



GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Ministry for Primary Industries
Manatū Ahu Matua



New Zealand's GRA Mitigation Research Funding – Priorities and funding mechanisms

January 2021

Version: 1.0

Overview

New Zealand's funding to support the aims of the Global Research Alliance on Agricultural Greenhouse Gases (GRA) includes an allocation for mitigation research. This is a portion of the investment provided through Budget 2020 to Vote Agriculture, Biosecurity, Fisheries and Food Safety.

The purpose of this funding is to advance science knowledge related to the mitigation of agricultural greenhouse gases. Supported research proposals will need to meet certain requirements, be focussed on certain topics and be submitted through appropriate mechanisms.

This document outlines the general requirements, topics and priorities, processes, communication and assurance processes for the New Zealand GRA Mitigation Research fund.

General Requirements

The primary requirements for research proposals to be considered for funding from the New Zealand GRA Mitigation Research Fund are, research must:

- Support the aims of the GRA;
- Focus on agricultural greenhouse gases; and
- Be linked internationally.

Other aspects will be included in the consideration of research proposals. Proposals will be strengthened through the inclusion of the following considerations, strong proposals will:

- Support GRA flagship projects
- Support the priorities of the GRA, particularly those of the Livestock Research Group and Integrative Research Group
- Be underpinned by rigorous identification, prioritisations and assessment processes
- Benefit multiple countries
- Accelerate New Zealand appropriate mitigation solutions
- Enhance the reputation and capacity of New Zealand science system
- Access significant international co-funding
- Link to, work with, support, or be of relevance for developing countries
- Develop and strengthen global science, innovation and technology partnerships
- Develop the pipeline of climate change personnel capability

Topics of interest for investment

There are many potential areas for research to support of the aims of the GRA. To focus research proposals, the following topics are considered important both to New Zealand and internationally. These topics are reviewed annually. Topics of interest for this funding align with the priorities of the GRA council, Livestock Research Group and Integrative Research Group. How these topics interact with the priorities of New Zealand's domestic research programme (see [NZAGRC priorities](#)) should be considered.

Soil carbon

This topic relates to research to do with manipulating or measuring carbon in the soil. Soil carbon is being considered in many regions for both sequestering carbon emissions from the atmosphere and as a potential sink in emissions trading schemes. For this to be viable, accurate, large scale measurement of soil carbon (including fluxes) will be required. Techniques and practices to prevent soil carbon loss and to sequester further carbon are also being sought.

Topics for potential investment from the New Zealand GRA Mitigation Research Fund will need to align with the priority areas of the [Strategic Research Agenda](#) developed by the international CIRCASA project. New Zealand contributed to the development of this international collaboration. The focus for New Zealand research will be on aspects that are truly multinational, benefit New Zealand's domestic aims around soil carbon and develop new science.

Recent or current soil carbon projects include:

- Emissions avoidance of soil carbon from lands undergoing practice change (University of Melbourne) - *Complete*
- Multiscale Soil Organic Carbon Monitoring to Support GHG Mitigation Strategies on Agricultural Land (Manaaki Whenua – Landcare Research) - *Complete*
- Full inversion tillage to accelerate soil C sequestration (Plant and Food Research) - *Complete*

Rumen biochemistry/microbiology

This topic relates to manipulating the rumen biochemistry and microbiology to decrease greenhouse gas production. Methane produced in the rumen is responsible for the majority of livestock methane production, one of New Zealand's largest individual categories of greenhouse gas sources. Understanding how the rumen environment can be manipulated to produce less methane is crucial for the development of potential methane inhibitors and vaccines.

A review of the current state, opportunities and gaps in rumen microbiology has been commissioned. Once this is complete the priorities for investment in this area will be based on the recommendations of this paper.

Recent or current rumen biochemistry/microbiology projects include:

- Predicting appropriate GHG mitigation strategies based on modelling variables that contribute to ruminant environmental impact (AgResearch) - *Complete*
- Antibody binding to antigenic targets in the rumen (AgResearch) - *Complete*
- Reducing hydrogen and methyl-compound production to mitigate rumen methane (AgResearch) – *Complete*
- Support for the Hungate1000 Culture Collection (AgResearch) – *Complete*

Soil nitrogen

This topic relates to research to do with manipulating or measuring nitrogen emissions from the soil. In New Zealand, nitrogen cycling is an important aspect of several environmental discussions. How nitrogen is utilised will impact the levels of nitrous oxide that are emitted by agricultural soils.

Priorities in this space include understanding the mechanisms for plant impacts on nitrogen loss, testing biological nitrification inhibitors across a range of climatic and soil regions, reducing nitrous oxide emissions from fertiliser use and modifying the soil microbiome to improve nitrogen utilisation. Other research areas based on nitrogen may be included in other topics in this list. Reviews of the current state, opportunities and gaps around parts of this topic will be commissioned. The focus for New Zealand research will be on aspects that are truly multinational, benefit New Zealand's domestic aims around soil nitrogen and develop new science.

Recent or current soil nitrogen projects include:

- Quantitative assessment of key nitrification inhibitors to mitigate nitrous oxide emissions in contrasting livestock grazed pastoral soils (Massey University) – *Current*
- Interdisciplinary approaches that integrate field, lab and microbiome research for reducing greenhouse gas emissions from animal agriculture (University of Otago) – *Current*
- Discovery of new nitrification inhibitors: Phase II (Lincoln University) – *Complete*
- Assessing reductions in N₂O emissions following full inversion tillage pasture renewal (Plant and Food Research) – *Complete*
- Mitigating Agricultural Greenhouse Gas Emissions by improved pH management of soils (University of Otago) – *Complete*
- Mitigating N₂O emissions by optimising irrigation management (Lincoln University) – *Complete*
- N₂O switch (Lincoln University) – *Complete*

Low emission animal identification

This topic relates to finding ways to measure and identify emissions from individual animals. It should enable low emission animals to be identified for breeding programmes, and make individual measurements cheaper and easier, opening further research areas.

Priorities in this space revolve around the development and testing of techniques and equipment to rapidly, robustly and cheaply measure and identify greenhouse gas emissions from livestock, including proxy measures. A review paper of this topic will be commissioned.

Recent or current low emission animal identification projects include:

- Enteric Fermentation Flagship Project: Rumen microbiomes to predict methane (AgResearch) – *Current*
- Rumen microbiomes to predict methane (AgResearch) – *Complete*
- Understanding the effects of variation in individual animal production on greenhouse gas emissions (Massey University) – *Complete*
- Evaluation of enteric methane emissions profiles and simulations of spot-sampling methods using respiration chamber data from sheep and cattle (AgResearch) – *Complete*

Impacts of feed and nutrition on greenhouse gas emissions

This topic relates to research to understand how feed consumed by livestock impacts their emissions profile. Identifying the impacts of different feeds on production and emission from livestock will enable the development optimised feeds to reduce emissions and increase productivity.

The priority in this space is for diets applicable in pastoral farming systems. Particularly of interest are diets suitable for production in both New Zealand and a range of global geographic zones. There

is already a programme of work underway funded by the New Zealand GRA Mitigation Research Fund. Further research in this topic may build out of the current programme.

Recent or current feed/nutrition projects include:

- Capturing Effects of Diet on Emissions from Ruminant Systems (AgResearch) – *Current*
- The effect of feed and nutrition on methane emissions from cattle (Various) – *Current*
- New Zealand collaborative seaweed programme for methane emission reduction in ruminant animals (Victoria University) - *Current*
- Determining the effect of feeds on methane emissions in vivo and in vitro (AgResearch) – *Current*
- Developing a process for analysing the methane-emitting potential of ruminant feeds and complete diets (AgResearch) – *Current*
- Delivering methane inhibitors to pasture-fed ruminants (Victoria University) – *Complete*
- Refining direct fed microbials and silage inoculants for reduction of methane emissions from ruminants (AgResearch) – *Complete*

Manure Management

This topic relates to research to understand the impacts on emissions of different management practices of manure. Variations in the management of manure can have large impacts on the emissions they produce and is often linked to the type of production system and climate.

The priority in this space is to collate research and present it in ways that are beneficial to a range of GRA members. There is already a programme of work underway funded by the New Zealand GRA Mitigation Research Fund. Further research in this topic may build out of the current programme.

Recent or current manure management projects include:

- Mitigating greenhouse gas emissions from livestock systems (AgResearch) – *Current*
- Establishment of a database and inventory refinement for GHG emissions associated with Manure (AgResearch) – *Current*
- Collating disaggregated data from developing countries for the development of emission factors (INIA) - *Current*

Remote and Proximal Sensing

This topic relates to taking measurements of relevance without the need for collecting direct samples. This may relate to other topics covered in this list. All scales are included, from satellite technology to handheld field scale measurements.

Priorities in this space are in areas that advance the research in other topic areas, or where measurements are of direct use for calculating activity data for inventory compiling (e.g. livestock numbers and feed quality).

Recent or current remote/proximal sensing projects include:

- Mapping and managing urine patches to reduce nitrous oxide emissions (Manaaki Whenua – Landcare Research) – *Current*

Funding Mechanisms

In order to fund activities in a flexible manner to work toward the identified priorities, a range of mechanisms will be used. The following examples illustrate how these will be applied.

Calls aligned to international funding calls

MPI will hold funding calls for research meeting the priorities and requirements of the GRA fund, where there is clear alignment to an international funding call. These will be run on an as required basis and there will be no set funding total or requirement to fund any proposals under it. Proposals supported in these calls will only have final approval and release of funding if the wider international project is funded by the international call.

Many international calls are not open to fund New Zealand scientists (except under specific circumstances). To enable New Zealand scientists to collaborate with projects under these calls, MPI may use New Zealand GRA mitigation research funding to fund the New Zealand contribution.

Process:

- MPI notified of international funding call (this may be directly from the international funder or through New Zealand's research community).
- MPI will communicate with the New Zealand research community the option of the call and express interest in New Zealand involvement.
- MPI/NZAGRC will decide to make funding available and communicate this.
- Research community discuss with international partners to design a collaborative and inclusive research proposal.
- New Zealand researchers put forward proposals to NZAGRC seeking funding for the New Zealand contribution, clearly outlining how this supports the larger project.
- Proposals are reviewed by a panel consisting of representatives drawn from MPI's GRA team, MPI's internal climate change and investment group, NZAGRC and external expert reviewers.
- Successful submitters are informed and can include confirmation of New Zealand funding in application to international call.
- If the larger project is successful in the international call, funding will be made available for the New Zealand contribution and will be contracted through NZAGRC.

Targeted investment

Review activities are expected to highlight areas of interest for further research. Targeted investments may be made to ensure these gaps or opportunities are realised. This will involve commissioned research. There is no set funding allocation for these investments. Experts will be shoulder tapped and asked to prepare a proposal on a specific topic. This will be reviewed in the same manner as any other proposal

Process

- MPI and NZAGRC identify areas of interest highlighted by review activities.
- Experts in the field are asked to draft a proposal for a piece of research to fill the knowledge gap or utilise the opportunity and submit it to NZAGRC.

- The proposal is reviewed by a panel consisting of representatives drawn from MPI's GRA team, MPI's internal climate change and investment group, NZAGRC and external expert reviewers.
- Successful proposals are confirmed and contracted through NZAGRC.

As appropriate investment

In order to utilise opportunities arising through international discussions, negotiations and collaborations, some funding will be retained for opportunistic investment in mitigation research. These opportunities may fall outside the identified topics of focus, but will be of importance to the priorities of the GRA, LRG and/or New Zealand's domestic programme. They must still meet the same requirements around leveraging, collaboration etc. They will be assessed by the same expert review panel system as other investments.

Process

- Opportunity identified.
- Proposal developed by interested parties.
- Proposal submitted to MPI, NZAGRC or GRA representatives.
- The proposal is reviewed by a panel consisting of representatives drawn from MPI's GRA team, MPI's internal climate change and investment group, NZAGRC and external expert reviewers.
- Successful proposals are confirmed and contracted through NZAGRC.

Communication

For the large part, communication is managed on a contract by contract basis. Many projects involve requirements to present at international fora, maintain networks and databases, produce research papers and provide reporting.

Opportunities

The criteria, topics, priorities and processes outlined in this document are communicated to the research community. Information is shared with identified research contacts and informally through personal networks by MPI. Information is encouraged to be shared wider to all who would find this relevant.

The primary source of contact for most researchers with the New Zealand GRA Mitigation Research Fund is through NZAGRC. All proposals need to be provided to them. Discussions involve both NZAGRC and MPI's GRA team.

Communication on funding calls, both to notify the research community of upcoming opportunities and how the New Zealand GRA Mitigation Research Fund may be involved, is made as early and widely as possible. Sharing this information throughout the research community is encouraged. It is also encouraged for the research community to share with the MPI GRA team when they hear of international opportunities aligned to the topics and priorities outlined here.

Outputs

Once research products are produced there are several avenues for making them public. Most projects have a requirement for outputs to be publicly available. Journal articles, conference proceedings and technical reports must be open access. Exemptions to this requirement are on a negotiated case by case basis where open access prevents third party investment or is of commercial risk.

Technical reports, case studies etc produced for MPI are in a format approved by MPI and ready for publishing. They may be published on the GRA website, MPI website, Climate Cloud or Ag Matters website, as applicable.

Research projects may be included on New Zealand's page of the GRA website. This includes details on outputs, what the aim was, what was achieved and recommended future steps.

All outputs to be made public need to be approved through the Release of Information (ROI) process. This ensures the outputs are of a certain quality, reference funding in support of the GRA and are accurate. Approval is through a multistep process with approvals from both NZAGRC and MPI.