



LIVESTOCK RESEARCH GROUP news

LRG Co-Chair Update

Over the last year, Jeroen Dijkman moved to become Managing Director of the Animal Science Group at Wageningen, succeeding Martin Scholten, a previous LRG co-Chair. Harry Clark has rejoined the co-Chair team alongside Sinead Waters (Teagasc) and Richard Dewhurst (SRUC) in the interim. The new team has taken the opportunity to look again at priorities for LRG and its networks (see below). However, we emphasise that the co-Chairs are there mainly to support the networks of researchers, which are our engine room for ideas and activity.

COVID-19 restrictions have led to many changes in our activity, with the LRG Annual Meeting 2020 and GRA Council 2021 meetings held virtually. Virtual meetings have brought benefits, with more people participating and reduced costs, but there are also challenges in fitting everything in. We miss the large amount of useful activity which occurs in the margins of meetings and which the 'chat function' or 'breakout rooms' cannot match. However, there have been some superb virtual farms tours that many would not have been able to take part in physically – notably the excellent tours of innovative enterprises in both Australia (linked to the GRA Council meetings) and New Zealand (GRA

'Reducing While Producing': Virtual New Zealand Farmer Study Tour). There are some important messages and examples about collaboration and co-innovation by farmers and researchers. We are again planning the LRG annual meeting virtually, though we expect to be back meeting to face-to-face alongside GGAA (Florida, USA) in 2022.

Whilst large virtual meetings can be unwieldy, one of the positives from COVID-19 restrictions has been the value of the networks in bringing together global research communities in specific areas to map our priorities and opportunities – either through virtual workshops or online chats. Networking of scientists is central to the GRA and the recent MMN workshop, reported below, and the forthcoming AHN workshop reflect this.

Sinead Waters
Richard Dewhurst
Harry Clark

MAY 2021 ISSUE

LRG Priorities.....	2	Scholarships.....	10
LRG2020.....	3	Bambang Hari Kusumo, LEARN Award Recipient.....	11
Global Dairy Platform Initiative.....	4	Upcoming Events.....	12
LRG Network Updates.....	5		



**GLOBAL
RESEARCH
ALLIANCE**
**ON AGRICULTURAL
GREENHOUSE GASES**

LRG Priorities

One of the key LRG actions agreed was to facilitate the preparation of a science-based manuscript on the role of livestock in sustainable agri-food systems. Following that instruction, the Co-chair team has worked to bring together a global science consortium that is preparing the first manuscript for publication in a high-impact journal. The review, based on published science and pertinent ongoing work, examines the livestock sector in a realm that limits global warming within the temperature goal of the Paris Agreement. It explores global and regional implications through a systems perspective lens while balancing for selected livelihood; food and nutritional security; one-health; social and cultural; and other environmental outcomes encompassed by the Sustainable Development Goals (SDGs). The publisher has been identified, and the paper is nearing completion for submission to the journal.

On the capability building front, New Zealand Government funding has been secured to implement Tier 2 inventory development and mitigation research support in six East African countries and six countries in the ASEAN region. This funding also supports a minimum of two methane measurement hubs in each region. Currently, the countries with which to work are being selected, and in-country partners are being engaged.

With COVID-19 forcing us all to rely on technology for taking care of business, it is no surprise that webinars have become a popular way to broadcast research

findings. As we all become increasingly comfortable in a virtual workplace, it is natural that the LRG would use virtual means to communicate updates from the research networks. With the benefit of accessing webinars from anywhere, our ability to reach a broader audience rises. Thus, the LRG co-Chairs have implemented an ongoing programme of webinars with content arising from Network research. The MMN kicked off the programme of webinars with their successful MMN Update on 2nd February 2021, which featured three presentations from key members and covered the history of establishing the network, the scope, deliverables, its relationship with international projects such as DataMan, MELS, and future priorities. These webinars will continue quarterly, with the Animal Health Network set to present in June.

The LRG co-Chairs are keen to have enthusiastic research network leadership and are investigating the merit of refreshing leadership roles every 2-3 years. Refreshing network leadership provides an opportunity for others to step into a leadership role and can energise the networks by taking a new direction, as seen in the Feed and Nutrition Network, where Andre Bannink stepped in after the respected leadership of Alex Hristov.

Finally, the LRG co-Chairs are evaluating the best way forward to communicate LRG news and events. We'd love you to tell us everything about the current LRG communications and how to make them better in the future. Take our quick survey [here](#).

TELL US EVERYTHING!

Take our quick survey to help us
communicate with you better

TAKE THE SURVEY NOW

LRG2020

The 12th annual meeting of the Livestock Research Group (LRG) of the Global Research Alliance on Agricultural Greenhouse Gases (GRA) was held virtually for the first time on the 18th and 19th September 2020. The meeting took place over two days and was chaired by the LRG co-Chairs: Jeroen Dijkman, New Zealand; Sinead Waters, Ireland; and Richard Dewhurst, United Kingdom. The meeting was attended by 93 participants, representing forty-two member countries of the GRA and seven partner organisations.

The meeting aimed to update members on the topics below through a series of on-demand presentations, which are publicly available at www.lrg2020.com.

- Development of detailed baselines for livestock emissions to support NDCs;
- Approaches and tools to support Monitoring, Verification and Reporting (MRV);
- Preparation of context-specific mitigation plans and policies;
- LRG achievements and progress since our last meeting and future priorities.

The live plenary sessions on both days allowed for panel discussions and decision-making sessions.



OUTCOMES

The meeting identified a series of research priorities for the LRG and the next steps to develop these. Participants ranked the science capability needs by region (Africa, Asia, Latin America and Europe/Oceania/North America), and shared the outcomes and experiences of the LRG activities that have occurred throughout the previous year. The LRG also agreed the following priority actions:

- Developing closer collaboration with the Integrative Research Group (IRG);
- Increase training opportunities and managing interface of networks;
- Greater participation in Networks;
- Annual Network workshop;
- Identification of science priorities;
- Identification of what the barriers are to the adoption to practise change;
- Identification of Network priorities and funding mechanisms; and
- Prioritisation of science capability needs across the LRG and by regions.

FUTURE SCIENCE PRIORITIES

Harry Clark, Director of the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) and LRG co-Chair, presented the future science priorities of the LRG. He discussed the need for processes that will enable the development of a portfolio of projects as the GRA expands and how to use those process to identify collaborative projects.

Harry suggested a process on short-listing priority projects and areas or research for further development. The group discussed the development of a list of topics for future discussion including:

- literature reviews;
- harmonising the science and research that support global discussions; and
- science support and building institutional capacity in countries to support countries MRV and NDC.

Find the meeting report [here](#).

Global Dairy Platform initiative

Members of the Livestock Research Group are working on a pilot project to scope pathways to net zero warming effects from the global dairy industry. Our partners are the Global Dairy Platform (GDP) and FAO and we expected that this will be a long-term collaboration bringing in all other key dairy industry stakeholders. The scoping study will look at baseline emissions from dairy, as well as mapping out mitigation opportunities and potential in different regions and systems. The rapid pilot stage of this project will report by mid-2021, providing an overview of the scale of the challenge

and a road map towards net zero dairying. We will be approaching GRA members representing different regions and systems to provide expert opinions about mitigation options over the next few weeks. In some cases, this will be based on extensive previous work, whilst in others it will confirm gaps knowledge gaps. More details about GDP's vision are at:

<https://globaldairyplatform.com/media-archives/gdp-bulletin-march-april-2021/#one>



LRG Networks

ANIMAL HEALTH NETWORK

The Animal Health and Greenhouse Gas Emissions Intensity Network (AHN) is a forum for researchers that investigate the connection between animal diseases and GHG emissions intensity. They explore GHG mitigation opportunities through disease control.

The current global situation caused by the coronavirus shows how important the "One Health" approach (health of humans, animals and environment) will be for the future of mankind.

The Animal Health Network (AHN) pursued in the frame of the One Health approach possible Greenhouse Gas mitigation opportunities through disease control for a sustainable production of food

of animal origin. Recently, researchers from the AHN agreed to start the preparation of a review using the previous work as a starting point.

Furthermore, an Animal Health and Greenhouse Gas Emissions Intensity Network Webinar is planned for June 2021.

The network is particularly interested in people from developing countries to participate in the AHN. For more on the AHN or to join, please contact [Dirk von Soosten](#), Friedrich-Loeffler-Institut (FLI), Federal Research Institute for Animal Health, Germany You can also follow the AHN on twitter: [@AHGHGN](#)

MANURE MANAGEMENT NETWORK

The Manure Management Network (MMN) focuses on reducing livestock GHGs through manure management.

The Manure Management Network held a webinar on 2nd February 2021, facilitated by LRG Co-Chair Dr Sinead Waters, Teagasc. The webinar included three presentations:

- An introduction to the Manure Management Network's objectives, research scope and main activities, presented by Prof. Dave Chadwick, Bangor University, Wales, UK;
- An overview of the DATAMAN project, including the development of the DATAMAN database and a brief look at the statistical analysis of the database, presented by Dr Tony van der Weerden, AgResearch, New Zealand. The DATAMAN project focuses on greenhouse gas (methane, nitrous oxide and ammonia) emissions from animal housing, manure storage, manure application to land and dung and urine deposited by grazing animals. The database captures information on GHG emission factors and biotic and abiotic factors affecting these emission factors. The database has been divided into Housing, Storage and Field, with an initial focus on the Field database. Analysis of the database will lead to revised emission factors and improved understanding of the drivers of these emissions.

- An outline of the MELS – Mitigating greenhouse gas Emissions from Livestock Systems – project, which continues and expands on the work initiated by DATAMAN. This was presented by Associate Prof. Barbara Amon, Leibniz Institute for Agricultural Engineering and Bioeconomy and University of Zielona Góra, Poland. The MELS project will build on DATAMAN by analysing the housing and storage data, develop functional relationships and include the development of a prototype on-farm model for estimating GHG emissions from manure management.

A recording of the Manure Management Network webinar is available [here](#) to view.

The DATAMAN and MELS projects are still looking for more emission factor data, particularly from Africa, South and SE Asian and South America. For those wishing to contribute data to the projects, please contact Tony or Barbara.

Version 1 of the DATAMAN Field database has recently been published and is available via open access from the Journal of Environmental Quality ([link to paper here](#)).

For more on the MMN or to join, please contact [Hongmin Dong](#), Chinese Academy of Agricultural Sciences.

LRG Networks

FEED AND NUTRITION NETWORK

The Feed and Nutrition Network (FNN) is a collaborative forum for scientists working on ways to reduce GHG emissions via nutritional means.



The network's key achievements has been the CEDERS project under the ERAGAS funding scheme, preceded by the Global Network project under the JPI funding scheme. The CEDERS project aims to address the dietary effects on GHG emissions in accounting tools and inventory methodology. The Global Network project aimed to address issues with the available global data on the impact of feed and nutrition on livestock GHGs.

FNN scientists have published five new papers associated with the CEDERS project :

Vibart, R., C. de Klein, A. Jonker, T. van der Weerden, A. Bannink, A.R. Bayat, L. Crompton, A. Durand, M. Eugène, K. Klumpp, B. Kuhla, G. Lanigan, P. Lund, M. Ramin, F. Salazar. 2021. Challenges and opportunities to capture dietary effects in on-farm greenhouse gas emissions models of ruminant systems. *Science of the Total Environment* 769, 144989. <https://doi.org/10.1016/j.scitotenv.2021.144989>

Ouatahar, L., A. Bannink, G. Lanigan, B. Amon. 2021. Modelling the effect of feeding management on greenhouse gas and nitrogen emissions in cattle farming systems. *Science of the Total Environment*, In press. <https://doi.org/10.1016/j.scitotenv.2021.145932>

Müller, C.B.C., S. Görs, M. Derno, A. Tuchscherer, K. Wimmers, A. Zeyner & B. Kuhla. 2021. Differences between Holstein dairy cows in renal clearance rate of urea affect milk urea concentration and the relationship between milk urea and urinary nitrogen excretion. *Science of The Total Environment* 755, 143198 <https://doi.org/10.1016/j.scitotenv.2020.143198>

Van Gastelen, S., A. Bannink, J. Dijkstra. 2019. Effect of silage characteristics on enteric methane emission from ruminants. *CAB Reviews* 14, 051. <https://doi.org/10.1079/PAVSNNR201914051>

Van Gastelen, S., J. Dijkstra & A. Bannink. 2019. Are dietary strategies to mitigate enteric methane emission equally effective across dairy cattle, beef cattle, and sheep? *Journal of Dairy Science* 102, 6109-6130. <https://doi.org/10.3168/jds.2018-15785>

Scientists involved in the CEDERS project plan for 2021 to present at stakeholders meeting, organise a specific CEDERS webinar, and are in contact with stakeholder organisations attributing GHG accounting at the regional or farm scale, as well as in national inventory.

In addition to the three papers that have been published in association with the Global Network project, FNN scientists have three new papers under construction:

- the development of models to predict methane production in sheep based on over 2000 individual animal records from Australia, Brazil, Canada, Egypt, France, Norway, New Zealand, Spain, Switzerland, and the UK (work under construction),
- a meta-analysis on available strategies to mitigate enteric methane emissions by ruminants from an extensive treatment means database including 98 strategies reported in 425 peer-review journal publications,
- a meta-analysis on nitrogen excretion data from dairy cows fed a wide range of diets to evaluate intercontinental and regional prediction equations.

In 2021, results from both the Global Network and CEDERS projects will be used and presented with dissemination activities. Furthermore, FNN scientists contributed to proposed refinements of the IPCC guidelines for enteric methane, published in 2020, and also results from the Global Network project were used.

For more on the FNN or to join, please contact [Andre Bannink](#), Wageningen University, The Netherlands.

LRG Networks

RUMEN MICROBIAL GENOMICS NETWORK

The Rumen Microbial Genomics Network (RMG) is a forum for researchers using genomics approaches to understand enteric methane emissions and how they might be reduced without compromising animal health or productivity.

Many of the members have been successful in receiving joint EU Horizon 2020 funding for the HoloRuminat project, which will start later this year and will be led by Diego Morgavi of INRAE. This project is centred around understanding livestock microbiome resilience and connectivity.

Members of the network published a comprehensive updated book on the rumen microbiome 'Improving Rumen Function' Burleigh Dodds Publishing, ISBN-13:9781786763327.

The review article entitled *Addressing global ruminant agricultural challenges through understanding the rumen microbiome: Past, present and future*. DOI: [10.3389/fmicb.2018.02161](https://doi.org/10.3389/fmicb.2018.02161) published by the network has been well cited.

We are looking for a volunteer to continue the social media engagement. If you are interested in helping, please contact Sharon Huws.

Due to the COVID-19 pandemic, the next RMG workshop will likely be in late 2021. For more on the RMGN or to join, please contact Sharon Huws, Queens University Belfast, United Kingdom. Follow us on twitter [@RMG_Network](https://twitter.com/RMG_Network).



LRG Networks

ANIMAL SELECTION, GENETICS AND GENOMICS NETWORK

Breeding as a long-term strategy to reduce livestock GHGs is the focus of the Animal Selection, Genetics and Genomics Network (ASGGN), along with identifying how other genetic traits can affect mitigation.

ASGGN DISCUSSION FORUM: PROXIES FOR ENTERIC METHANE EMISSIONS OF RUMINANTS

A large contributor to global methane emissions are ruminant animals, in particular cattle. Selecting and breeding for low methane emitting ruminants, could be part of the solution for global governments in reaching their climate goals. Yet, large-scale direct measurement of enteric methane emissions, with the most accurate method being respiration chambers, is currently expensive.

Indicators or indirect traits of the ruminant's methane production, so-called proxies, may offer a cheap and easily accessible alternative to direct methane measurement. Although a variety of proxies have been identified and examined, the perfect proxy to predict CH₄ at low cost is yet to be found.

On the 2nd of June 2021 (18.00 – 21.00 UTC-time) an informal online discussion forum will be held, aimed to discuss and evaluate potential proxies of ruminant methane emissions. Based on previous research, we have constructed a few themes as starting points for discussion and potential topics.

We invite anyone with relevant research to present or discuss their findings within a 5 to 10-minute presentation. Please let us know before the 28th of May if you would like to present.

Within this forum, there is room for emerging and novel techniques. Hence if your research does not fall under any of the themes, we highly encourage you to contact us and to join the discussion. The discussion forum is a precursor for a large internationally led review of the area. Participants will also be given the opportunity to contribute to a review.

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Sign up and stay updated for the discussion forum [here!](#) Any questions? Please contact ASGGN@agresearch.co.nz.



Scholarships

CLIFF-GRADS

The Climate, Food and Farming, Global Research Alliance Development Scholarships Programme (CLIFF-GRADS) is a joint initiative of the GRA and the CCAFS Low Emissions Development (LED) Flagship. CLIFF-GRADS builds capability in early career scientists from developing countries to conduct applied research in agriculture GHG emission quantification, modelling and mitigation, relevant to developing countries.

We are excited to announce that 57 PhD candidates from 20 developing countries will receive scholarships in Round 4

Increasing interest in the CLIFF-GRADS Programme has seen the number of recipients in this scholarship Round double after hundreds of applications were received.

A 2020 CLIFF-GRADS Science Collaboration Webinar Series was developed to facilitate technical capability building, knowledge transfer and international collaboration for the CLIFF-GRADS Alumni. Particularly for the Round 3 CLIFF-GRADS, whose research stays have been delayed due to international COVID-19 restrictions.

To read more about CLIFF-GRADS, see [here](#).

NZ-GRADS

The GRA is pleased to announce the launch of the New Zealand Global Research Alliance Doctoral Scholarship (NZ-GRADS) programme.

NZ-GRADS is a PhD scholarship offered to science students from developing countries to complete their PhD at a New Zealand university. The PhD research topics must be related to GHG emissions from agricultural systems, primarily livestock, but innovative and novel aspects of this will be considered, especially related to new technologies or new applications of existing technologies.

These PhD students would be actively supported through various extension and networking events hosted by the GRA and Education New Zealand.

For more information on NZ-GRADS, see [here](#).

LEARN AWARD OPPORTUNITIES

LEARN is an awards scheme sponsored by the New Zealand Government to build international capability in livestock emissions research. It is part of New Zealand's support for the GRA.

LEARN is focused on:

- Supporting technical staff and scientists from developing countries and GRA member countries to work alongside New Zealand colleagues.
- Sharing knowledge on livestock GHG emissions measurement, modelling and mitigation practices to increase the level of scientific skills and technological capabilities internationally.
- Supporting strategic research and capability building activities that align with the priorities of the GRA as well as relevant New Zealand science priorities.
- Advancing common research interests between countries and building enduring relationships.

There are currently two LEARN awards:

- LEARN Technical Training Award
- Global Research Alliance Senior Scientist (GRASS) Award

These awards are assessed on a quarterly basis, following a two-stage application process. The next two closing dates for full applications are 30 July 2020 and 30 October 2020. All applications must be developed in close collaboration with a New Zealand research institution. For more information, please see www.livestockemissions.net

Please note that applications for LEARN Co-funded PhD Scholarships and LEARN Postdoctoral Fellowships are not being taken at this time.

Bambang Hari Kusumo

LEARN Award Recipient



*Bambang Hari
Kusumo,
LEARN Award
Recipient*

Dr Bambang Hari Kusumo's experience in New Zealand as a LEARN Post Doctoral Fellow has led to him translating his knowledge of soil carbon and agricultural methane mitigation within a completely different type of agriculture – the rice fields of Indonesia.

His work has also encouraged the Indonesian Government to consider intensified rice-growing techniques without the need for flooding the fields.

Bambang Kusumo came to New Zealand from the University of Mataram, Indonesia, between 2012-14 to study "the use of Vis-NIR reflectance to allow the on-site monitoring of stable carbon in soil (including biochar) as well as environmental factors controlling denitrification and methane fluxes in soil".

Vis-NIR technology involves measuring soil content using visible and near-infrared spectroscopy. Bambang had previous experience in developing the Vis-NIR technique for measuring soil carbon, soil nitrogen and root density, during his PhD studies at Massey University.

Now a senior lecturer at the Department of Soil Science, Faculty of Agriculture, at Indonesia's University of Mataram, where he is also Vice Director of Postgraduate Studies, Bambang credits his LEARN experience for expanding his knowledge in several areas.

"I learned some philosophical concepts of why soil carbon differs due to land use differences. I also strengthened my knowledge of livestock greenhouse gas mitigation, as well as learning how to write a good article for international journal publication."

"I have tested the ability of NIR technology in predicting the soil carbon content both in rice fields and dry land areas. NIR technology was able to predict the soil carbon content with acceptable accuracy compared to conventional analysis and a

map of soil carbon and other nutrients has been successfully produced.

"These maps are useful as a guide to applying organic and inorganic fertiliser."

Bambang was also part of a team that worked in the West Nusa Tenggara Province to help the area measure its agricultural emissions and develop a strategy to reduce them.

He credits his learnings in New Zealand for providing the skills and technical knowledge that can be translated into Indonesian agricultural research including recommendations to the Indonesian government on improved farming techniques.

"Those learnings helped me to improve the research techniques that I conduct here, such as better methods of sample collection.

"I got more understanding about the dynamics of methane in rice paddy fields, so we are encouraging our government to apply system rice intensification without flooding.

"I also learned how to reduce the greenhouse gasses emitted from waste dumps, cow dung and enteric fermentation of cattle, so we understand the management that should be applied to handle them here."

Overall, Bambang says the LEARN experience was important not only to the techniques employed in Indonesia but to his own career.

"The publications that we produced were very valuable in supporting my promotion to be a Professor candidate at my university. I have been invited to give lectures and talks in government and scientific forums on soil carbon sequestration and other issues relating to agricultural greenhouse gas emissions."

Bambang is still in touch with the New Zealand scientists he worked with at Massey University. He says he would be very pleased to support any future LEARN project that involved research in his home country.

Upcoming Events

ANIMAL HEALTH NETWORK WEBINAR

A webinar to share knowledge and to keep the connection of animal health and greenhouse gases under discussion.

22 June 2021
10:00am - 12:00pm (GMT)
Virtual

2021 LRG ANNUAL MEETING

September 2021 (Dates TBC)
Virtual

8TH INTERNATIONAL GREENHOUSE GAS AND ANIMAL AGRICULTURE CONFERENCE (GGAA)

The meeting aims to present the latest research on the mitigation of greenhouse gases, measurement and modelling, as well as to discuss on-farm practices and policies to address the challenges associated with agricultural practices and their impact on greenhouse gases.

5 - 10 June 2022
Orlando, Florida
<https://conference.ifas.ufl.edu/ggaa/>

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