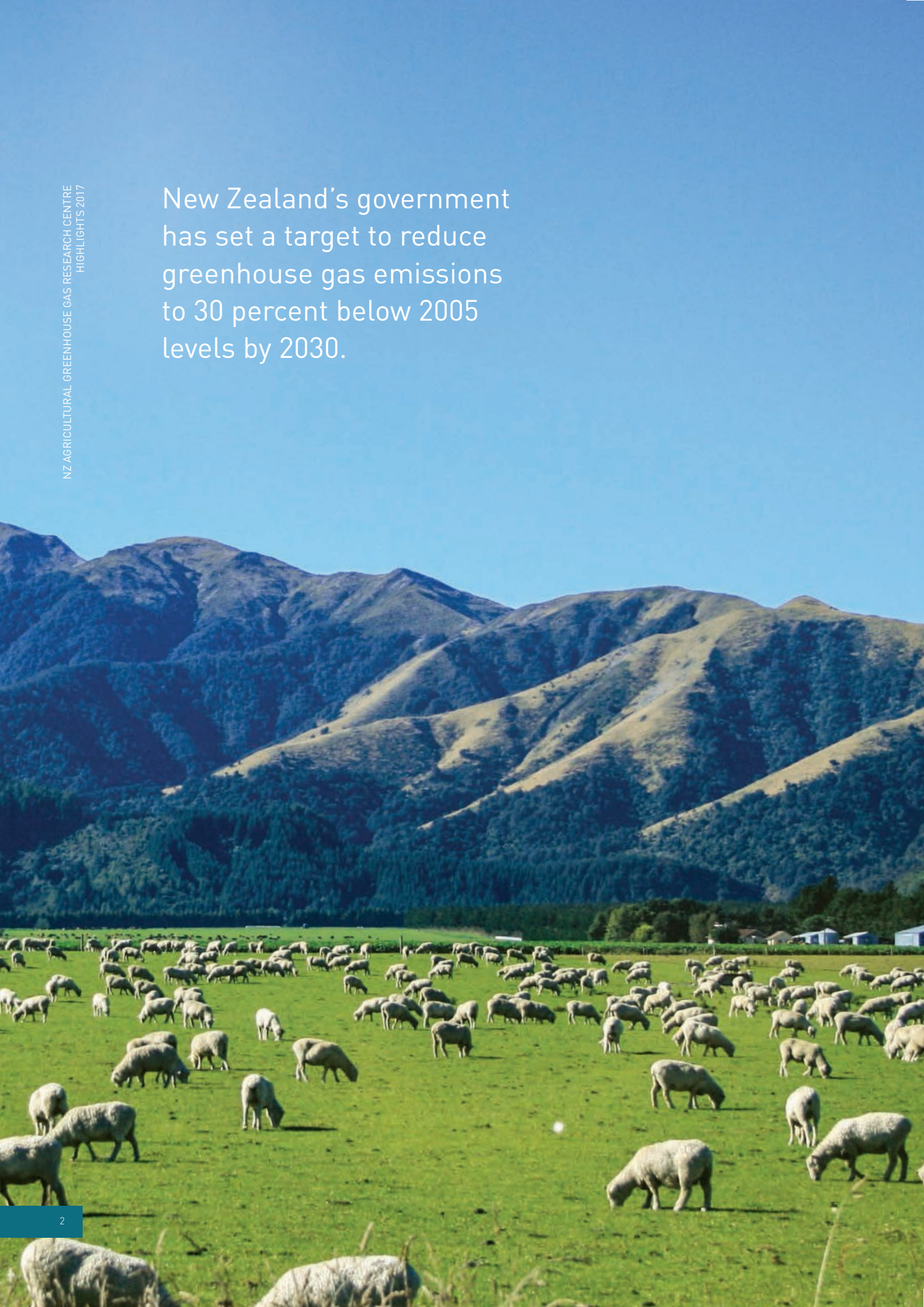
NEW ZEALAND
AGRICULTURAL GREENHOUSE GAS
Research Centre

HIGHLIGHTS 2017

New Zealand's government has set a target to reduce greenhouse gas emissions to 30 percent below 2005 levels by 2030.



THE KEY ROLE OF SCIENCE IN MITIGATING GLOBAL WARMING

Momentum is building in the climate change space, as politicians and the public alike look to the scientific community for solutions.

The past year has seen a rapidly changing international situation with regard to the environment. Governments around the world are placing a priority on the issue of climate change and are ratifying the Paris agreement much earlier than anticipated. New Zealand ratified the agreement in October 2016 and it came into force on 4 November 2016.

The Paris agreement sets a long-term goal to hold the increase in the global average temperature to well below 2°C above pre-industrial levels. Achieving this ambitious global goal will require action on all fronts to reduce emissions, while at the same time fostering adaptation to unavoidable climate change and supporting sustainable development.

New Zealand's government has set a target to reduce greenhouse gas emissions to 30 percent below 2005 levels by 2030. In New Zealand's case, agricultural greenhouse gas emissions make up 48 percent of the country's overall emissions profile. Despite a reduction in emissions intensity of about 1 percent a year since 1990, this has been more than offset by an increase in product generated by the agricultural sector, resulting in a total rise in agricultural emissions by 15 percent. It is clear that actions taken by the sector will have a major influence on whether and how the country will achieve its Paris emissions target and longer-term goals.

With that sense of urgency comes mounting pressure to develop practical tools and strategies to achieve the ambitious emissions reductions targets needed to restrict global warming to well below 2°C. Improving the efficiency of food production is a key first step, but on its own such an approach would only limit the rise in agricultural emissions, it does not reduce them. Developing new and additional mitigation approaches increases flexibility and ensures that efforts to address climate change can also support other environmental or social goals, enable sustainable economic growth and contribute to global food security.

Developing these approaches is the role of the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC). It does this in partnership with industry via its joint research programme with the industry/government-backed Pastoral Greenhouse Gas Research Consortium (PGgRc). A number of key results in the past 12 months demonstrate how close the science teams are getting to achieving viable solutions to reducing agricultural greenhouse gases from New Zealand farm systems, with some at the pilot stage and commercial partners being brought on board. However there is still a lot more work required on these projects to ensure they can become useful at the farm level. The NZAGRC now has less than two years of funding left, and New Zealand's future approach to research, development and implementation of agricultural greenhouse gas solutions will be critical to see our work make a difference.

Taking a leadership role within New Zealand and internationally through capability building work and active involvement with the Global Research Alliance on Agricultural Greenhouse Gases, the NZAGRC is continuing to build on its reputation as an authoritative and important source of clear and unbiased advice on the science behind agricultural greenhouse gases. It is an exciting time to be involved in this area, and the NZAGRC is working hard to contribute to what will be globally applicable mitigation solutions.

NEW ZEALAND AGRICULTURAL GREENHOUSE GAS RESEARCH CENTRE
PGgRc
WORKING TOGETHER

GLOBAL RESEARCH ALLIANCE ON AGRICULTURAL GREENHOUSE GASES

Ministry for Primary Industries
Manatū Ahu Matua

New Zealand Government

THE NZAGRC

THE NZAGRC BUILDING IN PALMERSTON NORTH

The NZAGRC is a core component of the New Zealand Government's approach for addressing greenhouse gas (GHG) emissions from agriculture.

This includes New Zealand becoming a world leader in agricultural GHG mitigation research and in international collaborative initiatives. The initiatives will advance the search for, and implementation of, mitigation solutions for agriculture that are consistent with countries' economic, social and environmental aspirations.

The NZAGRC is primarily a science funder, with additional responsibilities for strategic research coordination, capacity building and leading New Zealand's science input into international research activities in the agricultural GHG area.

OUR MISSION

To be an internationally renowned centre for research and development into agricultural greenhouse gas mitigation solutions.

OUR VISION

To provide knowledge, technologies and practices which grow agriculture's ability to create wealth for New Zealand in a carbon-constrained world.

OUR RESEARCH PROGRAMMES

MITIGATING METHANE EMISSIONS

(Joint programme with the PGgRc)

Breeding low GHG animals · Vaccine Inhibitors · Capture & mitigation by soil · Rapid low cost measurement options

MITIGATING NITROUS OXIDE (N_2O) EMISSIONS

Plant effects on N_2O emissions · Manipulating denitrification processes · Feed management options · Management effects on emission factors · Urine patch detector development · Potential inhibitor effects on N_2O emissions

INCREASING SOIL CARBON CONTENT

Manipulating carbon inputs to stabilise and enhance stocks · Tools to quantify soil carbon content · Modelling management manipulations

INTEGRATED FARM SYSTEMS

Demonstrating profitable, practical and low GHG emitting sheep, beef and dairy farm systems

MĀORI-FOCUSSED RESEARCH

(Aligned with Integrated Farm Systems)

Assisting the Māori pastoral sector to improve its capacity to increase resource efficiency and farm productivity whilst lowering GHGs

OUR GOALS

GOAL 1.

Advance knowledge and understanding

- 20 journal articles
- 35 conference papers
- Four core science programmes supported

GOAL 2.

Enhance awareness among stakeholders

- Alignment with industry via PGgRc
- Range of knowledge transfer activities
- Dedicated Māori GHG research programme underway

GOAL 3.

Contribute to policy

- Ongoing input into IPCC
- Leadership role in Global Research Alliance
- National & international advisory roles

GOAL 4.

Develop science capability

- 35 undergraduate student placements supported
- 19 PhD students studying & graduated
- 9 Post-doctoral researchers funded to date

GOAL 5.

Develop science and commercial partnerships

- Proactive input into Global Research Alliance
- 6 international scientist exchanges funded
- Partnering in the global soil carbon project, CIRCASA
- Commercialisation support to MPI and PGgRc

2016/17 AT A GLANCE

WORKING TOGETHER

SCIENCE

- Methane inhibitors moved into commercialisation pipeline with successful mitigation from five compounds
- Meat yield and wool growth are maintained in sheep with low methane traits
- 118 deer rumen samples sequenced to begin work on evaluating whether rumen microbial profiles are similar across sheep and other ruminant species
- Use of NZAGRC supported, and award winning technology, Spikey, helps establish efficacy of nitrogen transformation inhibitors in reducing nitrogen loss
- Improved measurements of the impact of agricultural management on soil carbon stocks, using infrared spectroscopy and regression analysis
- Lowering stocking rates on dairy farms, increasing sheep to cattle ratios, increasing farm efficiency, and planting marginal areas in forestry decreases GHG emissions and shows increased profitability. Farm systems with lower nitrogen losses tend to have lower greenhouse gas emissions intensity

ENGAGEMENT

NZAGRC has always worked closely with the PGgRc to design its research strategy and determine research investment priorities. From 2002-2012, the PGgRc invested more than $37m in GHG (mainly methane) mitigation research. During 2012/13, PGgRc successfully renewed its Partnership funding with MBIE for a further $37m over seven years. This renewal triggered a move for the NZAGRC to develop a much closer working relationship with the PGgRc.

Close cooperation with the PGgRc is a key pathway for the NZAGRC to interact with industry stakeholders, assist MPI to manage IP and enable knowledge transfer through commercialisation of new tools, technologies and practices.

Key joint initiatives in 2016/17 with the PGgRc included:

- Establishment of commercialisation pipeline for methane inhibitors programmme
- Continued collaboration on communications activities
- Joint research progress in vaccine discovery and breeding work

CHAIR & DIRECTOR REPORTS

CHAIR'S REPORT 2017

Dr Peter Millard
Chair, NZAGRC Steering Group

The past year has seen a rapidly changing international situation with respect to the environment. Governments around the world have been fast tracking climate change issues and ratifying the Paris Agreement much earlier than anticipated. New Zealand ratified the agreement in October 2016 and it came into force on 4th November 2016.

The New Zealand government has set a target to reduce greenhouse gas emissions to 30 per cent below 2005 levels by 2030. It also demonstrated its commitment to agricultural research in this area by announcing an additional $20m in support of the Global Research Alliance on Agricultural Greenhouse Gases (GRA) in 2015/16. This reflects the importance of developing domestic solutions, as well as fostering international collaboration to address a globally significant problem.

There is a growing urgency at all levels to address climate change. Large technical questions remain about how to mitigate agriculture's emissions whilst still producing food in sufficient quantities to supply an expanding population.

In the case of New Zealand, the agriculture sector contributes 48% to the country's GHG emissions. Actions by the sector will have a significant impact on whether and how our country will achieve its Paris emissions target and longer-term goals.

Practical and cost-effective new and enhanced approaches to reducing agricultural GHG emissions are required to help meet environmental, social and international aspirations and obligations, as well as economic growth targets. Developing these approaches is the role of the NZAGRC alongside the jointly industry/government-backed PGgRc. Our efforts are a great example of Government, industry and researchers working together, combining resources to identify and develop additional interventions that will provide effective and practical results by 2020 and beyond.

Through its national and international roles and responsibilities, particularly its active involvement in the GRA, the Centre continues to build on its reputation as an important source of clear and unbiased advice on the science behind agricultural greenhouse gases and their mitigation options.

DIRECTOR'S REPORT 2017

Dr Harry Clark MNZM
NZAGRC Director

Following the ratification of the Paris agreement, there has been increased momentum in the climate change space. There is mounting political and public pressure to develop practical tools and strategies to achieve the ambitious emissions reductions targets needed to restrict global warming to below 2°C. It is an exciting time to be involved in this area and the NZAGRC is working hard to contribute to what we envisage will be globally applicable mitigation solutions.

We keep a close eye on ensuring that the outcomes of our funding can be translated into practical solutions; in some areas, notably the animal breeding and inhibitor space, research has shown that these approaches work at the pilot scale. A particular highlight this year is that commercial partners are now engaged in discussions around the next phase of the inhibitor programme.

In addition to experimental work, NZAGRC-funded scientists continue to increase their engagement with farmers. In the Integrated Farm Systems and Māori programmes, meetings and hui involving scientists and farmers have increased the understanding of how current management practices can impact GHG emissions and the development of practical alternative scenarios which could reduce farming's environmental impact.

Capability building continues to be a core feature of the NZAGRC. Our ongoing scholarship programme with Massey, Lincoln and Waikato Universities has been increased and extended to run until June 2019. This scheme provides opportunities for undergraduates to gain experience in a research environment and stipends for post-graduates. We currently also provide direct support to PhD students linked to NZAGRC research programmes.

We continue to work collaboratively with the PGgRc, MPI and a wide range of national and international organisations. The Centre's role in administering GRA funding on behalf of MPI ensures excellent coordination of the New Zealand research programme with international efforts.

MITIGATING METHANE EMISSIONS

PRINCIPAL INVESTIGATORS:
DR PETER JANSSEN (AGRESEARCH)
DR GRAEME ATTWOOD (AGRESEARCH)

The majority of the NZAGRC methane programme is jointly funded with the PGgRc and aligns with existing MPI programmes funded through SLMACC and New Zealand funding in support of the Global Research Alliance. It aims to reduce emissions by directly targeting the methane-producing methanogens through the discovery of small molecule inhibitors and vaccines, and indirectly through feeding and changes in animal phenotype.

INHIBITOR RESEARCH LOOKING TOWARDS PRACTICAL REALITIES

Current results strongly suggest that high levels of methane emission mitigation (greater than 20 percent) can be obtained using small molecule inhibitors in an animal-safe manner. Over four trials, eight compounds were tested over a range of timeframes. Three compounds showed mitigation activity of 23-44 percent over 16 and 28-day periods. Two other compounds showed a drop in methane emissions of 15-20 percent over 16 days. The programme will now be solely funded by the PGgRc, as the lead commercialisation partner.

BREEDING PROGRAMME

Specialist selection lines for low and high emitting sheep were maintained and continue to diverge. Analysis implies that low methane traits do not occur at the expense of other desirable traits, such as meat yield or wool growth, although the economic value of specifically breeding for low emissions has to be evaluated in the context of other breeding initiatives.

GENOME MARKERS SHOW PROMISE

Using genome markers to select for low methane emitting animals is looking promising. The data imply that if using genomic marker data on their own (i.e. if no phenotypic measures were to take place), around 54 percent of the current genetic gain could be made.

DEER RUMEN MICROBES SEQUENCED

Around 118 deer rumen samples were sequenced for microbial composition analysis, with a link shown between the rumen size and the colonisation by different archaea. This is a useful first step toward evaluating whether the rumen microbial profiles characteristic of low methane emitting sheep are found in other ruminant species, and to explore whether they can help identify low methane producing animals with cross-species utility.

CATTLE EVALUATION CONTINUES

A cattle evaluation programme got underway at the end of the 2015/16 year, with the aim of validating a rapid, low cost system for measuring both methane and feed intake for individual cows in real time. An initial trial demonstrated that a confined environment is a way to reliably obtain data on both intake and methane emissions from individual animals on a daily basis. However, a second trial indicated that the system may be better suited to measure the effect of treatments across groups of animals, and it might not be suitable for identifying individual animals with contrasting methane emissions per kilogram of dry matter intake.

MITIGATING NITROUS OXIDE EMISSIONS

PRINCIPAL INVESTIGATORS:
DR CECILE DE KLEIN (AGRESEARCH)
PROFESSOR HONG DI (LINCOLN UNIVERSITY)

LOOKING TO PASTURE PLANTS

With the withdrawal of the nitrification inhibitor DCD from the market, the NZAGRC's research programme is focused on quantifying the effects of pasture plants on nitrous oxide emissions. This work is linked strongly to other government-funded work on nitrate leaching.

FEED MANAGEMENT OPTIONS

A range of trials and laboratory studies have been conducted to investigate feed management options for mitigating N_2O emissions from grazed systems. The highest potential has been shown by plantain and fodder beet. More work will be set up to investigate the mechanisms by which these plants reduce N_2O emissions. These mechanisms might include reduction in the total urinary output of the grazing animals, and regulation of nitrogen cycling processes.

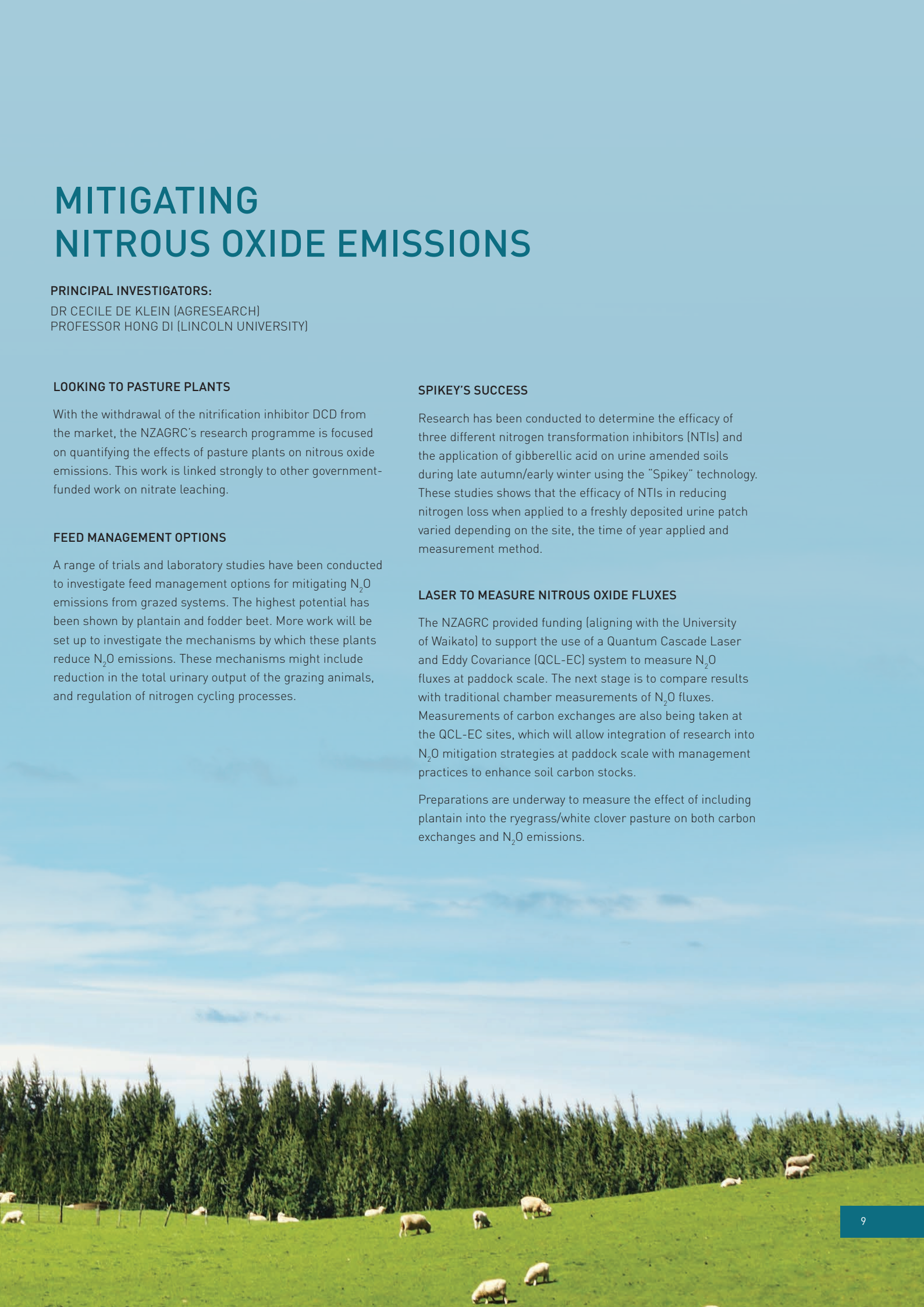
SPIKEY'S SUCCESS

Research has been conducted to determine the efficacy of three different nitrogen transformation inhibitors (NTIs) and the application of gibberellic acid on urine amended soils during late autumn/early winter using the "Spikey" technology. These studies shows that the efficacy of NTIs in reducing nitrogen loss when applied to a freshly deposited urine patch varied depending on the site, the time of year applied and measurement method.

LASER TO MEASURE NITROUS OXIDE FLUXES

The NZAGRC provided funding (aligning with the University of Waikato) to support the use of a Quantum Cascade Laser and Eddy Covariance (QCL-EC) system to measure N_2O fluxes at paddock scale. The next stage is to compare results with traditional chamber measurements of N_2O fluxes. Measurements of carbon exchanges are also being taken at the QCL-EC sites, which will allow integration of research into N_2O mitigation strategies at paddock scale with management practices to enhance soil carbon stocks.

Preparations are underway to measure the effect of including plantain into the ryegrass/white clover pasture on both carbon exchanges and N_2O emissions.



INCREASING SOIL CARBON CONTENT

PRINCIPAL INVESTIGATORS:

PROF FRANK KELLIHER (AGRESEARCH)
DR DAVID WHITEHEAD (MANAAKI WHENUA - LANDCARE RESEARCH)

Increasing the quantity of carbon stored in agricultural soils has the potential to offset emissions of greenhouse gases to the atmosphere, while soil carbon losses would further add to those emissions. However, realising this mitigation potential is technically challenging when soil carbon stocks are already high (as they are in New Zealand), potential changes in soil carbon are small and spatial variability is high. The current NZAGRC programme has three distinct components: (1) testing specific management practices that may increase the long-term soil carbon store in field situations; (2) developing and using models to predict how a range of management practices may influence long and short-term soil carbon storage; and (3) identifying those factors that influence the stability of current or newly added soil carbon.

THE IMPACT OF MANAGEMENT PRACTICES

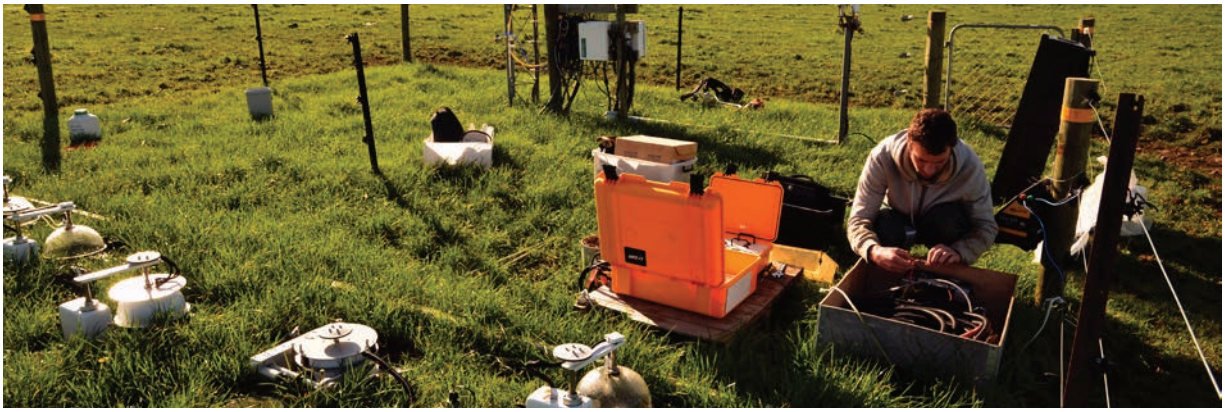
- Converting a ryegrass/clover grassland to a sward with diverse species resulted in lower carbon losses than when regrassing with ryegrass/clover. Diverse swards also maintained the same level of dry matter production as the new ryegrass/clover mix, and both were greater than production from the old ryegrass/clover grassland.
- Preliminary carbon balance studies for maize show large losses (most likely due to carbon offtakes during harvest) and the need for two cultivations (first to maize then to winter crop/permanent grassland). Measurements will be maintained to assess changes in soil carbon stocks for the full maize rotation, including both the import and export of maize feed.

NEW TOOL TO MEASURE SOIL CARBON

A study has been completed into the potential of using mid-infrared spectroscopy/partial least squares regression (MIR/PLSR) analyses to provide accurate estimates of the content and composition of soil carbon. The MIR/PLSR measurements provided reliable estimates about the impact of agricultural management on carbon stocks to a depth of 0.25m, as well as an indication of the vulnerability of soil carbon to change.

MODELLING SHOWS NEED FOR NITROGEN WHEN IRRIGATING

A modelling analysis of carbon and nitrogen (input, cycling and fate) in irrigated grassland in Canterbury showed reductions in soil carbon following irrigation, due to increasing nitrogen limitation. These two co-limiters of growth interact - irrigation stimulates carbon fixation and plant growth, this leads to greater nitrogen uptake by plants, which then leads to greater removal of nitrogen in products (meat, milk). So if nitrogen input is constant, over time it leads to increasing nitrogen deficiency. Our findings suggest that using irrigation during dry periods in dry regions can greatly increase plant growth, product yields and soil carbon inputs, provided nitrogen inputs are also increased. However, evidence suggests that this may not lead to increases in stabilised carbon stocks.



INTEGRATED FARM SYSTEMS

PRINCIPAL INVESTIGATOR:
DR ROBYN DYNES (AGRESEARCH)

The overall aim of this programme of work is to identify and demonstrate that management strategies that further reduce greenhouse gas emissions intensity already exist and that they are practical, adoptable and cost effective. The programme covers dairy, beef and sheep farms and is closely aligned to the dairy industry's P21 programme and the Beef+Lamb NZ environment-focused farm programme.

REDUCING GHG EMISSIONS ON SHEEP AND BEEF FARMS

The focus of on-farm monitoring at Highlands Farm (South Canterbury) this year was largely on forage production, especially from crops, for inclusion into farm systems and environmental models. Monitoring at Onetai station (King Country) mainly used animal production data, with additional measurements to investigate the impact of fertiliser and climate on pasture production.

The management team at Onetai identified crop for lamb finishing as a way to boost animal production, feed conversion efficiency and ewe condition. Cropping in small areas was shown to increase the ability to finish lambs - this allowed an increase in production and profit without increasing farm nutrient outputs and while decreasing greenhouse gas emissions intensity.

REDUCING GHG EMISSIONS ON DAIRY FARMS

The programme has demonstrated that farm systems with lower nitrogen losses tended to have lower greenhouse gas emissions intensity, and some future systems (that is, lower stocking rate plus higher breeding worth) had reduced total emissions. This is a significant opportunity for the dairy sector to reduce the environmental footprint of their systems. However, the effect on emissions of some technologies (for example wintering barns or stand-off pads) needs to be well understood as they could carry the risk of pollution swapping.

The tools and approaches developed and tested in this programme are valuable for assessing new mitigation strategies or technologies within a dairy farming system.

- Practical farming systems can deliver both lower intensity of greenhouse gas emissions and lower nutrient leaching losses.
- New technologies (on milking platform and for dry dairy cows during winter) provide new opportunities for reductions in greenhouse gas intensity.
- Changes in breeding, along with changes in stocking rate, lower supplement fertiliser nitrogen, use of wintering barns and specialist fodder crops (fodderbeet and kale) have the potential to reduce absolute emissions, depending on implementation.

LOW EMISSION FARM SYSTEMS FOR THE MĀORI FARMING SECTOR

PROGRAMME LEADERS:
DR TANIRA KINGI (SCION)
PHIL JOURNEAUX (AGFIRST)

This programme aims to assist the Māori pastoral sector to improve its collective capacity to increase resource efficiency and farm productivity while lowering greenhouse gas emissions.

SHARING KNOWLEDGE AND BUILDING RELATIONSHIPS

Farm system mitigation scenarios have been developed based on interaction and knowledge sharing between the farmers (including land entities), scientists and industry advisors, which has taken place in focus farm workshops and hui in the North Island.

During 2016/17 the MyLand model has been further developed, incorporating input from Farmax, OVERSEER and the Radiata Pine Calculator - it can display land use scenarios spatially by block within a farm, and summarise profitability and GHG/nutrient emissions. All four focus farms have been run through MyLand, and field days have been held on each farm to discuss the results with trustees and attending farmers.

WIN-WIN SCENARIOS

Some system changes in farm systems gave a potential win-win result that saw GHG emissions decrease on the focus farms while profitability increased:

- Lowering stocking rates on dairy farms (which increased per cow production and reduced the need for bought-in supplements)
- Increasing sheep to cattle ratios
- Increasing farm efficiency (for example lambing percentages)
- Planting marginal areas in forestry

Being able to display these scenarios in a spatial context improved the understanding of the impact of any land use change. Farmers were interested in scenarios which improved farm profitability accompanied by either a decrease in GHG emissions or only a slight increase in emissions. They were not interested in mitigations that decreased emissions at a significant cost to profitability.

NZAGRC INTERNATIONAL DIMENSION

The Global Research Alliance on Agricultural Greenhouse Gases (GRA), initiated by the New Zealand Government, remains a key pillar in New Zealand's international science and policy engagement in climate change and agriculture. It also offers significant opportunities for New Zealand to build global research and commercial partnerships and strengthen domestic capability.

NZAGRC is able to maximise these opportunities through its ongoing co-leadership of the GRA's Livestock Research Group (now in its seventh year) and its role in providing strategic advice and support to MPI (which administers the GRA Secretariat and the Government's dedicated GRA budget). The Centre Director continues to co-chair GRA's Livestock Research Group (LRG) together with his colleague from Wageningen UR (Netherlands), and the Centre Deputy Director acts as New Zealand's representative on the LRG. The Deputy Director, Operations Manager (International), International Capability and Training Coordinator (a role established in November 2016) and the Project Analyst, along with external contractors, support the LRG co-chairs in developing and monitoring the LRG's work plan including work with partner organisations.

Specific activities supported or led by NZAGRC in support of the GRA include leading and/or facilitating New Zealand involvement in GRA research and capability building activities, monitoring and administering research contracts on behalf of MPI, providing science advice on the strategic direction of the GRA, including connecting with key member countries and global partners (e.g. World Bank, FAO), pursuing collaborative funding opportunities, and linking research projects with existing international initiatives. NZAGRC also raises awareness of LRG and GRA activities including via newsletters, a regularly updated website, LinkedIn, and presentations at scientific conferences and expert meetings.

NZAGRC organised and led the annual meeting of the LRG in April 2017 in Washington D.C. This was the LRG's biggest meeting yet with nearly 30 countries represented as well as eight international and regional partner organisations including the FAO, World Bank, CCAFS (the Climate Change, Agriculture and Food Security programme of the CGIAR), and a number of Latin American organisations. The LRG meeting reviewed progress with the research networks and collaborative research projects (including workshopping the Enteric Fermentation Flagship) and agreed a continued capability building focus on supporting countries to progress to Tier 2 greenhouse gas inventories for livestock emissions.

KEY ACHIEVEMENTS IN 2016/17

- Conclusion of Phase 1 of 'Reducing enteric methane for livestock development', a partnership project with FAO, jointly funded by the Climate & Clean Air Coalition (CCAC) and the New Zealand Government. Funding for Phase 2 has been secured. More information at **nzagrc.org.nz/fao-nzagrc**
- Development of a GRA flagship research programme on enteric fermentation. More information at **nzagrc.org.nz/gra-flagships**
- Leading activities to build capability in developing countries to account for livestock GHG emissions and identify mitigation options including supporting South and South East Asian countries to improve their greenhouse gas inventories for livestock, and working with CCAFS and FAO to write an influential white paper taking stock of developing countries' systems for monitoring, reporting and verifying (MRV) livestock greenhouse gas emissions – in the context of their Nationally Determined Contributions (NDCs) under the Paris Agreement on climate change. More information at **nzagrc.org.nz/gra**
- Six fellows awarded through LEARN/GRASS Awards programme. More information at **livestockemissions.net**
- Contract management agent for 19 GRA research contracts, worth $12.85M
- Extensive support provided to MPI on new collaborative research investments including GPLER 4, and the European co-fund, ERA-GAS. These will be managed by NZAGRC from 1 July 2017.
- Support provided to MPI to secure formal observer status for the GRA in the Intergovernmental Panel on Climate Change (IPCC). More information at **globalresearchalliance.org/n/the-gra-becomes-an-official-observer-of-the-ipcc/**

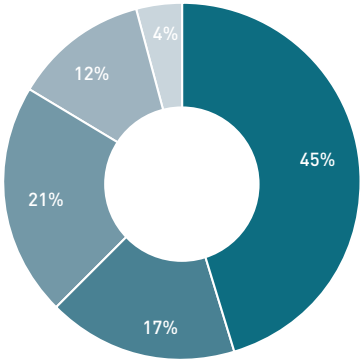
2016/17 IN NUMBERS

FINANCES

Total funding for the Centre in 2016/17 was $5.13m (including carry over from 2015/16). This covers core research programmes, other research (including fellowships and short-term projects) and administration.

In addition to the investment made in science, funding has also been used to contribute to governmental policy projects, a one day conference for science, policy and industry audiences and implementation of a communications outreach plan.

NZAGRC CORE RESEARCH FUNDING SPLIT 2016/17



CAPABILITY DEVELOPMENT

INTERACTIONS AND OUTPUTS IN 2016/17

63 — MEETINGS AND PRESENTATIONS (NEW ZEALAND)

35 — CONFERENCE PRESENTATIONS

26 — MEDIA INTERACTIONS

25 — GLOBAL RESEARCH ALLIANCE RELATED INTERACTIONS

UNDERGRADUATE SUMMER STUDENTS* — 22 — MEETINGS AND PRESENTATIONS (INTERNATIONAL)

20 — JOURNAL ARTICLES PUBLISHED

PHDS* — 19

15 — JOURNAL ARTICLES IN PRESS

UNDERGRADUATE HONOURS STUDENTS* — 11

09 — OTHER INTERACTIONS/ PUBLICATIONS

08 — INTERNATIONAL VISITORS AND GROUPS

MASTERS* POST-DOCTORAL FELLOWS* — 07

MASTERS PROJECTS* — 03

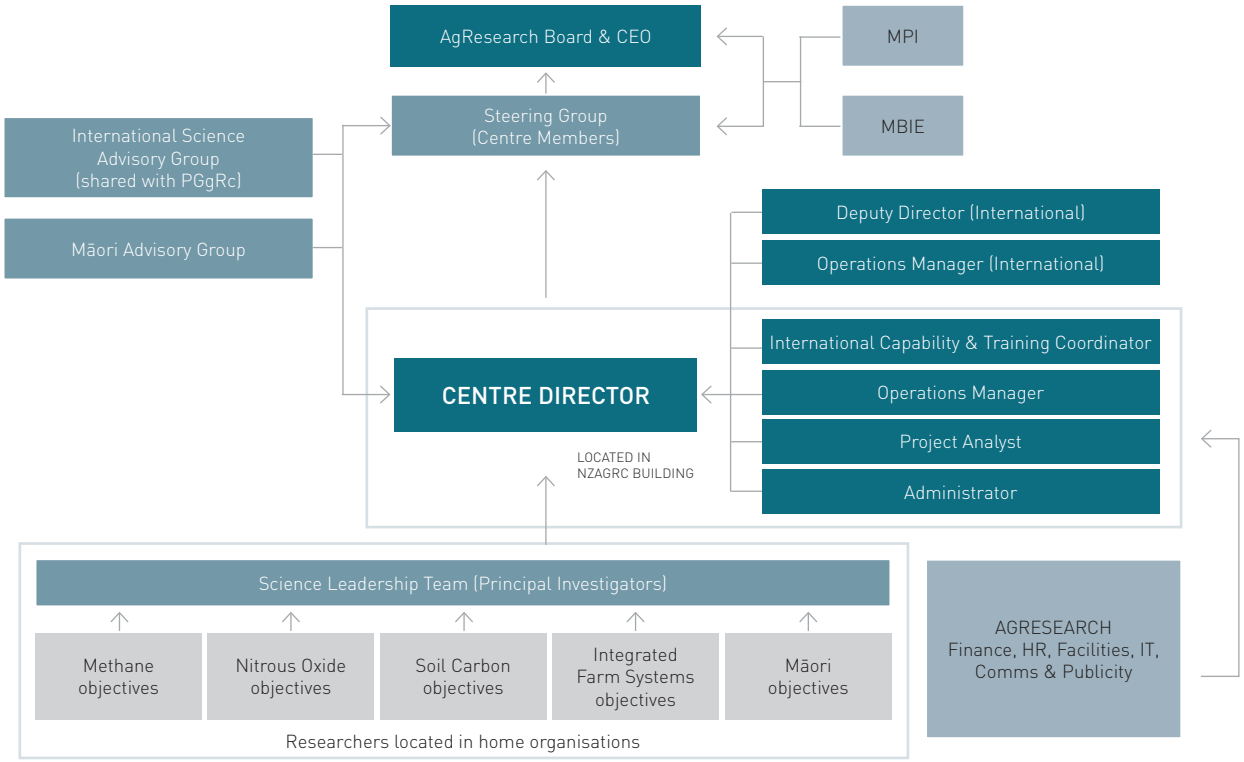
EARLY CAREER SCIENTIST* UNDERGRADUATE INTERN* — 02

*Total funded to date including active 16/17 numbers

LEADING PARTNERS IN SCIENCE

The NZAGRC has nine members, who between them represent research, development, education and industry. Each member brings unique strengths to the NZAGRC through the specific capabilities and expertise of their science teams and research facilities, and provides one representative to the NZAGRC Steering Group (SG).

NZAGRC GOVERNANCE AND OPERATIONAL STRUCTURE



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