NEW ZEALAND
AGRICULTURAL GREENHOUSE GAS
Research Centre

Annual Highlights

2021–2022

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Chair's Report

It has been another intensive year for the NZAGRC as we seek to play our full part in the evolving and urgent challenge of reducing agriculture's greenhouse gases.

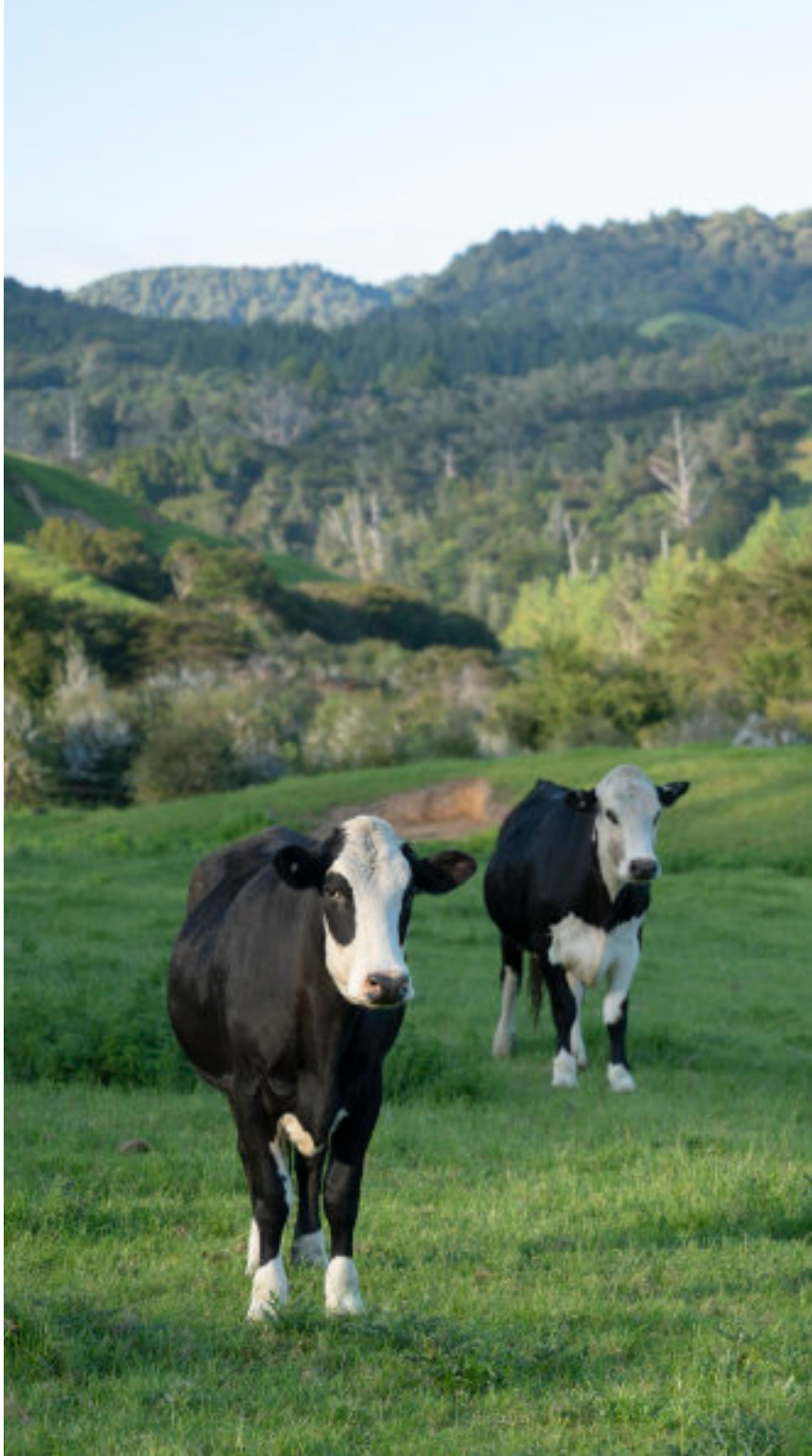
This year saw the Government strengthening its international commitments under the Paris Agreement, releasing Aotearoa New Zealand's first Emissions Reduction Plan that sets the direction for climate action for the next 15 years, and confirming an historic $339m investment to accelerate the development of mitigation solutions for agricultural greenhouse gas emissions as part of Budget 2022. This will be invested via a new Centre for Climate Action on Agricultural Emissions (CCAAE) of which an "enhanced" NZAGRC will be a key component along with a new Government/Industry joint venture.

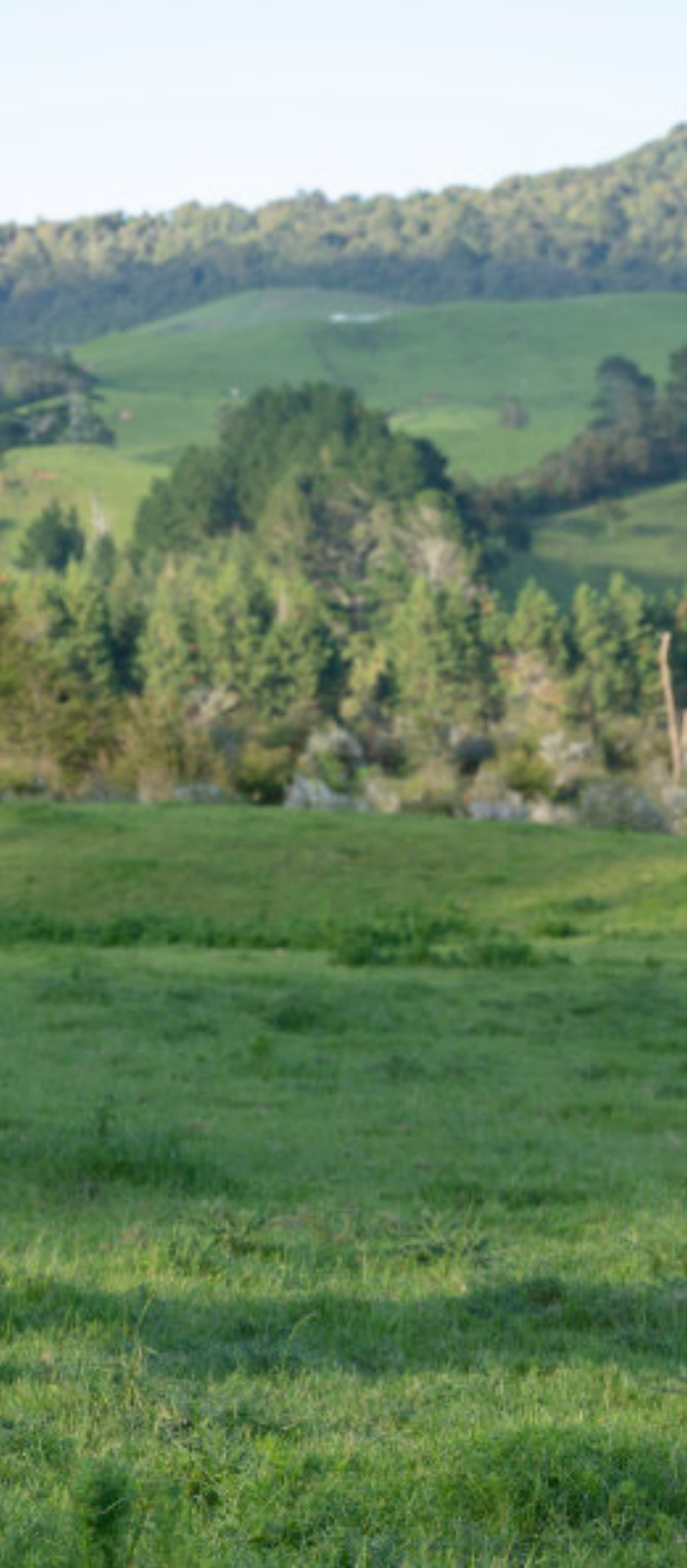
Never has an investment of this size been made in this area of research. It will be truly transformative and demonstrates the Government's commitment to farmers to have access to new mitigation tools and practices much sooner. This is an exciting time for the NZAGRC, and we stand ready to play an enhanced role in support of New Zealand's agricultural sector.

Amid all of this, the NZAGRC's science programmes have continued to make good progress, with promising results showing in the development of nitrous oxide inhibitors and the low-methane breeding work (albeit early days). I must also acknowledge the work of Toihau to develop a new Māori Research Strategy for the NZAGRC that will guide our future investments in this area.

We look forward to another busy and fulfilling year in 2022/23.

Dr Steve Thompson
Chair of NZAGRC Governance Group





Director's Report

As our Chair has noted, it has been a rapidly evolving landscape for the NZAGRC this year.

We started in July 2021 with confirmation of an additional $24m in funding from Budget 2021. This enabled us to boost the methane and nitrous oxide programmes, including purchasing new methane measurement equipment and increasing our investment in methane vaccine, methane inhibitor and low methane animal breeding. This expansion also enabled a new funding partnership with industry, known as the Ruminant Greenhouse Gas Partnership (RGP). The RGP is a subset of the previous Pastoral Greenhouse Gas Research Consortium (PGgRc) membership, comprising Fonterra, DairyNZ, Beef and Lamb New Zealand and Deer Industry New Zealand.

Good progress was also made in other areas. Our long-term soil carbon monitoring programme overcame the logistical challenges caused by COVID and remains on track to complete the first round of sampling of the 500 monitoring sites on farms across the country within the anticipated time frame. We also launched a new Future Farm Systems research programme, exploring the opportunities and challenges that lie ahead on the path to a low emissions primary sector. With Toihau, we began shaping a new Māori research programme, including developing a strategy to guide investment in this area from 2022/23.

Fittingly, the year ended on a high with the news in Budget 2022 of an extraordinary $339 million increase in funding for agricultural greenhouse gas mitigation research. This means that 2022/23 is shaping up to be even busier than the last year, but we are well-placed to chart a steady course towards solutions that matter for Kiwi farmers and growers.

Dr Harry Clark
NZAGRC Director (Domestic)

About the NZAGRC

The NZAGRC was established in 2009. Its goal is to discover, develop and make available practical and cost-effective technologies and practices for New Zealand farmers and growers to reduce agricultural greenhouse gas emissions.

The NZAGRC is a partnership between New Zealand's leading research providers working on agricultural greenhouse gas emissions and the RGP. It is a 'virtual' centre, in that the research it funds is carried out by scientists working in their own organisations.

The NZAGRC receives funding from the Government for investment in research programmes focussed on reducing methane and nitrous oxide emissions and maintaining/increasing carbon sequestration in New Zealand's agricultural soils. The NZAGRC also invests in Māori-led research and work exploring what a low-emissions future might look like for farming.

In addition to its role as a science funder, the NZAGRC ensures strategic research coordination and capacity and capability building. It also leads New Zealand's scientific input into international initiatives, in particular the Global Research Alliance on Agricultural Greenhouse Gases (GRA).

In May 2022, the Government announced the formation of a new Centre for Climate Action on Agricultural Emissions. An 'enhanced' NZAGRC was signalled to be a core component of this new centre. Planning for the CCAAE has started and it is expected to be operational in 2023.

For more on the NZAGRC, see: www.nzagrc.org.nz/about/

NZAGRC's Strategic Objectives

Eight objectives drive the NZAGRC's work:

1. Develop practices and technologies, and the knowledge and understanding to support future developments, that will contribute to New Zealand's 2030 and 2050 reduction targets for agricultural greenhouse gases

2. Quantify and increase the understanding of how to influence soil carbon sequestration in New Zealand's agricultural soils

3. Contribute to Iwi/Māori aspirations to play a leading role in the transition to a low-carbon economy

4. Be a trusted knowledge source and broker, facilitating the alignment of industry and Government funding, and securing additional resources both nationally and internationally

5. Enhance New Zealand's international reputation as a leader in agricultural greenhouse gas research by funding an innovative research programme of international quality and leading New Zealand's science input into the GRA

6. Ensure that national greenhouse gas research, development and extension activities are well-coordinated, developed with sector/stakeholder input and that progress in developing solutions is effectively communicated to the primary sector, Government and public

7. Enhance national capability and capacity, both human and infrastructure, to undertake agricultural greenhouse gas research, development and extension

8. Strengthen existing and build new collaborations with national and international organisations to increase the effectiveness of the NZAGRC's science programmes, Government investments in agricultural greenhouse gas mitigation, including the GRA programme, and Government-industry initiatives such as the PGgRc and He Waka Eke Noa

2021/22 Science Highlights

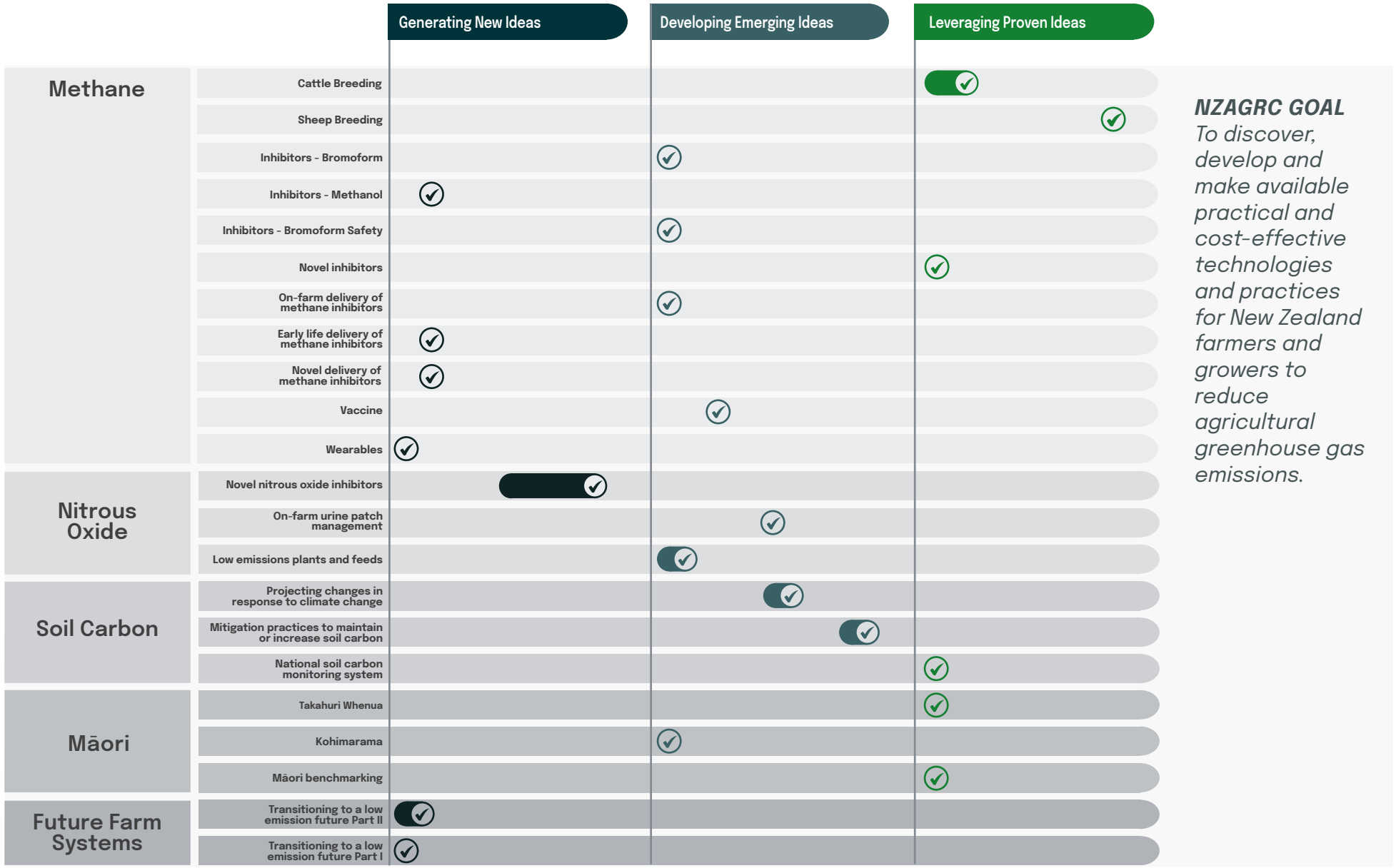
Since its inception in 2009, the NZAGRC has funded and coordinated research under five major themes:

- Methane
- Nitrous oxide
- Soil carbon
- Māori-focussed research
- Farm systems

The following pages provide a high-level summary of progress achieved within each programme during 2021/22. Summaries are also provided for the NZAGRC's work on outreach and to support policy development, and efforts to build capability and capacity within New Zealand's science system.

Figure 1 is a pipeline diagram of NZAGRC-funded research during 2021/22. The status of each contract is shown as of 30 June 2022, including whether it was moving through the pipe from the generation of new ideas to the development of emerging ideas, through to leveraging proven ideas.

Figure 1: NZAGRC Research Pipeline, 1 July 2021 to 30 June 2022[1]



NZAGRC GOAL
To discover, develop and make available practical and cost-effective technologies and practices for New Zealand farmers and growers to reduce agricultural greenhouse gas emissions.

[1]Progress in the NZAGRC's outreach programme is described separately on page 26.


1

Methane

The NZAGRC's methane programme aims to reduce emissions in two ways:

1. Directly, by targeting methane-producing microbes found in the digestive systems of ruminant animals through the discovery of small molecule inhibitors and vaccines

2. Indirectly, through breeding, different animal feeds and – most recently – wearable devices

The programme was significantly enhanced during 2021/22 with co-funding from the newly formed Ruminant Greenhouse Gas Partnership (RGP), which replaced the Pastoral Greenhouse Gas Research Centre (PGgRc). The methane programme also continued to align closely with other work funded by MPI, including via the GRA.

Building on the successful breeding of low methane sheep, work with dairy cattle is now fully underway led by LIC and CRV Ambreed. The team has identified genetic variation that has similar heritability rates to those found for sheep. This is an exciting early result as it suggests that researchers will be able to select animals that have low methane without reducing dry matter intake. They are now measuring the methane from nearly 300 young dairy breeding bulls, who are expected to sire a significant proportion of the future New Zealand dairy herd.

The vaccine team has identified nine putative candidate antigens that show activity against methanogens in the rumen. Further progress has also been made in understanding how a methane vaccine could be delivered, ensuring both increased antibody responses and avidity (strength of antibody binding to antigens), which strengthens the potential for an effective vaccine.

Work on early-stage proof of function and next generation inhibitory compounds provided valuable information on the challenges of developing methane inhibitors that can be effectively delivered in New Zealand's pastoral systems (see the case study on page 13). The effects of feeding synthetic bromoform were also explored, including on animal health and safety and product residues. No negative impacts have been found yet, although regulatory maximum residue limits and withholding periods are yet to be determined.

A new angle for the inhibitor research programme opened during the year. Rather than exploring compounds that directly inhibit methanogens, this work is looking at compounds that inhibit the bacterial species that produce the substrates critical for methanogens to thrive. Methanol is one such substrate, produced in the rumen via the breakdown of pectins, which are present in forages. Research is underway looking at whether it is possible to inhibit the enzymatic breakdown of pectin to methanol.

Wearable devices are a new and novel way of stopping methane emissions from cattle. These technologies involve a wearable device that, when fitted over the animal's head, capture exhaled methane and break it down into a combination of carbon dioxide and water vapour via an oxidation cell. Reports from UK trials have recorded >50% reduction in methane emissions from individual animals indoors. While these devices are not yet available for testing in New Zealand, Lincoln Agritec is developing a cost-effective oxidation cell for use in a wearable device. Early results are positive.

For more on methane: www.nzagrc.org.nz/domestic/methane-research-programme/

Showcasing science impact: The challenges of delivering methane inhibitors in pastoral grazing systems

A methane inhibitor is a chemical compound, which when fed regularly in small amounts reduces methane emissions from the rumen. New Zealand's pasture-based systems make it challenging to feed methane-reducing inhibitors to livestock at the appropriate level and frequency to reduce emissions.

A partnership with DairyNZ during 2021/22 examined two possible routes for the delivery of methane inhibitors.

The first route explored by DairyNZ involved field trials of in-paddock feeders (devices that control the timing and allocation of supplemental feed) to deliver methane inhibitors to grazing livestock. Bullying behaviour and the subsequent reluctance of a large proportion of animals to use the feeder were identified as problems that need to be overcome for automated in-paddock feeding to become an effective method for delivering inhibitory compounds.

The second route involved feeding a methane inhibitor (3-NOP/Bovaer®) to calves from birth through to 14 weeks of life. This was to test limited international research that had found evidence of a long-term persistent reduction in methane emissions from this approach.

The DairyNZ trials found that the methane reduction response did not persist beyond three weeks post-treatment. Alongside the trial, the researchers also surveyed around 500 farmers and members of the public to gauge opinion on the use of feed supplements for the purposes of methane mitigation. Of those surveyed, 27% of the public and 19% of farmers opposed feeding methane inhibitors to both cattle and calves. This highlights that attitudinal barriers in additional to technical barriers will need to be overcome to achieve high levels of uptake of methane-inhibiting compounds.

Nitrous oxide

In New Zealand, most nitrous oxide is produced by microbes acting on nitrogen introduced to the soil via livestock urine or synthetic fertilisers. The NZAGRC's nitrous oxide programme is focused on developing effective and safe inhibitory compounds that influence the rates that nitrous oxide is converted from those processes in the soil.

Success continued in the programme this year, following on from the achievements of 2020/21 when the team patented a compound with a high inhibitory effect on nitrous oxide. In 2021/22, research was focussed on confirming the effectiveness of the patented compound, optimising dose rates and better understanding how it worked.

Serendipitously, during this work the team discovered another compound (originally intended to be used as a solvent for the patented compound), also showed promise as a nitrification inhibitor. Early testing in the lab has shown it to have more than twice the inhibitory effect as DCD. Field testing is now underway to establish its effectiveness in reducing both nitrous oxide emissions and nitrate leaching across different climates and soil types. Discussions are also underway with a potential commercial partner.

Work also continued on possible mechanisms for applying nitrous oxide inhibitors on naturally deposited urine patches in pastoral systems. During 2021/22, a spray unit was developed that enhanced the physical co-location of inhibitors and urine in these urine patches. Field evaluation showed that up to 65% of the applied inhibitors can be retained in the pasture canopy and inhibitors recovered in the soil were mostly present in the top 20mm of soil.

In the plants side of the programme, work was ongoing to better understand the relationship between Plantain and nitrous oxide emissions. Research to date has shown that the presence of Plantain in swards can reduce nitrous oxide emissions from animal urine patches. However, results on the effects that Plantain has on the nitrous oxide emission factor (the percentage of nitrogen applied that is lost) are inconsistent and so far, it is unclear whether reduced emissions arise from Plantain simply having a lower N concentration in its leaves or whether other factors are at play.

It was also found that growing maize and Plantain can decrease nitrous oxide emissions but, in some circumstances, they may also decrease soil carbon storage. Overall, this resulted in a net increase in emissions (see also page 17).

For more on nitrous oxide: www.nzagrc.org.nz/domestic/nitrous-oxide-research-programme/

Soil carbon

The national, long-term soil carbon monitoring programme is now in its third year. Carbon stocks have been measured at just over half of the 500 sites on agricultural land across New Zealand. This first phase of sampling will be completed in 2022/23 and resampling will begin in 2023/24. This will enable the team to establish whether soil carbon stocks are changing through time within different land use classes.

Work on management practices that affect soil carbon stocks found that incorporating specific species into an existing pasture to decrease nitrous oxide emissions (e.g., Plantain) caused concurrent soil carbon loss that resulted in a net increase in total greenhouse gas emissions. Other work on maize found that carbon loss during maize production continued for at least four years – longer than previously thought. Both findings emphasise the fact that the net balance of all greenhouse gases needs to be considered when assessing individual mitigation approaches.

Research is also underway looking at the long-term response of soils and soil carbon to elevated carbon dioxide in the atmosphere and increased temperatures (mimicking global warming scenarios). This work is utilising the Free-Air CO_2 Enrichment (FACE) site near Bulls – the only field site globally where a grassland has been enriched with carbon dioxide since 1997. Modelling work suggests that elevated carbon dioxide itself will have a minor impact on soil carbon stocks.

The team also identified a major bug in the Agricultural Production Systems sIMulator (APSIM), which is internationally recognised as a highly advanced platform for modelling and simulation of agricultural systems. This bug relates to the flow of carbon through the modelled pasture system and because of the New Zealand team's efforts, the model will be strengthened.

For more on soil carbon: www.nzagrc.org.nz/domestic/soil-carbon-research-programme/

Future farm systems

The NZAGRC launched a new Future Farm Systems research programme during the year, exploring what farming might look like in a low-emissions future for New Zealand. This includes:

1. Case study analysis of farms that have/are successfully transitioning towards lower emissions and increased climate resilience, aiming to make these findings publicly available as a resource for other farmers and to support extension efforts.

2. Piloting a facilitated process at catchment and rohe levels to explore how groups of landowners can come together to co-design collaborative solutions for achieving meaningful reductions in emissions for their areas.

3. Assessing the impact (and likely responses) of plausible disruption at a regional scale from the changes existing primary industries are likely to implement to reduce emissions while also adapting to a changing climate. This will see two proposed future regional scenarios developed (one for Northland and one for Southland).

4. Analysis, at a landscape and post-farm gate level, of six alternative land use options that ruminant-based pastoral agriculture may need to consider for the sector to sustainably achieve the levels of methane reductions required in the absence of a widely applicable methane vaccine or dietary supplement. The six land uses selected are: tōtara as a production forest, chestnuts, blueberries, industrial hemp, pulses for protein and milling wheat.

Programme development was informed by an extensive literature review and stakeholder engagement process that began in March 2021 and ended in February 2022. This involved leaders and technical experts from across the primary sector, Māori agribusiness, Government, and research, as well as the NZAGRC's Toihau, Science and Stakeholder Advisory Groups.

For more on future farm systems: https://www.nzagrc.org.nz/domestic/future-farmsystems/

Māori-led research

One of the NZAGRC's strategic objectives is to contribute to Māori aspirations regarding agriculture and climate change. This was a major area of focus during 2021/22, driven by Toihau[2] - the NZAGRC's rōpū kaiwhakahaere. Toihau co-develops and oversees the NZAGRC's Māori research programme and provides guidance to the NZAGRC on the relevance of its wider research programme to te Ao Māori.

Work began on a new Māori Research Strategy for the NZAGRC, in pursuit of Toihau's vision for "*a lower emissions, sustainable food system built on a deep relationship of respect and reciprocity with te Taiao and where the full diversity of Māori landowners, agribusinesses and their iwi, hapū and whānau can thrive*." The Strategy will be completed in August 2022 and will guide a new, three-year phase of funding for Māori-led research.

Good progress was made in the existing, multi-year Takahuri Whenua project. This will see the development of a framework to support the decision-making processes of Māori Collectives when exploring options to reduce agricultural greenhouse gas emissions on their whenua. The framework builds on more than six years of NZAGRC-funded work modelling greenhouse gas emissions on individual Māori-owned farms, scaling that methodology up to address the needs of Collectives whose governance structures and decision-making processes represent the aspirations of their extensive landowner communities. Three Collectives are participating in this project – Tuwharetoa Farm Collective, Te Arawa Arataua and Whangarā Partnership – and there is considerable interest from others.

A 12-month scoping study in Tairawhiti, known as the Kohimarama project, saw grassroots community engagement and information-gathering to create a high-level funding proposal that centres mana whenua at the heart of climate change mitigation, adaptation, and broader social, cultural, and economic development. That proposal will be considered by Toihau once the NZAGRC's Māori Research Strategy is complete.

Recognising the urgent need to support Māori into scientific and agricultural careers, the NZAGRC began sponsoring Pūhoro in 2021. Pūhoro is a charitable trust providing mentoring and wraparound support for rangatahi Māori (secondary through to tertiary/employment) entering STEM pathways. Pūhoro is based in Palmerston North at Massey University and has partnerships with high schools, tertiary providers and research organisations in South Auckland, Waikato, Hawke's Bay, Manawatū and ōtautahi.

The NZAGRC also developed its first Māori case study for Ag Matters, featuring Orete No. 2 and Other Blocks Incorporation, a Māori incorporation in Eastern Bay of Plenty.

For more on our Māori research programme: https://www.nzagrc.org.nz/domestic/maori-research/

[2]Toihau meaning 'command/influence', with 'toi' meaning 'indigenous' and 'knowledge' and 'hau' meaning 'to be heard'

Building science capability and capacity

Capability and capacity building continued to be a strong focus for the NZAGRC during 2021/22.

Approximately $1.6m was committed for the purchase of essential methane measurement equipment, and six new Greenfeed cattle methane measurement units were delivered and commissioned. Further investment at DairyNZ Hamilton enabled four of these units to be located indoors within a facility that also allows the automated measurement of individual animal intake. The other two units are in Palmerston North and available for hire. Four cattle respiration chambers were also designed and constructed. These will be located at the National Ruminant Methane Measurement Centre in Palmerston North.

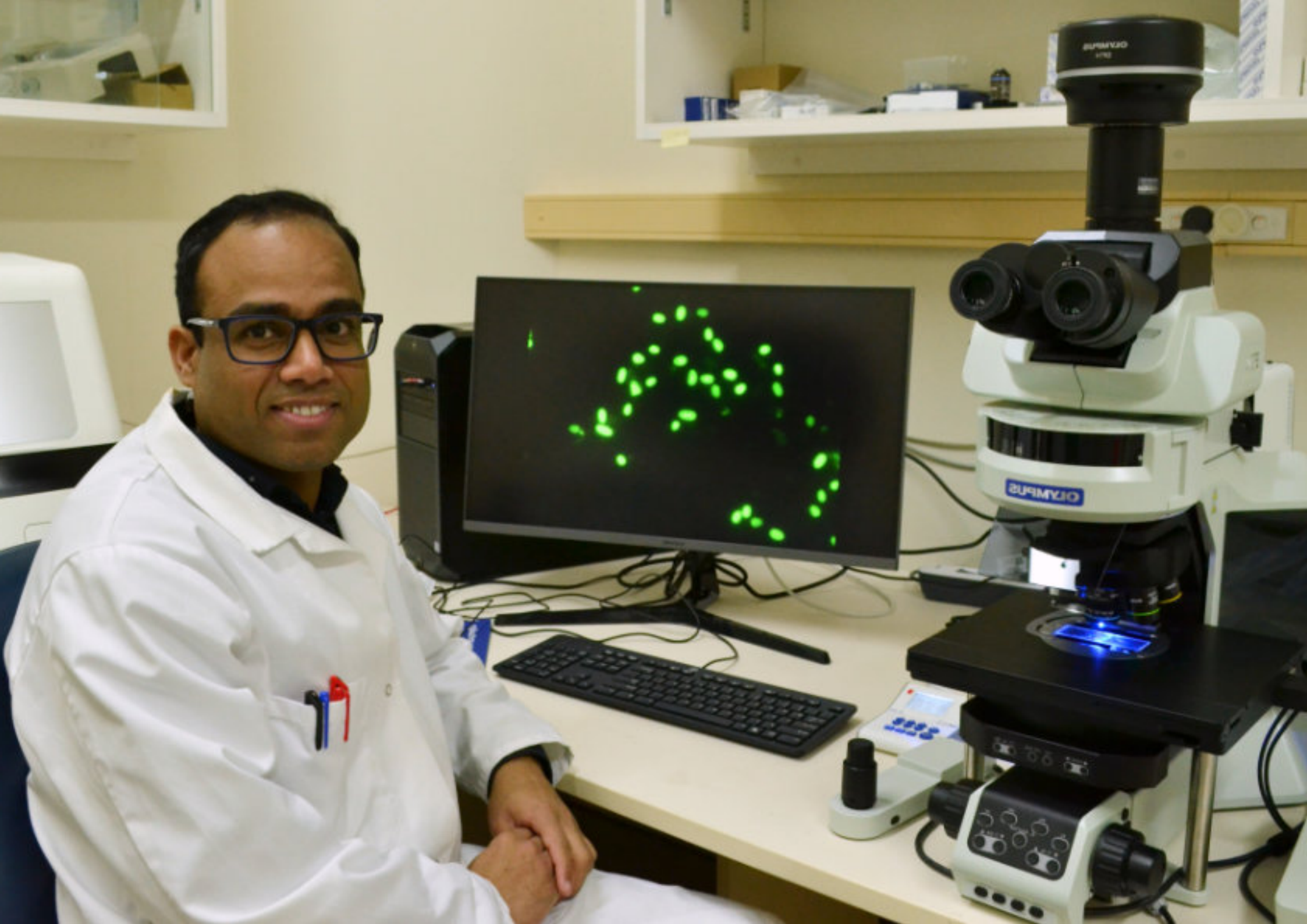
In addition to investing in infrastructure, the NZAGRC also helps grow the research community in New Zealand. In 2021/22, NZAGRC-funded programmes supported more than 27 Full Time Equivalent (FTE) scientists working across 44 organisations. New capability continued to be built via NZAGRC investment in students with three PhDs graduating and three undergraduates, three Masters and two further PhD students also supported. For more on how the NZAGRC is supporting young scientists to transition into full-time employment in New Zealand's research community, see Sandeep's story on page 25.

The NZAGRC also continued its support for House of Science – a scientific literacy resource provider to primary schools around New Zealand and initiated a new sponsorship arrangement with Pūhoro STEM Academy aimed at supporting young Māori students into STEM pathways.

The increasing demands on the science system in the agricultural greenhouse gas mitigation area is now well recognised and the NZAGRC was asked to commission preliminary reviews of available research personnel and infrastructure. Unsurprisingly, these found that the current infrastructure and equipment are no longer adequate for meeting the recent growth in demand for research services. Similar concerns were found in the review of human capability and a range of recommendations made for increasing staff numbers and providing job security for young scientists amongst other things.

As a result of these reviews, work will get underway in 2022/23 to develop a national strategy for agricultural greenhouse gas mitigation research and development that embraces innovation and education.

For more on capability and capacity: https://www.nzagrc.org.nz/domestic/capacity-development/


OLYMPUS

Supporting young scientists
Dr Sandeep Kumar

Dr Sandeep Kumar has recently taken up a permanent role as a microbiologist in AgResearch's Resilient Agriculture team in Palmerston North – a long way from Nasirpur, the small rural village in Bihar, eastern India, where he grew up.

Sandeep began his research career at the Indian Veterinary Research Institute (IVRI). He first heard about New Zealand's work on agricultural greenhouse gas emissions when a colleague went to an international science conference in Canada in 2010 and met staff from the NZAGRC.

That colleague connected Sandeep to the AgResearch rumen microbiology team, who secured a six-month technical training award from the NZAGRC for Sandeep to travel to New Zealand in 2011 and learn bioinformatics techniques. This was Sandeep's first time on a plane, let alone outside of India, but he soon settled in – eased by the cricket scene and the international research community in Palmerston North.

The bioinformatics experience he gained during his technical training sparked a dream to return to New Zealand to pursue a PhD. This became a reality a year later with further funding from the NZAGRC and from Teagasc in Ireland.

Sandeep did his PhD as part of AgResearch's low-methane sheep breeding project, looking at the Quinella bacterium found in the rumen of naturally low-emitting sheep. This was the first time in years that anyone had studied the physiology of Quinella in any detail and Sandeep's work led to crucial new knowledge of why the bacterium is more abundant in sheep that produce less methane.

Not wanting to stop at the rumen, Sandeep then turned his attention to the plant world via postdoctoral roles where he applied the bacterial physiology and comparative genomics skills gained during his PhD to plant physiology. Most recently, Sandeep has been appointed to a permanent position in this team and is now working at the plant microbial level as part of the nitrous oxide emissions programme.

Outreach and policy support

As well as its extensive research programmes, the NZAGRC has key roles to play in outreach and policy support, in line with its strategic objectives (see page 7). This ensures that the primary sector has access to science-based information and resources about agricultural greenhouse gas emissions and how they can be managed at the farm level. It also ensures that progress in the pursuit of solutions for reducing emissions is effectively communicated, including to help inform policy development processes.

A wide range of activities took place in 2021/22 to support these objectives.

The NZAGRC continued its work to grow the Ag Matters website – a climate change resource for farmers, growers, and rural professionals: www.agmatters.nz. Visitor numbers more than doubled to nearly 14,000 in 2021/22, despite little action to promote the site (this will take place in 2022/23 with a marketing campaign). Seven new farmer case studies were also added, ensuring that the site reflects a broad section of farm types and geographic locations.

The NZAGRC also continued to partner with AgFirst and the New Zealand Institute of Primary Industry Management (NZIPIM) to deliver climate change training for rural professionals. In 2021/22, this included:

- Six seminars designed to equip rural professionals with an understanding of climate change and agricultural greenhouse gas emissions
- Two advanced training workshops for farm consultants on how to use Farmax to model potential mitigation actions at the farm level and their impact on emissions and profitability

Including the eight events this year, the team has now delivered a total of 35 seminars and eight workshops to more than 680 rural professionals since June 2019. Based on NZIPIM estimates, this represents nearly 40% of the rural professional community – a high level of engagement.

Three 'State of Science' webinars were organised during 2021/22:

- 'Developing methane inhibitors for grazing livestock on New Zealand farms' featuring Dr Ron Ronimus on 6 December 2021
- 'Takahuri Whenua' featuring Dr Tanira Kingi and Phil Journeaux on 25 February 2022
- 'Pastoral systems, soil carbon and nitrous oxide emissions' featuring Prof. Louis Schipper on 27 May 2022

Nearly 200 people attended each event, and many have subsequently watched the webinar recordings available on the NZAGRC website.

NZAGRC staff contributed to policy development and other Government processes, including the development of a national Research & Development Plan as part of the Biological Emissions Reduction Science Accelerator (BERSA), the formation a new funding partnership with the RGP and the ongoing work of He Waka Eke Noa. The NZAGRC also engaged regularly with primary sector companies and other entities and hosted farmers and other stakeholder groups throughout the year.

For more on outreach: https://www.nzagrc.org.nz/domestic/outreach/

Photo credit: Dave Allen

International efforts

As well as its domestically oriented programmes, the NZAGRC oversees a programme of international science via the Global Research Alliance on Agricultural Greenhouse Gases (GRA). The GRA brings 66 countries and 27 partner organisations together to find ways to grow more food without growing emissions.

The NZAGRC has played a lead role in the GRA since it was established in 2010 and undertakes a wide range of activities on contract to MPI, including strategic advice, capability building, research contracting and implementation.

In 2021/22, the NZAGRC managed 70 GRA contracts on behalf of MPI, supporting collaborative projects involving many international scientists. In this respect, the GRA is a significant contributor to the global effort to combat emissions from agriculture.

The NZAGRC, along with partners in UK and Ireland, co-chair the Livestock Research Group (LRG) within the GRA. Commensurate with the challenges the livestock sector faces in terms of lowering emissions, the LRG has a very active membership and a wide-ranging programme of work. A core part of this is helping developing countries estimate, monitor and report their agricultural greenhouse gas emissions. In 2021/22, the NZAGRC contracted a programme of work providing:

- Training, support, and expert advice on the development of higher Tier national greenhouse gas inventories; and
- Equipment and technical support in targeted countries to enable the measurement of emissions from their own farming systems and test locally appropriate mitigation solutions.

This programme is currently building technical capability in 21 countries, mainly in South-East Asia and Africa. Measurement facilities are also being newly installed in eight of these countries.

In the global effort to tackle agricultural emissions, it is critical that scientists in developing countries are assisted to work in conjunction with their counterparts in developed countries. MPI funding administered by the NZAGRC supports a further programme of work which is enabling scientists from nine developing countries to collaborate in 25 EU-led projects researching rumen microbiology, reducing emissions from soils, building soil carbon, and re-integrating livestock and crop farming.

Outside of its GRA efforts, the NZAGRC also led a programme of work funded by the Global Dairy Platform to support the 'net zero by 2050' global dairy goal. Project partners include the Scottish Rural College, FAO, and scientists in Kenya, Uruguay, and Belgium. The NZAGRC also partnered with major international companies (Nestle, Cargill, JBS, Elanco) and a US farmer funded organisation (FFAR) to help fund a new international initiative on methane mitigation.

For more on our international activities: https://www.nzagrc.org.nz/international-activities/

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Leading partners in science

agresearch
āta mātai, mātai whetū

DairyNZ

Lincoln University

MASSEY UNIVERSITY
TE KUNENGA KI PUREHUROA
UNIVERSITY OF NEW ZEALAND

Manaaki Whenua
Landcare Research

NIWA
Taihoro Nukurangi

PGgRc
PASTORAL GREENHOUSE GAS RESEARCH CONSORTIUM

Plant & Food Research
Rangahau Ahumāra Kai

SCION
FORESTS ▪ PRODUCTS ▪ INNOVATION