

The science behind genetic and genomic technologies that contribute to animal selection tools to mitigate methane emissions from ruminant livestock, requires a huge resource of animals of different breeds and species, and access to unique skills.

The ASGGN (Animal Selection, Genetics and Genomics Network) offers a forum and environment in which scientists from all over the world can share information and data. The network will facilitate a coordinated international research effort to achieve progress



ASGGN Meets in Vancouver, Canada

The next international meeting of the ASGGN will be as a satellite immediately before the World Congress on Genetics Applied to Livestock Production

As a satellite symposium of the World Congress on Genetics Applied to Livestock Production (www.wcgalp.com), the Animal Selection, Genetics and Genomics Network (ASGGN) will meet on Sunday, August 17th in the Westin Bayshore Hotel, starting at 9.30am. This meeting is a unique opportunity to meet scientists working in the area of reducing greenhouse gas emissions from ruminant livestock using animal selection, genetics and genomics techniques. The meeting will offer network opportunities and open discussions.

During this meeting in Vancouver, we will cover:

1. the main conclusion of the White Paper on “Breeding ruminants that emit less methane – development of consensus methods for measurement of methane”;
2. an update of the ICAR Greenhouse Gases Working Group;
3. presentations on improvements on methods to measure methane;
4. presentations on advancements in analytical methods;
5. a discussion on what’s next for the ASGGN group.

We hope to see many of you in Vancouver!

If you have already registered for WCGALP, but not yet for this ASGGN Satellite Meeting, you can easily modify your registration. To do this, you’ll have to go to the WCGALP-website, and go to ‘registration information’, click on ‘on-line register’ and choose ‘modify your registration. Then you need your confirmation number, and once you are logged in you can then indicate that you want to participate in this meeting. Costs for this meeting are \$75. Additional costs for this network meeting are, greatly appreciated, sponsored by the New Zealand Agriculture Greenhouse Gas Research Centre (NZAGRC).

If you would like to contribute to the programme with a presentation, or if you require more information, please contact Yvette.deHaas@wur.nl The best presentation at this ASGGN workshop will be given the opportunity to present in the open session on “Animal Breeding and Environmental Challenges” chaired by Hutton Oddy.



WCGALP—Animal Breeding and Environmental Challenges

The ASGGN was invited to help form 2 sessions at the WCGALP in Vancouver. The sessions are part of the major theme of “Selection for harsh environments and management of animal genetic resources” chaired by Paul Boettcher of FAO. Three invited speakers will cover several aspects of “animal breeding to address environmental challenges”.

The first speaker (Hutton Oddy) will cover ‘opportunities and obstacles of applying an animal genetic solution to enteric greenhouse gas (GHG) emissions’. He will show that ruminants have a unique ability to produce high quality protein from fibrous feeds, but in doing so they also contribute to global GHG emissions, principally as enteric methane (CH₄) emissions. Evidence will be provided that direct selection for reduced CH₄ emissions may be an option for long term reduction in enteric CH₄ production, and the means by which the necessary measurements may be made will be discussed. A potential 40-45% reduction in CH₄ emissions from livestock

due to combined selection for low residual feed intake (RFI) and low CH₄ yield may be possible over the long term. It is likely that if a CH₄-related trait were to be implemented by a livestock industry it will be via genomic breeding values, which demand large numbers of measured animals in the reference population. Given the size of the reference population required for CH₄ traits, it is imperative that wherever possible groups around the world collaborate on development of low cost, rapid and stable methodologies for measurement and collection of data on CH₄ related traits, hence the ASGGN.

The second speaker (Suzanne Rowe) will cover ‘methodologies involved in selection for reduced CH₄ emission’, and will describe the aspects of measurement, sampling and population structures required to investigate feasibility of establishing GEBVs for CH₄ related traits. Suzanne will describe first hand experience with use of GWAS to estimate breeding values for CH₄ traits in sheep, and generalise to issues that need to be addressed in wider implementation of GEBVs for hard to measure traits in conjunction with existing programs to establish GEBVs for other routinely measured traits.

The third speaker (Eileen Wall) will cover ‘Marginal Abatement Cost Curves’ for a trait with an unknown, but largely politically set, future price in constructing breeding indices, and discussion of the issues that will need to be addressed to provide producers with incentives to use such a trait .

WCGALP session:

**Hutton Oddy (DPI):
opportunities and obstacles
of applying an animal
genetic solution to enteric
CH₄ emissions.**

**Suzanne Rowe
(AgResearch):
methodologies involved in
selection for reduced
methane emission.**

**Eileen Wall (SRUC):
marginal abatement cost
curves.**

+ contributed papers

The invited speaker session will be followed by a contributed papers session. This will present 6 papers covering specific aspects of trait development and methodologies in different production systems (dairy and beef cattle and sheep) and will present data on some of the potential consequences of selection for CH₄ related traits on animal physiology and other production traits. There is an opportunity for the “best” paper presented at the ASGGN Satellite meeting on Sunday August 17 to be also presented in this session.

Please join us at this session at WCGALP. For more information, please contact Hutton.Oddy@dpi.nsw.gov.au



Consensus methods for breeding low methane emitting animals

At the ASGGN meeting in Cairns (July 2012), the Methane Phenotyping Working Group was formed to review current knowledge and to prepare a white paper outlining a common set of standards/principles to enable measurement and sharing of data. In December 2013 the White paper was released (www.asggn.org) and recently a review paper was submitted for peer reviewed publication.

The report showed that methane (CH₄) emissions are a heritable and repeatable trait in sheep and cattle. Are strongly related to feed intake both in the short term and over the medium term. CH₄ emissions of individual animals are moderately repeatable across diets and across feeding levels. Repeatability is lower when short term measurements are used. Repeated measurements add value, the measures should be separated by at least 3-14 days. Short term (over minutes to hours) measurements of CH₄ show promise for genetic evaluation if ~3-20 measurements over an extended period of time (weeks to months) are taken. The measurement “protocol” (i.e. how the animal and its feeding behaviour are managed prior to measurement) is likely to be more important than the technology used to make the CH₄ measurement.

While there is evidence that correlated and predictor traits exist for CH₄ emissions, the current level of knowledge is insufficient to recommend the use of predictor traits in genetic selection to reduce CH₄ yield or CH₄ production. This needs to be addressed. Genomic selection offers potential to reduce CH₄ emission, however, CH₄ measurements on thousands of individuals are required to develop training sets with sufficient predictive accuracy. The “size of the prize” when combining lower CH₄ yield with selection for low residual feed intake may result in a reduction in CH₄ emissions of 40-45%. In summary, we feel genetic and genomic selection for CH₄ emission reduction offers a significant opportunity, but attention needs to be directed to a number of issues associated with brief, low cost measurements before it is to be implemented in industry.

We would like to acknowledge the following for their input into this document, Natalie Pickering, NZ; Yvette de Haas, Netherlands; John Basarab, Canada; Kristi Cammack, USA; Ben Hayes, Aus; Jan Lassen, Denmark; John McEwan, NZ; Steve Miller, Canada; Cesar Pinares-Patiño, NZ; Grant Shackell, NZ; and Hutton Oddy, Aus. For more information, please contact, Natalie Pickering at Natalie.pickering@agresearch.co.nz

Animal Health and GHG Emissions Intensity Network

The Animal Health and GHG Emissions Intensity Network aims to explore links and synergies between efforts to reduce livestock disease and reducing greenhouse gas (GHG) emissions intensity. The Network held its first workshop in the margins of the Society for Veterinary Epidemiology and Preventative Medicine in Dublin, Ireland, on the 25th March 2014. This international workshop brought together scientists in animal health, veterinary science, GHG research and other relevant fields. The meeting was organized to get to know one another, and to set the Network objectives and define tangible outputs and priority activities for the Network to achieve. Representatives (over 20) from Europe, South America, Africa and Asia initially heard presentations on Animal Health & GHG research in African populations, highlights from the FAO GLEAM model and its application to animal health and results from a UK study on endemic cattle disease and GHG abatement potential.

The group will be “led” by UK (DEFRA) and ILRI and coordination will be funded by the UK govt. A panel led discussion agreed that animal health improvements do have a significant impact of reducing GHG’s emission intensities. Key issues the group in its initial activities identified include (i) the links between productivity, disease and GHG emissions (ii) barriers to the adoption and uptake of animal health measures and (iii) data needs and data availability. Group was particularly interested to learn about the experiences from the ASGGN network in undertaking their initial objectives and there are obvious linkages in some of the activity, particularly in base lining data. A follow-up meeting is planned for Madrid in May 2014.



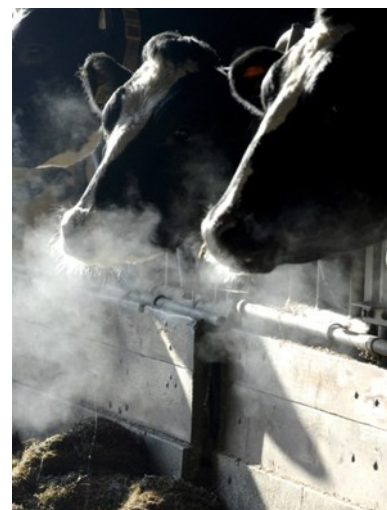
ICAR working group update

Genetic selection for reduced methane emissions from livestock: formal trait specifications

Identification of low CH₄ emitting phenotypes: Optimising genetic, genomic, and phenotypic measurement parameters in cattle and sheep through international collaboration.

In the last newsletter we described the new ICAR working group that has been set up to aid global collaboration and collation of data that measure greenhouse gas emissions from livestock. We are working towards associate membership of ICAR. Yvette de Haas has submitted an application on behalf of the ASGGN with Yvette as the ASGGN legal representative for ICAR purposes. Over the last few months we have held discussions to determine how to represent the network and the wider international community. Our initial and most important task will be the definition of traits, including how to measure them and how they should be recorded. This will be pivotal for storing global data in a database. Careful consideration is needed around information that should be recorded with a trait measure, i.e. the minimum definition required to ensure that the phenotypic measure is repeatable amongst scientific groups, and crucially in an industry setting. To address this, a technical document detailing the specifications for an international database of measurements of CH₄ emission and associated traits (e.g. feed intake) from ruminant livestock has been produced as part of work funded by the Global Research Alliance for reducing greenhouse gases from agriculture. It is anticipated that this document will form the basis of a formal report to the ICAR steering group for the incorporation of CH₄ related traits into ICAR compatible databases.

Whilst data collated in a specified format will offer greater opportunities for research collaborations and increased power for scientific analysis, the focus of these trait specifications is for the compilation of the resources required for commercial breeding values and industry adoption. The main purpose of the document was to provide a format for the recording of phenotypic information and the appropriate meta-data required for genetic selection. Specifications are provided for traits that are close to potential implementation by groups associated with industry genetic improvement. It is intended that in future, as further proxies for CH₄ are developed and validated, that the working group and other international parties will add further trait definitions. We anticipate that the document will be available for discussion at the forthcoming ASGGN meeting to be held in Vancouver.



Current members of the working group are Yvette de Haas, Nicolas Gengler, Jan Lassen, Brian Wickham, Eileen Wall, Frédéric deHareng, Natalie Pickering, John McEwan, & Suzanne Rowe. Please get in touch if you would like more information or to be involved contact Suzanne: suzanne.rowe@agresearch.co.nz

About ASGGN

The Network website is at www.asggn.org

Make a note to check it frequently. For example, current news about upcoming conferences is posted as soon as we get notification. While the site is updated regularly, it also needs your input in order to remain current.

Contributions, suggestions (and corrections) can be placed on the website by forwarding them to the administrator Natalie Pickering at asggn@agresearch.co.nz

This is your website. Please make use of it. The only way for the website to be successful is for the members use it - and to ensure that anything of interest is placed on it.

The first thing you should do is sign up as a member. This will give you access to the Members only pages where you will find the a members directory, minutes of meetings, Network documents and a Forum option.

Global Research Alliance meeting in Poland

Engaging Workshop GRA Meeting in Warsaw Poland 8th-9th of April 2014.

At the engaging workshop on the Global research alliance in Warsaw, Poland ASGGN was represented by Jan Lassen Denmark, who gave a talk about the network as well as representatives from the 5 other network under LRG. The aim of the meeting was to identify common interest and scientific gaps between GRA and a number of Central and Eastern European countries. A total of 5 countries presented their current activities and future plans within research of climate change. All countries showed interest in making measurements of methane emission from ruminants, but there were limited current activities other than in Poland. All countries showed intentions to be members of GRA, and also to actively participate in the established networks under LRG including ASGGN.

One specific activity mentioned at the meeting that has currently not been covered deeply by the ASGGN was animal adaptation to climate change. How do we ensure that we have animals that can cope with some of the consequences of climate change such as draught, heat and humidity? This scientific area will indeed have focus in ASGGN in the future. Also farmer involvement in methane measurements were discussed – which tools should one use to get commercial farmers to open up their farm to make measurements. Another point that was discussed was the economic value of methane emission for the farmer and incentives for the farmer to select for lower methane emission.

New members are entering the GRA family and ASGGN gives them a warm welcome!



New Projects - Poland

The release of greenhouse gases (GHG) is an international concern due to the global warming. The global livestock sector, particularly ruminants, contributes 18% of the total anthropogenic GHG emissions. A potential option to reduce the emission level is genetic selection. However, reducing emissions by genetic selection requires a large dataset of individual measurements.

To obtain such a dataset, the Department of Genetics and Animal Breeding of Poznan University of Life Sciences has started a three-year-project financed by the National Science Centre of Poland. The Polish project aims to collect individual recordings of methane emission from dairy cows' breath samples collected on commercial farms. This will enable the investigation of genetic and non-genetic factors influencing methane emission during the lactation.

To collect the methane measurements, an infrared gas analyzer will be installed in milking robots to measure methane from the cows' breath emitted during the milking process. Approximately, 600 cows will be measured within the project, some of them for the full lactation period. Methane emission level is possibly related to other important traits. Therefore, next to the methane emission data on production and functional traits will be collected to establish genetic and non-genetic relationships between them. To enhance the power of the analysis, part of the measured cows will be genotyped.

The results of the Polish project will contribute to the knowledge on the genetic and non-genetic factors influencing the methane emission and on its relationship to other traits which will help to design future mitigation and adaptation strategies.

For more information contact: Tomasz Strabel (strabel@man.poznan.pl) or Marcin Pszczola (mbee@jay.up.poznan.pl).

New Projects - Brazil

Research Network PECUS (GHG Dynamics in Brazilian Livestock Production Systems)



Brazil is one of the largest producers of livestock worldwide. It has a large and stable domestic market and is a major world exporter of animal products. In order to enhance Brazil's participation in understanding and reduce global livestock Greenhouse Gases (GHG) emissions: the Research Network PECUS was created (Greenhouse Gases Dynamics in Brazilian Livestock Production Systems). Headed by the Brazilian Agricultural Research Corporation - Embrapa, with inter-institutional and multidisciplinary teams, this research network studies the dynamics of GHG in production systems present in different Brazilian biomes in order to estimate the magnitude of GHG emissions, identify mitigation alternatives and support public policies in relation to GHG emissions related to livestock production in the country.



One of the PECUS component projects is RumenGases. This project is headed by Embrapa Dairy Cattle and it focuses on enteric methane emissions from ruminants. The RumenGases created the Reference Center on Methodologies for Measurement of Enteric Methane located at Coronel Pacheco in Minas Gerais. This project is investigating enteric methane emissions in cattle (beef and dairy), goats, sheep and buffalo around the country. Specifically, they are generating GHG data for ruminants held and fed under tropical conditions using commonly available tropical feedstuffs. Previously, information for methane emissions under these conditions has been very sparse.



Research being undertaken includes expanding the national inventory database for enteric ruminant methane emissions using both the sulfur hexafluoride (SF_6) tracer and the open-circuit respiration chamber techniques following accepted international standards and protocols. Screening studies have also commenced to evaluate enteric methane mitigation agents using *in vitro* gas production techniques.



There is also research underway addressing animal production strategies to mitigate enteric methane. This work includes: pasture management and feeding strategies, integration of various production systems, identification and selection of genotypes of efficient animals. As with the inventory research all employ SF_6 and open-circuit respiration chamber techniques. New measurement technologies are also being investigated, initially concentrating on short term measurements and use of thermography to estimate enteric methane emission.

For more information please contact:

Marcos Silva (marcos.vb.silva@embrapa.br); Luiz Gustavo (luiz.gustavo@embrapa.br) or Thierry Tomich (thierry.tomich@embrapa.br)

New projects - Canada

Methane emissions from beef cattle bred for low residual feed intake (RFI)

Alberta is among the largest beef producing region in North America, containing 42% of the beef cows and 70% of the beef feeding capacity in Canada. Alberta is also the only jurisdiction in North America that has an active carbon trading registry ([Alberta based offset credit system](#)).

Three beef cattle GHG reducing protocols have been registered, namely; 1) reducing days on feed, 2) reducing age at harvest, and 3) selection for low residual feed intake. It has been estimated that reducing age at harvest in Alberta's 2.4 million feeder cattle by one month would reduce GHG emissions by 681,000 t CO₂e annually. Similarly, after 25 years of selection for low RFI, the HOLOS whole farm model estimated that GHG emissions were 0.844 t CO₂e/cow/year lower compared with the average herd, or 1.64 Mt CO₂e/year lower for Alberta's 1.945 million beef cows and bred heifers.

However, these model estimates are not based on rigorous emission measurements in real-world conditions.

It has been estimated that reducing age at harvest in Alberta's 2.4 million feeder cattle by one month would reduce GHG emissions by 681,000 t CO₂e annually



Measuring CH₄ using Boreal laser at the Lacombe Research Centre. Picture courtesy of Dr. Vern Baron, Agriculture and Agri-Food Canada



Measuring CH₄ using Open path Fourier Transform Infrared Spectrophotometers (OP-FTIR), Lacombe Research Centre, Alberta, Canada. Picture courtesy of Dr. Thomas Flesch, University of Alberta

The accurate measurement of methane emissions from cattle can be labour intensive and expensive, and are difficult to interpret when animals are subjected to atypical management conditions during measurement. Such “unnatural” situations alter the behaviour of the animals and change their methane emissions. To further complicate the problem, cattle methane emissions are not uniform over time and vary within and between days and seasons.

In the proposed Canadian study, methane emissions from low and high RFI beef cows and heifers under winter confinement and summer grazing conditions will be measured using various techniques (respiratory chambers, Greenfeed System, Open path Fourier Transform Infrared Spectrophotometers, and GrowSafe Beef using biometrics).

The study will be guided by the White Paper on “Consensus methods for breeding low methane emitting animals” prepared by the international working group of the Animal Selection, Genetics and Genomics Network, and will provide samples to Livestock Gentec for genotyping, imputation to higher density genotypes and SNP association analysis. Data from this project would also be available for international collaboration.

Further information, contact Dr. John Basarab at john.basarab@gov.ab.ca, Alberta Agriculture and Rural Development & Livestock Gentec.

Upcoming Conferences

ICAR/ Interbull, May 18-23 2014, Berlin, Germany

In May 2014 the annual ICAR Conference will be held in Berlin. Interbull as permanent subcommittee of ICAR has integrated its annual meeting into this conference (www.icar2014.de/). A session on Functional Traits will be held on Thursday morning, 22nd May.

Joint RuminOmics/Rumen Microbial Genomics Network / ECO-FCE Workshop, June 16th 2014, Aberdeen, UK

The EU Framework 7 project RuminOmics is organising a satellite workshop, together with the Rumen Microbial Genomics Network and the analogous FP7 project on non-ruminant species, ECO-FCE, on the day preceding the main Rowett-INRA2014, Gut Microbiology: from Sequence to Function conference (www.ruminomics.eu/index.php/joint-ruminomics-workshop/)

RuminOmics Summer School, July 8-10 2014, Piacenza, Italy

Applications are now being accepted to attend a summer school to learn of the relationship between the animal genome and the intestinal microbiome and their impact on livestock production and the environment. Places on the course are limited to 25 students and there are funds available to support early career scientists from Central and Eastern Europe and the Mediterranean (www.ruminomics.eu/index.php/2014-summer-school/)

International Society for Animal Genetics, July 2014, Xi'an, China

The 34th conference of the International Society of Animal Genetics (ISAG) will be held in July 2014 in Xi'an, China (www.isag2014.com). ISAG is devoted to the study of the immunogenetics, molecular genetics and functional genomics of economically important domesticated animals. It is a scientific society that promotes scientific research and facilitates communication and dissemination of knowledge among scientists worldwide.

World Congress on Genetics Applied to Livestock Production, August 17-22 2014, Vancouver, Canada

The joint US-Canada organizing committee is proud to welcome you to the 10th WCGALP. This congress is the premier conference for researchers and professionals involved in genetic improvement of livestock. Check out the Animal breeding and the Environmental Challenges session, under the Genetic Improvement Programs: Selection for harsh environments and management of animal genetic resources topics.

EAAP, August 25-29 2014, Copenhagen, Denmark

The Danish organizing committee is pleased to welcome you to the 65th annual meeting of the EAAP (www.eaap2014.org). A main theme of the meeting will be "Quality in Animal Production" dealing with product quality as well as resource efficiency, sustainability, animal welfare and agro-ecology. There will be a session on non-standard traits in genomic selection and a session on resource use efficiency and improvement options from farm to global level.

Rumen Microbial Genomics



Contact: Adrian Cookson
rmg.network@agresearch.co.nz



Contact: Gemma Henderson
global.rumen.census@agresearch.co.nz



Contact: Bill Kelly
hungate1000@agresearch.co.nz

The Rumen Microbial Genomics Network is a global collaborative network of researchers with a common set of principles and guidelines in rumen microbial genomics to underpin the development of worldwide CH₄ mitigation and rumen adaptation technologies.

The Global Rumen Census project recognises that microbes play an important role in the nutrition and health status of ruminants, as well as in the production of the greenhouse gas methane. This project aims to survey the diversity of microbes present in rumen samples obtained from a range of locations and farming situations covering a range of ruminant species, breeds, feeds and locations.

The Hungate 1000 project aims to produce a reference set of sequenced genomes of available cultivated rumen bacteria and methanogenic archaea, together with representative cultures of rumen

Call for Short-Term Scientific Missions (STSM)

COST Action FA1302 - “Methagene – Large-scale methane measurements on individual ruminants for genetic evaluations”

We are looking to fund up to 3 short term scientific missions (STSM) to develop linkages and scientific collaborations between participating institutions involved in the [Methagene COST Action](#). STSM should contribute to the scientific objectives of the COST Action i.e. discuss and develop 1) protocols to harmonize large-scale methane measurements using different techniques; 2) easy to record and inexpensive proxies for methane emissions to be used for genetic evaluations; and 3) approaches for incorporating methane emissions into national breeding strategies. Applications of young researchers are especially encouraged.

Duration; From 5 working days to 3 months. The final duration of the STSM will depend on the budget allocated to the Applicant based on their request. Financial Support will be a maximum of 2500 Euro. This amount includes up to 500 Euro for the travel expenses and up to 80-100 Euro per day for subsistence costs.

Application procedure: The Applicant should:

1. obtain the agreement of the host institution, before submitting his/her application;
2. use the on-line registration tool to register his/her request for an STSM (see <https://e-services.cost.eu/stsm>);
3. after registration, download the formal STSM application and complete it with supporting documentation (CV, list of publications, motivation letter (half A4 page), letter of support from the home institute);
4. send the application by e-mail as attachment to the future Host institution of the STSM and to the Action STSM Coordinator : Dr Marcin Pszczola mbee@jay.up.poznan.pl

Methane physiology and modelling for geneticists

Training school of METHAGENE

From September 29 until October 2, 2014, the METHAGENE COST-Action will organize a training school at the Leibniz Institute for Farm Animal Biology (FBN) in Dummerstorf, Germany. The topics that will be addressed in the course are:

1. Global climate change and involvement of ruminants
2. Rumen microbiology, hydrogen, methanogens, metagenomics
3. Modelling methane production from ruminants
4. Nutrition and physiology affecting methane production
5. Technical aspects of methane measurement (GreenFeed, C-LOCK Inc. & Respiration Chambers)

Registration is open, closes July 1st, 2014. A maximum number of 20 attendees can be accommodated. Early stage researchers (within 8 years of their PhD) are particularly encouraged to apply and those selected will receive a grant towards their travel and accommodation. Applicants are requested to bring their laptop.

More information can be found at: [METHAGENE](#)



METHAGENE



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 or email the New Zealand Agricultural Greenhouse Gas Research Centre:

enquiry@nzagrc.org.nz

Contact ASGGN

Convener	Yvette de Haas	yvette.dehaas@wur.nl
Webmanager	Natalie Pickering	natalie.pickering@agresearch.co.nz
Website		www.asggn.org