



Livestock Research Group representatives; Amsterdam 2011

# WELCOME...

to the final newsletter for the Livestock Research Group for 2011.

It's been a busy but very productive year for the Group. At the LRG meeting held in Amsterdam (November 4-5) we heard from many countries about the progress being made on projects, collaborations and funding initiatives. Further planning took place both during the meeting and in the

coffee breaks for yet more exciting initiatives to advance in 2012.

This edition of the newsletter includes our personal summary of the Amsterdam meeting as well as contributions from LRG member countries outlining

new initiatives, capability building opportunities and progress on sub-group activities. We hope you enjoy reading it.

Happy New Year 2012!  
Martin Scholten and Harry Clark

## contact us

We are seeking contributions for future Newsletters from members of the Livestock Research Group.

Please send us information about relevant Group activities underway in your country for inclusion in the Newsletter to [enquiry@nzagrc.org.nz](mailto:enquiry@nzagrc.org.nz)

# Update from the Livestock Research Group meeting

Amsterdam 4-5 November 2011-11-25



Nearly 50 representatives of Alliance member countries attended the third meeting of Livestock Research Group to review current activities and consider critical areas for future action.

## Key points from the review of the current activities:

Current activities that are supported by the Group include the development of best practice guidelines and a technical manual for various greenhouse gas measurement methodologies. These outputs are produced by international teams of experts coordinated by New Zealand and aim to increase the robustness and comparability of emissions measurements globally.

The past half year also saw the establishment of two global research networks, one that will focus on opportunities to select low-emitting animals through genetics and genomics, and the other on increasing our knowledge and build up a database of the diversity of rumen microbes.

These networks have already identified opportunities for collaborative projects that could not be achieved by any single country but rely on the pooling of expertise and research capacity across countries. These projects focus on sharing data and developing common protocols for identifying and selecting low-emitting animals and genomic analysis of the diversity of the rumen microbial community.

The global stocktake of agricultural GHG research activities was reviewed and the Group agreed to reduce this activity to an approximately five-yearly event. New member countries to the LRG and the wider Alliance will still be invited to complete

the stocktake questionnaire survey and updates will be made available regularly. The Group agreed to use the LEARN network to facilitate the sharing of current projects and science contacts in the area of livestock emissions research.

## New areas for future action:

The Group agreed to establish a third global research network on animal feed and nutrition, to be coordinated by Switzerland with support from other LRG member countries.

Delegates also agreed to a set of regional workshops to assist capability building in developing countries. Thailand will host the first workshop in March 2012 focusing on south-east Asia. New Zealand was asked and agreed, through the NZAGRC, to scope and coordinate this initial workshop, building on its success in initiating collaborative research across five countries in Latin America.

Countries also discussed the possible synergy between reducing the burden of disease in animals and reducing the emissions intensity of livestock production. This line of inquiry will be followed up by the UK with interest expressed by several other countries.

A significant further boost to joint international research is expected from the New Zealand Fund for Global Partnerships in Livestock Emissions Research. This fund

aims to invest \$25 million over the next four years in international collaborations. It was launched at the Ministerial Summit of the Alliance in June this year, and the first round of Expressions of Interest closed on 7 November. A subset of proposals will be invited to submit full applications, with successful teams identified and proceeding to contracting by the middle of 2012. The fund requires all proposals to demonstrate strong international teams and co-funding. Other potential mechanisms to enhance international research collaboration discussed at the meeting included targeted funding under the EU Joint Programming Initiative but involving also non-European countries.

The meeting also heard from a range of international organisations outlining their activities that could provide important synergies with the Livestock Research Group. This interaction was well received and will be followed up by the co-chairs of the LRG.

The meeting took place at the end of the NCGG-6 Symposium and took full advantage of the invitation by Symposium organisers to run several parallel sessions during the symposium programme where 20 presentations about projects support by or of high relevance to the LRG projects were given to more than 200 symposium delegates (see Table).



Speaker	Country	Presentation
Vellinga and Gerber	Netherlands/FAO	Global emission patterns of the livestock sector and the different options for mitigation.
La Van Kinh and Pham Huynh Ninh	Vietnam	Summary of research on greenhouse gases in Vietnam.
Chadwick et al	UK	Improving the national inventory of agricultural nitrous oxide emissions from the UK (InveN2Ory).
Davison et al	Australia	Reducing emissions from the Livestock Research Program.
Finster et al	Uruguay/Chile	Climate Change and Beef Cattle Production in South American Countries: Quantification and Mitigation of Methane and Nitrous Oxide Emissions from Grazing Beef Cattle.
Gomez-Rosales	Mexico	Capability building opportunities within the Livestock Research Group of the Global Research Alliance.
Zeitz et al	Switzerland	Swiss diet types for cattle: How accurately are they reflected by the IPCC default values?
Higgins et al	Northern Ireland	Denitrification and the N <sub>2</sub> O mole fraction of limed grassland soils in a long-term incubation.
Petersen et al	Denmark	Greenhouse gas and odour emissions from livestock manure: effects of storage conditions and pre-treatment.
Alfaro and Ciganda	Chile/Uruguay	Analysis of the Livestock Research Group Stock-take data.
Cookson et al	New Zealand led	A Rumen Microbial Genomics Network approach for the development of worldwide methane mitigation and rumen adaptation technologies.
De Klein et al	New Zealand led	Working towards a common protocol for measuring N <sub>2</sub> O fluxes using chamber methods.
Veerkamp et al	Netherlands	Enteric CH <sub>4</sub> mitigation using animal selection, genetics and genomics.
De Boer et al	Netherlands	Greenhouse gas mitigation in animal production: towards an interdisciplinary research agenda.
O'Kiely et al	Ireland	Ruminant enteric methanogenesis on forage-based diets.
Zimmerman et al	USA	The Greenfeed system: a fast CH <sub>4</sub> measurement technology from grazing cattle.
Ernfors et al	Ireland	Effects of a nitrification inhibitor on soil nitrogen dynamics and N <sub>2</sub> /N <sub>2</sub> O emissions from Irish grassland soils after application of slurry.
Thalib et al	Indonesia	Use of a chamber method to verify the effectiveness of a complete rumen modifier reducing the enteric methane on ruminants.
Hegg et al	USA	Air issues associated with animal agriculture.
Misselbrook et al	UK	Mitigation strategies to reduce N <sub>2</sub> O emissions following nitrogen inputs to a range of English soils and crops.





Paul Vriesekoop, Jac Meijs, Andy Reisinger and Michael Kruezer

## The LRG launches a Network and Database Activity\* on 'Feed and Nutrition in Relation to GHG Emissions'

At its meeting on 4-5 November 2011 in Amsterdam, the LRG launched a Network and Database Activity in the field of 'Feed and Nutrition in Relation to Greenhouse Gas Emissions'.

This is the most intensive area of research in GHG mitigation from animal agriculture and the LRG wants to build on, and make best use of the huge body of work that exists to investigate the huge number of dietary intervention options that are theoretically possible. The Feed and Nutrition Network will coordinate the research activities being undertaken in this area and oversee the development of a research/information database.

Outcomes from the Network will include obtaining a deep insight on the state of art of research in the field (incl. 'grey' and non-English literature) which will assist the Network to identify gaps in the science knowledge and avoid duplication of research effort. A long-term goal for the Network is to provide advice on research 'best practice' to support the adoption of appropriate mitigation measures across various regions of the world.

The LRG agreed that Switzerland would coordinate the Network. Switzerland will be assisted by a facilitating group, which will include (but won't be limited too) the Netherlands, United Kingdom, France and USA.

The Network will be of interest to all Alliance countries interested in ruminant feeds and nutrition in relation to enteric methane emissions as well as emissions of N<sub>2</sub>O and methane from ruminant manure. Special attention will be given to the involvement of, and uptake of issues relevant to developing countries.

Invitations to nominate country contacts to help refine the Network's work plan and activities and to develop links with the broader scientific community will be sent shortly to each LRG member country.

*\*This initiative has been prepared by Michael Kreuzer and Johanna Zeitz (Switzerland), Andre Bannink, Jan Dijkstra, Jac Meijs and Theun Vellinga, Paul Vriesekoop (the Netherlands) and Andy Reisinger (New Zealand).*

## Global ReseArCH4 inveN2Ory

A workshop on agricultural GHG measurement methodologies and techniques to support the work of the Alliance was held at the University of Reading Centre for Dairy Research (CEDAR), UK, on 31 October 2011.

The workshop was a great opportunity for scientists and industry to come together and share knowledge and information about techniques and technologies used to measure GHG emissions to improve national inventories and develop mitigation strategies. The workshop attracted around 100 delegates from 15 countries, to see technologies in use, and learn about their application and limitations from scientists that actually use the technologies.

The day was split into two sessions. The morning saw presentations across parallel sessions outlining measurement methodologies and techniques for both livestock emissions and those from soils and manure. Topics included the harmonisation of SF<sub>6</sub> techniques, low cost monitoring of small animals, online measurement of dairy cows during milking and low cost monitoring of small animals. The afternoon was launched with an introduction by the Minister of State for Agriculture and Food, Jim Paice who led the way through a number of practical, demonstration sessions. Various equipment such as SF<sub>6</sub> Tracer gear, laser spectrometers, the GreenFeed system and CEDAR's own calorimetry chambers were presented to delegates who were able to interact with scientists using the equipment and learn more about the technology.

The workshop builds on the £12.6 million investment already committed to improve measurement and understanding of GHG emissions from UK agriculture.

*The University of Reading Centre for Dairy Research (CEDAR) is one of the UK's leading institutions for nutritional, reproductive and metabolic studies for the dairy industry and holds over 400 dairy cows.*



UK MP Jim Paice addressing delegates after lunch



# The working groups of the Livestock Research Group

## Ruminant working group

**Co-chairs: Drs Harry Clark, New Zealand, and Veronica Ciganda, Uruguay**

Most of the activities initiated by the LRG since its inception have focused on ruminants, as emissions of methane from enteric fermentation and nitrous oxide from pastures and grazing land constitute the majority of GHG emissions from livestock. All members of the LRG are also members of this sub-group.

Initial projects of the sub-group focused on developing best practice guidance and a technical manual for measuring emissions from ruminants. A research project has also evaluated a novel method (the Greenfeed<sup>TM</sup> system) to obtain rapid and low-cost emission measurements from individual grazing animals.

Two dedicated open research networks were established in early 2011, one focusing on options to identify and select naturally low-emitting animals for targeted breeding, and the other to better understand the genomic diversity of rumen microbes. These networks have already provided impetus for collaborative research proposals that would not have been possible without the pooling of expertise provided by the Alliance. A third network established during the LRG's third meeting in Amsterdam will complement those two networks by focusing on options to reduce emissions intensity via animal feed and nutrition.

## Non-ruminant working group

**Co-chairs: Ir. Paul Vriesekoop, The Netherlands and Dr. La Van Kinh, Vietnam.**

This working group consists of delegates from the following countries: Colombia, China, Denmark, Finland, France, Germany, Japan, Korea, Malaysia, Mexico, the Netherlands, Pakistan, Spain, UK, USA and Vietnam.

At the meeting of the LRG in February 2011 in Clermont Ferrand, France, it was decided that this group should focus on Manure Management, as this is the single most important source of GHG's from non-ruminants, but that this would include consideration of manure management from ruminants as well. During the meeting in November in Amsterdam it was proposed that the group should focus its activities around:

1. Organising information sharing amongst the partners.
2. Organising regional research networks.
3. Organising and keeping up to date an Emission Factor Database.

In the upcoming months the co-leaders will organise contacts with the members of the group to determine how to progress the activities above. If you are not currently a member of this sub-group and have an interest in GHG emission mitigation among non-ruminant livestock or manure management generally then please contact Paul Vriesekoop at [Paul.Vriesekoop@wur.nl](mailto:Paul.Vriesekoop@wur.nl).

The ruminant and non-ruminant sub-groups work together where relevant to manage issues of shared interest such as extending funding mechanisms and developing links with other international organisations that could complement the goals and strengths of the LRG. The two sub-groups will also jointly contribute to regional workshops that seek to build capacity, identify research needs and opportunities for collaborative programmes amongst LRG member countries.





Marcio Chiba and Brian Devantier at the AgResearch Ballantrae Research Centre

## From Crops to Grasslands

Marcio Chiba is a Scientist for the Soil and Environmental Research Centre, a Research Institute within the Sao Paulo State Bureau of Agriculture, Brazil. After spending many years surveying soil, Marcio took an opportunity to study the deployment of a crop-livestock integration system by farmers from Sao Paulo State.

This new farming system was introduced to protect the soil from the impact of heavy rainfall on bare soils; a problem of concern in Brazil where heavy rainfall is very common during the summer months. By keeping soils permanently covered with plants this new farming system has potential to not only minimize soil erosion, but the forages grown once the crop has been harvested would be good for grazing cattle and would minimize the need to import feed onto the farm.

Additionally, Brazilian farmers do not fertilize crops and this new crop-livestock integration

system has the potential to increase the yield of forage crops through "crop fertilization" through the presence of foraging animals; which in turn could increase farm profitability. Marcio is visiting New Zealand on a LEARN Postdoctoral Fellowship to work with Iris Vogeler and Rogerio Cichota's at AgResearch, Grasslands to further develop models and understanding of just how much impact the crop-livestock integration system could have on Brazilian farm systems.

Marcio has already started to collect data with Coby Hoogendoorn and Brian Devantier

at AgResearch Ballantrae Research Station. His research will focus on the spatial and temporal variability of N losses via leaching and  $N_2O$  emissions under hill country grazing by means of linking experimental observations with process based modelling and Geographical Information Systems (GIS).

Marcio will use the knowledge gained on managing highly productive pastures with low environmental impact back in Brazil to apply the concepts to grain cropping areas under no-till.

## Working with the experts on a LEARN fellowship



Sandeep Kumar and Gemma Henderson

Sandeep Kumar is a Research Associate in the highly-regarded Rumen Microbiology Group of Professor Devki Nandan Kamra at the Indian Veterinary Research Institute in Bareilly. Sandeep's research considers the effects of feed additives on ruminant methane emissions and rumen microbial diversity of domesticated and wild ruminants. The overall goal of his research is to gain a better understanding of livestock methane emissions and so be able to mitigate these whilst simultaneously improving livestock productivity.

Knowing the benefits of working with, and learning from other experts in this area – Sandeep applied for and won a LEARN fellowship. The fellowship has funded his six-month visit to AgResearch in Palmerston

North New Zealand where he is improving bioinformatic tools used to analyse next generation sequencing data, under the guidance of Dr Gemma Henderson and Dr Peter Janssen in the Rumen Microbiology Team.

Sandeep says that the experience he gains in New Zealand will be of huge benefit to the research program at his home organisation in India. In addition, the outcomes of the research he is involved with on his fellowship will be used in ongoing methane mitigation programs funded by the Pastoral Greenhouse Gas Research Consortium and the New Zealand Agricultural Greenhouse Gas Research Centre.

## LEARN Technician Award

The LEARN Technician Award will provide funds for a Technician from a developing country to travel to a New Zealand research organisation to receive training on equipment, tools or methods that when applied in their home organisation/country will improve the measurement of and understanding of greenhouse gas emissions from agriculture. The award aims to build capacity amongst Technicians to facilitate their future or ongoing participation in research, development and extension activities or programmes directly related to the mitigation of livestock greenhouse gas emissions.

To be eligible, you must:

- Have a bachelor's degree or equivalent tertiary qualification or be a technician with at least 5 years work experience
- Be a registered member of the LEARN network
- Work in collaboration with a New Zealand research organisation
- Be resident and normally employed on a permanent contract by a research organisation in a developing country as defined by the Development Assistance Committee of the OECD (DAC) list of Overseas Development Assistance (ODA) recipients. The list is available online via this link
- Satisfy New Zealand Government requirements for international entry into New Zealand
- Be able to speak and understand English to a level sufficient that you can understand technical concepts that will be explained in English

### Funding

The visit must be between 6 weeks and 6 months duration and be completed within one year of the Technician's Award having been granted.

- Up to NZ\$17,000 for 6 months (pro rata for less than 6 months) will be provided to recipients to cover living expenses only (i.e. not the recipient's salary)
- Up to NZ\$3,000 will be provided for an economy airfare and travel/medical insurance



# Learn

Livestock Emissions &  
Abatement Research Network

## Global Research Alliance Senior Scientist (GRASS) Award Supporting research in Agricultural Greenhouse Gases

The New Zealand Government in support of the goals of the Global Research Alliance is funding senior scientists from Alliance member countries to participate in an exchange programme to enhance collaboration and the building of mutually beneficial research partnerships between New Zealand and other Global Research Alliance countries.

### Focus areas

- Methane emissions from livestock and livestock wastes
- Nitrous oxide emissions from livestock wastes
- Enhancement of pastoral soil carbon sinks
- Integrated whole farming systems impacts at all scales as they relate to livestock emissions.
- National inventory development as it relates to livestock emissions

### Eligibility

To be eligible, you must:

- Have a PhD or be a scientist with at least 5 years experience participating in/leading major projects that align to the priorities of LEARN, the Alliance or other relevant national strategies
- Demonstrate impact and leadership in your professional field
- Be able to contribute to scientific research and its application in your home region and the larger Alliance network, based on your networking record
- Work in collaboration with a New Zealand research organisation
- Be resident and normally employed on a permanent contract by a research organisation in an Alliance member country

### Funding

The exchange must be between 6 weeks and 6 months duration.

- Up to \$30,000 for 6 months (pro rata for less than 6 months) will be provided to recipients to cover actual and reasonable living expenses
- Up to \$5,000 will be provided for economy airfares and travel/medical insurance
- Up to \$5,000 will be awarded for associated research costs

For more details refer to the LEARN Website: [www.livestockemissions.net](http://www.livestockemissions.net) or email the  
New Zealand Agricultural Greenhouse Gas Research Centre: [enquiry@nzagrc.org.nz](mailto:enquiry@nzagrc.org.nz)

# Growing potential of Alliance to increase agricultural productivity, food security and reduce emissions intensity

The current 32 member countries of the Global Research Alliance (the Alliance) cover roughly 59% of total global greenhouse gas emissions from agriculture.

The Alliance's focus is firmly placed on increasing cooperation and investment in research activities to help reduce the emissions intensity of agricultural production systems, increase their potential for soil carbon sequestration and improve their efficiency, productivity, resilience and adaptive capacity. The Alliance's increasing membership demonstrates the important contributions that the initiative can make towards achieving these goals.

The emissions estimates are for 2008 and come from the EDGAR emissions database, including emissions from enteric fermentation, paddy rice, manure management and agricultural soils. The EDGAR database applies an IPCC Tier 1 methodology to estimate emissions from a broad range of agricultural activities in all countries using official statistics about relevant activity data.

Emissions of methane from enteric fermentation are the biggest single source of agricultural emissions, responsible for about half of total agricultural emissions.

Emissions of nitrous oxide from manure and urine deposited on pastures and paddocks contribute about 13%, while methane and nitrous oxide from manure management are estimated to make up just under 10% of total agricultural emissions. The Alliance through the members of its Livestock Research Group now covers just over half of global emissions from enteric fermentation and nitrous oxide from pastures and paddocks, and about 66% of methane and nitrous oxide emissions from manure management.

The exact distribution of emissions between ruminant and non-ruminant sources cannot be determined precisely based on EDGAR

emissions categories because this database does not differentiate between nitrous oxide emissions from ruminants and non-ruminants, nor between direct and indirect soil nitrous oxide emissions from nitrogen-based fertiliser or livestock manure applied to croplands or fodder crops.

The coverage of more than half of the emissions from each emissions category shown below demonstrates that the Alliance has a growing potential to deliver benefits on a global scale and is also testament to the important contribution of the Livestock Research Group within the overall scope of the Alliance.

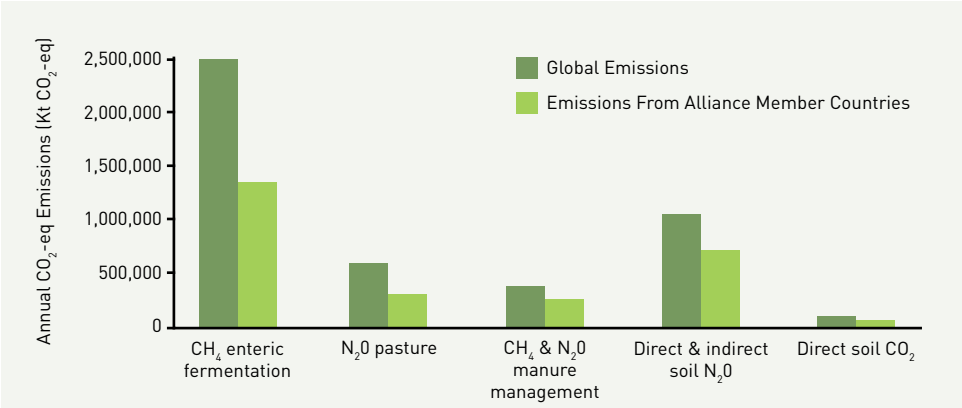


Figure 1. Emissions from key livestock-related agricultural source categories globally and for Alliance member countries. Data are from the EDGAR database version 4.2 for the year 2008, the latest year for which comprehensive data are currently available.



Season's Greetings

All the best for a happy and prosperous new year 2012.